

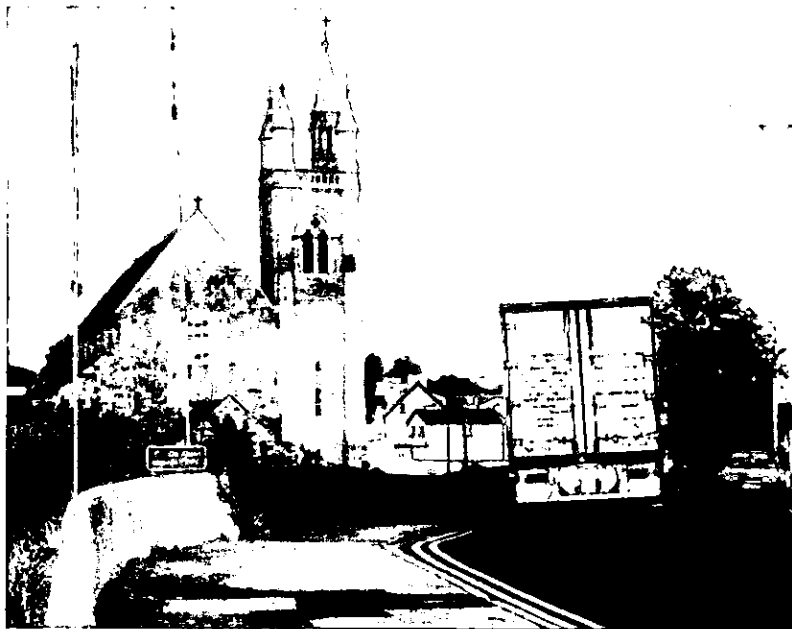


Comhairle Chontae Dhún na nGall  
DONEGAL COUNTY COUNCIL

# N13/N15 Ballybofey/Stranorlar Bypass

## Environmental Impact Statement

### Volume 1: Main Text



November 2007



**McCARTHY HYDER**  
CONSULTANTS  
CONSULTING ENGINEERS



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## 1.0 Introduction

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### 1.1 Background to and Development of the Proposed Road

Donegal County Council (DCC) is developing a scheme to provide a bypass for the N15 and N13 National Primary Roads around the Twin Towns of Ballybofey and Stranorlar.

Ballybofey and Stranorlar are situated in County Donegal on the banks of the River Finn, north east of Barnesmore Gap (Figure 1.1). The N15 National Primary Route from Sligo via Donegal Town to Lifford passes through the Twin Towns and intersects with the southern end of the N13 National Primary Route to Letterkenny / Derry at a T-junction in Stranorlar.

It is envisaged that the next phase in the scheme development will be carried out under a design and build contract. As a result the final design for the scheme will be completed at the detailed design stage, prior to construction, by the successful design and build Contractor and may therefore vary from the proposals set out in this Environmental Impact Statement (EIS). The design presented in this EIS and shown in Figure 1.2 has therefore been called the Preliminary Design to reflect this. The assessment of impacts and the proposed mitigation measures presented in this EIS are based on the Preliminary Design.

During the detail design stage, the design and the environmental mitigation measures will be refined and developed to ensure efficiency and effectiveness. As outlined previously, this may result in some changes to the design as published in the EIS. Generally, the detailed design refinements will seek to develop the Preliminary Design so that it has no material change on the environmental impacts of the scheme. Indeed, opportunities may be identified that reduce the impacts of the scheme. Stringent contract requirements and close supervision will ensure that the final design will be of the required quality and that the necessary mitigation measures to minimise the impacts of the scheme will be fully implemented.

### 1.2 The Need for the Proposed Road

Traffic growth is resulting in increasing congestion in the Twin Towns. Delay is caused to through traffic and local traffic movements to and from many properties, businesses and side roads along the N13 and N15. Road safety and the environment are currently affected and further traffic growth will cause the situation to deteriorate further.

The need for a bypass for Ballybofey / Stranorlar has been identified in County Development Plans for many years, including the County Donegal Development Plan 2000 and the current County Donegal Development Plan 2006 – 2012.

The National Development Plan (NDP) 2007 – 2013 states that there will be major improvements on national roads. Chapter 7 Economic Infrastructure Priority, Roads Sub-Programme identifies that there will be ongoing development of the Atlantic Road Corridor (as identified in Transport 21 – see below) from Letterkenny through Sligo, Galway, Limerick, Cork and Waterford. Investment will be particularly focussed on major upgrades to the Atlantic Road Corridor, of which the N13/N15 Ballybofey Bypass forms a part.

Transport 21, announced in November 2005, sets out a 10-year transport capital investment framework, including investment for national roads, from 2006 to 2015. The

major economic, social and demographic changes in Ireland over the past decade, the impact of these changes on transport demand, the strategic policies developed for areas relating to and impacting on transport, the National Spatial Strategy for Ireland 2002 – 2020: People, Places and Potential, and the need to provide a modern transport network for the future have been considered in the development of the framework. Enhancing connectivity at national, regional and local levels is a core aspect of Transport 21. The availability of an efficient, predictable and sustainable national transport network is recognised as a key factor underpinning economic growth and competitiveness and in improving quality of life. The transport investments set out in the NDP are derived from, and form part of, the overall investment framework under Transport 21.

The Border, Midlands and Western NUTS II Region, Development Strategy 2000 – 2006 identified that the National Primary Route Network, of which the Preliminary Design is part, will be one principal means to reduce peripherality, enhance the competitive position of the region and promote inward investment.

### 1.3 Objectives of the Proposed Road

The objectives of the proposed road are to:

- Provide a high quality road for strategic routes;
- Reduce traffic congestion along the National Roads through the Twin Towns;
- Maintain existing roads for local traffic;
- Improve safety along the existing roads and at junctions / accesses;
- Optimise journey times for long distance and local traffic;
- Encourage development of the Twin Towns', County and national economies;
- Minimise environmental and social impacts on the local residents and communities along the existing N13/N15; and
- Reduce the negative effects of peripheral location in Europe.

The following detail relevant primary road transport objectives as contained within the National Development Plan (2000 – 2006):

- To improve the reliability of the road transport system by removing bottlenecks, remedying capacity deficiencies and reducing absolute journey times and journey time variance;
- To improve internal road transport infrastructure between regions and within regions, contribute to the competitiveness of the productive sector and foster balanced regional development;
- To facilitate better access to and from the main ports and airports with the main objective of offsetting the negative effects of peripherality;
- To contribute to sustainable transport policies, facilitating continued economic growth and regional development while ensuring a high level of environmental protection; and
- To help achieve the objective of the Government's Road Safety Strategy in relation to the reduction in fatalities and serious injuries caused by road accidents.

## 1.4 The Requirement for an Environmental Impact Statement

Environmental Impact Assessment (EIA) has been described *"as the process of examining the environmental effects of the development – from consideration of the environmental aspects at design stage, through to the preparation of an Environmental Impact Statement, evaluation of the EIS by a competent authority and the subsequent decision as to whether the development should be permitted to proceed, also encompassing public response to that decision"* (NRA, 2006).

An Environmental Impact Statement (EIS) is *"a statement of the effects, if any, which the proposed development, if carried out, would have on the environment"* (Environmental Protection Agency, 2002). Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive 85/337/EC (as amended by Directive 97/11/EC) and Directive 2003/4/EC.

The requirements for EIA are set out in the Roads Act 1993-2007, and the Roads Regulations 1994-2000. In particular, sections 50 and 51 of the Act, as amended, deal with EIA.

Section 50 Roads Act 1993, as amended, provides the following-

A Road Authority is obliged to prepare an EIS in respect of the types of proposed road development specified therein including "any prescribed type of proposed road development consisting of the construction of a proposed public road..." The Roads Regulations 1994 (SI No. 119 of 1994) in Article 8 thereof prescribe the said types of proposed road development which include:

*"Construction of a new road of four or more lanes, or the realignment or widening of an existing road so as to provide four or more lanes, where such new, realigned or widened road would be eight kilometres or more in length in a rural area, or 500 metres or more in length in an urban area" and the "construction of a new bridge or tunnel which would be 100 metres or more in length"*

The Preliminary Design comprises a 4 lane road designed to National Roads Authority Type 2 Dual Carriageway standards of over eight kilometres in length in a rural area, and will require the construction of a bridge of approximately 170m in length over the River Finn. The Road Authority has therefore prepared an EIS for the Preliminary Design.

## 1.5 Information to be contained within the Environmental Impact Statement

The following sections refer to the provisions of Section 50 Roads Act 1993, as amended, and other guidance documents in relation to information to be contained within the EIS for the Preliminary Design.

### 1.5.1 Section 50 Roads Act 1993

**SUBSECTIONS (2) and (3)** set out the information to be contained in the EIS as follows –

**SUBSECTION (2) (which sets out the specified information to be contained in the EIS)**



**Paragraph (a)** – A description of the proposed road development comprising information on the site, design and size of the proposed road development.

**Paragraph (b)** – A description of the measures envisaged in order to avoid, reduce and if possible remedy significant adverse effects.

**Paragraph (c)** – The data required to identify and assess the main effects, which the proposed road development is likely to have on the environment.

**Paragraph (d)** – An outline of the main alternatives studied by the Road Authority concerned and an indication of the main reasons for its choice, taking into account the environmental effects.

**Paragraph (e)** – A summary in non-technical language of the above information.

**SUBSECTION (3) (which sets out information requirements for an EIS that are “in addition to and by way of explanation or amplification of the specified information referred to in subsection (2)”).**

**Paragraph (a)** –

- (i) A description of the physical characteristics of the whole proposed road development and the land use requirements during the construction and operational phases.
- (ii) An estimate, by type and quantity, of expected residues and emissions (including water, air and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed road development.

**Paragraph (b)** - A description of the aspects of the environment likely to be significantly affected by the proposed road development, including in particular –

- Human beings, fauna and flora;
- Soil, water, air, climatic factors and the landscape;
- Material assets, including the architectural and archaeological heritage, and the cultural heritage;
- The inter-relationship between the above factors.

**Paragraph (c)** – A description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed road development on the environment resulting from:

- The existence of the proposed road development;
- The use of natural resources;
- The emission of pollutants, the creation of nuisances and the elimination of waste,

And a description of the forecasting methods used to assess the effects on the environment.

**Paragraph (d)** – An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the Road Authority in compiling the required information.

**Paragraph (e)** – A summary in non-technical language of the above information.

The Road Authority is obliged to have incorporated in the EIS the above additional information under subsection (3) to the extent that such information is relevant to a given stage of the consent procedure and to the specific characteristics of the proposed road development or type of proposed road development concerned and the environmental features likely to be affected and further the Road Authority preparing the EIS may reasonably be required to compile such information having regard, inter alia, to current knowledge and methods of assessment.

### 1.5.2 EPA Guidelines

Regard was had to the Environmental Protection Agency (EPA) Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, 2003) and the Guidelines on the Information to be Contained in an Environmental Impact Statements (EPA, 2002) in the preparation of this EIS.

### 1.5.3 NRA Guidelines

#### **NRA National Roads Project Management Guidelines, Version 1.1 (March 2000) (NRPMG)**

The NRPMG provide guidance on the framework within which environmental considerations are effectively integrated into national road scheme planning. They place an emphasis on the identification and avoidance of environmental impacts in the early stages of planning and design. This process occurs prior to taking the project through the statutory procedures, including, where appropriate, the preparation of the EIS. The NRPMG also provides for public consultation at a far earlier stage than required by statutory procedures. The four key stages identified in the NRPMG comprise phase 1 which involves the overall planning of the scheme, phases 2 and 3 which are the Constraints and Route Corridor Selection Studies and phase 4 which is the preliminary design of the preferred route and the preparation of the EIS, where required, and Compulsory Purchase Order (CPO) for the Preliminary Design.

#### **NRA Assessment and Construction Guidelines (2005)**

The NRA has issued a series of documents providing environmental planning guidance and environmental construction guidance for road schemes. The Environmental Impact Assessment of National Road Schemes – A Practical Guide (2005) is discussed in more detail below as it guides the preparation of road EISs. The document is not intended to provide advice on specialist studies. A number of publications exist providing such specialist advice and where relevant, these have been used (and referred to) in the assessment Chapters of this EIS.

#### *Environmental Impact Assessment of National Road Schemes – A Practical Guide (2005)*

The NRA Environmental Impact Assessment of National Road Schemes – A Practical Guide (2005) (known as the NRA Guidelines) is intended to be read in conjunction with the EPA Guidelines. The objective of the NRA Guidelines is to ensure that the EIA process for road schemes continues to follow statutory procedures while at the same time achieving quality and consistency in the assessment and mitigation of environmental impacts.

The NRA Guidelines comprehensively address a range of issues including:

- Screening of road projects so as to determine whether or not an EIA is required,
- Information requirements for a road scheme EIS and the scoping process,

- Preparing an actual road scheme EIS in terms of how information is presented on the core issues of project description, the existing environment, environmental impacts and environmental mitigation measures,
- Notification and dissemination of the EIS, and
- Common issues encountered in road scheme EISs derived from experiences gained through consultation and from practical difficulties encountered in undertaking the EIA process for major national road schemes.

The NRA Guidelines describe the regulatory requirements for each stage of the EIA process and for each part of the EIS and identify common issues in a road scheme EIS.

## 1.6 Scope of the Assessment for the Preliminary Design

An informal Scoping Study was undertaken for the preferred route (McCarthy Hyder Consultants, 2001). The Scoping Study documented the key environmental issues to be addressed in the EIS and outlined the methodologies proposed.

Since 2001, the list of topics and issues devised for the Preliminary Design to meet the requirements of the Roads Act 1993 as amended, having regard to the EPA guidance documents, the NRA Guidelines (Appendix 6 of the *Environmental Impact Assessment of National Road Schemes – A Practical Guide* (National Roads Authority, 2005)), ongoing consultation (see 1.6), and the particular circumstances of the scheme. These appear in the EIS under the following subject titles:

- Planning
- Socio-economics
- Agricultural Land
- Landscape and Aesthetics
- Surface Water Quality and Drainage
- Ecology (Flora, Fauna and Fisheries)
- Architectural, Archaeological and Cultural Heritage
- Air Quality
- Noise and Vibration
- Geology and Hydrogeology
- Inter-relationships and Schedule of Environmental Commitments

In addition to the topics listed above, the Roads Act 1993 as amended requires a description of the aspects of the environment likely to be significantly affected by the proposed road development, including human beings and material assets. The following sections outline how these topics have been considered.

### **Human Beings**

The human environment can be described as the existence, activities and well being of people, usually considering people as groups or populations. It therefore includes issues in relation to economic activity, social considerations (e.g. development patterns and types of activity), land use (including severance and amenities) and health and safety (e.g. human health and nuisance).

This EIS assesses the impact of the Preliminary Design on human beings within the Chapters on Agricultural Land, Visual Impact and Aesthetics, Noise and Vibration, Air Quality and Surface Water Quality and Drainage. Impacts on the local community (residential property, community severance and local businesses) are considered in the

Socio-Economics Chapter. Impacts on recreation and amenity are considered in the Chapter on Land Use and Amenities. Issues relating to health and safety are considered in the sections on traffic flows and accidents within Chapter 2.0 (Background to the Project), and in Chapter 14.0 (Geology and Hydrogeology). In addition, health can be affected by the physical environment (e.g. air and noise). The relevant Chapters (Noise and Vibration and Air Quality) therefore refer to the relevant guidelines and standards.

### **Material Assets**

Material assets can be described as resources that are valued and that are intrinsic to specific places (human or natural origin) and the value of such resources may arise for economic or cultural reasons. This EIS considers impacts on material assets under the separate topic Chapters as appropriate.

Material assets include natural resources (e.g. air, water, geology and soils), economic resources (e.g. towns, settlements, roads, utilities, land ownership, transport infrastructure) and cultural resources (e.g. archaeology, architecture, settlements, monuments, features and historic sites, folklore and tradition).

Impacts on natural resources are considered within Chapters on Surface Water Quality and Drainage, Geology and Hydrogeology and Ecology (flora, fauna and fisheries).

Impacts on economic resources are considered within a number of Chapters. Issues in relation to land ownership are considered within the Chapter on Agricultural Land. Impacts on the local population with reference to community severance are considered within the Chapter on Socio-Economics. Recreational amenities are considered within the Chapter on Land Use and Amenities. Impacts on utilities are presented in Appendix 3.1 - Affected Services. Impacts on local transport are described in Chapter 3.0 Description of the Preliminary Design.

Impacts on cultural resources are considered under the Chapter on Architectural, Archaeological and Cultural Heritage.

## **1.7 Methodology**

The objectives of the EIA can be summarised as follows:

- to establish the existing environmental conditions of the site and surrounding area, which may be potentially affected by the proposed development;
- to identify the potential effects, both positive and negative, that may arise from the construction and operation of the proposed development, taking account of the size and location, the sensitivity of the local environment, the concerns of interested parties and the requirements of statutory consultees;
- to predict and evaluate the extent and significance of the potential effects;
- to identify and evaluate measures that can be employed to mitigate adverse effects.

The EIS has addressed the direct, indirect, secondary, cumulative, short, medium and long-term, permanent, temporary, positive and negative effects as well as the interactions. The effects have been examined for the construction and operation stages of the project to define the full effects of the proposed development. These impacts are considered in the relevant Chapters.

To evaluate identified effects, those contributing to the EIS were asked to use the same terminology and approach to the identification of significant effects where possible. The assessment of significance is based on the characteristics of the impact and the sensitivity of the receptor. For those topics where the adoption of the preferred approach was not possible, the method by which significant effects have been identified is clearly set out near to the start of relevant Chapters.

The standard terminology and approach to the identification of significant effects used within the project are based on the EPA Glossary of Impacts (EPA, 2003) and NRA Guidelines as outlined below:

- Profound impact (An impact which obliterates sensitive characteristics)
- Significant impact (an impact which, by its character, magnitude, duration or intensity alters a significant aspect of the environment)
- Moderate impact (an impact that alters the character of the environment that is consistent with existing and emerging trends)
- Slight impact (an impact which causes noticeable changes in the character of the environment without affecting its sensitivities)
- Imperceptible impact (an impact capable of measurement but without noticeable consequences)

These categories are based on four objective criteria:

1. Magnitude and Intensity – the extent of the area affected by the development or the number of receptors, or the intensity of the impacts in relation to those normally experienced;
2. Duration – the period of time an impact will occur or an effect which causes a permanent change to any aspect of the environment;
3. Sensitivity – the sensitivity of the receiving environment;
4. Probability – the likelihood of an impact occurring.

Where appropriate, mitigation measures have been proposed to reduce any significant adverse impacts. The EIS presents the residual impacts of the Preliminary Design after the proposed mitigation measures, as identified in each Chapter, have taken effect as planned.

The inter-relationships between specialist topics have been considered within each of the chapters presented in this report. Inter-relationships are also discussed further in Chapter 15.0'

## 1.8 Non-Statutory Consultations

Statutory and non-statutory bodies, as well as local interest groups, have been consulted as part of the EIA process. A comprehensive list of those contacted is presented in Appendix 1.1. Public Consultations at the Constraints and Route Selection Stages were also held and these are discussed further in Chapter 2.0.

## 1.9 Structure of the Environmental Impact Statement

This EIS presents the findings of the EIA that has been undertaken on the potential impacts associated with the Preliminary Design during construction and operation. In order to do this effectively, the EIS has been prepared in discrete chapters in order to present the full picture for each individual subject area, which is likely to be affected by the proposed road. The environmental subject areas have been determined through

consultations and from the statutory criteria as defined above. A Non Technical Summary (NTS) has also been produced to summarise the main details of the project in non-technical terms and is available as a separate A4 report. The report is structured as follows:

**Table 1.1 Structure of the Environmental Impact Statement**

Chapter 1.0	<b>Introduction.</b> This section introduces the project and sets out the need for the Proposed Road and key objectives. The requirements for an EIA are set out and scope and structure of the EIS defined. The general methodology for the EIS is also described.
Chapter 2.0	<b>Background to the Project.</b> Describes the background information to the Proposed Road including a description of the existing road network and traffic conditions. A summary of the route selection process (including an outline of the main alternatives considered) and public consultations is also included.
Chapter 3.0	<b>Description of the Preliminary Design.</b> Describes the Preliminary Design. In addition, a construction programme and methodology have been outlined
Chapters 4.0 – 14.0	<b>Assessment Chapters.</b> The assessment chapters consider the environmental effects of the Proposed Road for each subject area and evaluate the potential effects that may occur as a result of the scheme. Within each environmental subject area, a methodology for the assessment is presented. A description of the baseline environmental conditions is then provided followed by an assessment of the effects of construction and operation. Mitigation measures are also discussed where appropriate.
Chapter 15.0	<b>Inter-relationships and Schedule of Commitments.</b> A summary of the key inter-relationships and a schedule detailing mitigation commitments.
Appendices	Information in support of that contained in this EIS is contained in a separate Volume.
Figures	The figures referred to in this EIS are contained in a separate Volume.

## 1.10 List of Consultants

This EIS has been prepared by McCarthy Hyder Consultants in conjunction with the following external consultants:

Flora, Fauna and Fisheries	Natura Environmental Consultants Broomhall Business Park Rathnew Co Wicklow Ireland
Cultural Heritage	Irish Archaeological Consultancy Ltd. 8 Dungar Terrace Dun Laoghaire Dublin
Socio-Economics	Roger Tyms & Partners 19 Woodside Crescent Glasgow United Kingdom  Jonathan Blackwell & Associates 6 Fairfield Park Rathgar Dublin 6
Landscape and	RPS Group Plc

Aesthetics	Lakesbury House, Hiltingbury Road, Chandlers Ford, Hampshire, United Kingdom
Agriculture	Phillip Farrelly & Co. 1 Kennedy Road Navan Co. Meath
Air Quality	ANV Technology Ltd. Clonroad, Ennis, Co. Clare

## 1.11 References

County Donegal Development Plan 2000

Department of the Environment and Local Government (1999), National Development Plan 2000-2006

Department of the Environment and Local Government (2002) National Spatial Strategy for Ireland 2002-2020: People, Places and Potential.

Donegal County Council (2006) County Development Plan 2006- 2012

EC (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997)

EC Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment, as amended by Council Directive 97/11/EC.

EC Environmental Impact Assessment (Amendment) Regulations 1999 (SI No. 93 of 1999)

Environmental Protection Agency (2002), Guidelines on the Information to be Contained in Environmental Impact Statements

Environmental Protection Agency (September 2003), Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)

EU Habitats Directive (92/43/EEC)

McCarthy Hyder Consultants (2001), N15 Ballybofey/ Stranorlar Bypass Environmental Scoping Study

National Development Plan 2007 – 2013 Transforming Ireland, A Better Quality of Life for All (January 2007)

National Roads Authority (2000), National Road Project Management Guidelines – Version 1,1, March 2000

National Roads Authority (2005) Environmental Assessment and Construction Guidelines.

National Roads Authority Design Manual for Roads and Bridges

Regional Authorities (1999), Border, Midlands and Western NUTS II Region, Development Strategy 2000-2006. Report prepared by Fitzpatrick Associates Economic Consultants

Roads (Amendment) Act 1998

Roads Act 1993

Roads Regulations 1994 (SI No. 119 of 1994)

Transport 21 (2005) Connecting Communities, Promoting Prosperity.



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## 2.0 Background to the Project

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### 2.1 The Existing N15 and N13 National Primary Routes

The N15 National Primary Route from Sligo via Donegal Town to Lifford passes through the Twin Towns and intersects with the southern end of the N13 National Primary Route to Letterkenny / Derry at a T-junction in Stranorlar. The existing road comprises a single carriageway road, generally about 7.5 metres in width with hard shoulders, in some locations, of varying width.

There are numerous frontages and private accesses including private dwellings, business premises and farm / field entrances. The mandatory speed limit on rural unrestricted single carriageway national roads is 100 kilometres per hour (k.p.h). Within residential areas, the speed limit is reduced to 60 k.p.h. and 50 k.p.h. On-street parking is permitted in locations along the route within the Twin Towns. All junctions along the route are priority controlled. A number of regional and County Roads, i.e. the R252 road to Glenties and R236 to Raphoe, connect to the existing N15 and N13. Numerous local roads also connect to the existing N15 and N13.

Traffic congestion within the Twin Towns reduces the speed of traffic and contributes to the increase in overall journey times for drivers. These increased delays contribute to road user frustration and reduce the level of safety on the road. Community severance is increased due to the large volumes of traffic through the Twin Towns.

The existing N15 and N13 roads are narrow and winding, making travel difficult for large vehicles, particularly through the Twin Towns. There are also limited opportunities for safe overtaking. At some junctions and private accesses there is limited visibility. These factors may increase driver frustration and traffic delay along the existing N15 and N13.

### 2.2 Traffic

#### 2.2.1 Traffic Surveys and Modelling

A traffic model, covering the area between the Twin Towns, Letterkenny and Lifford, has been produced in order to provide predicted traffic levels for the road network with and without the proposed scheme in place for the purpose of the environmental and economic assessments. This traffic model was prepared by consulting engineers, Jacobs (formally Babbie Pettit) with information from the traffic model made available to McCarthy Hyder Consultants (MHC) for use in the N13/N15 Ballybofey / Stranorlar Bypass assessments.

Traffic surveys were undertaken in May and June 2000 throughout the study area. These surveys included Origin Destination Surveys, Manual Classified Turning Counts and automatic traffic count (ATC). Journey time surveys were also carried out. Full details of the surveys are contained in the Final Traffic Survey Report, November 2000 produced by Babbie Pettit.

Using the traffic data collected, a traffic model was built using the TRIPS Version 32 suite of programs. A description of the model and its validation is given in the N13, N14 & N15 Ballybofey / Letterkenny / Lifford Traffic Study (Draft) Report August 2000 produced by Babbie Pettit.

Further traffic surveys were undertaken in July 2006 and the traffic model was subsequently updated and recalibrated using the 2006 traffic data by Jacobs consulting engineers (formally Babbie). The results of the re-calibration are included in the "N15/N13 Local Model Validation Report" (Jacobs, October 2007).

## 2.2.2 Traffic Flows

The traffic model provided traffic flow assignments for the existing road network and the future road network with the Preliminary Design in place, for a base year of 2006.

NRA Traffic Forecast Indices for years 2002 – 2040 (published 2003) have been used to forecast future traffic levels on both the existing road network and the future road network with the proposed scheme in place. These indices predict different traffic growth rates for different road types. The greatest growth rates will occur on National Primary Roads with the lower growth rates occurring on non-national roads. The indices also predict different growth rates for cars / light goods vehicles and for heavy goods vehicles.

The year of opening of the road has been assumed, for the purposes of this EIS, to be 2011. This date is subject to change according to programming / resourcing constraints during the development of the Primary Road network nationally.

The base year traffic flows for 2006, the forecast flows for the assumed opening year of the proposed scheme of 2011 and design year of 2026 (opening year plus 15) for the existing road network, and the future road network with the proposed scheme in place are given in Figure 2.1 as Annual Average Daily Traffic flows (AADT).

Figure 2.1 shows that without the proposed scheme, traffic levels on the existing N15 to the west and east of the Twin Towns (Ballybofey / Stranorlar) are forecast to be 9,900 and 7,900 vehicles per day, respectively, by 2011. On the N13 north of the Twin Towns, AADT flows of 13,800 vehicles per day are forecast in 2011. These flows are forecast to increase to 12,700, 10,100 and 17,500 vehicles per day respectively by 2026.

If this section of the N13/N15 remains unimproved, traffic delays will increase significantly within the Twin Towns, leading to increases in operating costs. The accident rate will also increase further with traffic growth. In addition, the increase in traffic will give rise to an increase in noise nuisance and community severance will continue.

The provision of the proposed scheme has the effect of reducing the flows on the bypassed section of the existing N15 to the west of the Twin Towns from 9,900 to 1,500 vehicles per day in 2011 and from 12,700 to 1,700 vehicles per day in 2026. On the bypassed section of the existing N15 to the east of the Twin Towns, traffic levels fall from 7,900 to 3,000 vehicles per day in 2011 and from 10,100 to 4,300 vehicles per day in 2026. To the north of the Twin Towns, traffic levels on the N13 are forecast to fall from 13,800 to 5,000 in 2011 and from 17,500 to 6,000 vehicles per day by 2026.

Traffic flows carried by the proposed scheme are forecast to vary considerably along its length. Figure 2.1 shows that the maximum AADT in 2011 of 12,600 vehicles per day occurs between the Navenny and Stranorlar Junctions, compared to the minimum AADT of 8,400 vehicles per day between the Meencrumlin and Navenny Junctions. By 2026 flows on the bypass are forecast to increase to 16,900 vehicles per day between the Navenny and Stranorlar junctions and to 10,800 vehicles per day between the Meencrumlin and Navenny junctions.

### 2.2.3 Accident Statistics

Traffic accident statistics have been supplied by DCC for the period 1996 to the end of 2002 (Appendix 2). For the sections of the N13 and N15 that will be bypassed there were 4 fatal accidents, 19 accidents involving serious injuries and 54 accidents involving minor injuries in this period. It is anticipated that the proposed road will result in a general improvement in road safety and, as a result, road accidents will decrease significantly.

## 2.3 Effect of the Proposed Scheme

The proposed scheme will help the economy of the area by improving road access. By taking traffic away from the Twin Towns, journey times will be shorter and traffic delays and operating costs will be reduced.

The resulting effect will be to reduce the volume of traffic through Ballybofey and Stranorlar. It is anticipated that in the opening year (2011), the traffic passing through the Twin Towns will be reduced by approximately 43% of its 2006 level<sup>1</sup> as a result of the proposed scheme. As a consequence, noise pollution and pedestrian safety will improve.

Current journey times between Meencrumlin and Kilross, for example, will be reduced by 15-20 minutes during peak hours. At the same time, heavy traffic will be largely removed from unsuitable roads and away from residential areas.

There is a degree of uncertainty in predicting the amount of accident reduction produced by a road improvement, but it is expected that there will be a significant reduction in accidents as a result of increasing the opportunities for safe overtaking and providing improved horizontal and vertical alignments with the introduction of the proposed scheme. This reduction in future accidents represents a significant improvement to the safety of all road users from the current situation.

The generation of traffic as a result of the proposed scheme is not considered to be an issue as:

- The current road network is not forecast to operate close to capacity, thus there is no suppressed traffic to be released onto the proposed scheme;
- Changes in modes of travel or destination as a result of the proposed scheme are unlikely to occur;
- Any further demand for residential development on declassified roads, including, potentially, commuter housing for Letterkenny and Derry created by the proposed scheme will be controlled through the normal planning system process; and
- The reduction in travel costs as a result of the proposed scheme is too modest to give rise to additional trips.

## 2.4 Design Development

The identification of the Preliminary Design for the proposed scheme to which this EIS relates has been the result of studies undertaken in three key stages – the Constraints Stage, Route Selection Stage and Preliminary Design Stage. Throughout these stages, appropriate statutory and non-statutory bodies, as well as local interest groups and the public, have been consulted.

<sup>1</sup> For the N15 R252 Junction – Navenny Road Junction, 2006 flows are 16,900 AADT. In 2011, the Specimen Design opening year, flows on this section are predicted to be 7,300 AADT (see Figure 2.1)

## 2.4.1 Constraints Study

Work commenced on the Constraints Study Phase in April 2000 with the establishment of the Study Area for the project (Appendix 2.2). The study area is centred on the Twin Towns of Ballybofey and Stranorlar. It extends some 48 sq. km from Lough Mourne in the west, to Edenmore in the east (2km east of Stranorlar) and in the north to the point where the N13 to Letterkenny crosses the Deelee River at Callan Bridge. During the Constraints Study Phase information was gathered on potential constraints within this study area, which could affect the design and location of the Specimen Design. Studies covered planning, ecology, landscape, cultural heritage, geology, surface water quality and drainage and agriculture. The studies involved consultation, desktop investigations and site visits. Details are provided in the Constraints Study Report (MHC September 2000).

## 2.4.2 First Public Consultation

The proposal for a bypass and the constraints identified were presented to the public at exhibitions at Jackson's Hotel, Ballybofey on 7 June 2000 and at County House, Lifford on 8 June 2000. The aim of the consultation was to give the public the opportunity of highlighting aspects of local concern or special interest to be taken into account in the planning and design of the proposed road. The responses to the Public Consultation are detailed in the Constraints Study Report (MHC, September 2000).

## 2.4.3 Route Selection Stage - Assessment of Alternatives

The aim of the Route Selection Stage was to identify potential route options and then identify a Preferred Route based on an assessment of economic, environmental and engineering assessment factors for each route option.

Following the initial study work carried out in the Constraints Study Phase four broad route corridors were defined. The Green and Blue routes were based on the reserved lines identified in the Ballybofey and Stranorlar Development Plan 1996. The Pink and Red routes formed alternative outer northern and southern bypass options respectively. The route corridors considered are illustrated in Figure 2.2.

The route selection process involved traffic surveys; identification and investigation of possible options; assessment of impacts on land holdings/severance; broad assessment of environmental impacts; economic evaluation and the preparation of a budget/cost estimate for each option.

All the Route Options identified were designed in accordance with the requirements of the NRA Design Manual for Roads and Bridges (NRA DMRB) to a Design Speed of 100 kph. Forecast traffic flows indicated that either standard single (S2) or wide single (WS2) were required to obtain a LOS D in line with the NRA National Roads Needs Study (equivalent to an inter-urban travel speed of 80kph). The horizontal and vertical alignments for the route options were therefore developed using the recommended design approach for a single carriageway road.

The Green Route was based on the southern route reservation previously identified in the Ballybofey and Stranorlar Development Plan (1996). This route left the existing N15 approximately 1km east of the Lough House and followed close to the existing road before diverging south at Blackburn Bridge. The alignment ran roughly parallel to the existing road and passed between Ballybofey and the townland of Sessiagh O'Neill. The bypass crossed the River Finn just upstream of the Burn Darnett confluence and then passed south of Stranorlar, running along the River Finn floodplain. A junction with the existing N15 was proposed in the area immediately east of St. Joseph's Hospital

with the bypass alignment then continuing north to tie-in with the N13 Letterkenny Road at Kilross. The total alignment length, including spur roads, was 15.4km.

The Blue Route was based on the northern route reservation previously identified in the Ballybofey and Stranorlar Development Plan 1996. This route left the existing N15 approximately 1km east of the Lough House and initially ran south of the existing road before crossing to the north at Cappry. The alignment ran to the north of Ballybofey and crossed the River Finn just upstream of the existing footbridge on Beechwood Avenue / Railway Road. The alignment passed north of Drumboe Woods and climbed the hill past Magherapaste and Admiran to intersect with the N13 Letterkenny Road north of Kilross. A spur road linked the bypass at Dunwiley to the N15 in the area immediately east of St. Joseph's Hospital. The total alignment length, including spur roads, was 15.5km.

The Pink Route was a new alignment which ran north of Ballybofey / Stranorlar and north of the existing N15. It left the existing N15 approximately 1km east of the Lough House and initially ran close to the existing road, before diverging north at McGrory's Brae. The alignment ran north of Cappry Road and crossed the R252 and River Finn just downstream of Logue's Bridge. The bypass then climbed the hill through Drumboe Lower and joined the alignment of the Blue Route at Admiran where it continued to intersect with the N13 Letterkenny Road north of Kilross. A spur road linked the bypass at Dunwiley to the N15 immediately to the east of St. Joseph's Hospital. The total alignment length, including spur roads, was 16.6km.

The Red Route was also a new alignment which ran south of Ballybofey / Stranorlar. It left the existing N15 approximately 1km east of the Lough House and initially ran south of the existing road, before diverging south towards Meenglass Crossroads. The alignment ran roughly adjacent to the old disused railway line passing through the townlands of Sessiagh O'Neill and Navenny before bearing north through Dreenan and Edenmore towards the River Finn. The bypass crossed the River Finn downstream of Dreenan Bridge and intersected the existing N15 immediately east of St. Joseph's Hospital. The bypass alignment continued north to tie-in with the N13 Letterkenny Road at Kilross. The total alignment length, including spur roads, was 15.5km.

## 2.4.4 Emerging Preferred Route

A detailed environmental and economic appraisal of each option was then carried out to identify a preferred option. The basis for choosing the Preferred Route is set out in a Route Selection Report (McCarthy Hyder Consultants May 2001), which includes, in a tabular format, information on the relative attractiveness of each option.

The environmental appraisal of each route included identification of potential impacts on local communities, properties and farms, archaeology/heritage, ecology, landscape, geology, air quality, noise, planning designations, socio economics, surface water and groundwater.

The environmental impacts of each option were assessed on a seven-point scale and compiled in framework assessment tables. These tables were used to compare and weigh the impacts between route options and identify a preferred route for each category. Based on the ranking 'with mitigation' of each option, the Red Route was associated with the highest number of 'most preferred' ratings. Although 'least preferred' with respect to landscape, it was identified that all route options would have at least a 'moderate adverse' impact on the landscape of the area.

The economic appraisal of each option was carried out using the UK Department of Transport's inter urban and rural economic assessment program Cost Benefit Analysis

(COBA). The economic assessment gave marginally positive economic returns for the Red Route and Blue Route, significant positive returns for the Green Route and negative returns for the Pink Route.

The conclusions from the environmental impact assessment and economic appraisal of the four options were compiled into a "Summary of Key Issues" table (Appendix 2.3), which was used to rank each option. The Red Route was ranked first because, on balance, it had the lowest impact on the built and natural environment while offering value for money and complying with the relevant engineering guidelines. The Red Route was therefore recommended as the Emerging Preferred Route.

## 2.4.5 Second Public Consultation

The public consultation for the Route Selection Stage was held on the 22 and 23 November 2000 at Jackson's Hotel in Ballybofey. At the exhibition the route corridor options and the identified Emerging Preferred Route were presented. The aim of the consultation was to give the public the opportunity to comment on the Emerging Preferred Route and the work carried out to date.

A total of 647 people visited the exhibition over the two days. Attendees were invited to take away brochures summarising the route options and complete questionnaires. The responses to the Second Public Consultation are detailed in the Public Consultation Report (MHC July 2001).

## 2.4.6 The Preferred Route

Following the exhibition and return of completed questionnaires, it became apparent that a number of key issues needed to be investigated further before the Red Route could be confirmed as the Preferred Route. In particular the issue of side road severance was identified as being a major concern to local residents.

In particular residents of the Townland of Sessiagh O'Neil highlighted the importance of maintaining access along the Carrickmagrath Road. Following a review of the comments received, it was concluded that the impact of closing the road had been underestimated and that benefits to the local community justified the additional cost of retaining the road open by bridging the bypass. In addition a link to the Navenny junction from Coach Road was also included in the Preferred Route to reduce the impact on nearby communities, as two side roads in Navenny and Daisy Hill were to be closed.

A further change to the Red Route was made in the townland of Tircallan. Here the Red Route ran within 35 metres of the nearest property. A minor revision to the horizontal geometry allowed the route to be located a further 65 metres away with no detrimental impact on any other properties.

The Final Route Selection Report (McCarthy Hyder Consultants May 2001) was issued to DCC and the NRA in May 2001 recommending that the Modified Red Route be adopted as the Preferred Route. Donegal County Council then adopted this route.

## 2.4.7 Preliminary Design Stage

The aim of this phase of the project was to develop the design for the Preferred Route to sufficient detail to enable accurate land requirements to be identified. This enables Compulsory Purchase documents to be prepared and environmental issues to be examined in more detail so that mitigation measures can be incorporated into the design. The Preliminary Design produced for the N13/N15 Ballybofey/Stranorlar

Bypass is then used as the basis for the preparation of an Environmental Impact Statement (EIS).

During the Preliminary Design Phase, a number of improvements to the Preferred Route have been made to incorporate findings of discussions with landowners affected, the environmental assessment process and to incorporate amendments to the NRA standards. These amendments to the Preferred Route are described in Chapter 3.0 and have lead to the development of the Preliminary Design described in detail in Chapter 3.0.

## 2.4.8 EIA of the Preliminary Design

The assessment of impacts, the prediction of environmental effects and the proposed mitigation measures are based on the Preliminary Design as detailed in Chapter 3.0. The principles and objectives of mitigation have been established. The preliminary design and the environmental mitigation measures will be refined and developed during the detailed design stage before construction.

The detailed design will seek to develop the Preliminary Design in a manner such that it has no material change on environmental impacts in accordance with the approval, if granted. Indeed, opportunities may be identified that may reduce the impact of the proposed scheme.

Stringent contract requirements, close supervision and the development, implementation and maintenance of an Environmental Operating Plan (EOP) (see Chapter 3.0 Description of the Preliminary Design) will ensure that the detailed design will be of the required quality and meet the environmental commitments set out in the EIS, as enshrined in the Approval, that is granted.

## 2.5 References

Babtie Pettit (2000) N13, N14 & N15 Ballybofey / Letterkenny / Lifford Traffic Study (Draft) Report (Reference: BTI200549N)

Donegal County Council. Traffic accident statistics 199 - 2002

Donegal County Council (2005) Ballybofey Stranorlar Local Area Plan 2004-2010

Donegal County Council (2006) County Development Plan 2006- 2012

EC (Natural Habitats) Regulations, 1997

Jacobs (October 2007) N15/N13 Local Model Validation Report

McCarthy Hyder Consultants (2000), N15 Ballybofey / Stranorlar Bypass Constraints Study Report

McCarthy Hyder Consultants (2001), N15 Ballybofey / Stranorlar Bypass Route Selection Report

National Roads Authority (1998), National Roads Needs Study.

National Roads Authority (2003), Guidelines for Cost Benefit Analysis

National Roads Authority Traffic Growth Forecasts 2002 – 2040



National Roads Authority, Design Manual for Roads and Bridges (2000 & subsequent revisions)

UK Department of Transport (1998), Cost Benefit Analysis, Version 11

## 3.0 Description of the Preliminary Design

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### 3.1 Introduction

This Chapter presents a detailed description of the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass. It includes details of engineering features, land take requirements, construction and operational requirements.

The description of the main elements of the proposed scheme is presented in the following paragraphs covering the route from west to east. The description includes references to Chainages (Ch) denoting the approximate distance in metres along the proposed scheme, with Chainage values starting at Lough Mourne, at the western end of the scheme. Chainages and link lengths have been rounded for reasons of clarity; exact chainages and lengths may be obtained from the drawings.

### 3.2 Preliminary Design Description

#### 3.2.1 Main Elements

The N13/N15 Ballybofey / Stranorlar Bypass commences in the townland of Cashelnavenan adjacent to the northern edge of Lough Mourne. For approximately 0.4km the proposed scheme then follows the line of the existing N15 along the north shoreline of Lough Mourne to the townland of Meencrumlin. From this point the proposed scheme leaves the existing N15 and follows a route adjacent to the corridor of a disused railway line through the townlands of Croaghonagh, Goland, Carrickmagrath, Sessiagh O'Neil and Navenny before turning to the north through the townlands of Dreenan and Edenmore to cross the River Finn downstream of the existing Dreenan Bridge. North of the river the proposed scheme meets the existing N15 in the townland of Mullandrait. The proposed scheme then heads north adjacent to an unnamed tributary of the River Finn through the townlands of Mullandrait, Castlebane and Mullaghagarry to eventually join the N13 at the existing N13/R236 junction in Kilross.

The Preliminary Design consists of:

- Approximately 0.4km standard single carriageway transition between the proposed road and the existing N15 adjacent to Lough Mourne, followed by 14.2km of Type 2 Dual Carriageway followed by 0.3km standard single carriageway forming a 14.9km southern bypass (including junctions) around the Twin Towns of Ballybofey and Stranorlar.
- Two grade separated junctions at Meencrumlin and Navenny
- A major bridge crossing of the River Finn.
- An additional five road bridges at minor road crossings and two accommodation bridges.
- Two roundabout junctions, at the N15 east of Stranorlar and at the N13 at Kilross.
- A 1.2km reduced single carriageway link road (the Ballybofey Link Road) joining the proposed scheme to the existing N15 in Ballybofey at a new traffic signal junction and including a bridge crossing of the Burn Daurnett and traffic signal junctions with Creamery Road and Trusk Road.

### 3.2.2 Type of Road

The Preliminary Design is a Type 2 Dual Carriageway, which consists of two traffic lanes in each direction to allow continuous safe overtaking in both directions, with opposing traffic streams separated by a safety barrier.

### 3.2.3 Cross Sections

The mainline proposed scheme comprises of two different cross sections. The first cross section comprises a standard single carriageway that occurs on the transition between the existing and proposed road between the western tie-in with the N15 at Ch 600 and the approach to Meencrumlin Junction at Ch 1000 and comprises a 7.3m carriageway with two hard shoulders and two verges. It also occurs between Kilross Roundabout at Ch 15200 and the northeastern tie-in with the N13 at Ch 15450.

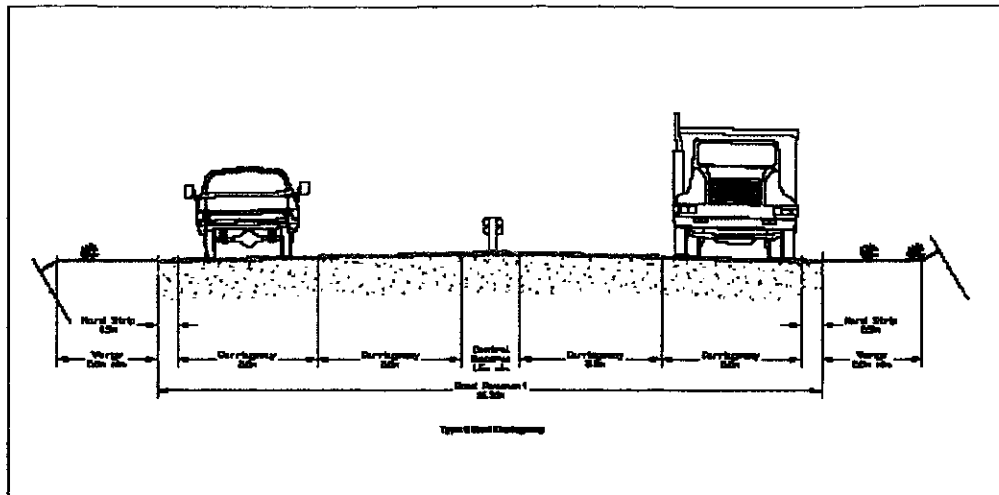
The single carriageway cross section comprises:

- Verge of varying width
- 2.5m hard shoulder
- 7.3m carriageway (2x 3.65m traffic lanes)
- 2.5m hard shoulder
- Verge of varying width

The second cross section extends for most of the proposed scheme length between Meencrumlin Junction and Kilross Roundabout at Ch 15200 and comprises a Type 2 Dual Carriageway. The Type 2 Dual Carriageway road is illustrated in Diagram 3.1 below and comprises:

- 2.5m verge
- 0.5m hard strip
- 2 x 3.5m traffic lanes
- 1.5m central median with post and rail central barrier
- 2 x 3.5m traffic lanes
- 0.5m hard strip
- 2.5m verge

Diagram 3.1 – Illustration of Type 2 Dual Carriageway Cross Section



The 1.2km long Ballybofey Link Road comprises a reduced single carriageway with the following cross section:

- 3.0m verge
- 1.5m footpath
- 7.3m kerbed carriageway (2x 3.65m traffic lanes)
- 1.5m footpath
- 3.0m verge

The cross sections are shown in Figure 3.1.

### 3.2.4 Detailed Description of the Proposed Scheme

The proposed scheme will start at its western end at Ch 600 where it will tie into the existing N15 alignment adjacent to the northern shoreline of Lough Mourne. At this location, the land is relatively high, with an elevation of 190m Above Ordnance Datum (AOD – Malin Head) at the foot of Croaghanierin. The proposed scheme will approximately follow the alignment of the existing N15 until Ch1300.

A compact grade separated junction is provided at Meencrumlin at Ch 1700, to provide access to the existing N15 heading towards Ballybofey. The existing N15 turns northwards and the proposed scheme will continue on a straight alignment heading northeast. The existing N15 will be closed off at its intersection with the proposed scheme at Ch 1300 and realigned southwards for a distance of 100m to its proposed junction with the eastbound carriageway of the proposed scheme at Ch 1600. Access to the westbound carriageway will be provided via an overbridge at Ch 1700 to link to a junction with the proposed scheme at Ch 1600.

The existing N15, north of the junction at Ch 1300 will be reclassified to regional or local road status. An accommodation road will be provided parallel and south of the proposed scheme between the junction at Ch 1600 and Ch 1300. This accommodation road will provide access to lands to the south of the proposed scheme and also to the proposed 'northern dam' to be constructed as part of the Lough Mourne Water Supply Scheme (see Section 3.2.15).

A severed land plot between the existing N15 and proposed scheme between Ch 1400 and Ch 1600 will be utilised by the provision of a picnic area with access being provided via the cul-de-sac section of the existing N15 west of the junction.

From Ch 2100, the proposed scheme then follows an alignment through the forested area at Croaghonagh for a distance of 2.6km (passing through a cutting east of Meencrumlin between Ch 2170 and 2500 with a depth of approximately 16m) before emerging from the forest at Ch 4700 at Goland Upper.

From Ch 3800 the proposed scheme indicates an embankment approximately 4m in height to accommodate the Goland accommodation underbridge at Ch 4280. The proposed scheme will divert slightly to the north of the disused railway line, thus preserving associated ecology, reducing farm severance and avoiding the cashel (Cultural Heritage Site No.77/015, known in this report as RMP 2, see Chapter 10.0 Architectural, Archaeological and Cultural Heritage) at Goland Upper (approximately Ch 5000). The proposed scheme will still be at a relatively high elevation at Goland Upper, but will start to descend here into the River Finn Valley, heading in an easterly direction through the townlands Goland Upper and Goland Middle where it passes Long Accommodation Roads North and South between at Ch 5800. At Ch 6200 it passes the first of two existing houses that will need to be acquired in order to accommodate construction of the scheme in the vicinity of Meenglass Underbridge.

The proposed scheme will pass into shallow cutting on the approach to Carrickmagrath overbridge (Ch 7150) where it will then pass through a short cutting of approximately 5m depth to enable side road approaches to the bridge to be constructed on embankments. From Carrickmagrath onwards, the proposed scheme will continue on a generally downward gradient towards the River Finn, passing through Sessiagh O'Neill (Sessiagh O'Neill underbridge will be at Ch 7900) and Navenny south of the Twin Towns where the housing density increases slightly. At Ch 7800, in the vicinity of Sessiagh O'Neill Underbridge, the alignment passes the second of two houses that will need to be acquired to facilitate construction.

The second grade separated junction on the proposed scheme will be located at Ch 8600 at Navenny and will comprise a full grade separated junction comprising two roundabouts in a dumb-bell arrangement connected by an underbridge beneath the mainline. The junction provides access between the mainline and the Ballybofey Link Road that leads to the centre of the Twin Towns to the north. The proposed scheme will continue (with an underbridge at Daisy Hill at Ch 9550) on an east by north easterly direction until Ch 9800, south of Rockfield House, where it will turn northwards on a straight alignment downhill in a north by north easterly direction towards the crossing point of the River Finn approximately 400m north east of Edenmore House. On the approach to Edenmore underbridge (Ch 10700), the proposed scheme will be on an embankment approximately 8.5m in height which will start at approximately Ch 10550, continuing through the entire extent of the River Finn flood plain to enable the finished road level of the proposed scheme to be at least 2m clear of the 100 year flood levels. A detailed description of the River Finn crossing is given below.

The four-armed Stranorlar Roundabout, the first of two roundabouts on the scheme, is located at the junction of the existing N15, Ch 11600 at Mullandrait, some 300m north of the River Finn crossing. From here, the proposed scheme will follow a straight alignment in a northerly direction through the townlands of Treanamullin, Castlebane, Tircallan and Mullaghagarry as it climbs out of the Finn Valley. The proposed scheme will be at existing ground level as it passes Church Road, which will be closed. The proposed scheme will be on embankment varying between approximately 2-6m in

height in the vicinity of Mullaghagarry until around Ch 13900 where it will be in cutting of a depth of approximately 13m.

The Mullaghagarry accommodation overbridge will be located at Ch 14700. At Mullaghagarry, the alignment turns slightly to the west on its approach to the tie in with the existing N13 at Ch 15100. Immediately before the tie in with the N13, there will be the second and final roundabout with the existing R236 from the east and the existing N13 from Stranorlar to the southwest at Kilross. This four-armed roundabout replaces the existing at grade junction between the N13 and the R236. The N13 approach will be re-aligned to tie into the roundabout by following the alignment of an existing local road, which will be widened as necessary. The existing N13 approach from Stranorlar to the existing junction with the R236 will be closed. By this stage, the proposed scheme has climbed out of the Finn Valley and is at an elevation of approximately 100m AOD.

### **Ballybofey Link Road**

The Ballybofey Link Road will be the primary route between the proposed scheme and the Twin Towns, and residential areas south of the Towns. It is important to emphasise the difference in the nature of the Link Road and the proposed scheme. The proposed scheme is designed as a high-speed free flow national strategic link, whereas the Link Road will function as a local access road and an approach to the Town centres.

The Ballybofey Link Road starts at the Navenny Junction at Ch 0 and follows a straight northerly alignment on a downhill gradient towards the Burn Daurnett, crossing the Creamery Road at Ch 450 by way of a traffic signal junction. At Ch 580 the Link Road crosses the Burn Daurnett Bridge and then turns to the northwest, on an uphill gradient, towards Ballybofey, crossing the Trusk Road at Ch 800 by way of a second traffic signal junction. It terminates at the existing N15, in Ballybofey, at Ch 1100 by way of the third traffic signal junction on the proposed Link Road.

## **3.2.5 Junctions**

The Preliminary Designs for the proposed junctions are described below.

### **Meencrumlin Compact Grade Separated Junction**

The Meencrumlin Compact Grade Separated junction is located at Ch 1600–1700 and provides access to and from the existing N15 running from Cashelnavenan to Ballybofey. The junction comprises an overbridge at Ch 1700 and links from the existing N15 from Ballybofey to the eastbound and westbound carriageways of the proposed scheme. Both of the links to the eastbound and westbound carriageways of the proposed scheme include auxiliary lane merge entry and tapered diverge exit to and from the proposed scheme in accordance with the NRA Design Manual for Roads and Bridges (DMRB). This junction will provide access between the proposed scheme and the bypassed section of the existing N15 and the proposed Lough Mourne viewing area, located to the northwest of the Junction. The bypassed section of the existing N15 will be reclassified to a regional or local road after the construction of the proposed scheme. The proposed Type 2 Dual Carriageway will start to be introduced over a transitional section between Ch 1000-1200 before being fully introduced at Ch 1200 and running through the Meencrumlin Compact Grade Separated junction.

### **Navenny Grade Separated Junction**

This full grade separated junction with the Link Road, at mainline Ch 8600 at Navenny, will provide the main point of access to the Twin Towns from the proposed scheme. The junction comprises two roundabouts in a dumbbell arrangement, both sides of the

proposed scheme, and linked via an underbridge at Ch 8600. The proposed scheme passes over the junction uninterrupted. The majority of the junction will be in cut with the mainline running approximately at existing ground levels.

#### **Stranorlar Roundabout**

This four-armed roundabout is located at mainline Ch 11650 at the intersection between the existing N15 east of the Twin Towns, at Mullandrait and the proposed scheme. It will provide access from Stranorlar and from the N15 east to the proposed scheme. Stranorlar Accommodation Road, located to the south east of the roundabout, provides access to land that will be severed during winter months as a result of flooding.

#### **Kilross Roundabout**

The northern-most roundabout on the proposed scheme will be located at Ch 15100 at Kilross at the intersection of the proposed scheme, the existing R236 and the existing N13. This four-armed roundabout provides access to the proposed road from the northern side of Stranorlar and effectively replaces the existing at grade junction between the N15 and the R236.

#### **Ballybofey Link Road Junctions**

For reasons of road safety, traffic management and pedestrian / cyclist accommodation in a developing residential area, traffic signal junctions are proposed for use on the Link Road. These will calm traffic on the Link Road, where drivers that have left the proposed scheme will have become accustomed to travelling at high speeds that will be inappropriate and unsafe for conditions on the Link Road and on the approach to the Towns. Traffic signals will also safely accommodate the high proportion of cross traffic emerging from Trusk Road and Creamery Road and provide the facility to control queue lengths on the approaches to the junction should the need arise in the future. A relatively high percentage of traffic (compared to the Link Road traffic) along these local roads will be slow moving agricultural vehicles.

### **3.2.6 River Bridges**

Two river bridges are proposed at Ch 11300 over the River Finn and at Ballybofey Link Road Ch 580 over the Burn Daurnett.

#### **River Finn**

The proposed scheme crosses the River Finn to the east of Dreenan Bridge. At its crossing point, the River is approximately 30m in width. The bank to the north side is lined with mature trees, while the southern bank rises steeply before flattening out over the floodplain. The River and the surrounding riverine habitat is a candidate Special Area of Conservation (cSAC) under the EU Habitats Directive (92/42/EEC).

Meetings and discussions with The Loughs Agency, National Parks and Wildlife Service (NPWS), NRA and the Office of Public Works (OPW) along with environmental studies have led to the Preliminary Design for the River Finn crossing shown in Figure 3.4.

Although the actual form of the bridge may vary when detailed investigations are complete, a 170m long design is proposed to accommodate the movement of floodwaters. The proposed scheme crosses the river at an angle of approximately 45° to the course of the river. This results in a centre span of approximately 80m. There will be further spans of approximately 45m either side of the centre span. The central span will be supported on leaf piers located on the banks of the river. These leaf piers will be located at least 5m clear of the main river channel. The side spans will be supported on

piers and abutments. One option of construction would be a steel/concrete composite superstructure. The bridge deck will be approximately 20m wide (square) accommodating the Type 2 Dual Carriageway cross-section and two 1.5m maintenance accesses on either side of the carriageway.

#### **Burn Durnett**

A bridge will be constructed on the Link Road to Ballybofey to span the Burn Durnett, a tributary of the River Finn. This bridge will have a single span of approximately 20m, as shown in Figure 3.5.

### **3.2.7 Road and Accommodation Bridges**

A total of 9 road bridges will maintain local road access across the proposed scheme, including 7 public road bridges and 2 accommodation bridges. The public road bridges will be located at:

- Ch 1700 Meencrumlin Junction
- Ch 6230 Meenglass
- Ch 7190 Carrickmagrath
- Ch 7900 Sessiagh O'Neill
- Ch 8600 Navenny Junction
- Ch 9570 Daisy Hill
- Ch 10700 Edenmore

The accommodation bridges will be located at:

- Ch 4280 Goland
- Ch 14720 Mullaghagarry

Figures 3.4 and 3.5 show general arrangements for typical bridges.

### **3.2.8 Road Closures**

The proposed scheme indicates four public road/track closures at:

- Ch 2900 Croaghonagh (track)
- Ch 4850 Goland (track)
- Ch 9050 McFeely's Brae (public road)
- Ch 12650 Church Road (public road)

### **3.2.9 Drainage**

#### **Culverts**

Culverts will be provided at a number of locations to allow the proposed scheme to be conveyed across existing waterways and drainage ditches. The size of culverts will vary depending on the flow regime of the particular waterway / ditch but will be no smaller than 1500mm in accordance with OPW guidelines and will be oversized to accommodate a 500mm depth natural stream bed.

Where appropriate, the length of culverts will be minimised. This may require the watercourses to be diverted; the impact of each individual diversion will be assessed during the Detailed Design stage.



Further details of works carried out on or near watercourses are discussed in Chapter 8.0 Surface Water Quality and Drainage and Chapter 9.0 Ecology (Flora, fauna and fisheries).

#### **Road Drainage**

The main methods of drainage will be via a combination of grassed swales, combined filter drains, concrete channels and sealed drainage systems. Drainage ponds will provide runoff attenuation and pollution control. The location of drainage ponds in the Preliminary Design is shown in Figure 3.2.

Where the proposed scheme is on embankments above 1.5m and less than 6m in height, over-the-edge drainage will generally be used. For embankments lower than 1.5 metres high, combined filter drains will generally be used. Such filter drains may be lined with an impermeable membrane to prevent water infiltrating into the embankment and undermining the stability of the slope.

For embankments greater than 6m in height, surface run off will be collected at the road side by surface water channels or sealed filter drains and conveyed by sealed pipes to the swales or filter drains at the base of the embankments.

Where the proposed scheme is in cutting, a single pipe will fulfil the function of draining the road surface and pavement layers. The size of the combined filter drain will be typically between 225mm and 375mm and will discharge to an outfall. A sealed drain or swale may be used once the capacity of the 375mm pipe has been exceeded.

#### **Side Roads**

Side roads (consisting of regional, county and local roads) that require kerbs will be drained using either gullies with carrier drains or combined filter/carrier drains. Piped drains will eventually discharge to an outfall, a sealed drain, and a swale or to the mainline drainage system.

Side roads that do not require kerbs will be drained using either over-the-edge drainage or combined filter drains where appropriate, in accordance with the principles described above. The swales or filter drains will discharge to an outfall, a sealed drain, and a swale or to the mainline drainage system.

#### **Cut Off and Embankment Ditches**

Ditches will be required at the top of cut batters and at the toe of embankments in areas where the surrounding ground slopes toward the road. These ditches will prevent runoff from adjacent land from flowing onto the proposed works, and to prevent ponding of water at the toe of embankments. Any farm drains that are cut by the new works will either be diverted or discharged into a ditch. In a few isolated locations, soakaways will be used.

#### **Runoff Attenuation**

Surface water discharge will enter a series of 21 drainage ponds of varying size prior to final discharge to watercourses wherever practicable. These will remove contaminants by bio treatment of the runoff through the pond and will discharge to watercourses at Greenfield run off rate. The size of the drainage ponds will accommodate a 1 in 30 year storm event plus an additional 15% storage to allow for future increased rainfall due to climate change.

In circumstances where the provision of a drainage pond is not practicable, surface water runoff will flow through petrol interceptors prior to discharge to watercourses. In these cases (with one exception), swales will be used up stream of the discharge point.

Swales are grass lined channels designed with a shallow gradient to encourage surface water run off to flow slowly along their length while contaminants are removed through a combination of bio treatments, capture by the grass, evaporation and infiltration. As a safety factor, any run off remaining in the swale prior to discharge will enter petrol interceptors that will remove any remaining floating contaminants. The single exception to this will be immediately upstream from the River Finn crossing (for 200m to the north and 500m to the south) where it is not practicable to place a swale or a pond within the flood plain without it being flooded in the winter months. In this case concrete channels will be used to capture the surface runoff from the road before being fed through a petrol interceptor prior to discharge to the Finn.

The drainage proposals for the scheme are presented in Figure 3.2 and outfall treatments summarised in Table 3.1 below:

**Table 3.1 Outfall Treatment Summary**

Chainage (to nearest 50m)	Outfall No.	Discharge Treatment	Pond Volume Required (m <sup>3</sup> )
Drainage Ponds 1 and 2 are not used			
1000	3	Drainage Pond 3	67
1600	4	Drainage Pond 4	618
2900	5	Drainage Pond 5	1192
3900	6	Swale outfalls to petrol interceptor prior to discharge	-
4250	7	Swale outfalls to petrol interceptor prior to discharge	-
5300	8	Drainage Pond 6	373
6000	9	Drainage Pond 7	467
6200	10	Swale outfalls to petrol interceptor prior to discharge	-
6700	11	Swale outfalls to petrol interceptor prior to discharge	-
7400	12	Drainage Ponds 8 & 9	1192
8250	13	Drainage Pond 10	82
8600	14	Drainage Pond 11	3766
9150	15	Drainage Pond 12	700
10700	16	Drainage Ponds 13 & 14	1468
11200	17	Swale outfalls to petrol interceptor prior to discharge	-
11300	18	Swale outfalls to petrol interceptor prior to discharge	-
11700	19	Drainage Pond 15	933
12250	20	Drainage Pond 16	283
12850	21	Drainage Pond 17	215
13200	22	Swale outfalls to petrol interceptor prior to discharge	-
13700	23	Drainage Pond 18	1163
15200	24	Drainage Pond 19	1369
15500	25	To existing N13 drainage system	-
Link Rd 550 & 600	26	Drainage Ponds 20 & 21(it is proposed to bund these ponds to the elevation of the design flood height. Additionally, a flap valve will be required at the outlet of the ponds to prevent their use being compromised during periods when the outlet invert is submersed).	2149

Runoff from areas adjacent to the road will be unaffected by the works and will not require attenuation. In rare instances it may be necessary to combine runoff from adjacent areas with runoff from the road and to attenuate the volume of runoff from both.

Drainage measures have been developed during the preliminary design stage and will be developed further during the detailed design stage in consultation with OPW, the Northern Fisheries Board and the Loughs Agency as appropriate.

### 3.2.10 Mammal Passage

Provisions for mammal passage have been incorporated within the Preliminary Design following relevant NRA guidance documents, and will be examined further at the Detailed Design stage. Details are included in Chapter 9.0 Ecology (Flora, fauna and fisheries).

### 3.2.11 Traffic Signs and Lighting

Traffic signs will be designed and provided in accordance with the Department of the Environment Traffic Signs Manual. The design for traffic signs will be developed during the Detailed Design stage.

There will be no lighting provided on the proposed scheme except at and on the approaches to the following:

- Meencrumlin junction;
- Navenny junction;
- Stranorlar roundabout;
- Kilross roundabout.
- Creamery Road traffic signal junction (on Ballybofey Link Road)
- Trusk Road traffic signal junction (on Ballybofey Link Road)

The effects of lighting have been considered further in Chapter 7.0 Landscape and Aesthetics and Chapter 9.0 Ecology (Flora, fauna and fisheries).

### 3.2.12 Pedestrian and Cycling Provision

There will be no specific provision made for pedestrians or cyclists along the mainline of the proposed scheme, since pedestrian and cyclist demand is neither anticipated nor encouraged for reasons of road safety.

Pedestrian and cyclist activity is expected on the Ballybofey Link Road and for this reason, traffic signal junctions have been proposed at the junctions with Creamery Road, Trusk Road and the existing N15. These junctions will accommodate pedestrian movement and will be designed to cater for cyclists by way of advanced stop lines as considered appropriate. A footway will be provided on both sides of the Ballybofey Link Road along its entire length.

Junctions will be provided with dished kerbs and tactile pavements to accommodate pedestrian and cycle movements through the junctions and across roundabouts from the side road approaches to the proposed scheme.

A footpath will be provided along the 450m long realigned road on the western approach to the proposed Kilross roundabout to service residents near the junction. A footpath will be provided at all bridges crossing the proposed scheme (see Section 3.2.7), with the exception of the Goland and Mullaghagarry accommodation bridges.

### 3.2.13 Landscape Design

Landscape studies were carried out to investigate the potential impacts of the proposed scheme. Following this investigation, a preliminary scheme of landscape planting along the route was developed to reduce the adverse impacts of the construction and operation of the proposed scheme (Chapter 7.0). Landscape proposals will be finalised at the Detailed Design stage.

### 3.2.14 Services

The relevant utility companies have been consulted to identify services likely to be affected and these are outlined in Appendix 3.1. These include Electricity Supply Board power lines, Eircom telephone lines and water supply pipes.

### 3.2.15 Lough Mourne

An Bord Pleanála approved plans in 2005 by DCC Water Services Department to construct dams to raise the water level of Lough Mourne, providing additional storage, by diverting flows from the Bunadaowen River into the Lough. The top water level of Lough Mourne would be raised from approximately 166m AOD to 170m AOD, by damming the Lough at the southwestern end.

At the northern eastern end of the Lough, DCC Water Services Department propose to construct a small retaining dam to prevent the higher waterline from encroaching beyond the existing access road that runs adjacent to the northern eastern bank of the Lough. DCC originally proposed to construct this small dam adjacent and to the east of the existing service road that runs along the eastern shoreline of the Lough. In this location, the proposed dam would have conflicted with the proposed scheme alignment.

To avoid conflict with the proposed scheme, DCC amended the Lough Mourne design proposals slightly. This also assisted DCC in its objective of conserving significant sections of the former railway line in order to safeguard their potential for longer term mixed recreational uses. In this area, the former railway line follows the northern shoreline of the Lough.

The vertical alignment of the proposed scheme will ensure that the road is above the proposed water level of the Lough. Parts of the embankment for the proposed road will encroach into the area that will ultimately come within the higher future waterline resulting in these sections (Ch 650–740 and Ch 1000–1300) of the embankment footings lying within the edges of the Lough, to a maximum depth of 2m. In these areas, the bottom of the embankment, up to the future water line, will be constructed of rock to ensure embankment stability and to allow free movement of water within the embankment construction up to the water line.

Drainage Pond 3 will also require raised bund edges to prevent flooding from the higher waterline.

DCC Water Services Department will also construct an access road along the top of the small retaining dam to facilitate maintenance and provide access to lands in the

vicinity of Lough Hill, south east of Lough Mourne. Access to this small dam will be achieved via a 300m long accommodation road, designed to accommodate large agricultural vehicles, running parallel and immediately adjacent to the southern side of the proposed scheme between Ch 1300 and the Meencrumlin junction at Ch 1600.

Recent communication (October 2007) with DCC has indicated that the Lough Mourne Letterkenny Water Supply Scheme is on the Water Services Investment Programme 2007-2009 to start construction in 2008. It is estimated that it will take 18 months to complete.

### 3.3 Permanent Land Take

DCC, Philip Farrelly and Co. Agricultural Consultants and McCarthy Hyder Consultants, held meetings with directly affected landowners in October 2002 and again in 2006. The findings of these meetings together with previous records of meetings and land registry records have been combined to produce a land ownership mosaic for the proposed scheme.

The boundary of the areas of proposed land take is the proposed permanent fence line. The following parameters have been used to identify the requirement for land take for the proposed scheme:

- Roadway traffic lanes, median, hard strips and verges;
- Maintenance strips;
- Swales;
- Accommodation roads;
- Drainage attenuation measures and watercourse realignments;
- Landscaping and planting;
- Acquisition of small unviable landlocked parcels of land;
- Construction site compounds in use during construction; thereafter landscaped;
- Working space;
- Traffic diversions required during the construction of the scheme.

The location of possible construction compounds (indicated on Figure 3.2) can be accommodated within the proposed land take. The total permanent land-take for the proposed scheme is 118 ha, with 113 ha of this, being agricultural land.

The proposed scheme will require the acquisition and demolition of 2 properties at Ch 6200 and Ch 7800.

#### 3.3.1 Accommodation Roads

The land ownership mosaic together with recorded views of affected landowners has been used to establish access requirements and to evaluate side road and mainline realignments. The suggestions received have been evaluated and, where practicable, incorporated into the preliminary design to mitigate impacts.

The accommodation roads proposed will:

- Ensure landowners have access to the Local Road network in the area;

- Ensure efficient access between multiple land parcels owned by any one landowner is achieved; and
- Reduce the total number of direct accesses onto the proposed scheme.

Access roads will be provided, built mainly parallel to the proposed scheme. Access roads are shown on Figure 3.2. These roads will access the local road network or cross the proposed scheme. Where justified an accommodation bridge will provide private means of access to the opposite side of the proposed scheme as described in Section 3.2.7.

### 3.4 Differences with the Preferred Route

The design of the road, junctions, bridges and side road crossings progressed during the Preliminary Design Stage from the Preferred Route identified following the Route Selection Study in 2001 (McCarthy Hyder Consultants) (see Chapter 2.0 Background to the Project for more details). This allowed the development of the Preliminary Design, to achieve the objective of providing a bypass and also to address environmental issues. As a result, the proposed scheme varies from the Preferred Route at a number of locations. A brief description of the differences is presented below.

#### 3.4.1 Severance of the Local Road Network and Access to Agricultural Land

Generally, the existing local road network has been retained intact, by the provision of a means of crossing the proposed road via bridges or passing through roundabouts. During the Preliminary Design Stage an additional underbridge was added at Daisy Hill (Ch 9600) to reduce local community severance, particularly for residents in Navenney. This underbridge replaces a link to Coach Road from the new junction at Navenney, which had originally been proposed in the Route Selection Report to reduce community severance in this area.

For reasons of road safety and the protection of capacity, no direct access will be provided from the proposed scheme to private land or residences, between the proposed Meencrumlin junction and the proposed Kilross roundabout. Following discussions with landowners, access to agricultural land has been incorporated within the proposed scheme as described in Section 3.3.1.

#### 3.4.2 Environmental Constraints

The alignment at Goland was investigated as the following constraints were identified:

- Two Recorded Monuments to the north ((RMP 1) Standing Stone - DG077-029) and south ((RMP 2) Cashel – DG077-015) of the disused railway line lie within this area. Archaeological test excavations carried out in 2005 (see Chapter 10.0) determined that the 'standing stone' (RMP 1) was in fact of no archaeological significance).
- There is a large section of disused railway line in this area, which is of ecological value as a wildlife corridor and a landscape feature. Retention of hedgerows will be optimised where possible.
- Within the Ballybofey-Stranorlar Local Area Plan 2004-2010, Policy CO16: Former railway lines states that it is an objective of the Council to ensure that significant sections of the former railway line are conserved intact, in order to safeguard their potential for longer term mixed recreational uses.

Alternative options were therefore investigated in this area with the objective of minimising the impact on a local residence, archaeological sites, the disused railway and agricultural land. Options were considered to the north and south (Figure 3.7). The route to the north was considered to have the least impact on archaeology, ecology, farm severance, landscape and the disused railway line. However it was identified that it will have a significant impact on the residential property. Overall the northern alignment will have a lesser impact and was therefore recommended, with mitigation to minimise impacts on the property. The alignment was therefore moved northwards between Ch 4500 and Ch 5800, by approximately 35m. Between Ch 5800 and Ch 7400, the alignment was moved northwards by approximately 15m to reduce the impact on the disused railway.

### 3.4.3 Engineering Constraints

#### **Road Cross Section**

In order to conform with NRA DRMB road standards, the proposed road type for the proposed scheme has been converted from a Standard Single (S2) Carriageway / Wide Single (WS2) Carriageway between Meencrumlin and Kilross to a Type 2 Dual Carriageway Road type. This has resulted in additional land being required both for the wider carriageway area and for the inclusion of the grade-separated junctions at Meencrumlin and Navenny.

#### **Meencrumlin / Croaghonagh**

Between Ch 2500-4000 the proposed scheme was moved northwards by approximately 20m to alleviate earthworks difficulties. The proposed scheme will now follow the line of an existing vehicular road which itself will be reinstated to the north of the proposed scheme

#### **Dreenan**

Between Ch 9600-10500, the proposed scheme was moved to the northwest approx 35m to alleviate earthworks difficulties.

#### **Kilross Junction**

The Preferred Route included a staggered major/minor priority junction at Kilross. In the proposed scheme, this has been changed to an 80m-diameter approx roundabout following a detailed traffic analysis of the junction and the conversion to a Type 2 Dual Carriageway. The proposed roundabout will require street lighting.

#### **Stranorlar Junction**

The at-grade roundabout that forms Stranorlar junction has been increased in diameter to 80m following detailed traffic analysis. This is to reduce queuing on the proposed scheme from the south. The proposed roundabout will require street lighting.

### 3.4.4 Road Safety Audit

A Stage 1 Road Safety Audit Report was prepared for the N13/N15 by Hyder Consulting in November 2002 (when the cross section proposed for the bypass was a single carriageway) and again following the conversion of the proposed scheme to a Type 2 Dual Carriageway road type in March 2007.

Safety issues identified in the Type 2 Dual Carriageway Road Safety Audit included:

- Introduction of kerbed splitter islands at roundabouts to increase vehicle path deflection and provide safe means of pedestrian crossing;

- Provision of additional visibility at some side road junctions;
- Amendment of the Kilross Roundabout to accommodate safe vehicular access to existing houses located immediately to the east of the roundabout.

## 3.5 Construction of the Proposed Scheme

### 3.5.1 Programme

Subject to the satisfactory completion of the statutory procedures and to the availability of finance, it is anticipated that construction work will begin in early 2010. The construction period is anticipated to last approximately 2 years, with the road opening in late 2011 or early 2012. Normal hours of work will be as those defined in Table 1: Maximum Permissible Noise Levels at the Façade of Dwelling during Construction (*Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (Rev. 1, National Road Authority, October 2004). These are presented in Chapter 12.0 Noise and Vibration.

Construction works will be expected to be ongoing for longer periods in areas of major earthwork activity, areas of poor ground, and locations where large structures are required. This will include areas of large cut / fill particularly along the section of the proposed scheme between Meencrumlin junction and Goland through Crockenbrack Forest and peat bog and also the construction of the River Finn bridge.

Where restrictions may be placed on the Contractor due to seasonal constraints, consideration will be given to advance works being undertaken where appropriate.

Although tourism is an important factor in the local economy, it is not considered that construction will have a significant effect on the tourist industry and no significant restrictions will be placed on the construction programme to accommodate peak tourist seasons.

### 3.5.2 Material Requirements and Waste Disposal

The construction of the proposed road will require an earthworks operation comprising the following elements:

- Volume of suitable material & rock excavated: 0.69M m<sup>3</sup>
- Volume of material required for embankment construction: 1.24M m<sup>3</sup>
- Volume of topsoil used for landscaping: 0.10M m<sup>3</sup>
- Volume of unsuitable material used for landscaping: 0.17M m<sup>3</sup>
- Volume of unsuitable material to be disposed of: 0.05M m<sup>3</sup>
- Volume of suitable material to be imported to site: 0.55M m<sup>3</sup>

The above quantities will be reviewed at the detail design stage.

For the minimal net requirement of imported material, potential primary sources of the imported fill material will include local commercial quarries.

Sourcing of materials for construction of embankments and road surfacing will be determined by the Contractor, subject to the necessary statutory procedures.



Concrete will be required throughout the construction period. Demand will be greatest during the bridge construction works. Concrete may be ordered from local suppliers or batched on site.

It is anticipated that the majority of material made available from excavation activities will be used in the construction of either the main earthworks or landscaping. Consideration will be given to using any material remaining after completion of the permanent works for agricultural/ecological improvement works in accordance with local planning controls. The final option will be disposal, which will be in accordance with waste management legislation.

It is likely that the mass haulage of earthworks will be carried out along the haul routes within the fenced off area required for construction. The local road network will therefore be largely unaffected by the bulk of the earthworks.

### 3.5.3 Construction Compounds

Construction compounds will include stores, offices and plant storage. These will be located away from sensitive areas where possible. Following construction, these areas will be cleared and reinstated by the Contractor. The proposed scheme indicates a possible location for the main site office at Ch 9800, in Dreenan, on the northern side of the road. The site lies within the intended land take for the proposed scheme and could be accessed directly from the works and from the local road network via a short temporary road within the works to Daisy Hill road. A second possible compound location is east of the proposed scheme at Ch 12700.

### 3.5.4 Construction Traffic

Construction traffic will be generated by movement of material, equipment and supply vehicles. A small amount of traffic will be generated by site personnel.

Primary access to the site for all construction vehicles will be provided from the N15 (west) from Donegal, the N15 (east) from Lifford and the N13 (north) from Letterkenny. These routes are all National Primary Routes and, generally, of sufficient width and condition to accommodate construction traffic without causing adverse effects to nearby property or delays for road users.

Secondary access to certain areas of the site will be permitted from local roads that are capable of accommodating two-way traffic, without vehicles having to give way to allow others to pass. Within the site the majority of construction traffic will use haul roads along the road corridor itself, for access.

The proposed major access roads for construction traffic to the proposed scheme are illustrated in Figure 3.8.

Construction traffic will have to access the site to the southern side of the River Finn by travelling through the Twin Towns, as it is likely that the proposed bridge will be completed towards the end of the construction period. Measures to reduce the impact of construction noise and dust will include road sweeping in the vicinity of site entrances, and working hours limited to those provided in Table 1: Maximum Permissible Noise Levels at the Façade of Dwelling during Construction (*Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (Rev. 1, National Roads Authority, October 2004) (See Chapter 12.0 Noise and Vibration). Mitigation measures are discussed further in Chapter 12.0 Noise and Vibration and Chapter 11.0 Air Quality.

The Contractor will be responsible for daily inspection and maintenance of roads used by construction vehicles to ensure that they are free of construction debris, dust and mud. Mitigation measures are discussed further in Chapter 11.0 Air Quality.

### 3.5.5 Temporary Road Diversions

The locations on the proposed scheme where side roads and access roads requiring temporary diversions to facilitate construction of the proposed scheme are listed below. These diversions will be accommodated within the land-take required for construction of the proposed scheme.

All diversion routes will be properly sign-posted. The areas requiring temporary traffic management measures include:

**Table 3.2 Temporary Diversions Required**

Location		Temporary Diversion Required
Ch	Description	
4270	Forestry Road	200m Off-line diversion during the construction of an online bridge.
6230	Local Road in Meenglass	200m Off-line diversion during the construction of an online bridge.
7190	Local Road in Carrickmagrath	200m Off-line diversion during the construction of an online bridge.
7900	Trusk Road	200m Off-line diversion during the construction of an online bridge.
9570	Daisy Hill	During the construction period of an online bridge, traffic can be redirected onto local road that crosses the proposed scheme at Ch 9070. No Temporary diversion road required.
10700	Local Road in Edenmore	200m Off-line diversion during the construction of an online bridge.

### 3.5.6 Construction Workers

It is estimated that 450 people will be employed directly or indirectly in the construction of the scheme. Temporary construction employment may be generated locally.

### 3.5.7 Construction Works

The Contractor will prepare an Environmental Operating Plan in which the proposed methodology, programming and working practices will be described, in accordance with the NRA Guidelines (NRA, 2007).

The following outlines the likely construction works, general impacts and mitigation measures that will be employed.

Fencing will be erected to mark the land take boundary. Further archaeological surveys and testing will be undertaken in order to resolve archaeological issues (see Chapter 10.0). Site clearance, including vegetation clearance, will be undertaken involving the use of large machinery and vehicles. The construction compounds will be created for site offices, material storage and site vehicles. Where necessary, services will be diverted.

The main areas of earthwork activity within the proposed scheme are summarised below.

- Cut Between Ch 2170-2500 (Crockanbrack Forest)
- Cut Between Ch 8240 -9200, Mainline + Side roads (Navenny)
- Cut Between Ch 9990-10550 (Dreenan)
- Fill Between Ch 10550-11980 (River Finn flood plain)
- Cut Between Ch 13910-14870 (Mullaghagarry Forest)

Materials brought to site will include pre-cast concrete structures, materials for the road pavement, cement, hard core/gravel, pipes, chemicals and oils. The construction of the road and associated structures including bridges and river crossings will involve earth movements, crossing services, site drainage and run-off, de-watering operations, working near or within watercourses, working on flood plains and laying the road pavement.

The majority of the major earthworks required for landscaping will be undertaken during the main construction phase. Landscaping works will be included as part of the main construction contract (see Chapter 7.0 Landscape and Aesthetics).

#### **River Finn Crossing**

The Preliminary Design of the bridge over the River Finn indicates a three span structure with a total length of 170m. The central span of 80m will be of sufficient length to span the main river channel and leave a minimum of 5m natural bank path for mammals and anglers and to enable natural vegetation. The 45m side spans will provide free movement for landowners, as well as sufficient open cross section to allow for floodwaters during periods of heavy rainfall. Mitigation measures will be put in place to avoid disturbance of the riverbank in the vicinity of the bridge during construction. Mitigation measures are discussed further in Chapter 9.0 Ecology (Flora, fauna and fisheries).

#### **Lough Mourne Proposals**

Construction of the dams to raise the water level of Lough Mourne is expected to commence in 2008 and last for approximately 18 months (see Section 3.2.15). As identified previously, the mainline of the proposed road will be above the proposed water level of the Lough. However, parts of the embankment for the proposed road will encroach into the area that will ultimately come within the higher future waterline resulting in these sections (Ch 650-740 and Ch 1000-1300) of the embankment footings lying within the edges of the Lough, to a maximum depth of 2m. Drainage Pond 3 will also require raised bund edges to prevent flooding from the higher waterline.

Prior to the start of construction of the proposed scheme, a detailed method statement will be prepared. This construction method statement will be prepared in consultation with the relevant authorities and include mitigation measures to prevent contamination of the Lough Mourne public water supply. Further details are provided within Chapter 8.0 Surface Water Quality and Drainage.

#### **Assessment of Effects and Mitigation Proposals**

Details of the predicted impacts and mitigation associated with the construction of the proposed scheme are included within the relevant Chapters. The environmental measures detailed within the EIS will be implemented as an integral part of the

proposed scheme. Further details of environmental commitments are given in Chapter 15.0.

Construction effects are generally of short-term duration and are localised in nature. In considering the possible methods of mitigation it is necessary to balance the severity of the impact with its duration. For example, it may be better to cause greater disruption over a shorter period than less disruption over an extended period. Disturbance arising from construction may result from various activities including preparatory works, diversion of services, noise and vibration from plant, excavation and fill operations, spoil disposal, stockpiling and handling, construction traffic, severance of roads and accesses and the duration and timing of construction.

Disruption due to construction can be mitigated to a certain extent by imposing working restraints within the contract documentation and Contractor's Environmental Operating Plan (EOP). The National Roads Authority has recently (2007) produced guidance on the creation, implementation and maintenance of an EOP. These restraints, however, will not prevent the Contractor fast tracking construction in certain areas to allow the potential for early delivery of the project. Mitigation will include:

- Working in accordance with relevant legislation;
- Adopting good working practices;
- Adequate site supervision;
- Development of working methods to protect areas of importance;
- Programming and methodology to minimise environmental disturbance (e.g. working hours, avoiding ecologically sensitive periods);
- Pollution control measures, management of site drainage and run-off. Where possible, drainage will be installed early on in the contract;
- Access to agricultural holdings and property will be maintained where possible;
- Local liaison and involvement of regulatory bodies;
- Appropriate traffic management and signing (including restricting heavy construction traffic to approved routes and access points);
- Supervision and control of deliveries and storage;
- Covering loads and stockpiles;
- Damping down during dry weather conditions; and
- Sweeping of roadways.

### 3.6 Operation and Maintenance

During a period of 24 months after construction, remedial and maintenance works will be undertaken as required. During the period of establishment, landscaping maintenance will be carried out.

Routine maintenance on National Primary Roads is normally undertaken by the Local Council. In general, routine maintenance comprises grass cutting, road sweeping, gully emptying, street light maintenance and landscape maintenance. A separate maintenance procedure will be adopted to maintain the central barrier.

### 3.7 References

Department of the Environment (1999 and revisions), Traffic Signs Manual.

Donegal County Council (2005), Ballybofey-Stranorlar Local Area Plan 2004-2010

EU Habitats Directive (92/43/EEC)

McCarthy Hyder Consultants (2001), N15 Ballybofey / Stranorlar Bypass Route Selection Report

McCarthy Hyder Consultants (2007) Road Safety Audit Report

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National Roads Authority (2002). Design Manual for Roads and Bridges. April 2002 and subsequent revisions.

National Roads Authority (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (Rev. 1)

National Roads Authority (2004) Environmental Assessment and Construction Guidelines.

National Roads Authority (2007) Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.

## 4.0 Planning

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### 4.1 Introduction and Methodology

The purpose of this planning policy appraisal is to provide relevant information on national/regional/local planning policy objectives, particularly relating to the built and natural environment of the local area that the Preliminary Design for the N13/N15 Ballybofey/Stranorlar Bypass may have an impact on. Full details of the Preliminary Design are presented within Chapter 3.0 (Description of the Preliminary Design).

### 4.2 Scope of the Planning Policy Appraisal

The following Chapter will provide a summary of national, regional and local planning policy relevant to the N13/N15 Ballybofey/Stranorlar Bypass and surrounding area. Policy will then be reviewed at each spatial scale. The implications of specific legislation and guidance relating to air quality; water quality; noise; geology; ecology; landscape and cultural heritage have been reviewed within other Chapters of this Environmental Impact Statement to which reference should be made.

The Preliminary Design lies entirely within the County of Donegal, within the wider Border, Midland and Western (BMW) Region. The region had European Objective 1 Status until the end of 2006 and is now a 'Phasing in Region' under the transitional arrangements.

### 4.3 Planning Policy Context

#### 4.3.1 National Planning Policy

The national level planning policy documents relevant to the Preliminary Design include:

- National Development Plan (NDP) 2007-2013
- Reform of the Structural and Cohesion Funds 2000–2006, and the Third Report on Economic and Social Cohesion (MRA & EU, 2003)
- National Spatial Strategy for Ireland 2002-2020: People, Places and Potential
- Department of Transport – Statement of Strategy 2005–2007
- Sustainable Development: A Strategy for Ireland
- Making Ireland's Development Sustainable (2002)
- Transport 21

The above plans and strategies are reviewed in depth below.

#### National Development Plan 2007–2013

The National Development Plan (NDP) sets out a programme of integrated investments for €184 billion over the next 7 years that will underpin Ireland's ability to grow in a manner that is economically, socially and environmentally sustainable. Investment will be in education, science, technology and innovation in order to provide an improved quality of life for all. The plan recognises that the past decade has seen tremendous economic and social progress in Ireland giving foundations of a truly modern, forward

looking, internationalised society but that further investment is required with the following principles:

- Eliminate major infrastructure deficits
- Ensure the enterprise sector remains at leading global edge
- Remember economic and social progresses are inter-dependent
- Develop in accordance with the National Spatial Strategy (NSS) to achieve a balanced regional development
- Prioritise the protection, preservation and improvement of the natural environment, with long-term sustainable development underpinning policy planning and implementation
- Ensure value for money and implementation for the taxpayer
- Ensure development is necessary and affordable
- Support development by prudent budgetary and fiscal strategy
- Reflect consensus on priority areas

Environmental sustainability is addressed in the Plan with 1 of the 14 chapters addressing in broad terms the impact of the plan on the environment and how this will and should be addressed. This chapter also highlights the three challenges the Environmental Protection Agency set in its State of the Environment Report, Ireland's Environment (2004) of:

- Meeting international commitments on air emissions, especially greenhouse gases and acidifying gases
- Combating eutrophication of surface waters
- Managing waste flows effectively

The Plan also includes an Environment Research sub programme that will spend €93 million on environmental research over the period of the Plan.

The Plan highlights that a good transport infrastructure is crucial to the promotion of national competitiveness and sustainable development and therefore that it is important to remove the remaining infrastructure bottlenecks that constrain Ireland's economic development and inhibit balanced regional development and environmental sustainability. The Plan states how vital for rural communities that weaknesses in transport infrastructure and services continue to be addressed. Transport 21 is encompassed into the Plan, which will help achieve improved rural transport through the upgrading of national primary and secondary routes with particular regard to enhancing connectivity for rural areas within the Gateway / Hub town catchments. The Plan also states how important investment in Ireland's very extensive non-national (regional and local) road network with 11,630 kilometres of regional road and 78,972 kilometres of local road.

The Plan also notes the major investment in transport infrastructure that took place between 2000-2006. However, it states that this must now be built on and accelerated to achieve the overall objective of a further massive enhancement in the transport network by 2013. Investment in transport infrastructure over the Plan period will total nearly €33 billion of which €13.3 billion will be invested in upgrading and building new national roads, €4.3 billion in non-national roads and €90 million invested in the Rural Transport Initiative. The Roads sub-programme has a total of €17.6 billion for investment. The roads sub-programme principal objectives are:

- Completion by 2010 of the major inter-urban routes linking Dublin with Belfast, Cork, Galway, Limerick and Waterford
- The upgrade of the M50 by 2010 which will convert to barrier free tolling in 2008
- Improvement of road links between National Spatial Strategy Gateways
- Ongoing development of the Atlantic corridor from Letterkenny through Sligo, Galway, Limerick, Cork and Waterford
- Continued upgrading of road links to Northern Ireland
- Targeted improvements of a number of key national secondary routes
- Improvements and maintenance of the non-national roads network
- Investment in strategic non-national roads which will complement the national roads investment

### Reform of the Structural and Cohesion Funds 2000–2006, and the Third Report on Economic and Social Cohesion (MRA & EU, 2003)

These documents identify that investment in roads is critically important. In particular the completion of the National Primary route programme is required to ensure that major towns are attractive to inward investment.

### National Spatial Strategy for Ireland 2002-2020: People, Places and Potential

The National Spatial Strategy for Ireland (NSS) is a broad planning framework designed to achieve a better balance of social, economic, physical development and population growth between regions. The aim is to achieve this by identifying development patterns for different areas and setting indicative policies for the location of different types of development for the period up to 2020.

The Strategy is supported by regional planning guidelines, integrated planning frameworks, and county and city development plans and strategies, all of which will extend the impact of the NSS at regional and local levels.

The NSS guides future infrastructural, industrial, residential and rural development while providing protection for Ireland's cultural, natural and environmental heritage, promoting social inclusion and enhancing quality of life. Through closer matching of where people live with where they work, different parts of Ireland will, in the future, be able to sustain a better quality of life for people; a strong, competitive economic position; and an environment of the highest quality.

One of the main aims of the NSS is to allow balanced regional growth outside of the Dublin area by allowing the strengthening and revitalisation of the target areas.

The NSS recognises the particular relevance of physical networks of infrastructure such as roads, public transport, energy and communications in achieving this aim, since these have influenced and continue to influence the location, timing and extent of development. As such it has identified transportation and roads as key elements within the infrastructure of the country. The Strategy also recognises that highly developed infrastructures are features of strong economic performance and balanced regional development.



Referring specifically to the Border Region, the Strategy identifies the N13/N15 as a Strategic Linking Corridor, providing road access internationally to and from Gateways (of which Letterkenny is one), Hubs and other areas in the vicinity of the Border.

Ballybofey is identified as one of a number of centres that have built up important functions in a variety of areas including tourism, retailing and employment in a range of enterprises. The national transport framework envisaged by the NSS will support the development of such functions in the future through quality development, physical attractiveness and joint promotion.

### Department of Transport – Statement of Strategy 2005-2007

The Department of Transport Statement of Strategy for the period 2005–2007 restates the five High Level Goals established in the 2003-2005 Strategy. These are summarised as follows:

- Integration - ensuring an integrated approach to the development and delivery of transport policy. This is by providing a coherent policy framework covering all modes of transport and by the integration of transport policies with other Government policies, particularly balanced regional development, social inclusion and sustainable development;
- Investment - the improvement of accessibility, expansion of capacity, increased utilisation and enhanced quality of the transport system by delivering a prioritised transport investment programme;
- Safety - ensuring that transport infrastructure and services are provided, managed and used in a manner that protects people from death and injury;
- Competition, regulation and reform - enhancing the efficiency and effectiveness of the delivery of transport services through competition, economic regulation and structural reform of State Agencies; and,
- Delivery - ensuring the Department is organised, resourced and developed to deliver quality services to their external and internal customers.

The Strategy sets out guiding principles, which should underpin the Departments work, not only for period of the Strategy but into the future:

- To facilitate access;
- To maintain and improve the national network as necessary;
- Support land use and spatial planning;
- Optimise the use of the network;
- Strive to minimise the adverse impacts of transport activity;
- Contribute to social inclusion;
- Influence and take account of EU and other international developments in transport;
- Implement policies and investments in a coherent and prioritised way and in a manner that gives value for money.

Section 8 of the Strategy details objectives for Road Transport. The Department recognises that a safe and efficient road network is important to the development of the national economy. To that end it is committed to working with the National Roads Authority to implement the road construction programme within the NDP, and therefore the Preliminary Design for the N13/N15 Ballybofey/Stranorlar Bypass.

As the period of this current Strategy is nearing its end, the Department of Transport is required to prepare a revised Strategy Statement for the period 2008-2010. A period of public consultation on the revised Strategy Statement has recently ended. Following submissions received, the revised Strategy Statement must be with the Minister by 14<sup>th</sup> December 2007 and is likely to be published soon after that.

## Sustainable Development: A Strategy for Ireland, 1997

The need to help economic growth and development to be more environmentally friendly has lead to the preparation of a National Sustainable Development Strategy entitled 'Sustainable Development: A Strategy for Ireland' (The Department of the Environment, Heritage and Local Government (1997)). The Strategy 'addresses all areas of Government policy and of economic and societal activity, which impact on the environment'. The Strategy aims to re-focus policies as necessary to ensure that growth and development in Ireland will be environmentally sustainable as far as possible.

The Strategy focuses on specific strategic sectors including the transport sector and sets out an agenda for a more sustainable transportation system in Ireland. This includes making transport more efficient through reduced congestion and reduced emissions through improved vehicle technology.

The Strategy recognises that while road development does have environmental impacts, Government policy and investment for road transport will support necessary economic growth for the country by targeting bottlenecks, which represent inefficiencies in the infrastructural system.

## Making Irelands Development Sustainable, 2002

Against the background of developments that have been made in relation to sustainable development and the publication of 'Sustainable Development: A Strategy for Ireland' in 1997, the document 'Making Irelands Development Sustainable' (2002): Department of the Environment and Local Government aims to:

- Review progress with sustainable development in Ireland since Rio;
- Assess the challenge we now face; and
- Set out policies and actions to meet the challenge.

The Report focuses on the link between economic activity and pressures on the environment due to the level of economic growth in Ireland since the early 1990's. The report also recognises the progress made with protection of the environment since 1992 with improvements to river quality, air and water quality and waste recycling levels. However, it also recognises the ever-growing pressures on the environment such as growing energy consumption, rising greenhouse gas emissions and the impact of growing housing demand.

In looking to meet the challenges faced, the report states that the 'Government will aim at improving the quality of life now and for future generations by:

- Promoting and securing a high quality environment;
- Keeping the economy competitive in a rapidly changing world;
- Providing a strong basis for further economic prosperity;
- Bringing about a fairer and more inclusive Ireland; and
- Contributing well to sustainable development at the global level'.

In summary, the report recognises the importance of Ireland's environment as a resource in its own right and as an essential asset for economic progress.

## Transport 21

Transport 21 is the capital investment programme through which the transport system in Ireland will be developed over the period 2006-2015. The projects and programmes that make up Transport 21 will aim to:

- Increase accessibility;
- Ensure sustainability;
- Expand capacity;
- Increase use; and
- Enhance quality.

The ten-year investment framework outlined by Transport 21 totals some €34 billion over the investment period and provides funding specific to this statement to:

- Complete the development of the inter-urban motorway network by 2010;
- Bring about improvements in the rest of the national road network, focusing particularly on the balanced regional development objectives of the NSS and on the needs identified in the National Roads Needs Survey; and
- Deliver a sustainable transport system that balances social, economic and environmental considerations.

There are two investment programmes under Transport 21: A National Programme and A Greater Dublin Area Programme. Under the National Programme, the following objectives are identified:

- To create a high quality, efficient national road and rail network consistent with the objectives of the NSS;
- To provide for a significant increase in public transport use in provincial cities;
- To strengthen the national, regional and local public transport services; and
- To enhance safety and security facilities at regional airports.

## Summary of National Policy Impacts

Having regard to the Preliminary Design it is considered that it is in accordance with many of the aims and objectives set out in National Planning Policy and Strategy.

The N13/N15 Ballybofey / Stranorlar Bypass proposal is directly referenced in the National Development Plan under the National Roads Programme. The NDP recognises the need to address the current infrastructure deficit and congestion in major urban areas through investment in road infrastructure. The NDP links this investment strongly to improving the economic competitiveness of the Country.

Within the National Spatial Strategy, the N13/N15 route is identified as a Strategic Linking Corridor and again, the Strategy recognises the need for a Quality Road Network to ensure economic competitiveness.

The Preliminary Design is also in line with a number of the goals set out in the Department of Transport Statement of Strategy including investment, integration and safety. The Strategy also clearly states the Departments support and commitment to the National Roads Programme.

In relation to sustainable development strategies the Preliminary Design is in accordance with a number of objectives including the need to make transport more efficient, and whilst minimising environmental impacts of road infrastructure, recognise the economic benefit of such improvements.

#### 4.3.2 Regional Planning Policy

The Preliminary Design is located within the Border, Midlands and Western (BMW) Region of Ireland. The main policy and strategic documents, within the region, include:

- Draft Border, Midlands and Western Operational Programme 2007-2013;
- Regional Planning Guidelines for the Border Region 2004; and
- Western Development Commission Strategic Statement 2007-2009.

As with the national level policy, these documents are reviewed below before a summary of the N13/N15 Ballybofey / Stranorlar Bypass compliance to regional policy is provided.

##### Draft Border, Midlands and Western Operational Programme 2007-2013

The Government's objective for regional policy is: to achieve balanced regional development in order to reduce the disparities between and within the two regions (South East and BMW Regions); and to develop the potential of both to contribute to the greatest possible extent to the continuing prosperity of the country. Policy to this end will be advanced in parallel with policies to ensure that development is sustainable, with full regard to the quality of life, social cohesion and conservation of natural and cultural heritage.

The agreed vision for the BMW Region is to develop: 'An innovative, knowledge based and competitive Region, with a high quality environment, first class infrastructure, visionary leadership and a quality of life for its citizens that is among the highest in the world'. The objective of the Operational Programme is: "to facilitate innovation, ensure sustainable development, improve accessibility and develop the urban fabric within the region, in order to enhance overall productivity and competitiveness."

The Programme recognises:

- The weaknesses of the BMW Region in terms of raising its research and innovation capacity, increasing entrepreneurship and attracting investment for high potential start up companies.
- The environment of the BMW Region is generally of high quality in most respects. The quality of the environment and diversity and sustainability of energy supply are important determinants of the quality of life for the inhabitants of the Region, as they increase the attractiveness of a Region for people to invest in, visit and locate.
- There is increasing emphasis at EU level on environmental protection and the promotion of the use of sustainable sources of energy supply.
- The BMW Region is sparsely populated and essentially rural in character.
- The combination of small town size, wide population dispersal, the presence of agricultural land and structures and infrastructure deficit are critical issues.
- The provision of an efficient, flexible and safe transport infrastructure is a necessary pre-condition for economic development as it boosts productivity, and thus the development prospects of Regions concerned, by facilitating the movement of people and goods.

- Development of regional transport infrastructure with economically vital road links and enhanced access to public transport are economically vital for the BMW Region.

The Programme notes the challenges that face the BMW Region in order to address its weaknesses and protect its strengths in order to ensure the achievement of the Regions vision. The following priority objectives have therefore been developed:

- To enhance the research, innovation and ICT infrastructure and capacity of the Region, to promote entrepreneurship and enterprise development and to support collaboration and technology transfer between research institutions and the business sector that responds to the economic development needs of the region.
- Contribute to sustainable development of rural areas and the protection and enhancement of the rural environment by protecting surface and groundwater from pollution. Stimulate energy efficiency, renewable energy production and the promotion of clean and sustainable urban transport.
- To strengthen the spatial structuring of the BMW Region by investing in integrated sustainable initiatives in order to enhance the competitiveness, accessibility and social cohesion of the regional growth centres and to modernise the region's transport infrastructure.

## Regional Planning Guidelines for the Border Region

Following the publication of the National Spatial Strategy (NSS) in 2002 (detailed above), each of the Regional Authorities were required to prepare and adopt Regional Planning Guidelines to provide a long-term strategic planning framework for the development of the region for the next 20-year period by allowing the implementation of the NSS at a Regional Level. The Regional Planning Guidelines for the Border Region (2004) (known hereafter as the RPG) contain strategic policy directions that cross the boundaries of the individual counties and will later be incorporated into County policies and other Development Plans in the Region.

The Vision for the Border Region set out in the RPG states 'By 2020 the Border Region will be a competitive area recognised as, and prospering from, its unique interface between two economies, where economic success will benefit all, through the building of distinct sub-regional identities, in an outstanding natural environment, with innovative people, which in themselves, will be our most valuable asset'. Key to achieving this vision is quality infrastructure.

Section 1 of the RPG identifies 9 key Strategic Goals that provide a framework for the way forward for the Region:

- Implement the NSS in the Region through promoting the development of critical mass in the three new Gateways. Identifying and prioritising investment in physical, social and economic infrastructure in these Gateways, over the period of the current and subsequent National Development Plans and supporting the role of other Key Towns identified in the NSS.
- Identify, prioritise and assist in achieving the delivery, including their co-ordination, of the networks of physical, social and economic infrastructure, which have an inter-county and inter-regional dimension comprising of the following key infrastructural areas; transportation, energy, communications, waste management facilities, health, education, culture and social facilities.
- Provide a long term Regional Spatial Framework, which in addition to Gateways and Hubs of the NSS, work towards identifying a hierarchy of regionally significant settlements. This hierarchy would include settlements with a range of

economic, social and cultural functions, the different types of rural areas in the Region and associated rural development strategies, the uniqueness of the Gaeltacht and connectivity with other regions, and regionally significant areas of archaeological, architectural, natural and cultural heritage.

- Develop Gateways and Hubs to achieve a sustainable population distribution, which supports "a living countryside", a network of smaller towns and villages, and a stabilised rural population.
- Foster the development of the Regions' most valuable asset, its people, and to support innovation, quality of life and wellbeing of the regions people.
- Co-ordinate the pursuit of interdependent strategies for the economic, social and cultural development of the Border Region along with Northern Ireland.
- Integrate effectively in a productive and mutually beneficial manner, Cross Border Spatial Development Strategies, in particular with the key strategies emanating from the Shaping Our Future: Regional Development Strategy for Northern Ireland, 2025 and associated interregional development initiatives, and to support and promote strategic links between the two economies.
- Integrate effectively with and have greater coordination between the other Regions in Ireland.
- Undertake regular monitoring and review of the performance of the Regional Strategy against the Strategic Goals.

These Strategic Goals and the RPG are underpinned by the following principles:

- Adherence to NSS as a model of development.
- Connectivity.
- Strong urban structure (positivity) and sustainable rural areas as a future development scenario.
- Subsidiarity.
- Sustainability.

The RPG identifies three sub-regions for the area. The N13/N15 Ballybofey / Stranorlar Bypass lies within sub-region 1. Within sub-region 1, the key settlement is identified as the linked gateway of Derry and Letterkenny, with Ballybofey / Stranorlar identified as a medium sized town. The guidance identifies peripherality as an issue within the sub-region with the necessity for key infrastructure links being a priority. Such investment in infrastructure is considered key to economic development of the region.

Effective infrastructure is seen as a pre-condition for achieving the strategic goals, and that the lack of connectivity due to an infrastructure deficit in the Region is a key issue which needs to be addressed through the NDP and NSS. In view of this the Border Region Regional Authority (known as the Authority) has the critical enabling investment priority of National Primary Routes Development, in particular motorway access between key urban areas. Section 6 of the RPG sets out the following objectives for road transportation in the Border Region:

- Ensure that all strategic radial road and rail routes serving the Region achieve the level of service comparable to other strategic radial routes throughout the rest of the country, within the timeframe of these Guidelines.
- Prioritise the development of all national routes, primary and secondary
- Address the challenge of achieving similar quality radial road and rail links, with and through Northern Ireland.

- Support the provision of motorway access to the North West and West of the Region in the short to medium term, specifically the N4 Kinnegad to Sligo, which should obtain motorway status.

The Authority also calls for the immediate preparation of an Integrated Strategic Land Use and Transportation Framework for the area, which broadly conforms to the NSS, the RPG.

Section 7 of the RPG covers the Environment and Amenities. It recognises that the Region has an excellent environmental quality, which takes in the natural and built environment, coupled with landscapes of outstanding natural beauty, which will require careful management. Further to this there are a number of environmental objectives within the Section, of which some are relevant to the Preliminary Design, including to:

- Ensure that the environment is maintained in a sustainable manner.
- Develop a positive vision for heritage and a regional approach to the management, enhancement and protection of heritage items.
- Support the protection and preservation of geological interest sites
- Support the protection of biodiversity in the Region.

### Western Development Commission Strategic Statement 2007-2009

In this, the third Strategic Statement, the Western Development Commission (WDC) outlines its goals and expected outputs for the western region (counties of Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway and Clare). The core remit of the WDC is to promote the economic and social development of the Western Region with the regions productive sectors, infrastructure and rural communities being of particular concern. The vision for the region within the Statement is of 'A confident and ambitious Western Region where excellence, innovation and creativity are rewarded, and the rich quality of life, clean environment and unique heritage are valued and safeguarded'.

The Strategic Statement is organised around five strategic goals to:

- Contribute to balanced regional development by ensuring that the Western region maximises its full potential for economic and social development.
- Promote the benefits of living, working and doing business in the Western Region.
- Support the sustainable economic and social development of the rural economy.
- Provide risk capital to Small and Medium Sized Enterprises (SME's) and social enterprises.
- Operate the WDC as a competent and effective organisation.

Unlike the previous 2004-2006 Statement, the new Statement does not specifically mention the development of road networks and public transport. However, the Preliminary Design would contribute to balanced regional development and support the sustainable economy.

### Summary of Regional Policy Impacts

The Preliminary Design is in accordance with a number of objectives set out within the Border, Midland and Western Operational Programme. The programme identifies a need for quality physical infrastructure and recognises the increased demand for quality roads in the Region due to population and economic growth.

RPG for the Border Region outlines the delivery of infrastructure as being of key strategic importance. The N13/N15 Ballybofey / Stranorlar Bypass positively contributes to the 'Vision' of the RPG which, when referring to sub-regions identifies road infrastructure as key to economic development, specifically making reference to the development of National Roads. The RPG also refers to the protection of the environment which is a key issue considered throughout the development of the Preliminary Design.

The Preliminary Design is also in accordance with the aims and objectives of the Western Development Commission Strategic Statement 2007-2009. Although very strategic in its nature, the Preliminary Design would be seen to contribute positively to the overall 'Vision' of the Statement and is in line with a number of the goals within the Statement.

#### 4.3.3 Local Planning Policy

The following documents have been reviewed in depth and provide the main local level policy for the area affected by the proposed road.

- County Donegal Development Plan 2006–2012
- Ballybofey Stranorlar Local Area Plan 2004–2010

#### County Donegal Development Plan 2006-2012

The County Donegal Development Plan 2006–2012 (CDDP) was adopted on 11<sup>th</sup> July 2006 and replaces the Donegal Development Plan published in 2000. Each Chapter of the CDDP deals specifically with a certain sector and for clarity this structure has been mirrored in the review below.

##### ***Spatial Strategy***

Chapter 2 of the CDDP sets out the Spatial Strategy for both the urban and rural parts of the County and draws on the provisions of the National Spatial Strategy and the RPG for the Border Region. Within this wider Strategy, Ballybofey and Stranorlar are identified as Towns for Urban Strengthening and as being capable of providing a strong urban structure at the Sub-Gateway level. These Sub-Gateway's are identified as driving development, providing important retail, commercial and public service functions, assisting in promoting, sustaining and diversifying the rural economy, developing a strong urban structure and aiding in the implementation of the retail strategy. The CDDP identifies the N13/N15 as a Strategic Transport Corridor.

##### ***Transport and Communications***

Transport and communication is covered in Chapter 3 of the CDDP, which identifies 'the provision of safe and effective transport systems into and within the County' as the overarching goal'. Major improvements identified to assist in achieving this goal include the N13 (Derry-Letterkenny-Stranorlar) and the N15 (Sligo-Donegal-Stranorlar-Lifford).

Specifically, Policy No. TC1: Strategic Road Network Development, states that the strategic road network development will be progressed by the Council. This includes the improvement and safeguarding of the national roads network in the County. The Council will reserve the routes and acquire the lands necessary to implement the National Roads programme. The N13/N15 Ballybofey / Stranorlar Bypass is identified as a National Primary Improvement.



***Employment Generation and Enterprise Development Strategies***

Chapter 4 of the CDDP refers to policies for Employment Generation and Enterprise Development Strategies, which in places make specific reference to the development of road infrastructure.

Policy EED2: Promotion of Development Corridors for example states that it is the Policy of the Council to support the objectives of 4 development corridors within the County. This includes the southern economic development corridor stretching from Sligo through Bundoran, Ballyshannon, Donegal Town through to Ballybofey/Stranorlar and Lifford and onward to Letterkenny. The CDDP goes on to state that the southern economic development corridor will exploit the opportunities arising from the significant road linkages and bypass improvements.

Policy EED3: Key Interest Centres states that the Council will continue to co-ordinate with the relevant enterprise development agencies, to provide for a number of Key Interest Centres throughout the County. The Business and Industrial Park at Ballybofey/Stranorlar is one of the locations likely to be targeted.

***Environmental Services and Protection***

A wide-ranging suite of policies/ proposals have been developed by the Council for Environmental Services and Protection and these are covered in Chapter 6 of the CDDP.

Policy ESP1 – Environmental Protection, sets out the intention to monitor environmental impacts from human activities in respect of soil, air, and water, and to mitigate against negative impacts through enforcement, licensing and direct intervention.

Policy ESP 2 – Flood Risk and Development. The risk of flooding should be considered in all cases where development is being proposed in the interests of individuals proposing the development and of the public in general. It is the Council's Policy that development should not itself be subject to an inappropriate risk of flooding nor should it cause or exacerbate such a risk at other locations. Provisions are set out, including the statement that appropriately designed development, which is not sensitive to the effects of flooding, may be permissible in floodplains provided it does not reduce the rate and quantity of runoff. The provisions also state that on site storm water ponds to store and/ or attenuate additional runoff from the development should be provided to include Sustainable Urban drainage Systems (SUDS). In addition soak-aways or French drains should be provided to increase infiltration and minimise additional runoff. For developments adjacent to watercourses of a significant conveyance capacity any structures (including hard landscaping) must be set back from the edge of the watercourse to allow access for channel clearance/ maintenance. Development consisting of construction of embankments, wide bridge piers, or similar structures will not normally be permitted in or across floodplains or river channels. All new development must be designed and constructed taking consideration of the following minimum flood design standards:

- For urban areas or where developments are involved – over 100 year flood
- For rural areas or where further developments are not involved – the 25-year flood.

***The Built and Natural Heritage***

Chapter 8 of the CDDP details policies for the Built and Natural Heritage. The Preliminary Design in question may impact on the following objectives set out in this chapter:

- Seek the conservation and wise management of areas of natural environment

- Protect landscapes of highest scenic amenity and views and prospects of specific importance.

Map 9 of the CDDP illustrates conservation allocations. The map shows areas of 'Especially High Scenic Amenity' (EHSA), Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Heritage Areas (NHA) and views and prospects. Indicative areas for the above classifications are shown close to the Preliminary Design with the Lough Mourne area lying within an EHSA, and two views and prospects from the N15 looking southwest towards Barnesmore Gap.

The Map also identifies two Natural Heritage Areas (NHAs) and a cSAC south west of the Preliminary Design. The River Finn is also a cSAC. Due to these designations the following policies are worth considering.

Policy BNH1: Designated Nature Conservation Sites (Habitats) states that it is Council policy to:

- Maintain, and where possible enhance, the conservation value of all the pNHA's, cSACs and SPAs, as well as many other sites that may be proposed for designation
- Ensure development proposals do not destroy or damage any sites of international or national importance, designated for their wildlife/ habitat significance, including pNHAs, cSACs and SPAs.

Policy BNH2 deals with the protection of Trees, Stone Walls and Hedgerows. It is likely that trees and hedgerows will be adversely affected in a number of locations across the Preliminary Design. Details of trees and hedgerows effected and proposed mitigation are provided in Chapter 9.0, Ecology (flora, fauna and fisheries).

Policy BNH5: Landscape Conservation identifies areas of especially high scenic amenity (EHSA) and recognises these as areas of the highest landscape quality in the county, characterised by wilderness and few, if any, manmade structures. It is the Councils policy to not consider favourably development that would restrict, intrude significantly or materially alter any of the views and prospects designated. In particular the Council will seek to preserve the views and prospects of special amenity value and interest, in particular, views between public roads and the sea, rivers and lakes. In this regard, development proposals situated on lands between the road and the sea, lakes or rivers shall be considered on the basis of the importance value of the view in question, whether the integrity of the view has been affected to date by the existing development, whether the development would intrude significantly on the view and whether the development would materially alter the view.

Policy BNH9 states that it is the Policy of the Council to preserve, protect and record the architectural heritage of Donegal for future generations. Measures include protecting structures of architectural, artistic, historical, cultural, scientific, technical value or interest and protecting important non-structural elements of the built environment such as stone walls, pillars and associated boundary conditions, holy wells, mass rocks etc.

Policy BNH16 states that it is the Council policy to protect and enhance the integrity of archaeological monuments and their settings and also to secure the preservation (in-situ, or as a minimum, by record) of all archaeological monuments included in the Record of Monuments and Places and of sites, features and objects of archaeological interest generally. An archaeological assessment is conducted in Chapter 10.0, Architectural, Archaeological and Cultural Heritage.

Other policies of importance include Tourism Policy TOU3, which seeks the provision and maintenance of a high quality transport network and supporting infrastructure and

Policy GCSR23, which looks to develop sport and recreation provision throughout the County.

### **Ballybofey Stranorlar Local Area Plan 2004-2010**

The Local Area Plan 2004-2010 supersedes and replaces the Ballybofey & Stranorlar Development Plan 1996. Planning designations within the vicinity of the Preliminary Design as defined by the Ballybofey Stranorlar Local Area Plan 2004-2010 are presented in Figure 4.1.

The Local Area Plan recognises that Ballybofey / Stranorlar function as a joint settlement linked by Stranorlar Bridge. The towns have developed in a linear settlement pattern along both the River Finn and the N15 and are well placed strategically having regard to their proximity and accessibility to other key centres in the county namely Letterkenny and Donegal town.

The Local Area Plan notes that the census indicates a rise in population from 3047 in 1996 to 3603 in 2002, equivalent to an 18% population increase. These figures are testament to the strong house-building sector in the towns revealed by the construction of a number of large residential developments since 2000. Census figures also indicate a population in the rural hinterland of Ballybofey / Stranorlar providing evidence of a strong and growing rural market and thereby adding to the demand on services, amenities and facilities that are currently provided within the towns.

Traditionally, Ballybofey is the strongest of the towns in terms of its vibrant retail sector having regard to the location of McElhinneys store and a number of smaller scale retail outlets in the vicinity. Donegal County Council's Retail Strategy (2001) indicates Ballybofey / Stranorlar as a higher order centre at tier 3 (which relates to the level of retail floorspace in the settlement with Metropolitan Dublin being Tier 1 and settlements such as Cork, Limerick, Galway and Waterford being tier 2). In this regard, the retail strength of the towns is largely due to the success of the department store, McElhinneys.

#### ***Traffic and Transport***

The strategic traffic and transport objective set out in the Local Area Plan is to take steps to ensure the safe free flow and movement of vehicular and pedestrian traffic throughout the town centre area so as to create improved conditions for commerce and business and to assist in the establishment of improved accessibility for both vehicles and pedestrians to land use zones in the outlying areas of the towns.

The Local Area Plan recognises that Donegal County Council and the National Roads Authority have been preparing a Preliminary Design to provide a bypass for the N15 and N13 national primary roads, around Ballybofey / Stranorlar. The need for the construction of the bypass has been identified in previous County Development Plans and other documents as discussed in Chapter 1.0. The bypass will result in the provision of a high quality strategic route together with the reduction in traffic congestion along the National Roads through Ballybofey/Stranorlar. The Local Area Plan notes that an Environmental Impact Statement was being prepared.

Policies T6 – T9 relate specifically to the construction of the proposed Preliminary Design ensuring that land has been reserved for the N13/N15 Ballybofey / Stranorlar Bypass and that access point into the link road have been identified and therefore the Preliminary Design is in accordance with relevant traffic and transport policies.

#### ***Employment and economy***

The Local Area Plan states that the strategic employment and economy objective is to strengthen the existing town centre commercial core of Ballybofey / Stranorlar and

make adequate provision for expansion of this area together with a complimentary designation of sufficient lands for larger scale employment generating developments.

Policy E1: Retail hierarchy states that it is the policy of the Council to promote and encourage the enhancement of the importance of Ballybofey / Stranorlar as a higher level, tier 3 centre in the retail hierarchy.

Policy E2: Retail Strategy states that it is the policy of the Council to support and promote the development of retail activity in Ballybofey / Stranorlar in accordance with the objectives, strategic framework and policies set out in the Retail Strategy.

### ***Community and Recreation***

The Local Area Plan states that the strategic community and recreation objective is to make adequate provision for social, community and recreational needs by means of enhancement of available facilities and provision of new additional facilities in order to enhance the social, community and recreational offer in line with the growing population of Ballybofey / Stranorlar.

Many future community and recreational schemes may be facilitated by the construction of the Preliminary Design and the removal of traffic from the town centre.

Policy CR12: River Finn states that it is an objective of the Council to actively harness the potential arising from the River Finn for recreation, leisure and fishing purposes subject to application of policies CO1 (cSAC), CO2 (flood risk areas) and CO3 (flood impact assessment). This objective may be adversely impacted where the Preliminary Design crosses the River Finn.

### ***Conservation of the natural and built environment***

The Local Area Plan states that the strategic conservation of the natural and built environment objective is to identify the fine assets of Ballybofey / Stranorlar, in terms of both the natural and built environment and to establish a framework for the long term protection and sustainable enhancement of these assets.

The Local Area Plan identifies that the River Finn and adjacent lands have been designated a cSAC under the EU Habitats Directive. The wildlife and habitat importance of these lands is recognised in the policies of the Local Area Plan wherein much of the lands within the cSAC are zoned for recreation and open space purposes.

Policy CO1: Area of candidate SAC states that all development proposals on lands situated within the cSAC shall be considered on their own merits and shall only be permitted where it can be demonstrated that such proposals do not have an adverse affect on the natural and semi-natural habitats and species of flora and fauna.

Policy CO2 and CO3 deal with flood risk areas and flood impact assessment. Issues in relation to flooding are covered in more detail in Chapter 8.0, Surface Water Quality and Drainage, along with the flood impact assessment for the Preliminary Design.

Policy CO4: Conservation of the built environment states that the Council will protect structures included on the Record of Protected Structures which form part of the architectural heritage of the area and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

Policy CO6: Development proposals within the vicinity of a protected structure states that any proposals within the vicinity of a protected structure shall be required to be of a nature and scale that will not detract from the special interests of the protected structure or its setting.

Policies CO11 and CO12 refer to archaeological heritage and assessment. It is the policy of the Council to protect the archaeological heritage from damage and secure the preservation of archaeological monuments. A detailed assessment of the impact of the Preliminary Design on archaeological features is provided in Chapter 10.0, Architectural, Archaeological and Cultural Heritage.

Policy CO16: This policy states that it is an objective of the Council to ensure that significant sections of the former railway line are conserved intact; in order to safeguard their potential for longer term mixed recreational uses. Adverse impacts may arise where the Preliminary Design crosses the former line (see Chapter 13.0 Land Use and Amenities).

#### **Infrastructure and Utilities**

Policy IU1: Water supply states that it is an objective of the Council to advance the Lough Mourne/Letterkenny Water Supply Scheme to ensure the adequate provision of water within the Plan area and surrounding hinterland.

### **Summary of Local Policy Impacts**

Local Policy documents are very specific to the area likely to be effected by the proposal. It is therefore important to consider potential impacts in detail.

The County Donegal Development Plan 2006-2012 identifies a number of specific policies, some of which the Preliminary Design is in accordance with, others which contain objectives that may be facilitated by the N13/N15 Ballybofey / Stranorlar Bypass and finally those which may be adversely affected and therefore must be considered during construction and operation. The CDDP refers specifically to the N13/15 as a Strategic Transport Corridor and is identified in Chapter 3 for major improvement to assist in achieving the provision of safe and effective transport systems.

Policies TC1, EED2 and TOU3 are in support of the proposed road as all refer to improvements to national routes. The Preliminary Design is also likely to facilitate objectives within Policies EED3 and is therefore of beneficial impact.

Although the proposed road therefore complies with both the strategic aims and a number of specific policies in the CDDP, the document also identifies a number of policies that will need to be considered during construction and operation. These policies relate specifically to the protection of the environment, and the built and natural heritage of the area and may be adversely affected by the Preliminary Design if appropriate mitigation is not employed.

Referring to the Ballybofey Stranorlar Local Area Plan, the Preliminary Design is again in accordance with the majority of policies and objectives. Within the Traffic and Transport Section of the Local Area Plan a number of policies reference the Preliminary Design directly. The Local Area Plan notes the preparation of this Environmental Impact Statement. Policy T6, T7, T8, T9 all deal with the protection of land and access arrangements for the bypass and support its construction. Employment policies will also be supported by the construction, allowing the retail potential of the area to be realised.

As with the wider CDDP, the Local Area Plan recognises the importance of the conservation of the natural and built environment and therefore the review has identified a number of policies that must be considered during the design and construction of the Preliminary Design. Specific policies that may be affected by the Preliminary Design include those relating to the protection of the natural environment and historic environment including archaeological features. More information on

landscapes and protected structures is provided in Chapter 7.0, Landscape and Aesthetics and Chapter 10.0, Architectural, Archaeological and Cultural Heritage respectively.

#### 4.4 Mitigation Proposals

The Preliminary Design is overall in accordance with the above development strategies, subject also to some specific landscaping, archaeology and ecology policies within local level plans. Specific mitigation measures to minimise impacts in these areas can be found in Chapter 7.0 Landscape and Aesthetics, Chapter 9.0 Ecology (flora, fauna and fisheries) and Chapter 10.0 Architectural, Archaeological and Cultural Heritage.

#### 4.5 Summary of Planning Policy Effects

At a national level, the Preliminary Design is in accordance with specific objectives within the National DP and the National Spatial Strategy. In addition it will contribute to achieving objectives within sustainable development strategies by reducing congestion and vehicle journey times. The N13/N15 Ballybofey / Stranorlar Bypass is also supported by the objectives of the Border, Midlands and Western Operational Programme and the Regional Planning Guidelines for the Border Region.

The Preliminary Design is specifically in accordance with Transport and Communications Policy TC1, Employment Generation and Enterprise Development Policy EED2 and Tourism Policy TU03 and will potentially facilitate the objectives of a number of other policies relating to tourism, business development and housing within the County Donegal Development Plan.

In relation to the Ballybofey Stranorlar Local Area Plan, the Preliminary Design is supported through a number of Traffic and Transport policies (T6-T9), which ensure land is preserved for or allowed for applications, which will be facilitated by the construction of the N13/N15 Ballybofey / Stranorlar Bypass. The Local Area Plan recognises the potential for the Preliminary Design to allow the Ballybofey / Stranorlar area to meet its retail potential and further expand community and recreational facilities.

As with any large-scale development, there is potential for certain landscape and built features to be impacted upon during construction and this could impact adversely on policies wishing to protect these features. In the case of the Preliminary Design impacts are most likely in relation to policies wishing to protect the natural landscape and archaeological features and these impacts are considered and assessed in great depth in the relevant chapters of this document.

The Preliminary Design does cross the dismantled railway in a number of locations, which may result in adverse impacts in relation to Policy GCSR23 of the County Donegal Development Plan (CDDP) and Policy CO16 of the Ballybofey Stranorlar Local Area Plan. The Preliminary Design crosses a number of conifer and mixed woodlands, and hedgerows resulting in a minor impact on Policy BNH2 of the CDDP. The Preliminary Design crosses the River Finn, a cSAC. The scale and impact depend on the construction methods and a mitigation strategy is imposed in order to comply with policies that seek to protect the river.

In summary the Preliminary Design is in accordance with the strategic goals set within policy at national, regional and local levels. The Preliminary Design is also indirectly in accordance with a number of unrelated policies, enabling and encouraging development such as housing and retail investment. At a local level, the N13/N15

Ballybofey / Stranorlar Bypass may adversely impact on a number of policies that afford protection to the natural and historic environment. Appropriate mitigation to protect these features is outlined in Chapter 7.0 Landscape and Aesthetics, Chapter 9.0 Ecology (Flora, fauna and fisheries) and Chapter 10.0 Architectural, Archaeological and Cultural Heritage.

## 4.6 References

Draft Border, Midland and West Regional Assembly, Operational Programme 2007 – 2013,

Department of the Environment and Local Government (2002) National Spatial Strategy for Ireland 2002-2020: People, Places and Potential.

Department of Transport (2005) Department of Transport Statement of Strategy 2005-2007.

Donegal County Council's Retail Strategy (2001)

Donegal County Council (2005) Ballybofey Stranorlar Local Area Plan 2004-2010.

Donegal County Council (2006) County Development Plan 2006-2012.

National Development Plan 2007–2013 Transforming Ireland, A Better Quality of Life for All (January 2007).

Reform of the Structural and Cohesion Funds 2000–2006, and the Third Report on Economic and Social Cohesion (MRA & EU, 2003)

Shaping Our Future: Regional Development Strategy for Northern Ireland, 2025

The Border Region Regional Authority (2004) Regional Planning Guidelines for the Border region.

The Department of the Environment, Heritage and Local Government (1997) Sustainable Development: A Strategy for Ireland.

Transport 21 (2005) Connecting Communities, Promoting Prosperity.

Western Development Commission (2007) Western Development Strategic Statement 2007-2009.

Department of the Environment, Heritage and Local Government (2002) 'Making Irelands Development Sustainable'.

## 5.0 Socio-Economics

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### 5.1 Introduction and Methodology

This Chapter presents the socio-economic impact assessment and it describes the impact of the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass on the human environment. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

The socio-economic study has aimed to:

- Identify the existing social and economic environment.
- Assess the potential commercial impact of the proposed scheme on the local business sectors, including retailing, tourism and industry.
- Assess the potential community impact of the Preliminary Design.
- Identify development likely to be facilitated by the Preliminary Design.

The effects identified in this assessment relate to the physical environment. Changes in income, consumption and employment are therefore relevant only insofar as they give rise to further indirect, or associated environmental impacts.

The background to the current proposal is set out in the context of the overall road network development. Nevertheless, the impacts which are considered in this study are the incremental impacts arising from the construction of this section of the overall system.

The impacts on human beings arising from traffic movement in terms of noise, air quality and visual impact are dealt with in other chapters of this Environmental Impact Statement (EIS). The impacts on human beings considered here relate to direct physical impacts of the construction work and impacts on the quality of life arising from changed traffic flows, as well as social severance.

This assessment seeks to isolate the land use changes and changes in economic activities, which are directly attributable or attributable in part, to the development of the Preliminary Design, with resultant impacts on material assets and cultural heritage (but excluding archaeology).

This assessment has been based on:

- Collection and analysis of data in order to prepare an initial local profile of the study corridor.
- A sample of businesses surveyed on the 27th and 28th of June 2002 in the study corridor. A number of businesses were excluded from the survey as their function was beyond the scope of the study; including banks, insurance companies, hairdressers and offices due to their limited potential for loss of trade as a result of the Preliminary Design.
- Consultation with a representative of the local Chamber of Commerce was carried out to identify issues/opportunities that could arise as a result of the Preliminary Design. Representatives from the Donegal County Council planning department were also contacted to ascertain local information.
- Comparative analysis including a brief analysis of similar experiences in Ireland to provide an indication of the effects of bypassing, as elsewhere.



- A land use survey along the corridor route (as at June 2002) to facilitate the identification of changes in activities that may be attributed to the Preliminary Design.
- A primarily desk-based exercise was undertaken in August 2006 to review existing reports and utilise updated data. This was accompanied by a site visit to the Twin Towns to assess any changes.

## 5.2 Existing Environment

### 5.2.1 Background

The strategic context for the scheme is described in Chapter 4.0, Planning. The existing N13/N15 travels from Lough Mourne in the townland of Meencrumlin northeast towards the Twin Towns of Ballybofey and Stranorlar. The N13 then turns north towards Letterkenny and the N15 east towards Lifford. Ballybofey and Stranorlar are located side by side on the N15, and both towns experience heavy flows of traffic on the main shopping streets.

Annual Average Daily Traffic (AADT) flow data has been made available in the "N15/N13 Local Model Validation Report" (Jacobs, October 2007). Details of traffic at locations along the N13, N15 and other main roads are shown in Table 5.1 and shown in Figure 2.1.

**Table 5.1 - N15 Current Traffic Flow Data (for year 2006)**

Location	Nos. of Vehicles (AADT)
N15: West of Meencrumlin	8,400
N15: Meencrumlin - Cappry Road	8,400
N15: Cappry Road – R252 Junction	13,100
N15: R252 Junction – Navenny Road Junction	16,900
N15: Navenny Road - N13/N15 Junction	16,800
N15: N15/N13 Junction - Lifford Road Roundabout	6,800
N15: East of Lifford Road Roundabout	6,800
N13: North of Kilross	9,800
N13: Kilross - N13/N15 Junction	11,700
R252: R252 Junction – Cappry Road	3,900
Cappry Road	1000
Navenny /Edenmore Road	5,200
R236: East of Kilross Junction	3,100

### 5.2.2 Population

Population growth in County Donegal has exceeded expectation by almost 4% from a predicted 132,153 for 2001 to an actual 137,575 total population in 2002 (Central Statistics Office, Census 2006). The overall growth achieved in the County from the 1996 Census period (when population was 129,994) was 5.7% or 0.95% per annum. This in turn represented a slight increase over the 1991 Census. The national rate of growth over the same period has been 8% (1.3%

p.a.) the highest rate of growth experienced since the 1970s. The highest level of growth was achieved in Leinster and the lowest rate of growth, at 5.3% was in Ulster.

County Donegal was less affected than some other western counties by the national increase in emigration, which took place in the 1980's. It is worth considering that population growth of nearly 20% was experienced in the County in the 15-year period between 1971 and 1986.

The Census Report 2006 published by the Central Statistics Office in April 2007 states that the total population in County Donegal had reached 147,264 people. This equates to a +7.0% increase in the 2002-2006 period.

The town population of Ballybofey-Stranorlar was 3,047 in 1996, 3,603 in 2002 and had increased to 4,176 in 2006 (CSO Census of Population, 2002, 2006). This includes all or part of the Electoral Divisions of Stranorlar, Knock and Dooish. The town population has grown by +18.2% in the period 1996-2002 and +15.9% in 2002-2006. This significantly exceeds the 8% national growth rates of 1996-2002 and 2002-2006. The wider Stranorlar rural area experienced a less dramatic growth of 4.9% (1996-2002) and 7.1% (in 2002-2006). Urban growth in the area has therefore outstripped the corresponding growth in rural population.

In examining the County's age profile in 2002, 38% of Donegal population were 19 years of age or under, which was slightly higher than the corresponding State figure of 36%. In 2006, 30% of the County population were 19 years or under, compared to 27% across the State. The higher than average numbers in this age group offer a greater challenge to provide employment opportunities. The County also has a high proportion of residents in the dependent category (i.e. those less than 15 years of age and those over 60 years of age).

### 5.2.3 Employment

According to the Quarterly National Household Survey (Central Statistics Office, 2007) for the second quarter of 2007, the unemployment rate for the Border region, of which Co. Donegal is a part, for the period March to May 2007, was 5.3%, down on the June to August period in 2006 (by 0.6%). However, during the corresponding March to May period in 2005 and 2006, the rate of unemployment was lower at 4.9% and 5.0% respectively.

In Ballybofey / Stranorlar unemployment levels are perceived locally to be relatively high and Live Register figures for October 2007 for the Ballybofey local area had 763 people registered (Central Statistics Office, 2007). Key employers in the area in June 2002 included McElhinney's Department store, employing 147 full time and 27 part time staff, Jacksons Hotel with 80 full time, 40 part time and a further 30 seasonal staff, Nena Models Ltd and Mulrines Soft Drinks manufacturing factory (numbers employed not available). The Twin Towns do not have a large-scale industrial employer.

The Donegal economy is still dependent in many ways upon the agricultural sector, which is reflected by the fact that approximately 20% of the economically active population in the County are engaged in primary agriculture. The mainstay remains in the area of sheep rearing in the upland areas and cattle farming in the lowland areas. In addition to this, barley, oats and potatoes are farmed.

Whilst Donegal is also the most important sea fishing county in the Irish Republic, it has a growing aquaculture sector, which is steadily increasing in overall importance. In the manufacturing sector, the textiles industry has been established for many years in Donegal and despite recent downturns in the sector, this continues to be of major importance to the area not only in terms of employment but also the wider County Donegal economy.

#### 5.2.4 Settlement Patterns

Ballybofey / Stranorlar are identified as sub-Gateway level towns in the settlement hierarchy, according to the County Donegal Development Plan 2006-2012 (Donegal County Council, 2006). They are considered as one principal town for the electoral area with dedicated policies supporting commercial and retail development. Information provided by Donegal County Council (in 2002) indicated that the principle of consolidating the Twin Towns as a single service and employment centre would continue to be supported in the Ballybofey / Stranorlar Local Area Plan (in preparation in 2002). This has remained the case in the new Local Area Plan published in 2005.

The Twin Towns' primary function is as a market centre serving the Finn Valley area. The June 2002 survey indicated that there is a strong retailing tradition focused on McElhinney's department store, which attracts shoppers from an extensive catchment including shoppers from Northern Ireland. Historically, the Twin Towns were also a centre for textile manufacturing. This sector is however, declining as a result of relocation policies to areas where production is less costly (Chamber of Commerce, *pers. comm.*).

Table 5.2 outlines the land uses on the existing N13/N15 as identified in the detailed survey undertaken in June 2002. A site visit was completed in August 2006 to validate this survey and no changes of any broad significance were found.

There were no other urban settlements located within the study area and outside the 50 kph speed limits of Ballybofey and Stranorlar, the settlement patterns were dispersed with most land use activity dedicated to agriculture and forestry.

#### 5.2.5 Housing

Housing completion rates within County Donegal have grown substantially, from 766 in 1991, to 2,545 in 2000. The average household size in County Donegal has decreased over the period 1961 to 2002 from 4.03 to 3.02 according to the County Donegal Housing Strategy (Donegal County Council, 2006)

Information from Donegal County Council (2002) indicated that the Ballybofey Stranorlar Local Area Plan (in preparation in 2002) would seek to promote communities while facilitating the accommodation of new housing developments. This position is confirmed in the new Local Area Plan published in 2005.

**Table 5.2 Summary of Land Use and Economic Activity – N13/N15 (June 2002)**

	<b>Segment</b>	<b>Economic Activity</b>	<b>Land Use</b>
1	Existing N13 from the Stranorlar junction with the N15 at McClay's Corner to the Kilross Junction	There was a cluster of business activity between the junction with the N15 and the 50 kph speed limit with a petrol filling station, three comparison outlets: a discount store, Stranorlar furnishings and McClays 'Baby Corner'; and 4 business, industry outlets, plus a pub, a church and 2 B&Bs. Moving into the countryside there were a further 3 B&Bs, however, just one is located directly on the existing route. Sign posting also indicated a wooden products outlet and Mill shop.	Commercial activity leading to linear and back land residential development within the 50 kph speed limit.  There were approximately a further 27 dwellings from the 50 kph limit to the Kilross junction, with a further cluster of residential development off the main road at Tircallan.
2	Existing N15 east of the N13 junction in Stranorlar at McClay's Corner, to the proposed roundabout near St. Joseph's Hospital	This section joins into the end of the commercial area of Stranorlar, provides access to the local golf club and includes a grocery and pharmacy. Further east, housing lined the N15 with some recent back land development. A new Primary Care Centre was also located within the 50 kph speed area. Beyond the speed limit there were approximately a further 43 dwellings including 1 B&B and a hospital within a short distance of the proposed roundabout.	Some commercial activity but the route was dominated by linear housing development with agricultural activities located to the rear.  The hospital was an important land use located on this route.
3	N15, Stranorlar and Ballybofey from McClay's Corner to the Glenfinn Road (R252).	This included the central commercial district of both Ballybofey and Stranorlar. The majority of retail activity occurs on this route. Parking was available on the main street and at a small car park in Stranorlar. A second more substantial car park formed part of the Ballybofey Shopping Centre. This car park showed signs of congestion. Some casual trading occurred on the car park grounds.	Two town centres providing a variety of commercial activities typical of small market towns. A section of built up residential land divides the two centres with the river Finn creating a clear divide.  There were a number of sporting grounds for football, gaelic games and athletics.
4	Existing N15 west of the R252 junction to the 50 kph speed limit.	From beyond the junction of the N15 and the R252, there was a wide variety of commercial activities including a hotel, 3 petrol filling stations with associated forecourt retailing, Mulrines factory (opposite the proposed link from the Preliminary Design into the town centre), a number of comparison retail outlets and 4B&Bs.	This area was largely low density commercial and residential.
5	Existing N15 west from the 50 kph speed limit to the proposed Meencrumlin Junction	This section of the route includes joinery, a factory shop, a vacant public house and access to a furnishings manufacturing company.	The land uses were widely dispersed and the majority of the land was in agricultural use.

## 5.2.6 Commercial Activity

As previously mentioned, Ballybofey and Stranorlar have an important retail function with a perceived high level of visitors to the Towns to visit McElhinneys department store. In June 2002, there were approximately 100 commercial outlets including retail convenience and comparison, petrol filling stations, banks, hairdressers, eateries and public houses, B&B's, and three hotel establishments.

According to the County Donegal Retail Strategy 2006-2012, which was adopted in July 2006, Ballybofey and Stranorlar are considered a Tier 3 higher order centre. Although it is noted that the Twin Towns possess attributes associated with Tier 2 major centres, they nonetheless do not 'achieve this level'. The retail strategy identifies that the main policy aim should be to establish the Twin Towns as a Tier 2 major town over the period to 2012. The Retail Strategy forms part of the approved County Donegal Development Plan 2006-2012 (Donegal County Council) at Appendix D.

In 2005, the towns of Ballybofey-Stranorlar had the fourth largest level of retail floorspace in the County, behind Letterkenny, Buncrana and Donegal town. The twin towns function as a predominantly comparison retailing centre of which McElhinneys department store accounts for 5,174 sq m (50.1% of comparison floorspace in the twin towns) Table 5.3 provides a summary of the (net) retailing floorspace in Ballybofey-Stranorlar in the year 2005.

**Table 5.3 Summary of the (net) retailing floorspace in Ballybofey-Stranorlar (2005)**

Location	Convenience (sq m)	Comparison (sq m)	Bulk Goods (sq m)	Total (sq m)
Letterkenny	12,279	41,249	12,162	65,690
Donegal Town	4,210	7,619	1,060	12,889
Buncrana	2,916	7,252	4,024	14,192
Ballybofey-Stranorlar	1,934	10,324	380	12,638
<b>County Donegal</b>	<b>42,723</b>	<b>95,954</b>	<b>19,286</b>	<b>157,963</b>

Source: County Donegal Development Plan, 2006-2012

In June 2002, it was identified that industrial activity was limited in Ballybofey and Stranorlar. However, the Ballybofey / Stranorlar Local Area Plan published in 2005 designates new strategically located lands for industrial and service activities (see Section 5.3.2).

To identify businesses likely to be affected by the Preliminary Design, a commercial questionnaire survey was undertaken in June 2002 as part of this study (see Appendix 5.1) and a broad sample of businesses were approached. Table 5.4 outlines the local businesses that responded to the commercial questionnaire survey.

**Table 5.4 Businesses Surveyed in 2002**

Businesses Surveyed	No. of Responses	% of Responses
Retail Convenience	5	15
Retail Comparison	13	39
Petrol Filling Stations	4	12
Wholesale	2	6
Accommodation	6	18
Manufacturing	3	9
Total	34	100

**Note:** Percentages may not add to 100% due to rounding.

A number of types of uses were precluded from the questionnaire survey, including banks and hairdressers, due to the limited potential for loss of trade as a result of the Preliminary Design.

In order to establish customer profiles, customer types have been divided into four groups:

- **Local** - customers resident/working in the study area;
- **Passing** - customers travelling through the area;
- **Tourist** - customers who will tend to patronise tourist attractions and facilities (this group can often be confused with passing customers); and
- **Others** - customers which include shoppers from Northern Ireland and local businesses with wide regional or national customer catchments.

Respondents were asked to indicate the perceived proportion of each type of customer using their business. Tables 5.5–5.9 present the extent of reliance on different customer type by sector, therefore illustrating which sectors are most likely to be influenced by the construction of the Preliminary Design.

**Table 5.5 Proportion of Local Customers by Sector, presented as a % of total Customer Base (2002)**

Proportion of Custom	Zero local customers	1-25%	26-49%	50%	51-75%	76-100%	
Proportion of Sector							Total
Retail Convenience	0%	20%	0	0	40%	40%	100%
Retail Comparison	0%	0	0	15%	31%	39%	100%
Petrol Filling Stations	0%	0	25%	50%	25%	0	100%
Wholesale	0%	0	50%	0	50%	0	100%
Accommodation	66%	17%	17%	0	0	0	100%
Manufacturing	100%	0	0	0	0	0	100%

**Note:** Percentages may not add to 100% due to rounding

Table 5.5 indicates that all convenience, wholesale outlets and petrol filling stations surveyed rely to a certain extent on local trade. 100% of comparison retail outlets have a local customer base however two outlets did not indicate the proportion of local customers compared to other types of customers. Of all sectors, the convenience and comparison outlets demonstrated the actual highest level of dependence on local trade with 40% and 39% of these sectors achieving between 76 to 100% local customers.

**Table 5.6 Proportion of Passing Customers by Sector, presented as a % of total Customer Base (2002)**

Proportion of Custom	Zero passing customers	1-25%	26-49%	50%	51-75%	76-100%	
<b>Proportion of Sector</b>							<b>Total</b>
Retail Convenience	0%	100%	0	0	0	0	100%
Retail Comparison	31%	46%	15%	8%	0	0	100%
Petrol Filling Stations	0%	0	75%	25%	0	0	100%
Wholesale	100%	0	0	0	0	0	100%
Accommodation	49%	17%	17%	0	17%	0	100%
Manufacturing	100%	0	0	0	0	0	100%

Table 5.6 shows the importance of passing trade for convenience and comparison retailing, petrol filling stations and accommodation facilities surveyed. However, only accommodation facilities had over 50% of business coming from passing trade, at 17% of this sector. Petrol filling stations demonstrate the overall highest level of reliance on passing trade, all outlets having a 'passing' customer base of between 26-50%.

**Table 5.7 Proportion of Tourism Customers by Sector, presented as a % of total Customer Base (2002)**

Proportion of Custom	Zero Tourists	1-25%	25-49%	50%	51-75%	76-100%	
<b>Proportion of Sector</b>							<b>Total</b>
Retail Convenience	40%	60%	0	0	0	0	100%
Retail Comparison	92%	8%	0	0	0	0	100%
Petrol Filling Stations	50%	50%	0	0	0	0	100%
Wholesale	100%	0	0	0	0	0	100%
Accommodation	33%	0	33%	0	17%	17%	100%
Manufacturing	100%	0	0	0	0	0	100%

Table 5.7 demonstrates that while tourists do visit the area, they do not account for a large proportion of customers. While 60% of convenience retail outlets surveyed noted tourists as part of the customer base, they accounted for less than 25% of all customers. Accommodation facilities demonstrated the highest level of tourist trading, with 17% of outlets noting more than 76% of all customers as tourists. However other accommodation facilities also noted the importance of business customers, weddings and visiting shoppers.

**Table 5.8 Proportion of Other Customers by Sector, presented as a % of total Customer Base (2002)**

Proportion of Custom	Zero	Don't know	1-25%	25-49%	50%	51-75%	76-100%	
<b>Proportion of Customer</b>								<b>Total</b>
Retail Convenience	80%	-	20%	-	-	-	-	100%
Retail Comparison	86%	7%	7%	-	-	-	-	100%
Petrol Filling Stations	100%	-	-	-	-	-	-	100%
Wholesale	-	-	-	50%	-	50%	-	100%
Accommodation	17%	17%	50%	-	-	17%	-	100%
Manufacturing	-	-	-	-	-	-	100%	100%

**Note:** Percentages may not add to 100% due to rounding

Table 5.8 shows which sectors of the local business sector surveyed rely on other types of customer, namely, shoppers from Northern Ireland and regional and national trade catchments. Wholesale outlets and manufacturing demonstrate the highest levels of reliance on other types of customers. Improvement of access to the Twin Towns could facilitate an improvement in competitiveness for these activities. On a smaller scale, accommodation facilities noted other types of customers using their facilities, referring to travelling business people, shoppers and wedding guests.

Table 5.9 outlines the percentage of sector outlets visited by each customer type.

**Table 5.9 Percentage of Sector Outlets Visited by Customer Type (2002)**

Customer	Retail Convenience	Retail Comparison	Petrol Filling Stations	Wholesale	Accommodation	Manufacturing
Local	100%	100%	100%	100%	50%	0%
Passing	100%	85%	100%	0%	67%	0%
Tourist	60%	8%	75%	0%	100%	0%
Other	20%	15%	0%	100%	83%	100%

When asked if business was improving or declining, 65% of businesses questioned stated that they had experienced some growth in the previous three years, 12% had experienced no change and 18% had experienced decline. No clear pattern of decline between sectors was evident. However the reasons given for change included the impact of foot and mouth in 2001 and the impact of 9/11 attacks in the USA, as well as a general slow down in the national economy. More significantly, the limited amount of local parking facilities was identified in 2002 as a problem, acting as a considerable deterrent to shoppers, in particular at the Shopping Centre in Ballybofey. New parking facilities have since been introduced within the town centre by Donegal County Council, as a means to address this issue. There are also further proposals outlined by Donegal County Council to upgrade current parking facilities at Fairgreen in Stranorlar.

The reasons for growth were widespread and included: the growth of new housing; improvement in the standard of local shopping facilities; the value of the € against the £ Sterling; and the recent opening of the Donegal Town Bypass.

## 5.2.7 Local Facilities and Visitor Attractions

The natural features of the County with its coastline, scenic mountains and natural resources such as angling, the natural environment and scenery form an ideal focus in which the area's tourism industry continues to grow. The County has experienced a marked increase in tourism in recent years, especially from overseas visitors. This has been aided by the peace process in Northern Ireland, thus also ensuring an increase in visitors originating from both Northern Ireland and Great Britain.

The tourism sector provides much needed employment growth to the county and tourism income forms an essential part of the economic growth of both urban and rural areas in the County. Cultural tourism, focused on the Gaelic language and



culture, and on its literary traditions in both languages, will continue to play a significant and major role in attracting visitors to the area.

While not a major tourist destination, the Twin Towns do have a number of visitor attractions and facilities including: an 18-hole golf course; good quality salmon fishing on the River Finn; the Drumboe Castle and Woods; and an historic connection to Isaac Butt, the 19<sup>th</sup> Century civil rights activist and founder of the Home Rule Party, who is buried locally. The town also hosts an annual Mid-Summer Festival and has a theatre located at the former cinema.

It is the intention of Donegal County Council (2002) to establish a one-stop-shop civic centre in Ballybofey for operating its Council services. This scheme is strongly supported by the local Chamber of Commerce who recognise the potential of the scheme to attract further inward investment into the area. The Council remains committed to its delivery (2006), which is seen as being vital to enhancing the Twin Towns' key role as a sub-regional service centre.

The area has a strong athletic tradition with the Finn Harps Eircom League of Ireland football team, the County GAA football ground (MacCumhaill Park), the Finn Valley Athletics Club, Ballybofey-Stranorlar Golf Club, local Gaelic and soccer clubs and other sporting clubs and facilities. According to the information provided by Donegal County Council (2002), the Council is also committed to developing a multi-functional sports campus, incorporating a swimming pool in Stranorlar. This commitment is reaffirmed through policies contained within the Ballybofey-Stranorlar Local Area Plan (2005). Other existing local facilities identified during the survey in June 2002 (and in August 2006) include the Shopping Centre in Ballybofey which has a car park within which there were a number of casual trading stalls, a wide range of traditional style public houses, shops, cafes, chinese and indian takeaway and restaurants, and pizzeria.

## 5.2.8 Transportation and Infrastructure

The transport infrastructure in Donegal has seen considerable improvement in recent years, in particular the main road into the County from the south (N15) and from the North (N13), both of which are now of a reasonably high quality. However, local roads are still below standard, notably those connecting the west to the N13 and N15.

There are currently no railway services to the area. However, Bus Eireann does run nationwide services, which includes direct routes on to Sligo, Letterkenny, Derry and Donegal Town.

Donegal County has a number of schemes within the Rural Transport Programme. The Rural Transport Programme is the renamed Rural Transport Initiative (RTI), which was established by the Irish Government as a pilot project in 2002 under the 2000–2006 National Development Plan. The aim of the RTI is "to encourage innovative community-based initiatives to provide transport services in rural areas, with a view to addressing the issue of social exclusion in rural Ireland, which is caused by lack of access to transport". Each scheme is unique in its management and implementation methods.

Information provided by the County Council (2002) indicates that in the future, the improvement of local access through the development of pedestrian access and cycle ways will be proposed in the Ballybofey / Stranorlar Local Area Plan (in

preparation in 2002). This has been incorporated into the Ballybofey/Stranorlar Local Area Plan (2005).

In respect of communication infrastructure, plans are understood (by the EIS consultants) to be underway to bring broadband and fibre optic communications networks to County Donegal. Although the major towns will be connected, this may serve to reinforce the peripheral nature of the smaller towns and rural areas.

## 5.2.9 Impact of Existing N13/N15 on Land Use and Economic Activity

Based on the current traffic flows (2006) outlined in Table 5.1, and on comments made during the consultation and survey process (in 2002), the existing N15 and N13 have a significant impact on the study area (see Table 5.10).

Concern about the traffic management and signage in the Twin Towns has been highlighted by the responses from the survey undertaken in 2002. Reference was made to heavy traffic, congestion, long delays, and a perception that the N13 to the north of Stranorlar is dangerous.

**Table 5.10 Summary of Impact of Traffic Flows on Existing N15/N13 Routes (2002)**

	Section	Impact on Material Assets
1	Existing N13 from the Stranorlar Junction with the N15 to the Kilross Junction	Through traffic affected the amenity of residential premises located directly on the route, including approximately 27 dwellings outside the 50 kph speed limit. Traffic also hindered the movement of livestock across the route and affected access to businesses. Out of the three B&B's on this section of the route, two advised that they benefit from passing trade.
2	Existing N15 east of the N13 Junction in Stranorlar to the proposed Stranorlar roundabout	Residential amenity, including approximately 43 dwellings outside the 50 kph speed limits on this route were affected by through traffic. Two B&B establishments advised that they currently benefit from passing trade.
3	N15, Stranorlar and Ballybofey from the McClay's Corner to the Glenfinn Road	The main commercial centre experienced heavy traffic flows, which affected the quality of the shopping environment. The petrol filling station at the N15/N13 junction advised that they benefit from passing trade. In the commercial centre, most retail premises were located along the main route with the exception of the Shopping Centre which has a car park to the fore, and the College Court centre, an enclosed shopping space linked to the main street in Ballybofey. Limited on street parking was available. There was also access to parking on Navenny Street.
4	N15, west of the R252 Junction to the proposed Meencrumlin Junction	The three petrol filling stations and three B&B's on this section of the route advised that they benefit from passing trade. It was identified that access onto the road from dwellings (including approximately 54 dwellings outside the 50 kph speed limits) and businesses can be difficult.

## 5.2.10 Existing Land Use and Economic Activity on the Route of the Preliminary Design

The Preliminary Design will affect mainly agricultural land. The route affects some commercial forestry, with some housing located adjacent to the corridor. Two properties lying within the CPO boundary at Meenglass (Ch 6200) and Sessiagh O'Neill (Ch 7800) will also be acquired.

On the proposed Link Road running from the Preliminary Design to the western edge of Ballybofey, the route corridor passes to the rear of two residential estates

before reaching the existing N15 opposite Mulrines factory. At the time of visit (in June 2002), community facilities including a school and church were identified at Sessiagh O'Neill.

### 5.2.11 Summary of the Existing Socio-Economic Environment

Overall, the current heavy flows of traffic travelling through the study area on the N15 and N13 have a negative impact both on residential amenity and on most commercial activities, with the exception of petrol filling stations and B&B's, in Ballybofey and Stranorlar. Continued growth in population and housing, resulting in an ongoing increase in traffic flows, will reinforce existing negative impacts.

## 5.3 Assessment of Effects

Ballybofey and Stranorlar are both located on the N15 National Primary Route. This has significant implications in terms of traffic problems with congestion, traffic encroachment into shopping districts and residential areas, road accidents, noise and air pollution. The provision of a bypass will reduce these problems and make these towns safer, quieter, and cleaner and more attractive places to live, work and visit. The construction of the Preliminary Design will remove the majority of heavy goods vehicles from residential areas on the N15 and N13.

Along the route of the Preliminary Design, residential densities are lower than on the existing route. Two properties (at Ch 6200 and 7800) are within the CPO and will therefore be acquired. The proposed Link Road into Ballybofey does not cross any existing properties and does not separate or cut off any existing communities.

Once the Preliminary Design is completed and operational, the existing N13 and N15 in the development area will be downgraded to a regional (or local) road. This has potential implications in terms of land use, as the lands currently with access onto the existing N15 and N13 will have potential to be developed, subject to the normal planning procedures. Currently, planning permission is restricted along the existing routes due to their status as National Primary Routes.

The reduction of traffic, particularly heavy goods vehicles, on the existing road network will create a safer environment for cyclists, pedestrians, children and the elderly and generally enhance the residential amenity of the Twin Towns. Local traffic will find it easier to access the existing N13 and N15 from minor roads and driveways. The Preliminary Design will create a safer environment for shopping and social activity within the town centres. The removal of traffic and heavy goods vehicles from the town centres will provide opportunities to introduce pedestrian friendly measures.

The assessment examined the situation if the Preliminary Design was not constructed. It was considered that impacts on human beings and material assets in the do nothing scenario will occur primarily due to increased traffic levels on the existing N15 and N13 routes and will result in the following impacts:

- Residences along the existing routes will suffer a continued reduction in residential amenity as traffic utilising the route continues to increase.
- Traffic congestion will increase along the local road network.
- Linked with the increase in traffic, there will be an increased risk of accidents along the existing substandard N15 and N13 routes.

- The lack of proper infrastructure will curtail development within the Twin Towns, and also in County Donegal.

### 5.3.1 Assessment of Effects: Construction

#### **Sources of Significant Impact**

The potential sources of impacts on the socio-economic environment resulting from construction activities are identified below:

- Noise disturbance and dust from construction works;
- Construction traffic will contribute to congestion and delays on the existing roads;
- Passing trade may be lost as drivers could be less likely to stop in an effort to make up lost time;
- Temporary construction employment may be generated locally;
- Construction staff expenditure may provide a new source of temporary custom for local business, in particular accommodation facilities and convenience shopping outlets;
- Two properties (at Ch 6200 and 7800) are within the CPO and will therefore be acquired; and
- Local quarries may benefit where construction materials are sourced locally.

#### **Sensitive Receptors**

Receptors sensitive to the potential sources of impacts resulting from construction activities are identified below:

- Residential properties;
- Town centres;
- Local businesses.

#### **Impacts**

Potential impacts arising from the construction activities are identified below:

- Temporary loss of residential amenity;
- Reduced ease of access to town centres;
- Rise in temporary construction jobs;
- Temporary increase in local economic activity in the construction sector.

#### **Significance of Impact**

Due to the temporary nature of the construction phase, socio-economic impacts will also be temporary.

### 5.3.2 Assessment of Effects: Operation

#### **Sources of Significant Impact**

The construction of bypass routes can affect certain commercial activities, including elements of retailing, in one or two main ways:

- By removing traffic and, thus, congestion, but also potential custom from the town in the form of passing trade (simultaneously, removing congestion may give rise to positive impacts via increased commercial activity).
- By opening new lands on the edge or outside a town to development pressure which, if not subject to planning controls, might undermine the viability of town businesses.

The Department of Environment, Heritage and Local Government (DEHLG) advises that a terminal town, which is a destination in its own right (e.g. Waterford or Sligo), if provided with a bypass, might experience a 20% reduction in traffic. A town on a route between terminal points (e.g. Athlone or Naas) might typically have 60% diverted. A small village (e.g. Jamestown in Co. Leitrim) might have traffic flows reduced by 95% (Jonathan Blackwell & Associates, 2000). It is anticipated that in the opening year (2011), the traffic passing through the Twin Towns will be reduced by approximately 56% of its 2006 level<sup>1</sup> as a result of the Preliminary Design.

The general view on the commercial impact of bypass routes was set out in the Operational Programme on Peripherality 1989 to 1993 (Stationary Office, 1999), which suggested that the bypassing of major urban areas along national primary routes could have significant positive economic impacts on the bypassed urban areas. Section 8.7 of the report stated that:

*"Many towns situated on national roads have substantial traffic problems, with congestion, traffic encroachment into the main shopping streets and even residential areas, pedestrian/vehicular conflict and increased road accidents, noise, air pollution and so on. Traffic has reduced the attractiveness of these towns for residents, shoppers and tourists. The proposed provision of bypasses and relief roads will alleviate these problems and make the towns safer, quieter, cleaner and more attractive places in which to live, work and visit."*

In practice, there is limited evidence in Ireland on the impact of bypasses. In preparing the EIS for Balbriggan Bypass (Dublin County Council, 1995), Dublin County Council made contact with other towns already bypassed and drew the following general conclusions:

- The initial impact, following construction of a bypass may result in a loss of trade and decline in general economic performance.
- Following the initial adverse impact period, extending for perhaps 6-12 months, trade and economic performance gradually improves.
- Where such an improvement took place, it was due to a variety of factors including improved marketing of a town's resources by the employment generating sectors, improvements in access from and to the bypass including signage, growth in retail, office, industrial and residential development associated with an improvement in traffic conditions within the particular town and provision of car parking facilities.

A survey of 123 traders in Mullingar (in Westmeath), carried out by Jonathan Blackwell and Associates, in 1996 (2000), found that in the post bypass situation:

- 61% saw no difference in trade;
- 21% were unable to answer;
- 9% had experienced a fall in trade, attributed to the bypass;
- 1% had noted a decrease, not attributed to the bypass;
- 6% noted an improvement attributed to the bypass;
- 2% noted an improvement, not attributed to the bypass.

<sup>1</sup> For the N15 R252 Junction – Navenny Road Junction, 2006 flows are predicted to be 16,900 AADT. In 2011, the Preliminary Design opening year, flows on this section are predicted to be 7,500 AADT (see Figure 2.1)

Table 5.11 below summarises the Mullingar survey results by sector.

**Table 5.11 Mullingar Trade: Post Bypass Assessment (%)**

Trade category	No difference	No answer	Decrease: bypass	Decrease: other reasons	Increase: bypass	Total
Grocery trade	57	21	14	0	7	99
Public houses and Off-licence premises	53	37	5	0	5	100
Other food	50	42	8	0	0	100
Tobacco/sweets/newsagents	71	29	0	0	0	100
Clothes and footwear	69	18	4	0	9	100
Motor vehicles, cycles, petrol filling stations	36	7	36	7	14	100
Chemists	75	25	0	0	0	100
Durable household goods	80	10	10	0	0	100
Other (services)	70	10	5	5	10	100

From Table 5.11, and the overall results, it is evident that there was a small decline in trade. However, the figures do not weight results by the size of establishment, and since the difference is small, little by way of firm conclusions can be drawn. The results show that petrol filling stations are the sector most significantly impacted.

In an unstructured survey carried out by Jonathan Blackwell & Associates (2000) of Irish towns bypassed in recent years – Mullingar, Longford, Arklow, Naas, Nenagh, Portlaoise and Roscrea (relief road) – the relevant Chambers of Commerce were asked for their assessment of how the bypass had impacted on the commercial life of their town. All indicated that there had been an initial nervousness associated with the proposal to introduce a bypass, arising from a fear that there will be a significant negative impact on livelihoods. However, all reported that these fears were not realised, and that the overall impact on the towns in question had been very positive.

Positive impacts cited were improved quality of life for the towns' residents due to reduced traffic congestion, and an improved image for the town, making it a more attractive stop-off point for visitors. Enhanced attractiveness for new industry as a result of improved road infrastructure and access was also cited. For the visitor to the town, the issue was reported to be, now, one of choice: formerly, motorists had been forced to drive through the town: now it was a matter of freewill. This has engendered an increased positivism towards the bypassed town: the visitor is more confident that a visit to the town will not be frustrated by congested traffic and parking difficulties.

There have been acknowledged negative impacts, particularly petrol filling stations situated on the outskirts of the towns in question. Some had reported losses of up to 30% in trade. Some such outlets located on the old routes had either scaled down or closed. However, in some cases, the resultant impact was contained, where a petrol filling station was associated with a car dealership, which by its nature, is not influenced unduly by passing trade. Some petrol filling stations on the outskirts of the bypassed towns have increased their business and extended to include eateries/delicatessens.

These findings confirm that although the economic impact of bypass routes are generally positive there are still a number of activities on the periphery of most towns, such as petrol filling stations and restaurants, which will be vulnerable to any reduction in passing traffic. As a result of the construction of the Preliminary Design, these activities may lose some trade. The extent to which the reduction in the level of passing traffic could affect the viability of these establishments depends upon a number of factors such as their ability to retain and expand local custom and the extent to which motorists requiring services will be diverted into the town from the Preliminary Design.

#### **Survey of Expected Commercial Impacts on Ballybofey and Stranorlar**

In order to assess the potential impact of the Preliminary Design on businesses in the study corridor, a survey of 34 businesses was undertaken in June 2002. These businesses included B&B's, local food and non-food shops, a hotel, petrol filling stations and three manufacturing outlets. In particular, businesses located on the routes leading out of the Twin Towns were targeted as they were considered more likely to have car-based customers (See Appendix 5.2).

Based on the proportion of customer types indicated by businesses outlined in Table 5.4, and the potential the Preliminary Design will have to remove passing traffic from the Towns, it can be assumed that petrol filling stations, accommodation facilities, and convenience and comparison retailing will all experience some loss of trade. These businesses may also experience some loss of tourist trade, where visitors travelling to more tourist oriented destinations in the county no longer have to pass through the Twin Towns.

It must be noted however, that some passing and tourist trade will continue to travel through part of Ballybofey in order to access the R252 to Glenties via the proposed Link Road. As a result, businesses located between the R252 and the Link Road roundabout will continue to achieve a level of passing trade. Furthermore, any traffic wishing to access services in the Towns will enter either via the proposed Link Road or at the Stranorlar roundabout. These access points will serve to exclude any non-local traffic from the existing N15 west of the roundabout at Mulrines factory.

Just 18% of respondents to the survey believed that the Preliminary Design will have a positive impact on their business, while 50% stated that the Preliminary Design will have a negative impact on their business. 24% believed that there would be no impact as a consequence of the opening of the Preliminary Design. Table 5.12 outlines the sectoral responses in relation to the perceived impacts of the scheme.

**Table 5.12 Perceived Impact of the Preliminary Design on Local Business**

Sector	Positive		Negative		No Change	
	No.s	% of Sector	No.s	% of Sector	No.s	% of Sector
Convenience Retail	1	20%	2	40%	1	20%
Comparison Retail	3	23%	7	54%	3	23%
Petrol Filling Stations	0	0%	4	100%	0	0%
Wholesale outlets	0	0%	1	50%	1	50%
Accommodation	1	17%	5	83%	0	0%
Manufacturing	1	33%	0	0%	2	67%

Note: One convenience retail outlet gave no response to this question.

Of those businesses that believe the Preliminary Design will have a negative impact, petrol filling station owners predicted the highest level. 50% of such establishments expected between 26 to 50% loss of annual turnover, and 50% expected a loss of between 50% and 100%.

Of accommodation facilities expecting a loss in turnover, 40% of those in a position to predict an impact expected a loss of less than 25%, whilst another 40% expected a fall of between 26 to 50%.

Of those businesses able to predict a positive impact in percentage terms, 80% expected an upturn in annual turnover of less than 50%. A higher rate of positive impact was expected by the remaining 20%, representative of larger comparison retail outlets, reflecting the strength of this sector in the Towns.

The respondents were asked to give an indication of what the likely consequences will be if their predicted impact were to happen. A number of respondents gave no answer or did not know. Consequently, the results shown here are based on the number of actual responses.

Of those who expected a downturn in business, possible consequences included, for B&B, loss of value of the property and possible closure, loss of income, and the need to advertise and market the facility better. The need to advertise and market was also noted by a number of other businesses. 25% believed that a loss in business as a result of the Preliminary Design will lead to staff layoffs, and 13% believed that there was a risk of going out of business.

On a more positive note, 8% of businesses that expected an upturn as a result of the Preliminary Design believed that they would be in a position to employ more staff and 4% anticipated premises expansion.

When asked to give reasons for the expected impact on business (once again, the results shown are based on the number of actual responses, excluding don't knows), the most common response was "loss of passing trade" at 84%. A further 24% believed a reduced volume of tourists would affect business.

In terms of a positive impact, the reduction of congestion in the Town centres was identified by 12% of respondents as a reason for an increase in trading, along with a further 8% who believed that easier access to parking would benefit trade. These figures may be an under estimation as reduction in congestion and improved access to parking were not provided as options in the questionnaire but rather volunteered by respondents.

Further comments made by respondents indicated the potential to expand businesses, in particular where new opportunity sites became available as a result of the release of new lands and a change in planning restrictions. Such development, it was felt, would allow the Twin Towns to diversify their retail facilities and enhance attractiveness as a retail centre.

#### ***General Impact on Residential Amenity in the Study Area***

The construction of the Preliminary Design will relieve the congestion in Ballybofey and Stranorlar and thereby improve the residential amenity of the Towns, in particular in terms of air and noise quality. As a result, the Towns will become more attractive and safer places to live and visit.



Despite the rural route of the Preliminary Design, certain residences located close to the proposed route and the new residential estate adjacent to the proposed Link Road will have a reduction in amenity. There may also be some potential impact on the small Blackrock Drive estate. However the construction of the Preliminary Design will act to improve access to the estate by reducing the volume of traffic using the existing N15 route. Impacts on noise, landscape and air quality have been assessed in Chapters 12.0, 7.0 and 11.0 respectively.

#### **Community Severance**

As already discussed, the Preliminary Design will not significantly affect any community facilities. The key impact on communities therefore will be as a result of increased journey distances for cars. Generally, the existing road network has been retained intact, by means of crossing the proposed road via bridges or passing through roundabouts. During the Preliminary Design Stage an additional under bridge was added at Daisy Hill Road to reduce community severance.

#### **General Impacts on Tourism**

General impacts arising from the operation of the Preliminary Design on tourism include:

- Greater safety and convenience for visitors and a more congenial environment for walkers and cyclists.
- Traffic reduction will enable the development of further tourist facilities within the Towns and make them more attractive for the visitor.

#### **Possible Shifts in Land Use and Development Patterns**

##### **Business and Industry**

Industry in the study area is currently limited to a number of small-scale furniture manufacturing outlets, a drink manufacturing factory and a clothes manufacturing company. The Ballybofey / Stranorlar Local Area Plan (2005) earmarks land suitable for industry and employment generation (see below):

- **Glebe, Stranorlar** (Site EE1): land suitable for retail, commercial and light industrial uses, but excluding heavy industrial;
- **Mullindrait** (EE2): Situated to East of Stranorlar and bisected by proposed Preliminary Design route. The site is fit for light and heavy industry, retail warehousing, as well as hi-tech international business;
- **Mullindrait** (EE6): land suitable for retail, commercial and light industry;
- **Sessiagh O'Neill** (EE3): Close proximity to location of proposed junction to Preliminary Design. The site is suitable for light and heavy industry, retail warehousing and hi-tech international business opportunities;
- **Sessiagh O'Neill** (EE4): This site lies adjacent to Preliminary Design Link Road and is allocated for retail, commercial and light industrial employment;
- **Navenney** (EE5): Site adjacent to Preliminary Design link road and has the potential for retail, commercial and light industry;

In addition to these opportunities the **Masterplan Areas** identified within the Ballybofey/Stranorlar Local Area Plan (2005) provide 65ha of further land for a mixture of development use. The Indicative Masterplan Framework highlights potential commercial and retail use, along with recreation, leisure, community and public space in Masterplan Area 1 (to the south of Ballybofey-Stranorlar, see Figure 4.1), whilst Masterplan Area 2 (to the north-west of Ballybofey, see Figure 4.1) can more readily accommodate residential and recreation use.

With an improved infrastructure and an improved quality of human environment as a result of the removal of through traffic in the urban areas, the opportunity exists to reduce delivery times for businesses, and to make the area more attractive to outside investment.

Existing commercial zoning in the Twin Towns extends from Meetinghouse Street in Stranorlar to the Glenfinn Lane and Donegal Road junction in Ballybofey. No particular development opportunity sites are identified but Ballybofey/Stranorlar Local Area Plan (2005) has designated zones for development. With the establishment of the Preliminary Design, local businesses will benefit from an improved shopping environment, which may encourage more shoppers into the area, including some of those who currently travel from within the area to Letterkenny and Derry to shop.

Town centre businesses are likely to continue to operate in an improved shopping environment. If any sites become available as a result of closures, relocation or the freeing up of lands where development is currently restricted, alternative businesses may be established, contributing to the overall commercial attraction of the Towns and helping the Towns to achieve Tier 2 status in the County retail hierarchy. During the questionnaire survey, 28% of respondents believed that the Twin Towns have the potential to develop and improve retailing.

Accessibility to Letterkenny will be improved, with a possible resultant increase in shopping trips from the area. It will be necessary to introduce strategies to encourage shoppers to return to the Twin Towns and to ensure no further shopping expenditure is lost unnecessarily.

#### **Residential Development**

De-classification of the existing national primary routes may result in increased development pressure for linear residential development, in particular outside of the Town centres where convenient access to Letterkenny and Derry may act to attract commuters to the area.

Infill development may occur along these routes where access opportunities are available. The Ballybofey / Stranorlar Local Area Plan (2005) has designated residential zones across the plan area. The plan outlines a three-phased approach to residential development based on: (a) areas of development pressure; (b) those areas most serviceable; (c) recognition of infrastructural constraints, as well as (d) any proposed and planned infrastructure improvements. In this context the following 3 phases are identified:

**Phase A** development of lands around Lifford Road, Letterkenny Road, Dreenan, Donegal Road and Glenfin Road (comprising 300 ha). This is due to existing pressure and demand for housing development, as well as planned infrastructure improvements associated to the construction of the bypass and bypass junctions;

**Phase B** includes lands at Sessiagh O'Neill, Cappry and Kilross – all attributed to medium term development associated to the relatively remote location outside speed limits (i.e. Cappry and Kilross), and where improved and appropriate access is dependent on completion of the proposed bypass and the bypass link roads;

**Phase C** comprising lands at Drumboe and Magherapaste constrained to long term, by virtue of inadequate accessibility by road network and the lack of current infrastructural improvements programme necessary to address the issues.

Where the Twin Towns develop a more attractive shopping and social environment, they are likely to become attractive commuter towns for people working in Letterkenny and Derry.

#### **Tourism**

Tourism is not currently an important element of the socio-economic environment of the immediate study area however, potential tourist businesses may be encouraged as the quality of the local environment improves.

12% of respondents to the questionnaire survey, suggested that the area had the potential to develop and expand its tourist industry, including developing further fishing activities on the River Finn, walking, cycling and pony trekking in the local Drumboe woods and shopping.

Any increase in tourism is likely to have a knock on beneficial impact on other commercial activity in the area and in particular for accommodation, local cafes, restaurants and public houses.

## **5.4 Mitigation Proposals**

The Preliminary Design will reduce traffic through the Twin Towns and therefore result in improvements to amenity.

Landscape mitigation will be provided where appropriate to mitigate visual impact on residential property (Chapter 7.0).

Measures to mitigate the impact of severance of roads have been incorporated into the Preliminary Design (Chapter 3.0).

A hierarchy of signage and information points will be based on the Department of the Environment's Guidelines for Road Signs.

## **5.5 Conclusions**

Ballybofey and Stranorlar are located on the N13 and N15 National Primary routes. This has significant implications in terms of traffic problems with congestion, traffic encroachment into shopping districts and possibly residential areas, increased road accidents, noise and air pollution. The provision of a the Preliminary Design will reduce these problems and make the study area a safer, quieter, cleaner and more attractive place in which to live, work and visit.

The survey, consultation and site visit carried out in 2002 indicate that as a result of the construction of the Preliminary Design:

- A number of businesses, in particular petrol filling stations and B&B's are likely to experience a significant loss which may affect their future viability. However, evidence from post bypass experience in other towns suggests that the overall survey results may represent an unduly pessimistic view.

- Where losses do occur, in particular as a result of passing trade, businesses will require increased investment in advertising and marketing. There may also be a need for some businesses to diversify into other markets.
- Traffic accessing the R252 will continue to pass through part of the Town centre via the Link Road thereby maintaining passing and tourist traffic.
- Staff losses may occur, in particular at petrol filling stations, however expansion elsewhere may work to replace some jobs lost.
- Expansion of businesses or the start up of new outlets may be facilitated.
- Diversification may lead to a more varied supply of commercial activity in the area, improving its attraction as a retail centre.
- Reduced congestion in the Town centres and improved pedestrian safety will help to create a more attractive and safer shopping environment.
- The Preliminary Design could create further demand for residential development on declassified roads, including, potentially, commuter housing for Letterkenny and Derry. This will need to be controlled through the normal planning system process.
- Two properties (at Ch 6200 and 7800) are within the CPO and will therefore be acquired.
- The urban area may become more attractive to visiting tourists.
- Residential amenity and safety on the current N13 and N15 will be improved.
- During construction (commencing 2010 and concluding the end of 2011), it is likely that impacts will include noise and dust pollution and traffic delays. Mitigation measures to address these potential impacts are discussed in Chapters 3.0 (Description of the Preliminary Design), 11.0 (Air Quality) and 12.0 (Noise and Vibration).
- The predominantly rural route of the Preliminary Design will mean certain residences, which are located close to the Preliminary Design, are likely to have a reduction in amenity.

The global beneficial impacts and associated long-term growth prospects are likely to outweigh the possible initial fall in business predicted by operators known to be vulnerable to a reduction in passing traffic. It should be noted that, although negative impacts in particular cases cannot be excluded, evidence from the post bypass situation in other towns, suggests that the overall survey results containing the perceptions of traders, may represent an unduly pessimistic view and that trade almost always benefits from bypass development due to enhanced access and an improved environment. It is typical of experience elsewhere that traders are apprehensive before the event, but that the outcome is more favourable than expected.

Without the construction of the Preliminary Design:

- Residences along the existing N13 and N15 will suffer continued reduction in residential amenity, as traffic using the route continues to increase.
- Traffic congestion will increase along the local road network
- Linked with the increase in traffic there will be an increased risk of accidents along the existing substandard N15 and N13.
- The lack of proper infrastructure could curtail development within the Twin Towns and throughout County Donegal.

## 5.6 References

- Area Development Management Limited (2001), Rural Transport Initiative Information Pack
- Central Statistics Office (2002-2007), Quarterly National Household Survey
- Central Statistics Office (July 2002), Census 2002 Report
- Central Statistics Office (July 2006), Census 2006 Preliminary Report
- Central Statistics Office (April 2007), Census 2006 Report
- Donegal County Council (2006), County Donegal Development Plan 2006-2012
- Donegal County Council (2005), Ballybofey-Stranorlar Local Area Plan 2006-11
- Jonathan Blackwell & Associates (Dec 2000), Socio-economic aspects of the Environmental Impact Statement for the N15 Bundoran/Ballyshannon Bypass
- Jonathan Blackwell & Associates (November 2000), Unpublished Research
- Jacobs (October 2007), N15/N13 Local Model Validation Report
- Stationary Office, Dublin (2000), National Development Plan 2000-2006, Pn.7780
- Stationary Office, Dublin (1999) Operational Programme for Peripherality

## 6.0 Agricultural Land

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### 6.1 Introduction and Methodology

This Chapter discusses the agricultural impacts of the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass, which runs mainly through agricultural land. Agricultural land use is identified and the potential impacts arising from the construction and operation of the proposed road are examined. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

The following sources of information and documents were reviewed during the assessment:

- Central Statistics Office (CSO), Census of Agriculture, June 2000;
- Department of Agriculture Food and Rural Development Annual Reports;
- Department of Agriculture, Food and Rural Development Fact Sheet for National Data, July 2006;
- Teagasc;
- Local Authority statistics; and
- National Farm Surveys.

An assessment of the existing agricultural situation was carried out through visits in Autumn 2002 to the majority of farms affected (46 out of a total number of 55 farms affected). Nine farms were not visited due to the fact that landowners were not available in person or did not wish to supply information in the interview. These farms were assessed by way of a roadside survey and landowners were contacted by telephone. In June 2004, 12 of the farms were revisited in order to assess the impact caused by a minor realignment of the route of the proposed road.

Individual agricultural impact assessment reports were prepared for each holding affected. These provided the basis for the overall assessment of agricultural impact, described in this chapter.

In July and August 2006 all 55 landowners were contacted by telephone and / or a farm visit to record any significant changes to the farm since the original assessment. Typically these would include changes in land ownership, size of farm and type and extent of farming enterprises. The individual agricultural impact assessment reports were amended to reflect these changes. In February 2007 following the issue of a revision to the Preliminary Design a further three landowners were visited and included in the assessment. In September 2007, following the confirmation of the final design, a total of 55 landowners were identified as being affected and the agricultural impact on those farms is assessed in this chapter.

For reasons of confidentiality, the individual agricultural impact assessment reports are not included in the EIS, however a summary table is provided in Appendix 6.1.

#### 6.1.1 Degree of Impact

The degree of impact in the following Chapter was assessed assuming the construction and operation of the proposed road (including incorporation of bridges and access tracks as discussed in Chapter 3), but prior to any detailed agricultural mitigation.

Where mitigation measures relating to severance are possible the degree of impact in most cases will be reduced.

The degree to which the proposed road affects an individual farm will depend on:

- The degree of severance;
- The type of farm enterprise carried out;
- Land take;
- Farm size;
- Removal of buildings and / or facilities.

In assessing impacts, the following significance criteria have been developed for this scheme, based on the Environmental Protection Agency (EPA) "Guidelines on the Information to be Contained in Environmental Impact Statements" (March 2002) and the National Roads Authority "Environmental Impact Assessment of National Road Schemes – A Practical Guide" (2005). A brief definition of the categories prepared by Philip Farrelly & Company is included in Table 6.1.

**Table 6.1 Significance of Impact on Farms of the Proposed Scheme**

<b>EPA Glossary of Impacts</b>	<b>Significance Level (EIS)</b>	<b>Criteria (EIS)</b>
<b>Profound Impact</b>	<b>Severe</b>	Severe impact occurs where the farm enterprise cannot be continued as a result of the proposed road. This will occur where land take is of such a scale that the remaining land will not form a viable unit or where severance is of such a nature to make the holding unworkable or where important farm buildings and facilities are removed and cannot be replaced. Impact of this degree will be most likely to occur on a dairy or stud farm.
<b>Significant Impact</b>	<b>Major</b>	Major impact occurs where the farm enterprise cannot be continued without considerable management or operational changes. This will typically occur where the farm is split in two due to the severance but where access between the severed portions and the farm buildings can still be achieved effectively. Typically where the impact is major an enterprise change will be necessitated e.g. from dairy to drystock.
<b>Moderate Impact</b>	<b>Moderate</b>	Moderate impact occurs where the farm enterprise can be continued as before but with increased management or operational difficulties. While portions of the land will be severed the enterprise mix will be such that the farming system could continue perhaps with additional labour or contractor charges or other changes.
<b>Slight Impact</b>	<b>Minor</b>	Minor impact occurs where the farm enterprise will experience inconvenience as a result of the proposed road. Severance will not occur and the farm buildings and facilities will be left in place. Typically only a small portion of land will be removed at the boundary of the farm.
<b>Imperceptible Impact</b>	<b>Not Significant</b>	An impact is not significant where the farm enterprise suffers a slight inconvenience.

## 6.1.2 Degree of Severance

A separate set of criteria have been developed to assess the degree of severance of a farm:

**Table 6.2 Degree of Severance**

Impact	Significance Criteria
Major	The proposed road passes through the land parcel causing severance. It is divided into two units and the severed area is greater than one third of the land parcel. There may be a loss of access to farm buildings and / or facilities.
Moderate	The proposed road passes through the land parcel causing severance. It is divided into two units. Access is available to the two areas. The severed area is less than one third of the land parcel. Where present, the farm buildings and facilities remain on the larger land area.
Minor	The proposed road passes through the land parcel causing severance. There may be severance of a small area.
None	The proposed road passes generally along the external boundary leaving the bulk of the land in one unit. There is no severance.

### 6.1.3 Enterprise Type

The farm enterprise types, which will be most severely affected by the proposed road, are those of high stocking rates, which are intensively farmed. These would frequently be dairy farms and intensive beef farms. In addition with dairy farms livestock has to be moved around on a daily basis. If movement routes are severed these can result in additional problems to the operation and management of the farm.

Other farm enterprises may also be impacted to a greater extent by the proposed road. Horses are of a more nervous disposition than other stock types and they are prone to stress caused by irregular noise and moving vehicles. In addition land take and severance of land parcels may result in fields of an irregular shape (e.g. triangular shaped fields with sharp / narrow corners), which may be unsuitable for grazing with equine stock. Horses risk injury when galloping around such fields.

Drystock enterprises such as beef and sheep are generally less affected than dairy farms. Stock on these farms are not moved from field to field as frequently as on a dairy farm. Although if there is a significant impact, the farming practices on these farms can be adapted to mitigate the overall impact.

## 6.2 Existing Environment

This section of the Chapter compares the general agricultural activity at a national and county level with that of the area immediately affected by the proposed road. Agricultural Statistics on a national level are available from the Department of Agriculture Fact Sheet for National Data, July 2006. The most recent details on a County and District Electoral Division (DED) level are available from the Central Statistics Office for the year 2000.

### 6.2.1 Agriculture Nationally and in Co. Donegal

#### Nationally

The Department of Agriculture have stated the following details in the Fact Sheet for National Data, July 2006 relating to national land usage:

- The land area of Ireland is 6.9 million hectares, of which 4.3 million hectares is used for agriculture and approx. 710,000 hectares for forestry, which equates to about 10% of total land.
- 79% of the agricultural area is devoted to grass (3.4 million hectares), 11% to rough grazing (0.5 million hectares) and 10% to crop production (0.4 million hectares).



- Average land price in 2004 was €16,261 per hectare. Average land price in the first quarter of 2005 was €16,230, down 11.8% on the fourth quarter of 2004 and up 5.2% on the first quarter of 2004.
- Beef and milk production currently account for 55.4% of agricultural output at producer prices.

### **Co. Donegal**

The 2000 Census of Agriculture states that Co. Donegal has a total Utilisable Agricultural Area (UAA) of 230,610 hectares. This represented approximately 5.2% of the national UAA land area available in 2000, which was 4,443,071 hectares (CSO Census of Agriculture, June 2000). There were 8,805 farms of over 1 hectare in area, with the average farm size in the county being 26.2 hectares. This was less than the national average farm size of 31.4 hectares. The total number of persons employed in agriculture in Donegal was 13,975 with the total number of Annual Work Units (1 AWU = 1800 hours or more of labour input per person per annum) being 8,673.

Grassland based livestock farming is very important in Co. Donegal. The predominant farm enterprises were sheep and beef cattle with 2,885 farms involved in specialist sheep production and 3,423 involved in specialist beef production. A total of 398 farms in the county were dairy farms. Some 5,660 farms had permanent pasture, which supported dairying and / or other livestock enterprises (principally the drystock enterprises of beef and sheep).

The Department of Agriculture, Food and Rural Development have estimated that there were 1811 active participants in the Rural Environmental Protection Scheme 2 (REPS) Scheme and 754 active participants in REPS 3 Scheme in Co Donegal as of 30<sup>th</sup> April 2006. REPS include financial incentives to improve the quality and visual appearance of the rural environment through, among other actions, the protection of endangered wildlife, flora and fauna. In total the amount paid to farmers in Co. Donegal under both schemes from January to April in 2006 was €6,475,824.10 or 7.83% of the total paid to Irish farmers.

## **6.2.2 Agriculture Within the District Electoral Divisions of Goland and Stranorlar**

The proposed road traverses mainly agricultural land. It passes through the two District Electoral Divisions (DEDs) of Goland and Stranorlar; and through the townlands of Cashelnavean, Meencrumlin, Croaghonagh, Goland, Carrickmagrath, Sessiagh O'Neil, Navenny, Dreenan, Edenmore, Mullandrait, Castlebane, Knockfair, Mullaghagarry, Tircallen, Kilross, Lisnaree and Teevickmoy. The topography ranges from flat to undulating land.

This section of the Chapter gives a general picture of agriculture in the DEDs of Goland and Stranorlar and is therefore not specific to individual landowners - this follows later in Section 6.3.2 Individual Farm Impact.

Table 6.3 presents the categories of farming enterprises in the area surrounding the proposed road (i.e. within the DEDs of Goland and Stranorlar). The table also indicates how agriculture in this area compares with the national percentages for each enterprise category. Figures are based on the Agricultural Census completed in 2000. These are the latest figures available from the Central Statistics Office (CSO) for DEDs.

The table indicates that specialised beef production enterprises predominate in the surrounding area at 54%, which is in line with the national percentage of 51%. Similarly, the mixed grazing livestock within the DEDs of Goland and Stranorlar (15%)

are in line with the national percentage (15%). However, specialised sheep production (23%) and other farm uses (8%) both have a far higher percentage than the corresponding national percentages of 9 and 1% respectively. It is noted that there is an absence of specialist dairy, mixed crops and livestock and specialist tillage farms in the statistics shown for the area surrounding the proposed road.

**Table 6.3 Number and Percentage of Farms Classified by Farm Type within the DEDs of Stranorlar and Goland compared to the National Percentage in 2000**

Farm/Enterprise Category	No. of Farms in Goland and Stranorlar DEDs within Farm Category **	Percentage of Farms in Goland and Stranorlar DEDs within Farm Category	National % of Farms in Each Category
Specialist Dairy	0	0	19
Specialist Beef Production	70	54	51
Specialist Sheep Production	30	23	9
Mixed Grazing Livestock	20	15	15
Specialist Tillage	0	0	3
Mixed crops & Livestock	0	0	3
Other*	10	8	1
<b>Total</b>	<b>130</b>	<b>100%</b>	<b>100%</b>

\* For example, horses, deer, land leased, alternative enterprises, etc.

\*\* The number of farms is shown to the nearest 10. Discrepancies in the total columns are due to this 'rounding up' process.

### 6.2.3 Farm Size Within the District Electoral Divisions of Goland and Stranorlar in 2000

Table 6.4 presents the distribution of farm sizes within the DEDs of Stranorlar and Goland compared to the national average in 2000. The table shows that there were a higher percentage of farms under 10ha (29%) in the DEDs encompassing the proposed road compared with the national average (20%). This indicates that the proposed road will affect a relatively high number of landowners when compared with a route of similar length elsewhere in Ireland.

**Table 6.4 Number and Percentage of Farmers Classified by Farm Sizes within the DEDs of Goland and Stranorlar compared to the National Percentage**

Farm Size	No. of Farms in DEDs of Stranorlar and Goland within Farm Size Category	Percentage of Farms in DEDs of Stranorlar and Goland within Farm Size Category	National % of Farms in Each Farm Size Category
<10 ha	40	29	20
10 - 20 ha	30	21	24
20 - 30ha	30	21	18
30 - 50ha	30	21	21
50 - 100 ha	10	8	14
= / > 100 ha	0	0	3
<b>Total</b>	<b>140</b>	<b>100</b>	<b>100</b>

In the second smallest category, 10 – < 20 ha, the percentage of farms is lower in the DEDs encompassing the proposed road (21%) than that of the national average (24%). Once farm size becomes greater than 30 hectares, the prevalence decreases e.g. the national percentage of farms in the 50 – <100 ha category is 14% whereas only 8% of farms in the DEDs encompassing the Preliminary Design are within this size grouping. The results indicated that in general, farm size appears to be smaller in the study area.

Part-time farming and less intensive farming are also common in the area surrounding the proposed road.

#### 6.2.4 Crop Production Within the District Electoral Divisions of Goland and Stranorlar in 2000

The CSO states that in 2000 there were no specialist tillage enterprises in the DEDs of Goland and Stranorlar, which encompass the Preliminary Design. However, it is stated that 3114 hectares of land is under crop production (CSO, Goland and Stranorlar Crops, 2000). This crop production includes the following;

**Table 6.5 Number and Percentage of Farmers Classified by Crop Type within the DEDs of Goland and Stranorlar compared to the National Percentage**

Crop Type	No. of hectares in Goland and Stranorlar DEDs	% in each category	National % in each category
<b>Total Crops Fruit and Horticulture</b>	47	2	9
<b>Total Hay</b>	147	5	6
<b>Total Pasture</b>	1444	46	50
<b>Total Silage</b>	444	14	24
<b>Rough Grazing</b>	1030	33	11
<b>Total</b>	3112	100	100

The percentage of land under pasture (46%) in the DED's of Goland and Stranorlar is comparable to the national average of 50% (derived from the totals of the county figures in the 2000 Census of Agriculture: Table 11 Number of farms growing crops and the area of crops in each province and county). Almost half of the farms in these DEDs (Goland and Stranorlar) are engaged in this activity. As such it can be expected that the proposed road will not have a particularly deleterious effect on the production of any one crop type.

#### 6.2.5 Soils

The soils of Ireland are classified in the Soil Association Map of Ireland (Gardiner & Radford, Explanatory Bulletin to Soil Map of Ireland, An Foras Taluntais 1980). The soil types along the proposed road are typical of five particular soil associations. This classification is based on the general area surrounding the proposed road. The soils along the proposed road are not very productive with a moderate to poor range of use. Their indicative characteristics appear as follows:

##### **Soil Association 1: (Peaty Podzols 75%, Lithosols 15%, Blanket Peats 10%)**

The profile of the principal soil is characterised by a peaty surface horizon less than 30 cm thick. The soil is usually coarse-textured and moderately well to imperfectly drained. The use range of these soils is very limited. High elevation, inaccessibility, a peaty surface, together with low lime and nutrient status are the main limiting factors. They

are not suitable for tillage or intensive grassland but are confined mainly to mountain sheep grazing, amenity and some forestry.

**Soil Association 11: (Gleys 90%, Brown Earths 10%)**

The principal soil consists of a surface-water Gley whose origin is due mainly to the impermeable nature of the parent material. The surface horizon is about 15cm thick and consists of a greyish-brown clay loam to silty clay loam, which contains about 30% clay and 35% silt. The predominant soil has a limited use range. It is unsuited to tillage. For grassland, drainage improvements are necessary to avoid poaching by grazing livestock, to facilitate machinery use and to extend the growing season. However because of their impermeable nature, drainage is difficult on these soils.

**Soil Association 20: (Brown Podzols 60%, Acid Brown Earths 20%, Gleys 20%)**

The principal soil is a well-drained brown podzolic of clay loam to loam texture and of low base status. These soils and the acid brown earth in the association have moderately wide use range. They are well suited to tillage and pasture but they sometimes occur in less favoured climatic areas, and therefore are not as well suited to crops such as sugar beet. Productive pastures can be established on these soils, and they can be grazed over much of the year. Although occurring in the lower landscape positions, they can be improved through drainage.

**Soil Association 21: (Gleys 75%, Peaty Gleys 25%)**

The predominant soil is poorly drained, of loam to sandy loam texture and medium base status, and is classified as a podzolised Gley. The profile usually displays a greyish brown surface horizon. The associated peaty Gley is similar, except that drainage conditions are worse and a peaty surface horizon of about 15cms has developed. These soils have a limited usage range. They are poorly drained, even on favourable slopes. Cultivation is very difficult unless the soils are at an ideal moisture balance. They are best suited to grassland. Drainage is essential.

**Soil Association 24: (Low level Blanket Peats)**

This occurs mainly below the 150m contour, on topography that varies from flat lowland to rolling hill. Organic soils of this type are extremely wet and acidic and have very low permeability. Peat depths vary according to the underlying topography from less than 1m to greater than 6m. The very limited suitability of this soil is similar to the high level type except that slopes are not as steep and altitudes not as high. It has been estimated that 25% of this soil type is cut-over mainly for fuel.

## 6.3 Assessment of Effects: Construction

The proposed road will run through predominantly lowland with some highland on either side of the River Finn Valley. This land comprises of a moderate to poor range and usage. The main enterprise affected will be livestock based. In total 55 farms will be directly affected by the proposed road, either by severance, by taking land or by construction disturbance. The impacts of severance and land take will be present throughout the construction and operation phases, although with mitigation, impacts during operation can be reduced with time.

The following section describes the effects of the proposed road during the construction phase in terms of actual construction activities, their impacts as well as the more permanent effects such as severance. Standard mitigation measures are discussed where appropriate. The longer-term impact of the proposed road in terms of loss of agricultural land and the direct effects on individual farms are discussed in Section 6.4, under Operation effects, although these effects would also be present in varying degrees during the construction phase.

The main impacts on agricultural activity during the construction phase of the proposed road will be:

- Construction noise,
- Dust,
- Restricted access to severed land parcels during construction,
- Disturbance of field drainage works, and
- Disruption to ducting.

The nature of each specific impact is discussed below.

### 6.3.1 Construction Noise

The activity of earth moving machinery, transport lorries and other ancillary vehicles will generate additional noise emissions in the immediate vicinity of the road construction. In general, animals become accustomed to regular noises and sounds. However, noise can be of significance for farm animals when it becomes excessively loud. Intermittent noises can cause fright and distress. Blasting activity can be of particular concern with certain farm enterprises. In addition intermittent noises close to farm buildings, can distress livestock.

#### Mitigation Measures

Good communication between the contractor and the farmer during the construction phase will prevent undue disturbance due to noise. It will also facilitate farm enterprises so that valuable livestock sensitive to noise can be moved away from the construction work during critical times. Mitigation relating to noise is further detailed within Chapter 12.0 Noise and Vibration.

### 6.3.2 Dust

Dust generated from a number of sources, including the exposure of soil to the atmosphere during construction, may cause annoyance to the farmer and farm animals. In addition livestock are at risk of eye irritations from high levels of wind blown dust particles. This stress may reduce productivity and increase management difficulties.

#### Mitigation

Measures to control the reduction of dust will be put in place by the contractor and detailed within the Environmental Operating Plan. Measures are detailed within Chapter 11.0 Air Quality and will include wheel wash facilities to prevent spread of mud onto main roads, sheeting vehicles carrying dust-generating materials to and from site, and spraying, sealing or re-vegetation of exposed earthworks. Good communication between the contractor and the farmers in the proximity of construction activities will facilitate on-going farm enterprises so that valuable livestock are kept as far away as possible from the construction work during critical times.

### 6.3.3 Restricted Access to Severed Land Parcels

Access to severed land parcels will still be required during the road construction process (i.e. following the commencement of construction but before the accommodation works have been completed). It is to be expected that there will be increased difficulties in providing such access to farmers during the construction phase due to the need to allow machinery and equipment continual movement along the construction corridor. This will conflict with the farmer's requirements to move livestock

from one part of the farm to another in order, for instance, to utilise the grazing area properly.

### Mitigation

As in the case of mitigating noise and dust pollution, good communication between individual farmers and the construction authorities will minimise difficulties caused by the restriction of access to severed land parcels. Such communication should produce a workable arrangement, which will allow all parties to continue their work in return for some compromise to other parties.

Maintenance of open access to all landholdings and properties will be required during construction. Temporary fencing will be erected as required to delineate the site boundary and to minimise disturbance to adjacent lands. However, farmers may need to move animals across the construction site while they await more permanent measures to be put in place. This will be facilitated by providing gates where needed, until such time as the permanent access arrangements are in place for these farmers. At this time, these gateways will be replaced by permanent stock-proof fencing. Finally there will also be proper termination of existing boundaries, namely reinstatement of fences, hedge lines etc on a like-for-like basis once work is complete.

## 6.3.4 Disturbance of Field Drainage Works

It is to be expected that field drainage systems currently in situ will be disturbed and in places destroyed by the construction of the proposed road. These systems will be restored as part of the completed road works. However, there may be temporary impaired drainage in the period of time between initial disturbance and final reinstatement of such drainage works.

### Mitigation

In cases where impeded drainage during construction will cause obvious difficulty to a particular landowner, temporary measures will be looked at on a site-specific basis. This could include allowing waters to drain to less critical areas, so as to minimise the impact.

## 6.3.5 Disruption to Ducting

Access to either piped water or drinking points on watercourses may be removed during construction through the severance of piping on the farm or the diversion of watercourses used by livestock on the farm.

Electric fencing used on farms to stock proof farm boundaries or control the movement of stock may also be severed. A power supply will be required to stock-proof non-roadside boundaries on severed areas.

### Mitigation

Where required, alternative sources of water and electricity will be provided on severed lands. In addition, some temporary measures may be needed, such as water tanks and battery powered electric fencing to ensure that disruption to farming is minimised during the construction phase.

## 6.4 Assessment of Effects: Operation

The main impacts on agricultural activity during the operation phase of the proposed road consist of:

- Landtake,
- Severance,
- Removal of farm buildings and farm facilities, and
- Access to remaining lands.

As discussed above the proposed road will directly affect a total of 55 farms, either by severance or by taking land. The land ranges from moderate to poor range and usage. The following sections considers the impact of the proposed road in terms of the loss of agricultural land and the direct effects on individual farms from the proposed road, prior to detailed agricultural mitigation measures. Section 6.5 discusses the residual impacts on the farms after mitigation measures have been implemented.

#### 6.4.1 Loss of Agricultural Land

Nationally in 2000, there were 4,443,071 hectares of utilisable agricultural area (U.A.A) and within Co. Donegal there were 230,610 hectares. The area to be removed from agricultural production is approximately 113ha. This loss, while significant to individual farmers, will not be significant at a county or national level.

#### 6.4.2 Individual Farm Impact

As discussed in Section 6.3.3 the main effects of the proposed road will be during the construction phase e.g. land take, severance, acquisition / loss of buildings / facilities, access etc. The key impact during the operational stage will be access to severed land portions.

There are 55 farms directly affected by the construction of the proposed road. The landownership along the proposed road is shown in Figure 6.1. These farms have been categorised according to the following criteria:

- Farm size (ha);
- Farm enterprise type(s);
- Level of overall impact;
- Breakdown of those farms with major or severe overall impact;
- Degree of severance (if applicable);
- Access required to severed areas;
- Access points / gates required on affected lands;
- Buildings/facilities to be acquired.

Table 6.6 presents a summary of the Individual Farm Assessments and the impact of the construction of the proposed road. Full details are included in Appendix 6.1.

Table 6.6 Summary of Individual Farm Assessments

Category	No. of Farms	% of Farms
<b>Farm Size (ha):-</b>		
<10	11	20
10 - 20	17	31
20 - 30	11	20
30 - 50	9	16
50 - 100	6	11
= / >100	1	2
<b>Total</b>	<b>55</b>	<b>100%</b>
<b>Farm Enterprises:-</b>		
Specialist Dairy	0	0
Specialist Sheep Production	7	13
Specialist Beef	20	36
Specialist Tillage	0	0
Mixed Livestock *	9	16
Leased Lands	12	22
Forestry	1	2
Other **	6	11
<b>Total</b>	<b>55</b>	<b>100%</b>
<b>Level of Impact</b>		
Severe	2	4
Major	13	24
Moderate	26	47
Minor	11	20
Not Significant	3	5
<b>Total</b>	<b>55</b>	<b>100%</b>
<b>Of those with Major/Severe impact</b>		
Dairy	0	0
Beef	8	15
Sheep	1	2
Other ***	6	11
<b>Total</b>	<b>15</b>	<b>28%</b>
<b>Degree of Severance (Of 68 parcels):-</b>		
Major	20	29
Moderate	10	15
Minor	0	0
None	38	56
<b>Total</b>	<b>68</b>	<b>100%</b>
Access required to severed areas	27	40%
Affected Access points / or gates to be replaced required	18	27%
Animal Handling Facilities to be Acquired****	3	4%

\* Mixed Livestock includes any combination of cows, cattle, horses or sheep enterprises.

\*\* This category consists of two farms involved in silage production, one with forestry and ponies, one with forestry, sheep and horses and two farms that are unused.

\*\*\* This category consists of two leased farms, two farms involved in silage production, a mixed farm with beef and sheep and a mixed farm with forestry, sheep and horses.

\*\*\*\* Facilities include farmyards, fodder storage facilities and animal handling and housing facilities. This category consists of animal handling pens on two farms (farm ref. nos. 3 and 51) and farm buildings, which will be removed on one farm (farm ref. No. 17).

- (i) Access is deemed to be required where it has to be provided to a severed portion of land or a parcel where the access along the entire road frontage is removed.
- (ii) In the case of access required or facilities required, the figure refers to the number of land parcels in each case. It does not relate to the number of farms. In some cases access may be required on more than one land parcel on a holding.



- (iii) A parcel is defined as a unit of agricultural land, i.e. a field or a number of fields. It may represent the entire farm where it is all in one unit. While there are 55 farms affected, some farms have more than one parcel or agricultural unit affected and as a result there are 68 parcels. See "Impact on Individual Farm Parcels" below. Refer to the summary table 6.8 for details of those with more than one parcel.

Of all affected farms, 71% are in the farm size category of less than 30ha. This compares with 62% on a national level. This reflects a slightly higher incidence of smaller farm holdings in the area.

In terms of farm enterprises on the proposed road, there are no specialist dairy farms or mixed livestock farms that have dairying as the primary farm enterprise. There are twenty specialist beef farms representing 36% of the farms affected. In addition there are seven specialist sheep farms representing 13% of the farms affected. There are nine mixed livestock farms, all of which consist of beef and sheep enterprises. There is a significant level of less intensive farm enterprises along the proposed road. Overall this means that the agricultural impact of the proposed road would be less than it otherwise would have been on another scheme with more intensive agricultural enterprises.

#### **Overall Impact on Individual Farms**

Prior to any mitigation measures being put in place, there are two farms, representing 4% of those affected, on which the overall agricultural impact would be severe (see Table 6.6). Both of these farms are leased out. The impact of the proposed road on both of these farms involves acquiring the entire area of the affected land parcels.

There are thirteen farms, which would have a major degree of impact, which represents 24% of all farms. These consist of eight beef farms, one sheep farm, two involved in silage production, one with forestry and ponies and one with forestry, sheep and horses. Without mitigation measures, these farm enterprises cannot be continued without considerable management or operational changes due to the combination of the level of severance created, the type of enterprise, farm size, land take and the affects on farm buildings and facilities.

There are twenty-six farms, which would have a moderate degree of impact representing 47% of all farms. There are eleven farms, which would have a minor impact representing 20% of all farms. There are three farms that would not have a significant degree of impact, representing 5% of the overall farms.

#### **Impact on Individual Farm Parcels**

Where the proposed road has affected more than one land parcel on a farm the land severance on each land parcel is assessed separately. There are 68 individual land parcels directly affected along the proposed road all of which were assessed.

On three land parcels, facilities will be removed. Affected facilities include animal handling pens as well as animal housing facilities. On two land parcels (Farm Reference No. 3 & 51), animal-handling facilities will be removed, whilst on one land parcel (Farm Reference No. 17), animal-housing facilities will be removed consisting of loose sheds (namely farm buildings that can be used for housing stock or for a number of other uses).

Table 6.6 shows the details of the individual farm assessments and the anticipated impact of the proposed road on each farm.

### 6.4.3 Mitigation Proposals

Mitigation measures are detailed in this section. Further measures to compensate farmers due to land acquisition, are part of the statutory code for acquisition to be assessed at a later stage. For reasons of road safety, there will be no agricultural access permitted onto the proposed road.

From Table 6.6, a total of 27 land parcels or 40% of the 68 land parcels will require new access provisions to severed areas of land. Access points or gates will have to be provided on 18 land parcels or 27% of affected land parcels where they have been disturbed or will be required off existing roads.

The extent and complexity of such facilities varies with each farm depending on the nature of the impact and the type of enterprise being carried out. In some cases simple gateways will suffice, while in other cases access roads and bridges may have to be constructed.

The impact is mitigated somewhat by the fact that the main agricultural activity along the proposed road is specialist beef and sheep farming. No specialist dairy or equestrian farms are affected, which are particularly sensitive to new construction works.

## 6.5 Residual Impact

Table 6.7 shows the details of the individual farm assessments and the anticipated residual impact of the proposed road on each farm following recommended mitigation works being carried out.

**Table 6.7 Residual Impacts on the Individual Farms**

Category	Residual Impact No. Of Farms	Residual Impact % of Farms
<b>Impact on Farm (Of 55 farms)</b>		
Not Significant	3	5
Minor	13	24
Moderate	33	60
Major	4	7
Severe	2	4
<b>Of those with Severe/Major Impact</b>		
Dairy Farms	0	0
Beef	3	5
Sheep	0	0
Mixed Livestock with Beef/ Sheep/Other	1	2
Leased	2	4

Following recommended mitigation works discussed above relating to severance, the residual impact will be severe on two farms both of which are leased out on an annual basis.

On four farms, or on 7% of all farms, the residual impact will be major. This represents a 17% reduction in the level of farms with a major impact experienced prior to the consideration of recommended mitigation measures. The four farms include three beef farms and one mixed livestock farm on which sheep and beef are the primary farm enterprise.

Thirty-three farms will have a moderate degree of residual impact representing 60% of all farms. This represents a 13% increase in the level of moderately impacted farms on the proposed road. This is due to farms changing from the major to moderate impact classification following consideration of the recommended mitigation measures.

Thirteen farms will receive a minor impact representing 24% of overall farms. This represents a slight increase of 4% in the level of farms with a minor impact on the proposed road. This is due to some farms changing from moderate to minor impact classification following consideration of the recommended mitigation measures.

Three farms will not have a significant degree of impact, which represents 5% of the overall farms. There is no change in the level of all farms with no significant impact as a result of the proposed road.

Appendix 6.1 shows the details of the individual farm assessments and the anticipated residual impact of the proposed road on each farm following recommended mitigation works being carried out.

## 6.6 Conclusion

An assessment of the agricultural impact of the construction and operation of the Preliminary Design was carried out in the autumn of 2002, July to August 2006 and February and September 2007. The scheme will affect a total of 55 farms and the assessment of the impact on these farms was undertaken by an agricultural consultant.

The proposed road is approximately 14.9km in length and the area to be removed from agricultural production is approximately 113Ha. The Preliminary Design will run through predominantly lowland with some highland on either side of the River Finn Valley. This land comprises of a moderate to poor range and usage. The main enterprise affected will be livestock based.

Dry-stock enterprises (e.g. beef, sheep) are the predominant farm enterprises found along the Preliminary Design. These are generally less severely impacted than dairy farms where livestock are moved on a twice-daily basis. In all cases mitigation measures will be implemented, which will reduce the impact.

The main impacts on agricultural activity during the construction phase of the proposed road will be:

- Construction noise,
- Dust,
- Restricted access to severed land parcels during construction,
- Disturbance of field drainage works, and
- Disruption to ducting.

In all cases mitigation measures have been identified, and when implemented, will reduce the impact of the above. The main impacts on agricultural activity during the operation phase of the proposed road consist of:

- Landtake,
- Severance,
- Removal of farm buildings and farm facilities, and
- Access to remaining lands.

Mitigation measures have been identified in relation to severance of lands by the proposed road. The impacts of landtake and the removal of farm facilities also form part of the statutory code for compensation.

Of the 55 farms assessed, there are two farms on which the overall agricultural impact would be severe. There are thirteen farms, which would have a major degree of impact. There are twenty-six farms, which would have a moderate degree of impact. There are eleven farms, which would have a minor impact. There are three farms, which would not have a significant degree of impact.

A total of 27 out of the 68 land parcels assessed will require access to severed areas. The extent and complexity of such facilities varies with each farm depending on the nature of the impact and the type of enterprise being carried out. There are also 18 land parcels on which affected access points or gates will have to be replaced.

Following recommended mitigation works relating to severance, the residual impact of the proposed road resulted in two farms with a severe impact, four farms with a major impact, thirty-three farms with a moderate impact, thirteen farms with a minor impact and three farms where there would not be a significant impact.

The impacts of the proposed road upon agriculture, while significant to individual farmers, are not significant on a county or national level.

## 6.7 References

Central Statistics Office, June 2000 Census of Agriculture – National Status of Agriculture Statistics

Environmental Protection Agency Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (September 2004).

Gardiner, M. and Radford, J., 1980. Soil Associations of Ireland and their Land Use Potential. Soil Survey Bulletin No. 36. An Foras Taluntais, Dublin 143pp

Irish Department of Agriculture, Food and Rural Development Web Site Fact Sheet on Irish Agriculture – July 2006

<http://www.agriculture.gov.ie/publicat/factsheet/July2006.doc>

Irish Department of Agriculture, Food and Rural Development Web Site Fact Sheet on [http://www.agriculture.gov.ie/areasofi/rep\\_s\\_planner/FactsheetApr2006.doc](http://www.agriculture.gov.ie/areasofi/rep_s_planner/FactsheetApr2006.doc)

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## 7.0 Landscape and Aesthetics

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### 7.1 Introduction and Methodology

The purpose of this assessment is to initially understand and interpret the landscape character and visual context of the route corridor for the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass. It then goes on to systematically assess the potential landscape and visual impact of the Preliminary Design upon its receiving landscape and visual receptors. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

The methods of assessment are based on those described in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 5: Landscape Effects (1993 plus addendums). Further guidance has also been drawn from the Institute of Environmental Management and Assessment and the Landscape Institute publication entitled, Guidelines for Landscape and Visual Impact Assessment (IEMA/LI 2002). The mitigation proposals within this assessment have been prepared with reference to 'A Guide to Landscape Treatments for National Road Schemes in Ireland' (National Roads Authority, 2006).

#### 7.1.1 Stages in Assessment

The assessment process can be broadly divided into three parts:

##### **Landscape Character and Visual Appraisal of the Preliminary Design (Baseline Studies)**

This stage establishes the existing character and quality of the receiving landscape within which the Preliminary Design will be set. It includes a description of the defining features and characteristics of the locale as they combine to form its landscape character. Reference is made to landscape planning designations although detailed interpretation of all planning issues is addressed elsewhere in this Environmental Impact Statement (EIS) (see Chapter 4.0 Planning). Landscape character areas are described, defined and evaluated to identify the most valued areas and those displaying high quality characteristics (Appendix 7.1). Landscape character areas are illustrated on Figures 7.1 to 7.5.

Walkover survey of the Preliminary Design was undertaken during August 2003. Further surveys have also been undertaken during summer 2006 to verify the results of the earlier studies and to identify any changes to the baseline conditions that have taken place since the original field survey work. Further fieldwork to assess the potential visual impact of the Preliminary Design upon properties was undertaken during summer 2006 and winter 2006/7. Using site photographs and the results of field survey, an indicative Zone of Visual Influence (ZVI) was defined (Figure 7.6). The ZVI broadly defines the area within the surrounding landscape from which views to the Preliminary Design will potentially be available. In association with this study, the visual characteristics of the receiving landscape are illustrated within a number of local views. These show sections of the existing landscape within which the Preliminary Design will be set and are typical of views that will be received by a series of visual receptors including individuals or groups, static or mobile. These views are shown on Figures 7.7 to 7.17.

The study also included fieldwork to establish the baseline conditions of the existing night-time landscape through which the Preliminary Design would pass.

### **Assessment of Effects**

The impact assessment is divided into a number of distinct, but closely related parts and takes into account the potential direct, indirect, cumulative, permanent and temporary impacts of the Preliminary Design as follows:

- The potential magnitude of impact of the Preliminary Design upon the landscape character areas within the receiving landscape through which the route will pass. The magnitude of impact is that which would result from the Preliminary Design during construction, at Year 1 and Year 15 following scheme opening and beyond, inclusive of mitigation. The landscape impact assessment is summarised in Appendix 7.2.
- The potential magnitude of visual impact upon views, utilising the key viewpoints (Figures 7.7 to 7.17) as a basis for reference. These were taken from publicly accessible viewpoints identified during field survey. The assessment considers the potential visual impact of the Preliminary Design at Year 1 (Winter following scheme opening) and at Year 15 (Summer and Winter) for each viewpoint identified by the study.
- The potential magnitude of visual impact upon views from residential properties within the defined ZVI for the Preliminary Design, focusing on those broadly within a 2km corridor with the Preliminary Design forming its centre-line. The property locations are shown on Figure 7.18 (Sheet 1 to 5) and the assessment of potential visual impact included as Appendix 7.3.

The potential landscape and visual impact of the Preliminary Design is assessed using the criteria defined in Section 7.1.2 below. These take into account the potential effects of the proposed mitigation measures as shown on the landscape proposals plans (Figure 7.19).

In addition, the potential effects of the Preliminary Design upon the night-time landscape and upon night-time views have also been assessed. The potential night-time landscape character impacts uses the same criteria as listed in Table 7.1. The potential visual impact of the Preliminary Design upon the night-time views from Viewpoints 1 to 11 is also assessed using the criteria listed in Table 7.2. The night-time assessment is based upon the results of field survey undertaken during summer 2006 and winter 2006/7.

### **Design Appraisal and Mitigation Proposals**

A description of the Preliminary Design is given in Chapter 3.0 Description of the Preliminary Design. The main features of the proposals are described in this section as they relate to the potential landscape and visual impact of the Preliminary Design.

The assessment process aims to be objective and to describe the changes factually. However, the assessment of landscape and visual impacts inevitably requires a degree of subjective analysis. Whilst the potential changes arising from proposals can be factually defined, the significance of these changes does require qualitative judgements to be made. The conclusions to this assessment therefore combine objective measurement and subjective professional interpretation.

## 7.1.2 Criteria for the Assessment of Landscape and Visual Impact

### **Landscape Character Impact Assessment**

The potential landscape impact of each section of the Preliminary Design (inclusive of its mitigation) has been evaluated using the criteria defined in Table 7.1. A description of the potential landscape effects of the Preliminary Design and an assessment of its potential magnitude of impact are given in Section 7.3.1 and Appendix 7.2.

The criteria are as follows:



Table 7.1 Landscape Assessment Criteria

Scale	Criteria
Large beneficial (positive) effect	Very few if any investment proposals are likely to merit this score.
Moderate beneficial (positive) effect	<p>The proposals provide an opportunity to enhance the landscape because:</p> <ul style="list-style-type: none"> <li>• they fit very well with the scale, landform and pattern of the landscape;</li> <li>• there is potential, through mitigation, to enable the restoration of characteristic features, partially lost or diminished as the result of changes resulting from intensive farming or inappropriate development;</li> <li>• they will enable a sense of place and scale to be restored through well-designed planting and mitigation measures, that is, characteristic features are enhanced through the use of local materials and species used to fit the proposal into the landscape;</li> <li>• they enable some sense of quality to be restored or enhanced through beneficial landscaping and sensitive design in a landscape which is not of any formally recognised quality;</li> <li>• they further government objectives to regenerate degraded countryside.</li> </ul>
Slight beneficial (positive) effect	<p>The proposals:</p> <ul style="list-style-type: none"> <li>• fit well with the scale, landform and pattern of the landscape;</li> <li>• incorporate measures for mitigation to ensure they will blend in well with surrounding landscape;</li> <li>• will enable some sense of place and scale to be restored through well-designed planting and mitigation measures;</li> <li>• maintain or enhance existing landscape character in an area which is not a designated landscape, nor vulnerable to change;</li> <li>• avoid conflict with government policy towards protection of the countryside.</li> </ul>
Neutral effect	<p>The proposals are well designed to:</p> <ul style="list-style-type: none"> <li>• complement the scale, landform and pattern of the landscape;</li> <li>• incorporate measures for mitigation to ensure that the scheme will blend in well with surrounding landscape features and landscape elements;</li> <li>• avoid being visually intrusive nor have an adverse effect on the current level of tranquillity of the landscape through which the route passes;</li> <li>• maintain existing landscape character in an area which is not a designated landscape, that is, neither national or local high quality, nor is it vulnerable to change;</li> <li>• avoid conflict with government policy towards protection of the countryside.</li> </ul>
Slight adverse (negative) effect	<p>The proposals:</p> <ul style="list-style-type: none"> <li>• do not quite fit the landform and scale of the landscape;</li> <li>• although not very visually intrusive will impact on certain views into and across the area;</li> <li>• cannot be completely mitigated for because of the nature of the proposal itself or the character of the landscape through which it passes;</li> <li>• affect an area of recognised landscape quality;</li> <li>• conflict with local policies for protecting the local character of the countryside.</li> </ul>

Moderate adverse (negative) effect	<p>The proposals are:</p> <ul style="list-style-type: none"> <li>• out of scale with the landscape, or at odds with the local pattern and landform;</li> <li>• are visually intrusive and will adversely impact on the landscape;</li> <li>• not possible to fully mitigate for, that is, mitigation will not prevent the scheme from scarring the landscape in the longer term as some features of interest will be partly destroyed or their setting reduced or removed;</li> <li>• will have an adverse impact on a landscape of recognised quality or on vulnerable and important characteristic features or elements;</li> <li>• in conflict with local and national policies to protect open land and nationally recognised countryside.</li> </ul>
Large adverse (negative) effect	<p>The proposals are very damaging to the landscape in that they:</p> <ul style="list-style-type: none"> <li>• are at considerable variance with the landform, scale and pattern of the landscape;</li> <li>• are visually intrusive and would disrupt fine and valued views characteristic of the area;</li> <li>• are likely to degrade, diminish or even destroy the integrity of a range of characteristic features and elements and their setting;</li> <li>• will be substantially damaging to a high quality or highly vulnerable landscape, causing it to change and be considerably diminished in quality;</li> <li>• cannot be adequately mitigated for;</li> <li>• are in serious conflict with government policy for the protection of nationally recognised countryside.</li> </ul>
Very large adverse (negative) effect	<p>The proposals would result in exceptionally severe adverse impacts on the landscape because they:</p> <ul style="list-style-type: none"> <li>• are at complete variance with the landform, scale and pattern of the landscape;</li> <li>• are highly visual and extremely intrusive, destroying fine and valued views both into and across the area;</li> <li>• would irrevocably damage or degrade, badly diminish or even destroy the integrity of characteristic features and elements and their setting;</li> <li>• would cause a very high quality or highly vulnerable landscape to be irrevocably changed and its quality very considerably diminished;</li> <li>• could not be mitigated for, that is, there are no measures that would protect or replace the loss of a nationally important landscape;</li> <li>• cannot be reconciled with government policy for the protection of nationally recognised countryside.</li> </ul>

Source: [http://www.webtag.org.uk/webdocuments/3\\_Expert/3\\_Environment\\_objective/3.3.7.htm](http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_objective/3.3.7.htm)

## Visual Impact Assessment

A number of representative viewpoints have been selected to illustrate the potential visual impact of the Preliminary Design (see Figures 7.7 to 7.17). In addition, the potential visual impact of the Preliminary Design upon views from properties within the defined ZVI has also been assessed (see Appendix 7.3). Within each view the potential magnitude of impact has been assessed using the criteria defined in Table 7.2:

**Table 7.2 Visual Impact Assessment Criteria**

Scale of Impact	Criteria
Substantial adverse or beneficial impact	Where the Preliminary Design will cause a significant deterioration (or improvement) in the existing view
Moderate adverse or beneficial impact	Where the Preliminary Design will cause a noticeable deterioration (or improvement) in the existing view
Slight adverse or beneficial impact	Where the Preliminary Design will cause a barely perceptible deterioration (or improvement) in the existing view
No change	No discernible deterioration (or improvement) in the existing view

Source: UK Department of Transport, 1993 (plus addendums) Design Manual for Roads and Bridges, Volume 11.

## 7.2 Existing Environment

### 7.2.1 Landscape Planning

This section considers the potential impact of the Preliminary Design upon designated landscape areas or features within the relevant County Development Plans. For full consideration of planning policy, see Chapter 4.0, Planning.

#### ***County Donegal Development Plan 2006 -2012***

An objective of the Development Plan is to "protect landscapes of highest scenic amenity and views and prospects of specific importance". Policy BNH5 gives further explanation of policy and also defines "Areas of Especially High Scenic Amenity" (EHSA) and "views and prospects of special amenity value". Map 9 within the Development Plan shows indicative locations / extents for both. The Lough Mourne area is within an EHSA and there are also two views and prospects from the N15 looking southwest towards the Barnesmore Gap.

Policy BNH 2 relates to the protection of trees, stonewalls and hedgerows. The Preliminary Design would result in the loss of and / or severance of a number of these landscape features. Detailed identification of these is contained within Chapter 9.0 (Ecology - Flora, fauna and fisheries). In this study the potential landscape impact resulting from the removal of these landscape features is considered as part of the overall effects of the Preliminary Design upon a defined landscape character area (see Appendix 7.2). The removal of mature trees and hedgelines will, inevitably, result in some adverse local landscape effects. However, it should be noted that the Preliminary Design includes for extensive areas of new planting (including hedgelines and

woodland) which will go some considerable way to offset the loss of existing trees and hedgerows as a result of the construction of the Preliminary Design.

***Ballybofey Stranorlar Local Area Plan 2004 -2010***

The Local Area Plan includes a strategic policy designed to establish a framework for the long-term protection and enhancement of the natural and built environment to Ballybofey and Stranorlar. The Local Area Plan includes a land-use zoning plan, which defines the proposed River Finn candidate Special Area of Conservation (cSAC), and a large area for "Recreational, Amenity and Open Space" broadly centred on the River Finn. To the north of Edenmore House, the Preliminary Design follows the eastern edge to the defined recreational area. The zoning plan also defines "visually vulnerable" areas. However, these would not be directly affected by the Preliminary Design.

## 7.2.2 Landscape Character Appraisal

The Preliminary Design has been divided into its representative landscape types and landscape character areas based upon the results of walkover survey and visual analysis.

Landscape types "are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern."

Landscape character in contrast is "a distinct and recognisable pattern of elements that occur consistently in a particular type of landscape". Landscape character areas "are single unique areas and are the discrete geographical areas of a particular landscape type". (Source: South Gloucestershire Landscape Character Assessment, 2002).

**Landscape Character Areas: Classification and Evaluation**

The key characteristics of each landscape character area along the course of the Preliminary Design are described and evaluated in this section and summarised in Appendix 7.1. Each of the landscape character areas is also listed under their respective landscape type. In each case, however, it is the quality of the local and unique landscape character area that has been evaluated in this Chapter using the 5-point scale defined in Table 7.3. These criteria have also been used in comparable studies. The landscape character classification and evaluation is summarised in Appendix 7.1.

**Table 7.3 Landscape Character Area Classification and Evaluation**

Value	Definition
Highest Quality	Areas and / or features which have a particularly high value, by nature of their condition, high scenic qualities, strong characteristics such as pattern and land cover, cultural associations, and/or relative position and amenity including level of tranquillity. These are likely to be designated for their landscape quality and value.
Very Attractive	Areas and / or features which are considered to be of high value by virtue of their positive characteristics such as pattern and land cover, sense of place or local or cultural associations and level of tranquillity. These areas will be of regional or local importance and are likely to be, but not necessarily, designated by the planning authority as being of landscape value.
Good Landscape	Landscapes and / or features which retain a positive character such as pattern or land cover and a sense of place or local or cultural associations and a degree of tranquillity. These areas are unlikely to be designated for their landscape value.
Ordinary Landscape	Landscapes in fair to poor condition, which have undergone change to the extent that they no longer have a distinctive local character such as pattern and/or land, cover, or particular aesthetic quality, or they lack cultural associations or tranquillity.
Poor Landscape	Degraded landscapes and / or features in poor condition whose distinctive character and aesthetic quality has been seriously damaged.

#### **Preliminary Design**

The Preliminary Design passes through the following landscape types and landscape character areas:

**Landscape Type: Unenclosed uplands** (this landscape type is illustrated on Figure 7.15)

**Character Area: Lough Mourne**

**Chainage: 600-1900**

#### **Key Characteristics:**

- Glacial upland landscape with Lough Mourne as major landscape feature and adjoining high hills forming a landscape setting to the Lough.
- Sense of wildness, dramatic scenery / sometimes hostile.
- Extensive areas of unimproved grassland with occasional patches of gorse and *Juncus*.
- Rock outcrops.
- Large-scale and exposed landscape offering dramatic views of the Blue Stack Mountains to the southwest.

#### **Evaluation**

The Lough Mourne character area is within part of an area designated by Donegal County Council as an EHSA. These are areas considered by the County Council to possess the highest scenic quality. The Lough Mourne area exhibits a sense of drama due to its wildness and setting that is enhanced by its surrounding high hills. It is thus considered to be a landscape of the Highest Quality.

**Landscape Type: Afforested uplands (Figure 7.1)**

**Character Area:** Croaghonagh coniferous woodlands

**Chainage:** 1900-4850

**Key Characteristics:**

- Coniferous plantations at varying stages of maturity but with structured appearance.
- Some areas of open unimproved grassland.
- Burn Daurnett watercourse and the former railway line with their adjoining broadleaved vegetation form a linear feature within the character area.
- Coniferous plantations are a discordant feature with a fragmented appearance. Overhead power cables are a detracting feature within the character area.

**Evaluation**

The Croaghonagh coniferous woodlands have introduced a discordant landscape element that adjoins the Lough Mourne character area. Their ordered and structured appearance forms a marked contrast to the wilderness qualities of the Lough Mourne area. It is therefore graded as an Ordinary landscape within this assessment.

**Landscape Type: Enclosed farmland**

The Preliminary Design passes through two character areas within this overall landscape type. These are described as follows:

**Character Area:** Less intensively managed agricultural landscape: Types 1 and 2 (see Figure 7.5 for Type 1, the Type 2 character area is illustrated on Figure 7.7)

**Chainage:**

Type 1: 4850-6700 (Goland to Carrickmagrath)

Type 2: 7300-7900 (Sessiagh O'Neill) / 9050-10700 (Dreenan) / 12200-13500 (Treanamullin / Castlebane to Knockfair / Mullaghagarry).

Two variations of this less intensively managed agricultural landscape have been identified in the study. The key characteristics of the Type 1 less intensively managed agricultural landscape are described as follows:

- Rough grasslands, hedgebanks with well-established vegetation; some sense of neglect. Variations in colour and texture. Remnant stone walls.
- Enclosure pattern formed by hedgebanks, watercourses..
- Large-scale and expansive.

A distinct section of the Type 1 character area occurs between Goland and Carrickmagrath (Ch 4850-6700). It is a low-lying area and is relatively open. It is also further characterised by occasional wet areas, with rushes and rock outcrops.

The Type 2 less intensively managed agricultural landscape is smaller scale and less extensive and occurs in smaller "pockets" of landscape to the south and east of Stranorlar. Otherwise, it shares similar characteristics to that of Type 1.

At Sessiagh O'Neill (Ch 7300-7900) a relatively compact area of this Type 2 character area occurs which exhibits a definite sense of enclosure due to the maturity of its enclosure landscape, which is formed by hedgebanks with dense, well-established vegetation. At Dreenan (Ch 9050-10700) the character area is distinguished by its mature hedgelines and rush filled meadows. In addition, between Treanamullin /

Castlebane and Knockfair / Mullaghagarry (Ch 12200-13500) a low-lying and relatively extensive area of rushes *Juncus* is present, which is drained by a series of ditches.

#### **Evaluation**

The less intensively farmed landscape is considered to have greater appeal due in part to its sense of neglect which has resulted in an attractive mix of unimproved grasslands with occasional scrub and rock outcrops. Such management has established a more diverse landscape where variations in texture, colour and maturity enhance its overall character and visual appeal. It is thus considered to be a Very Attractive landscape.

**Character Area:** Intensively managed agricultural landscape surrounding Ballybofey / Stranorlar (Figure 7.3).

**Chainage:** 6700-7300 (Carrickmagrath to Sessiagh O'Neill) / 7900-9050 (Navenny, including link road to Ballybofey) / 13500-15480 (Knockfair / Mullaghagarry to Lisnaree / Trevickmoy).

#### **Key Characteristics:**

- Gently undulating landform on the hillsides surrounding Stranorlar / Ballybofey.
- Topography and vegetation combine to form a landscape with a structured appearance that features scattered farm buildings and residential properties.
- Relatively intensively farmed with small to medium sized fields and occasional dense mixed woodlands.
- Enclosure pattern formed by hedgebanks and occasional stonewalls.
- Distant views, particularly to the Blue Stack Mountains, from elevated areas although views generally restricted by topography and vegetation.
- Balanced and pleasant landscape.

This is the most extensive landscape character area through which the Preliminary Design would pass. It includes the majority of the landscape surrounding the Twin Towns forming much of the landscape setting to the settlements.

#### **Evaluation**

The intensively farmed landscape is considered to be a landscape of Good quality as it retains a recognisable landscape structure and some distinctive landscape features, such as its enclosure pattern of hedgebanks. Recent and extensive residential development within the Navenny area of intensively managed agricultural landscape (Ch 7900-9050) has changed parts of the character area to that of an urban landscape. The landscape quality of this area is thus assessed as being Ordinary within this study.

**Landscape Type:** Alluvial floodplain pasture (Figure 7.2)

**Character Area:** River Finn floodplain

**Chainage:** 10700-12200

#### **Key Characteristics:**

- Medium sized fields primarily used for cattle grazing.
- Dense hedgebanks with mature vegetation form enclosure pattern.
- The former railway line and its associated vegetation contribute to its enclosure.
- The character area is visible within views from elevated ground to the south and from the outskirts of Stranorlar. Within such views the area appears as a pleasantly balanced and verdant landscape.

### **Evaluation**

The River Finn forms an attractive landscape element within a distinctive, albeit intensively farmed area. The character area retains some sense of place. It also contains mature tree lines and hedgelines and whilst not extensively wooded still appears as relatively well vegetated. The parkland at Edenmore further enhances the local landscape character area. It is thus considered to be of Good landscape quality.

### **Landscape Type: Urban Areas**

**Character Area:** Ballybofey / Stranorlar

**Chainage:** Not applicable. The approximate extent of the urban areas of the Twin Towns is shown on Figure 7.6.

#### **Key Characteristics:**

- Linear appearance due to development pattern based upon past road building, primarily the N15.
- Narrow Main Street, lined with shops, restaurants and other businesses. Ballybofey has a more commercial appearance due to the presence of a large number of retail outlets.
- Ballybofey has a hinterland of light industrial development whilst Stranorlar's is largely residential.
- Views from the Twin Towns are largely curtailed by existing buildings. However, rising ground to the north and the south is visible from parts of the town.
- River Finn divides the Twin Towns.

### **Evaluation**

An evaluation of the quality of the urban environs of Ballybofey / Stranorlar is outside the scope of this study. It is, however, important to recognise that the Twin Towns are built upon an historic crossing point of the River Finn and that the adjoining hillsides through which the Preliminary Design will pass are part of the landscape setting to the Twin Towns.

Views of the River Finn and a section of the dismantled railway line near Sessiagh O'Neill are shown on Figure 7.4. These illustrate the heavily wooded character of certain sections of these landscape features.

### **Night-time Landscape**

Between Lough Mourne and the coniferous woodland at Croaghonagh the Preliminary Design passes through an area that is almost totally dark except for traffic headlights on the existing road and lighting from two occupied properties on the northern side of the Lough. However, at approximate Ch 1700 of the Preliminary Design, lights from the Twin Towns become visible for traffic moving east for the first time on the existing N15. Thereafter, and until the existing 4-way junction between Goland and Carrickmagrath, the landscape remains dark with background glow from the Twin Towns and also ever more frequent point sources of light from existing residential properties.

P20 (see Figure 7.18) is the first major point source of light for traffic using the existing N15 when travelling to the east with its illuminated fountains and extensive lighting to its frontage. A further major visual focus and point source of light, which is visible for many miles, is the Sports ground at Cappry, which occupies an elevated hillside position above the Burn Durnett. Further bright sources of light to the west of Ballybofey include industrial premises on the existing N15.

The hillside across which the Preliminary Design passes between the 4-way junction and the proposed Navenny link road junction is dark with scattered, static point



sources of light from individual properties very occasionally interrupted by traffic headlights traversing the valley sides. To the east of the proposed Navenny link road junction recent residential development has introduced a more extensive area of static lighting over what was previously a dark hillside. Street lighting is also present within these residential developments.

From Dreenan until its intersection with the existing N15 near the Saint Joseph's Hospital (which itself forms a bright source of light) the landscape is intrinsically dark. This section includes the River Finn and its associated floodplain, as well as Edenmore House. However, throughout, the Twin Towns form an intrinsically bright area with numerous distinct point sources of light, including streetlights and garages. These follow the course of the existing N15 through the settlements and also the side roads into adjoining industrial and residential areas. The Sports ground to the south of Stranorlar also forms a bright point source of night-time illumination.

To the north of the existing N15, the Preliminary Design would pass through an area that is intrinsically dark with illumination provided by a number of scattered properties, including Tircallen. The intersection of the N13 with the R232 is characterised by a small cluster of lights emanating from the properties. There is also a short run of streetlights at the junction.

## 7.3 Assessment of Effects

The purpose of this section is to systematically identify and assess the potential landscape and visual impact of the Preliminary Design.

### 7.3.1 Landscape Impact Assessment

#### **Nature of Landscape Impacts**

The following potential landscape impacts of the Preliminary Design have been identified and are summarised as follows:

#### ***Direct (or Primary) Effects***

The main direct effect of the Preliminary Design will be the loss by clearance and removal of landscape features that contribute to landscape character. The following landscape features are identified:

- **Hedgerows / Hedgebanks**

Hedgerows/ Hedgebanks are the defining characteristic of the Enclosed Farmland landscape type. They also contribute to the landscape character of the River Finn floodplain. The Preliminary Design will cause severance of the enclosure pattern throughout its length.

- **Woodlands**

Occasional broadleaved/mixed woodlands occur within the Enclosed Farmland landscape type. However, the defining characteristic of the afforested uplands landscape type is its extensive blanket of coniferous forestry. Areas of woodland will require removal to accommodate the Preliminary Design.

- **Landform**

Landform contributes to landscape character throughout the route of the Preliminary Design. The most severe impacts and, consequently, highest magnitude of landscape impact, will result from sections of the Preliminary Design that are on major embankments or in deep cuttings.

- **Cultural Heritage Features**

The enclosure pattern formed by hedgerows / hedgebanks is part of the cultural heritage interest of this landscape (see "Hedgebanks" above). Its people or occupants and those that have shaped its appearance are also part of its rich heritage resource. Whilst the route passes in close proximity to a number of properties, only two would be acquired in order to build the Preliminary Design (P69 & P139, see Figure 7.18 Sheet 2 & 3 of 5 respectively). Otherwise there will be no direct displacement of any of the local resident population. A number of cultural heritage features also occur near the Preliminary Design.

The dismantled railway forms a distinctive linear landscape element within a largely agricultural landscape setting. It was built in the nineteenth century with adjoining hedgebanks that were planted with Beech. These are now mature and make the feature relatively conspicuous within local views.

- **Other features including watercourses, rock outcrops and unimproved grasslands**

Each of these landscape elements contributes to landscape character. Loss of or potential impact upon each of these features will result in some form of landscape impact.

- **Features of the Preliminary Design**

Signage will introduce a static urban component, whilst traffic will introduce a transitory landscape impact that will vary in relation to the volume of traffic using the road. Each of these features will introduce elements of an urban landscape to an otherwise essentially rural landscape setting.

Lighting in certain areas along the Preliminary Design will also impact upon the intrinsic qualities of a landscape character area where it would have an urbanising effect. Lighting is proposed at the Meencrumlin Compact Grade Separated Junction, the Navenny Grade Separated Junction, the Stranorlar roundabout and the Kilross roundabout. It is also proposed along the Link Road to the existing N15 within Ballybofey and will extend for some 50metres along the mainline either side of each junction. Lighting would be of a 12m overall height and would have flat glass lanterns with limited light spillage. The potential impacts of the lighting columns have been considered as part of the overall landscape impact of the Preliminary Design upon each landscape character area through which it passes.

The Preliminary Design will also directly impact upon each of the landscape types and character areas described in Section 7.2.2. Whilst humans may perceive this impact visually the Preliminary Design will also impact upon the more sensory qualities of these landscapes such as their sense of wilderness or tranquillity.

**Indirect (or Secondary Effects)**

Indirect effects associated with the Preliminary Design include the potential landscape impact of new development within Ballybofey / Stranorlar or in areas directly adjoining the Preliminary Design.

The Preliminary Design will result in a number of indirect landscape effects as a result of modifying the existing drainage regime. This is especially the case with the wet grassland sites at Carrickmagrath West and Kilross / Lisnaree, as well as areas of upland blanket bog between Ch 600-0 and Ch 1400-2100. At these locations lowering of the water table would potentially modify the species composition and thus texture and hue of the grasslands. These would, however, be very local adverse landscape effects. However, all watercourses will be culverted / bridged under the Preliminary Design and outfalls to rivers and streams will include environmental protection

measures that will ensure water quality within adjoining areas is maintained. No further indirect landscape character impacts upon the wider landscape as a result of changes to the hydrological regime are therefore anticipated.

Noise barriers are proposed at a number of locations (see Chapter 12.0 Noise and Vibration). Barriers will be solid (i.e. no openings) and comply with ISEN 1793 and ISEN 1794. Barriers may be close-boarded timber fence, concrete panels or proprietary eco-barrier systems or earth bunds. Barrier heights are given relative to the surface of the road. These mitigation measures will be developed further at the Detailed Design stage, at which time, an appropriate assessment of the potential landscape impact of these features would be undertaken. However, in each case the barriers will provide some visual screening to traffic using the Preliminary Design within local views.

No other indirect impacts of the Preliminary Design are anticipated.

#### ***Cumulative Effects***

The cumulative effect of the Preliminary Design and existing roads upon landscape character has been considered as part of the overall impact assessment. Generally, road building can result in an adverse landscape impact. This may also be the case with the Preliminary Design. The Preliminary Design will, however, enhance the quality of the urban environment within the Twin Towns by diverting the majority of traffic, including heavy vehicles, away from their residential and retail centres.

#### ***Construction Impacts***

The construction impacts will include groundworks, movement of construction traffic, temporary stockpiles, materials storage and lighting of works. These will result in additional, but temporary landscape and visual impacts.

The magnitude of landscape impact of the construction phase will generally be the same as that stated below for the operational phase (see also Appendix 7.2). As such the construction will have similar direct impacts upon landform, field pattern and tranquillity. However, the nature of construction landscape impact will be somewhat different to that associated with the final scheme in the sense that a greater area of land will be disturbed, there will be construction traffic movement, stockpiles and temporary lighting, etc. However, these effects will be temporary and confined to the construction period for the Preliminary Design.

#### ***Operational Impacts***

##### ***Year 1***

The magnitude of landscape impact of the Preliminary Design at Year 1 will generally be the same as that stated at Year 15 below. However, the nature of the landscape impact will be somewhat different to that associated with the fully established scheme at Year 15.

At Year 1, the Preliminary Design will be fully operational with its associated lighting, traffic and signage. Mitigation proposals (e.g. woodland, scrub planting) as outlined in Section 7.4 will have been incorporated within the construction works. Cuttings and embankments will be seeded and planted but vegetation will take time to establish and reach maturity. Earthworks will have a more engineered appearance with abrupt changes in slope angle and relatively steep side-slopes. Once new planting starts to establish, it will begin the process of softening these landforms. This will improve the landscape integration of the Preliminary Design, in the sense that cuttings / embankments will not be as visually prominent and new hedgerows / hedgebanks will have partly reduced the effects of severance caused by the Preliminary Design upon

the field pattern. However, as with the construction phase, there will be ongoing direct landscape impacts in Year 1 upon landform, field pattern and tranquillity.

#### *Year 15*

This section describes the potential landscape impacts during daytime of the Preliminary Design at Year 15 (inclusive of its mitigation). It should be read in association with Figure 7.19 (Sheets 1 to 5) and Appendix 7.2.

At Year 15 it is anticipated that all grasslands will be fully established with their characteristic colour, texture and hue. Proposed hedgerows, woodlands and scrub will have established and are anticipated as having reached the heights stated below in Section 7.4. The maturation of planting will have further assisted with the landscape and visual integration of the Preliminary Design. However, there will be continued direct impacts upon landform, field pattern and tranquillity.

The Preliminary Design is described by reference to chainage as follows:

#### ***Chainage 600-1900***

The Preliminary Design passes through the Highest Quality Lough Mourne landscape character area. This is a highly sensitive landscape receptor due to the quality of the receiving landscape (see Section 7.2). Land take within this character area will be restricted as the Preliminary Design follows the course of the existing N15. Embankments and cuttings will be graded to slopes of 1:2. These design features will minimise the direct physical impacts of the Preliminary Design.

Relatively small areas of existing unimproved grasslands will be lost. However, between Ch 600-1300 much of the grassland impacted is semi-improved.

Small watercourses will be crossed throughout this section of the Preliminary Design. Generally, these have a relatively steep channel and flow into Lough Mourne. The characteristics of these watercourses will not be significantly changed by the construction of the Preliminary Design.

At Ch 1300 the Preliminary Design proceeds off-line and follows the edge of an extensive area of coniferous woodland. This section also includes the Meencrumlin grade separated junction that will enable access to the existing N15 from the Preliminary Design.

Due to existing landform variation new cuttings are generally required on the northern side of the Preliminary Design and embankments on its southern side. These are relatively minor landscape features albeit embankments of up to approximately 4m height in places will be constructed between Ch 600-1650. These, and the adjoining cuttings, will impact upon the setting of the Lough. Between Ch 1150-1900 (and onwards to Ch 1950) the Preliminary Design will also directly impact upon the disused railway and its associated Beech hedgebanks.

From Ch 1650 until the route enters the coniferous woodland at Ch 1900 the Preliminary Design is in cutting. This is a part of the character area that is more intrinsically linked with and provides the setting to the coniferous woodland rather than the Lough. As previously stated, this section includes the Meencrumlin grade separated junction. Whilst the junction would include an overbridge with embankments of up to 4.5m height and lighting columns of 12m height from Ch 1550 to 1750 approximately it would be sited broadly within the transition area between Lough Mourne and the Croaghonagh coniferous woodland. It is not within an area that is integral to the landscape setting of the Lough. Views from parts of the Lough Mourne

character area to the junction would also be partly curtailed by the existing intervening coniferous woodland.

As discussed in Section 7.2.1 the Lough Mourne area is within an EHSA. The impact of the scheme is assessed in this study as resulting in a Moderate Adverse magnitude of effect (see Appendix 7.2) upon the Lough Mourne character area. There would therefore be a Moderate Adverse impact upon this local area of the EHSA. However, the landscape integrity of the EHSA as a whole would not be affected.

#### ***Chainage 1900-4850***

The Preliminary Design is within the afforested uplands landscape type and the Croaghonagh-coniferous woodlands landscape character area. Due to the nature of the existing landform, the arrangement of embankments and cuttings will be such that new embankments will occur on the northern side of the Preliminary Design, whilst cuttings will be formed on its southern side. The Preliminary Design is also wholly within cutting between Ch 2200–2500 approximately, which is up to 16m in depth between Ch 2300–2400.

The Preliminary Design crosses the existing disused railway line at approximate Ch 1900 and again at Ch 2900 with resulting direct impacts upon this distinctive landscape feature. A small watercourse is also crossed at Ch 3100.

The Preliminary Design briefly emerges from coniferous woodland between Ch 2800–3000 and crosses two fields of pasture. Between Ch 3000–4850 the Preliminary Design continues within the Croaghonagh coniferous woodlands landscape character area albeit that much of the former afforested area has been clear-cut, and in part, replanted. The Preliminary Design is on slight embankment throughout this section within a natural topography that has a slight fall from south to north.

Overall the impact of the Preliminary Design on this landscape, which is considered to be of Ordinary quality, would be Slight Adverse. The introduction of new mixed woodland plantings would however, assist with the landscape integration of the Preliminary Design.

#### ***Chainage 4850-6700***

The Preliminary Design passes through a Type 1 less intensively managed agricultural landscape character area (Goland to Carrickmagrath). This is an enclosed farmland landscape that is characterised by a small to medium sized enclosure pattern defined by hedgebanks with mature trees and well-established understorey shrubs. Most of the hedgebanks are stone-faced. Many of the fields contain unimproved grassland with rock outcrops and stone walls. These are an attractive landscape feature with characteristic colour and texture. Occasional and sometimes extensive mixed woodlands occur with green lanes and streams. This is a Very Attractive landscape type with a scattered settlement pattern.

The main landscape effects of the Preliminary Design relate to its direct impact upon the existing unimproved grasslands and enclosure pattern of this local landscape area. It will also impact upon the setting of a number of local settlements. The Preliminary Design will be on embankment or at grade throughout the majority of this section reaching a height of up to approximately 7.5m above existing grade at Ch 6200.

Parts of the existing embankments associated with the dismantled railway will be directly impacted between Ch 4800–5250 approximately.

Through the introduction of earthworks (embankments) and the loss of some landscape features (including rock outcrops, hedgelines and trees) the impact of the

Preliminary Design is assessed to be Moderate Adverse. However, new woodlands and hedgebanks would provide some landscape integration of the Preliminary Design.

**Chainage 6700 - 7900**

The Preliminary Design continues in shallow cutting before emerging on embankment at the Sessiagh O'Neill side road and underbridge at Ch 7900. Throughout this section the Preliminary Design traverses a landscape with characteristics of both the intensively farmed (Ch 6700–7300 Carrickmagrath to Sessiagh O'Neill) and the Type 2 less intensively farmed (Ch 7300–7900 Sessiagh O'Neill) landscapes. These include hedgebanks with mature trees / understorey shrubs, green lanes and flowing streams that create an enclosed landscape of some considerable appeal and attraction. The Preliminary Design will directly impact upon these landscape character areas and result in the loss of some characteristic landscape features such as hedgelines and rough grasslands. Although the introduction of new woodland and hedgebanks will help offset some of the effects, the impact of the Preliminary Design on this section is assessed to be Moderate Adverse.

**Chainage 7900-9050**

The Preliminary Design traverses the north facing slopes of rising ground to the south of Ballybofey / Stranorlar within the Navenny area of intensively managed agricultural landscape. These slopes are exposed within views from certain areas of the Twin Towns due to landform and the somewhat degraded nature of the hedgerows. Many are regularly trimmed to some 1m in height and/or are gappy, which is reflective of the more intensively managed nature of this local landscape type. The former railway line is in marked contrast and is clearly discernible within local views due to the maturity of vegetation on its adjoining hedgebanks. The impact of the Preliminary Design upon the existing enclosure pattern is thus considered to be slight due to the relatively poor condition of the hedgebanks. Further, the intrinsic landscape character of this area has been modified by recent and extensive residential development. Whilst the proposed Navenny link road junction (including lighting) will involve a major cutting (up to approximately 8.5m in depth) through an extant ridgeline, resulting in an adverse landscape impact, the presence of the residential development has had an urbanising effect on the area. The impact of the Preliminary Design on this Ordinary landscape is therefore assessed to be Moderate Adverse.

**Chainage 9050-10100**

The Preliminary Design enters a Type 1 less intensively managed area of pasture (Dreenan landscape character area of less intensively farmed landscape) that is characterised by fields in which the rushes *Juncus* form the dominant vegetation type. Hedgebanks are also characterised by mature trees with a dense and well established understorey that combine to give this local landscape type a definitive sense of enclosure and intimacy. Throughout this section landform changes from the north-facing slopes of the previous section to a more level plateau area.

Although the Preliminary Design will be out of scale with the existing landform of this Very Attractive landscape, new woodlands and hedgebanks will assist with its landscape integration resulting in a Moderate Adverse impact.

**Chainage 10100- 10700**

The Preliminary Design continues within the Dreenan landscape character area of less intensively managed agricultural landscape and descends the slopes forming the southern side of the Finn valley in deep cutting (up to 12m depth). The existing slopes contain a relatively extensive tract of mixed woodland. Given the proposed depth of the cutting (12m depth at Ch 10350), the modified landform will have a Large Adverse impact upon local landscape character.

#### ***Chainage 10700- 12200***

The Preliminary Design crosses the floodplain of the River Finn, as well as the watercourse itself at Ch 11300, on embankment that rises to some 8.5m above existing grade either side of the river crossing. This is considered to be a landscape type of Good landscape quality (see Section 7.2). The local landscape character of the floodplain is generally open with some relict hedgebanks but also mature treelines that adopt a north-south alignment. The Preliminary Design will interrupt this orientation and cross the extant field pattern on a diagonal alignment. It is considered that the Preliminary Design will have some considerable impact upon the landscape character of the floodplain. Proposed lighting at the Stranorlar roundabout which links with the existing N15, will also have an additional landscape character impact as well as associated night-time effects.

As identified in Section 7.2.1 the Ballybofey Stranorlar Local Area Plan identifies a large area for "Recreational, Amenity and Open Space". The Preliminary Design forms the eastern edge to this defined recreational area. As such there would be some impact on the amenity value of this defined zone near to the road corridor primarily due to its impact upon views and upon the tranquillity of the River Finn corridor. The magnitude of impact upon the River Finn landscape character area is assessed to be Large Adverse.

#### ***Chainage 12200-13500***

The Preliminary Design enters a distinctive area of less intensively farmed agricultural landscape (Treanamullin / Castlebane to Knockfair / Mullaghagarry landscape character area), which has been evaluated as Very Attractive quality. Between Ch 12650-13500 the area is characterised by an extensive tract of rough pasture that is low-lying and dominated by rushes. It is drained by a network of drainage ditches. Hedgebanks are also well wooded with mature trees and understorey shrub vegetation. The Preliminary Design embankments are relatively low throughout this section, resulting in a Moderate Adverse impact.

#### ***Chainage 13500-15480***

Initially the Preliminary Design proceeds on embankment through an area of intensively managed agricultural landscape (Knockfair / Mullaghagarry to Lisnaree / Teevickmoy landscape character area), which is of Good quality. At Ch 13900 the Preliminary Design enters a deep cutting (depth approximately 13m). A small watercourse will be culverted at Ch 13650. However, this is a drainage channel that is considered to be of relatively low scenic quality. The Kilross roundabout will introduce a new road feature within a local rural setting. The impact of the Preliminary Design on this character area is assessed to be Large Adverse, as the Preliminary Design will introduce substantial new earthworks that would be out of scale with the local landscape pattern.

#### ***Ballybofey Link Road Chainage 0-1100***

The Link Road descends the north facing slopes of the hillside towards Ballybofey within an area of intensively managed agricultural landscape. Its course follows the existing north-south alignment of the existing enclosure pattern. It will result in some loss of existing hedgebanks and will require removal of a section of the disused railway line before descending to cross the Burn Darnett on embankment. The Link Road continues on rising ground adjoining residential areas of the town before linking with the existing N15 where a new traffic signal junction is proposed. Overall the Preliminary Design would result in a Moderate Adverse impact upon this area.

#### **Night-time Landscape Impacts**

#### ***Chainage 600-1900***

Whilst the Preliminary Design would introduce a dual carriageway within the landscape character area traffic headlights are already a characteristic of the night-time landscape. However, the Meencrumlin junction would introduce a more noticeable and more extensive static point source of light to the periphery of this character area, which is otherwise almost totally dark. The junction is also located at the approximate point at which light from the Twin Towns comes into view for traffic moving east on the existing N15. Whilst, on its periphery, the junction would introduce a new source of light to an intrinsically dark landscape of the highest landscape quality. There would be a Moderate adverse impact upon the night-time landscape.

***Chainage 1900-4850***

Whilst the Preliminary Design would be within an extensive area of coniferous forestry and views to traffic on the Preliminary Design would be restricted, a regular and moving source of light would be introduced to an otherwise intrinsically dark area. There would be a Moderate adverse impact upon the night-time landscape.

***Chainage 4850-10100***

This section of the Preliminary Design would traverse a section of the hillside above the Burn Durnett, which is characterised by scattered point sources of light and occasional traffic movements. Whilst dark the night-time landscape includes point sources of light, which become ever more frequent as the Preliminary Design continues to the east. Whilst it would pass through a number of landscape character areas of varying quality its impact upon the night-time landscape would be Slight adverse. This section includes the permanent static lighting at the Navenny link road junction, which would form an extension to the existing night-time illumination afforded by existing residential development upon the north-facing valley sides above the Twin Towns.

***Chainage 10100-12200***

This section includes the intrinsically dark River Finn and its associated floodplain as well as the permanent lighting associated with the Stranorlar roundabout. The Preliminary Design would introduce a moving source of light on embankment (some 8.5m height) above the Finn floodplain. There would be a Moderate adverse impact upon the night-time landscape.

***Chainage 12200-15480***

The Preliminary Design would continue through an area that is intrinsically dark with only occasional isolated and scattered point sources of static light, and vehicular movements. It would introduce a more frequent and regular source of moving light. The Kilross roundabout would introduce further static lighting, which would build upon that already present at the existing junction. This section of the Preliminary Design would have a Moderate adverse impact upon the night-time landscape.

***Ballybofey Link Road Chainage 0-1100***

This section of the Preliminary Design would pass through residential areas with concentrated point sources of light and regular vehicle movements. Whilst the link road would have traffic movements which would contrast with the static lighting introduced along the link road, it would not be out of character with that of the receiving night-time landscape. There would be a Slight adverse impact upon the night-time landscape.

## 7.3.2 Visual Impact Assessment

**Nature of Visual Impacts**

The potential visual impact of the Preliminary Design will result from changes in the character of existing views and the consequent effect upon the visual amenity provided



by a view following construction of the Preliminary Design. It is acknowledged that each of the potential direct, indirect and cumulative effects of the Preliminary Design described in section 7.3.1 will also potentially impact upon the visual amenity within local views. This illustrates the close and sometimes interactive nature of landscape and visual impacts.

In this study the potential visual impact of the Preliminary Design is illustrated by reference to a Zone of Visual Influence Study (ZVI), a number of representative viewpoints and a visual impact assessment of the Preliminary Design upon properties within the defined ZVI for the scheme.

#### **Construction Impacts**

The magnitude of visual impact of the construction activities upon the key viewpoints will generally be the same as that stated for the Preliminary Design at Year 1 (see Figures 7.7 to 7.17).

#### **Operational Impacts**

##### ***Zone of Visual Influence (ZVI)***

The indicative extent of the surrounding landscape from which local views to the Preliminary Design (without the long-term screening effect of proposed planting) will potentially be visible is shown on Figure 7.6. This approximates to the likely visibility of the bypass during the summer following opening. The ZVI is further described as follows (refer to Figure 7.18 for location of properties):

##### **Chainage 600-1900**

The Preliminary Design passes Lough Mourne before entering existing coniferous woodland at Ch 1900. The ZVI is constrained by Croaghanierin and Lough Hill. Whilst relatively extensive, the ZVI includes substantial areas of open moorland that is largely unpopulated.

Visual receptors between Ch 600-1900 include occupied properties adjoining the existing N15 and users of the Lough and its adjoining landscape. The County Donegal Development Plan 2006 - 2012, defines two views from the N15 over Lough Mourne as "views and prospects of special amenity value and interest". As stated in Section 7.2.1, these views are orientated across the Lough and towards the Barnesmore Gap. The character of these views will remain unaffected, as the Preliminary Design will follow the alignment of the existing N15 at similar grade. The proposed picnic area (Ch 1400-1600) will enable the amenity value of these views to be appreciated by users of the Preliminary Design.

##### **Chainage 1900-4850**

The Preliminary Design passes through an afforested area within which views are severely limited by existing coniferous woodland. However, a considerable area of the woodland has been clear felled such that the ZVI extends to the adjoining hillsides and districts of Woodland Dooish and Loughanboy. Trusk Hill is also prominent to the south.

Where the Preliminary Design emerges from this vegetative screen (Ch 2800-3000) on embankment it will be visible from the existing N15, the disused school, and properties on the south-facing slopes within Woodland Dooish. These are, however, distant views.

Throughout this section the Preliminary Design is largely on embankment as it passes through areas of cleared coniferous woodland. Whilst these adjoining woodlands provide a degree of visual screening, intermittent views to the Preliminary Design will

be available from the existing N15 and properties within Woodland Dooish. The Preliminary Design will not be visible within views from the south due to intervening landform and existing vegetation.

#### **Chainage 4850-10000**

Throughout this section, the Preliminary Design traverses the north facing slopes of the hillside to the south of Ballybofey / Stranorlar. These are relatively exposed slopes that are visible from an extensive area of land to the north, including much of Ballybofey / Stranorlar and the hillsides to the north of the Twin Towns. However, views from areas to the south of the Preliminary Design are still contained by rising landform.

Local views to the Preliminary Design are confined to those available from scattered settlements. Views from a property at Ch 5100 (P23) will be severely impacted as it is sited 30m from the centre-line of the Preliminary Design. Views from other dwellings adjoining the Preliminary Design between Ch 6200-6250 will also be similarly impacted as the road passes within close proximity to the properties on embankment. Noise barriers, proposed along the northern edge of the carriageway between Ch 5000-5300 (ranging from 1.5 to 2.5m height), Ch 5500-5700 (1.0m height) and along the southern edge of the carriageway between Ch 6100-6300 (1.5m height), will provide some visual screening to traffic from a number of properties.

Existing hedgebanks associated with the former railway line provide an effective screen to summer views from the various scattered settlements adjoining the Preliminary Design between Ch 6400-7700. In winter, however, the Preliminary Design will be more readily apparent. Noise barriers are proposed along the northern edge of the carriageway between Ch 7100-7500 (0.5 and 2.5m in height) and Ch 8500-8800 (3.0m height), as well as along the southern edge of the carriageway between Ch 6900-7100 (2.5m height), Ch 7900-8000 (1.0m height) and Ch 8000-8200 (1.8m height) which will also provide some visual screening to traffic for a number of adjoining properties.

The new cutting to accommodate the Navenny grade separated junction will be readily apparent within views from the Twin Towns (including residential properties). A noise barrier of 3.5m height is proposed along the north-eastern slip road until Ch 8830 and again between Ch 8830-9000 of 3.0m height along the northern edge of the carriageway. This would also provide some visual concealment to traffic within views.

Incidental views to the Preliminary Design will be available from a nearby and relatively dense cluster of detached properties between Ch 9500-10000. Views from a property at Ch 9600 (P214) will be adversely impacted where the Preliminary Design passes close to the building on embankment. A 1.0m high noise barrier (along the northern edge of the carriageway between Ch 9500-9700) will provide some screening to views from this property. The view from two properties (P211) that occupy an elevated position relative to the Preliminary Design will also be impacted near Ch 9900.

It should be noted that the proposed noise mitigation proposal excludes two new residential developments along the Preliminary Design (Planning Application numbers 038128 and 992722) (Ch 9050-9350) due to the limited available information on the development details. However, the need for noise mitigation for these developments will be reviewed during the Detailed Design stage subject to the information available. The landscape impacts of any additional noise mitigation proposals will also be considered at this time if appropriate.

#### **Chainage 10000-12200**

The Preliminary Design descends the hillside above Edenmore House before crossing the River Finn on embankment and reaching the Stranorlar roundabout linking the Preliminary Design to the N15. Whilst the embankment will be some 8.5m above existing ground levels, it is locally concealed from view (in summer) due to the screening afforded by existing vegetation. Hedgebanks associated with the former railway are particularly distinctive features that provide an effective visual screen.

Between Ch 9900-10500 the Preliminary Design will be in substantial cutting. The visual impact of this section of the Preliminary Design is considered to be slight within local views. However, the cutting will be prominent within views from the opposite side of the Finn Valley. Noise barriers on the western edge of the carriageway between Ch 10400-10800 (ranging from 1.5 to 2m height) will also provide some visual concealment to traffic on the road from properties adjoining the existing N15.

The Preliminary Design will be visible from a number of properties between Ch 10700-12200 as it crosses the floodplain of the River Finn on a substantial embankment. These properties will include Edenmore House and properties adjoining the existing N15. Noise barriers along the eastern edge of the carriageway between Ch 10800-11100 (height 1.5m) and along the western edge of the carriageway between Ch 11700-11800 (ranging from 2.0 to 3.0m height) will also provide some concealment to traffic within local views. The junction, which will be on embankment and lit, will therefore be highly visible within local views.

#### **Chainage 12200-15480**

The Preliminary Design continues through an enclosed and undulating farmland landscape with extensive tracts of mixed woodland. Rising ground to the immediate west provides elevated views to this section of the Preliminary Design, albeit from relatively few properties. Indeed, parts of this section are characterised by a lack of built development within the nearby landscape, which is relatively remote in comparison to other sections of the Preliminary Design. Noise barriers on the western edge of the carriageway between Ch 12900-13100 (ranging from 2.0 – 2.5m height) will provide some visual concealment to traffic on the road from adjoining properties.

Between Tircallen and its proposed junction with the existing N13 the Preliminary Design passes through a river valley with few properties. The ZVI is generally constrained to a 1.0km corridor width by landform. However, at the new Kilross roundabout junction with the N13, the ZVI extends some distance to the north and west. A noise barrier will also provide some visual screening to traffic on the road between Ch 14900-15100 (1.0m height along eastern edge of carriageway) within views from adjoining properties.

#### **Ballybofey Link Road Chainage 0-1100**

The Link Road would pass through residential areas of Ballybofey. The majority of these properties are two storey dwellings. Oblique views to the Link Road will be available from both ground and upper floor windows. Noise barriers are proposed along sections of the Link Road and vary in height from 1.0 to 4.5m (see Table 12.6, Chapter 12.0 Noise and Vibration). The noise barriers will provide some visual screening to local views from adjoining areas of recent residential development.

#### **Viewpoint Analysis**

The viewpoint analysis, which includes an assessment of the potential magnitude of visual impact of the Preliminary Design upon views at both Year 1 and 15, is presented on Figures. 7.7 to 7.17. The assessment has considered the Preliminary Design

incorporating the mitigation proposals detailed in Section 7.4. The assessment is as follows:

Table 7.4 Visual Impact Assessment for Viewpoints 1 to 11 (see Figures 7.7 – 7.17)

Viewpoint	Visual Impact Assessment			Visual Impact Analysis
	Year 1 (Winter) (with mitigation proposals)	Year 15 (Winter) (with mitigation proposals)	Year 15 (Summer) (with mitigation proposals)	
Viewpoint 1	Moderate adverse	Moderate adverse	Moderate adverse	The Preliminary Design would traverse the low-lying area within the central part of the view on shallow embankment. It would cause a noticeable deterioration in the existing view.
Viewpoint 2	Moderate to Substantial adverse	Moderate Substantial adverse	Moderate adverse	A new road junction is proposed with the existing N15 at this point (Stranorlar roundabout). It would be on embankment of up to 3 to 5m in height above existing ground level and would have lighting. There would be a significant to noticeable deterioration in the existing view. New planting would be proposed upon the new road embankments to complement the well-vegetated character of the local landscape.
Viewpoint 3	Substantial adverse	Substantial adverse	Substantial adverse	The Preliminary Design would directly impact upon a number of hedgebanks within the foreground of the view. The Preliminary Design would also be on an embankment of up to 7.5m in height above existing ground levels. There would be a significant deterioration in the view.
Viewpoint 4	Slight to Moderate adverse	Slight to Moderate adverse	Slight adverse	The Preliminary Design would traverse these north-facing slopes above the Twin Towns. The proposed new junction (Navenny Grade Separated Junction) would also occupy the centre of the view and would have associated lighting. It would, however, be seen in the context of recent new housing development. There would be a noticeable to barely perceptible deterioration in the view.
Viewpoint 5	Slight to Moderate adverse	Slight to Moderate adverse	Slight adverse	This is a relatively well-wooded section of the route that would provide some visual concealment to the Preliminary Design within local views. The proposed junction (Navenny Grade Separated Junction) would also be partially visible. New hedgebanks and woodlands are proposed that would provide some visual screening and landscape integration.
Viewpoint 6	Moderate adverse	Moderate adverse	Slight to Moderate adverse	The Preliminary Design would be visible as it traverses the hillside above the Burn Darnett between emerging from coniferous forestry at Ch 4850 to approximately Ch 8600 (Navenny Grade Separated Junction). Whilst partly in cutting and in places concealed by existing vegetation visible sections would cause a noticeable deterioration in the existing view.
Viewpoint 7	Substantial adverse	Substantial adverse	Substantial adverse	The Preliminary Design would be on partial embankment within this view. Whilst views to the far horizon would still be available the Preliminary Design would have a substantial impact upon the foreground of the view.
Viewpoint 8	Slight beneficial	Slight beneficial	Slight to Moderate beneficial	The Preliminary Design would be on embankment throughout much of this section. However, new mixed woodland plantings are proposed for that section within the existing area of coniferous woodland. As it emerges from these areas new broadleaved plantings are proposed. These would assist with the landscape and visual integration of the Preliminary Design. The existing N15 is a noticeable element within existing expansive views from this viewpoint. The additional visual impact of the Preliminary Design would be compensated by a reduction in traffic using the existing N15. The Preliminary Design would cause a barely perceptible improvement in the existing view.

Viewpoint	Visual Impact Assessment			Visual Impact Analysis
	Year 1 (Winter)	Year 15 (Winter)	Year 15 (Summer)	
Viewpoint 9	Slight adverse	Slight adverse	Slight adverse to No Change	The Preliminary Design would be on slight embankment and would follow the course of the existing N15 within the view. Some existing vegetation would be removed. This would cause a barely perceptible change to the existing view. The Meencrumlin grade separated junction would also just be visible within the extreme left of the view.
Viewpoint 10	Moderate adverse	Moderate adverse	Slight to Moderate adverse	The Preliminary Design would be visible in deep cutting as it descends the north-facing slopes above the River Finn. It would also be partially visible above the existing tree line adjoining the dismantled railway as it starts to cross the Finn floodplain on embankment. There would be a noticeable deterioration in the existing view.
Viewpoint 11	Moderate Substantial adverse	Moderate Substantial adverse	Moderate adverse	The Preliminary Design would be visible on embankment as it crosses the Finn floodplain. However, summer views would be restricted by the mature tree line within the mid-ground of the view. The Preliminary Design would cause a significant to noticeable deterioration to the existing view.

#### **Visibility Schedules**

The visual impact study has included an assessment of the potential magnitude of impact of the scheme upon views from a number of properties adjoining the Preliminary Design. The location of each property/property group is shown on Figure 7.18 (Sheets 1 to 5). Viewpoint schedules are included in Appendix 7.3.

Over 282 receptors comprising both individual properties and groups of properties have been identified and the potential change in view (either from the front, rear and/or side elevation of the property) as a result of the Preliminary Design assessed. The results of the assessment are presented in Appendix 8.3.

In the majority of cases the Preliminary Design would have a potential adverse effect upon views largely because it would introduce a new road to views that were previously rural in character. However, for a number of properties, the Preliminary Design would mean that traffic is taken further away from a property since, whilst the original route of the N15 or N13 would remain in use, traffic volumes using the former routes would be reduced. The resultant effect would be that traffic would have less visual impact upon a particular view. In such instances the Preliminary Design is assessed as having a positive visual effect.

#### **Night-time Visual Impacts**

The potential night-time visual impact of the Preliminary Design upon those views used in the Viewpoint Analysis has also been assessed. This includes an assessment of the potential magnitude of visual impact of the Preliminary Design upon night-time views at both Year 1 and 15. The assessment has considered the Preliminary Design incorporating the mitigation proposals detailed in Section 7.4. The assessment is as follows:

Table 7.5 Night-time Visual Impact Assessment for Viewpoints 1 to 11 (see Figures 7.7 – 7.17 for Daytime Views)

Viewpoint	Visual Impact Assessment			Visual Impact Analysis
	Year 1 (Winter) (with mitigation proposals)	Year 15 (Winter) (with mitigation proposals)	Year 15 (Summer) (with mitigation proposals)	
Viewpoint 1	Moderate adverse	Moderate adverse	Moderate adverse	The Preliminary Design would introduce a regular moving point source of light on embankment within an intrinsically dark area with currently occasional traffic movements on the existing minor road and static point sources of light from the properties. There would be a noticeable deterioration in the night-time view.
Viewpoint 2	Moderate to Substantial adverse	Moderate Substantial adverse	Moderate adverse	Static lighting associated with the Stranorlar roundabout would introduce a prominent source of illumination to the view, which is currently to an area that is intrinsically dark. Traffic moving over the roundabout would also introduce a more varied source of moving light that is considerably different to that of the existing where vehicle headlights are directed straight towards the viewpoint for traffic coming towards the Twin Towns from the west. New planting, implemented as part of the Preliminary Design would partially conceal vehicle headlights within low-level views.
Viewpoint 3	Substantial adverse	Substantial adverse	Substantial adverse	Vehicle headlights would be prominent within the foreground of the view as traffic moves towards the viewpoint from the west on embankment within a view with an intrinsically dark foreground with the bright illumination of the Twin Towns as its backdrop. Static lighting associated with the Navenny link road junction would also be visible within the backdrop of the view but within the context of existing lighting associated with recent residential development to the south of the Twin Towns and that within Navenny. Given the prominence of vehicle headlights within the immediate foreground of the view there would be a significant deterioration in the view.
Viewpoint 4	Slight to Moderate adverse	Slight to Moderate adverse	Slight adverse	Static lighting associated with the Navenny link road junction would be visible immediately adjoining recent residential development to the south of the Twin Towns (P167 on Figure 7.18). Vehicle lights from traffic on the Preliminary Design to the west of the junction would also be visible on a hillside, which currently has relatively few vehicular movements. There would be a noticeable to barely perceptible deterioration in the view. New planting, implemented as part of the Preliminary Design would partially reduce the night-time visibility of traffic using the Preliminary Design and the Navenny link road junction at Summer Year 15.
Viewpoint 5	Slight to Moderate adverse	Slight to Moderate adverse	Slight adverse	The Preliminary Design would introduce a moving and linear source of light to an essentially dark hillside with static point sources of light. Whilst recent residential development has introduced a more extensive source of static lighting to the hillside the regular movement of vehicle headlights over and above Sesslagh O'Neil would contrast with the existing night-time view. There would be a noticeable to barely perceptible deterioration in the view. New planting would partially conceal vehicle headlights at Summer Year 15.
Viewpoint 6	Moderate adverse	Moderate adverse	Slight to Moderate adverse	There would be similar visual effects upon the night-time view as that for Viewpoint 5. However, the valley sides are slightly darker than those visible within Viewpoint 5 and consequently, regular traffic movements would be more noticeable within night-time views. There would be a noticeable deterioration in the view, which would be reduced to a noticeable to barely perceptible deterioration at Summer Year 15 due to the



Viewpoint 7	Substantial adverse	Substantial adverse	Substantial adverse	partial concealment to traffic afforded by vegetation. Vehicle headlights would be prominent within the foreground to the view and in close proximity to the viewpoint. There would be a significant deterioration in the night-time view.
Viewpoint 8	Slight beneficial	Slight beneficial	Slight to Moderate beneficial	Traffic headlights from vehicles using the existing N15 on the valley floor are visible within the night-time view. Traffic using the Preliminary Design would be visible where the new road emerges from its vegetative screen in addition to occasional movements, which would remain on the existing N15. However, the character of the foreground view would be largely dark whilst the Preliminary Design would introduce a moving linear source of light to the middle distance of the view. There would be a barely perceptible improvement in the view, which would be further enhanced at Summer Year 15 due to the partial screening effects of new woodlands implemented as part of the Preliminary Design.
Viewpoint 9	Slight adverse	Slight adverse	Slight adverse	Vehicle headlights would be visible and would follow the same route as those associated with the existing N15. However, with the Preliminary Design being dual carriageway there is the possibility that lines of four vehicles could be occasionally visible within night-time views. Static lighting associated with the Meencrumlin junction would also be partially visible (also as night-time glow) within the extreme right of the view. There would be a barely perceptible deterioration in the view.
Viewpoint 10	Slight adverse	Slight adverse	Slight adverse	Vehicle headlights on traffic descending the hillside above the River Finn floodplain within deep cutting would be visible over and above existing static sources of light within residential development and existing streetlights within the foreground to the view. Sky-glow would also be visible over intervening vegetation within the extreme left of the view from the Sranorlar roundabout. There would be a barely perceptible deterioration in the view.
Viewpoint 11	Moderate to Substantial adverse	Moderate Substantial adverse to	Moderate adverse	Moving vehicle headlights on embankment following a linear route would be immediately noticeable within a view over the intrinsically dark River Finn floodplain. There would be a significant to noticeable deterioration in the view. Intervening vegetation within hedgelines would reduce the visibility of vehicle headlights within the night-time view.

### 7.3.3 Residual Impacts

Residual impacts of the Preliminary Design are defined as those that will remain following the full establishment of proposed mitigation (Year 15). The Preliminary Design will introduce a new scale of road within a hitherto rural landscape setting. Despite the proposed mitigation strategies (see Section 7.4), the Preliminary Design would result in an adverse landscape impact ranging from Slight Adverse on the Croaghonagh coniferous woodlands character area to Large Adverse on some Good Quality landscape character areas. It will, however, improve the general environmental quality of the urban areas of Ballybofey / Stranorlar by reducing traffic volumes passing through the Twin Towns. In landscape and visual terms, within the Twin Towns, this is likely to be equivalent to a slight beneficial impact since vehicles would still pass through the Twin Towns but at lower volumes (see Section 2.3, Chapter 2.0 Background to the Project).

#### **Landscape**

The residual landscape impact of the Preliminary Design will generally be the same as that stated at Year 15 (Section 7.3.1). Beyond Year 15 planting will continue to establish and gain height. Plantations are likely to be managed which may include thinning. The Preliminary Design may have been developed to include new signage, additional junctions, lighting, bridges and traffic flows may have increased. The N15/N13 Ballybofey / Stranorlar Bypass will continue to have direct landscape impacts upon landform, field pattern and tranquillity.

#### **Visibility**

The residual visual impact of the Preliminary Design will generally be the same as that associated with the Preliminary Design at Year 15. Beyond Year 15 planting will continue to establish which may (in some instances) further reduce the potential magnitude of visual impact of the N15/N13 Ballybofey / Stranorlar Bypass within views from some of the key viewpoints and properties.

## 7.4 Mitigation Proposals

The Preliminary Design is the result of a staged approach to the design of the new road that has included the selection of a preferred route corridor and, within that corridor, the selection of a preferred route. Mitigation proposals, based on the Preliminary Design, are shown on Figure 7.19 and are summarised below (where possible all plantings shall use native species of local provenance). The sourcing of this plant material would be given further consideration at Detailed Design stage. Where appropriate, bedrock exposed within new cuttings will be left to naturally regenerate. Further consideration will be given to the aesthetic design of the Preliminary Design, including its structures, landform and planting arrangements at the Detailed Design stage. Whilst the Preliminary Design would be progressed by the Design Engineer, the landscape design would be progressed by a landscape architect with specialist inputs by an ecologist and other specialists as appropriate. These specialists would form part of the Contractor's Team appointed to undertake the Detailed Design and Build phase of the project.

## 7.4.1 General Mitigation Proposals

Landscape mitigation measures have been prepared with the aim of minimising the potential adverse landscape and visual effects of the Preliminary Design (see Figures 7.19 (sheet 1 to 5)).

Where it has proved impractical to “design-out” certain adverse impacts, such as high embankments and deep cuttings, the planting of new woodlands, grasslands, scrub and hedgerbanks / hedgerows (depending upon the type of field boundary found within the local area of the route) can assist with the landscape and visual integration of the Preliminary Design. Where practicable, hedgerows and treelines will be planted along new field boundaries and road margins to reconnect severed hedgerows and treelines. However, overall reinstatement is proposed which responds to the landscape character of the area through which the new road passes. For example, through the Lough Mourne character area (Ch 600-1900), the landscape is largely open and expansive. Within such sections the landscape strategy has been to reinstate the road verges to grassland in response to the open character of the receiving landscape. Conversely, as the Preliminary Design passes through the Croaghonagh Coniferous Woodlands (Ch 1900-4850) new mixed woodlands are proposed in response to its local landscape character, which is wooded.

Elsewhere, landscape mitigation is proposed which will provide some visual screening to views from a number of properties by Year 15 following opening of the Preliminary Design.

All landscape preparation, planting and seeding shall be completed at the earliest opportunity during the implementation period to assist early establishment. Environmentally acceptable products would be used wherever possible, such as peat-free composts, biodegradable products and recycled materials. The use of fertilisers shall be avoided wherever possible and the use of herbicides shall be minimised with greater emphasis placed on the use of mulches. Pesticides shall not be used without specific prior written approval.

Landscape management / maintenance will be implemented throughout the establishment period for the planting and seeding areas shown on Figure 7.19. All works throughout this period would fully embrace the principles of sustainability embodied in the statements made above with respect to the implementation phase of the project.

## 7.4.2 Specific Mitigation Proposals

The mitigation proposals include the following specific mitigation measures that are designed to reduce the potential landscape and visual impact of the Preliminary Design:

### **Chainage 600-1900 (Lough Mourne landscape character area):**

The Preliminary Design follows a course alongside Lough Mourne. The landscape is open moorland with unimproved grasslands. Reinstatement will mirror the existing unimproved grassland. The proposed cutting and embankment slopes are graded at 1:2 wherever possible to minimise land take within this area of highest landscape quality. New broadleaved woodlands are proposed to enclose the Meencrumlin grade separated junction both to partially conceal the junction within views and to assist with its landscape integration with the adjoining Croaghonagh coniferous woodland.

**Chainage 1900-4850 (Croaghonagh coniferous woodlands landscape character area):**

The Preliminary Design enters an extensive area of coniferous plantation, some of which has been cleared and re-planted. Between Ch 1900-4850 intermittent new mixed woodlands are proposed to infill land within the Compulsory Purchase Order (CPO) boundary between the Preliminary Design and the dismantled railway line and to reinstate the woodland edge to the existing forestry. Elsewhere, reinstatement of verges will be to unimproved grassland with scrub to enhance landscape and habitat value. Natural regeneration of trees and shrubs should be allowed within the highway boundary as part of the long-term management proposals. New mixed woodland plantings (maximum 10% conifers) are proposed along certain sections of the Preliminary Design to reinstate areas of cleared woodland. Existing hedgebanks adjoining the disused railway line will be retained between Ch 2000-2800 to provide some visual screening to views from properties P3 to P6.

**Chainage 4850-6700 (Goland to Carrickmagrath area of less intensively managed agricultural landscape):**

Between Ch 4850-5400 hedgerows and woodlands are proposed in response to local landscape character. New woodland planting is proposed on the south side of the Preliminary Design between Ch 4850-5250 (approximately) to reinforce the existing treeline associated with the dismantled railway. The existing hedgebank on the south side of the disused railway will be retained between Ch 4840-5260. On the north-side further woodland planting is proposed to provide a visual and physical buffer between the Preliminary Design and an adjoining property. Where the Preliminary Design would pass through a generally low-lying and level landscape of rough grassland and scrub between Ch 5400-6300 unimproved grasslands, scrub, woodlands and hedgebanks are proposed to assist with its landscape integration. This would include extensive woodland planting on the embankments to the Meenglass side road and underbridge to conceal this feature within external views and to integrate the feature with adjoining scrub/ woodland. Between Ch 6300-6700 the reinstatement of the highway embankments to broadleaved woodland is proposed to link with adjoining areas of existing woodland including that associated with the disused railway line and to screen the Preliminary Design within views from locally adjoining properties. This would be Oak-Ash-Hazel woodland (WN2) in order to replicate the locally occurring habitat type.

**Chainage 6700-7300 (Carrickmagrath to Sessiagh O'Neill area of intensively managed agricultural landscape):**

A new hedgebank is proposed between Ch 6700-6900, which follows the CPO boundary on the north side of the Preliminary Design in order to reinstate the existing field pattern. Additional woodland planting is also proposed on the south side of the Preliminary Design to reinforce the existing visual screen provided by the dismantled railway. However, grassland areas are also provided in response to the local landscape character (which is open) and to enable some views from the road. More extensive planting is also proposed on the embankments to the Carrickmagrath side road and overbridge (especially on the north side of the Preliminary Design) in order to provide some visual screening to nearby properties. Existing hedgebanks adjoining the disused railway line would be retained between Ch 6400-7100 approximately to provide some visual screening to views from properties P81, 85, 88, 92 and 95.

**Chainage 7300-7900 (Sessiagh O'Neill area of less intensively managed agricultural landscape):**

The Preliminary Design enters an area of landscape that is characterised by hedgebanks with mature trees and well-established understorey shrubs. It exhibits a definitive sense of enclosure. New woodlands are proposed at and adjoining the

Sessiagh O'Neil side road and overbridge in order to conceal the feature within external views and to provide some visual screening to views from adjoining properties. These would also reinforce its sense of enclosure. Throughout this section the existing dismantled railway line on the south side of the Preliminary Design (outside the CPO boundary) is heavily wooded. It provides an important visual screen within views from properties to the south. The gap in an existing hedgeline would be planted (infilled) to assist with the visual screening of the Preliminary Design within views from properties P101 and 102. Existing vegetation adjoining the Sessiagh O'Neill side road and underbridge would be retained where possible to provide a partial visual screen to views from adjoining properties.

**Chainage 7900-9050 (Navenny, including link road to Ballybofey area of intensively managed agricultural landscape):**

New hedgebanks are proposed between Ch 7300-8100 to reinstate the existing field pattern and to provide a partial visual screen to views from adjoining properties to the immediate south of the Preliminary Design. The Preliminary Design is visible within views from Ballybofey / Stranorlar as it traverses the hillside above the Twin Towns. New broadleaved woodlands to enclose the Navenny link road junction will provide visual screening and assist with the landscape integration of the Navenny junction within views from the Twin Towns. On the southern side of the Preliminary Design, new hedgebanks and woodlands are proposed intermittently to conceal the Preliminary Design within views from local properties. The Link Road to the Twin Towns runs parallel to existing field boundaries as it descends the hillside. New hedgebanks are proposed where existing hedgelines will be removed to accommodate the Preliminary Design and broadleaved woodlands to provide screening to views from adjoining residential development.

**Chainage 9050-10700 (Dreenan area of less intensively managed agricultural landscape):**

Between Ch 9050-10100 the Preliminary Design passes through a generally level landscape with some sense of enclosure that is also characterised by hedgebanks with mature trees and well-established shrubs. Between Ch 9050-9300 new hedgebanks are proposed to reinstate the existing field pattern and to provide some visual screening to views from adjoining properties. A small woodland block (Ch 9050-9150, north-side of the Preliminary Design) will also screen views to a section of the Preliminary Design from recent residential development. Within this section unimproved grasslands with scrub / woodland to enhance habitat value are proposed to compliment local landscape character. New woodland planting at Ch 10000 would be WN1 and WN6 to reflect that which locally occurs (see Chapter 9.0 Ecology (Flora, fauna and fisheries)). The Preliminary Design is in substantial cutting as it descends to cross the floodplain of the River Finn between Ch 9900-10500. The local landscape character is generally wooded and it is proposed that cuttings are reinstated to mixed woodland (maximum 10% conifers). This would also partially conceal the cutting within views from parts of Stranorlar on the opposite side of the Finn Valley as planting matures.

**Chainage 10700-12200 (River Finn floodplain landscape character area):**

The Preliminary Design crosses the floodplain of the River Finn on high embankment between Ch 10700-11900. Ideally, embankments should be extended to avoid abrupt changes in landform within an extensively level landscape. However, there is a conflict with floodplain issues (see Chapter 8.0 Surface Water Quality and Drainage). Embankments should, however, remain as grassland to compliment the local character of the floodplain. Between Ch 11600-12200 the landscape is generally level and low-lying. New hedgebanks and woodlands are proposed to conceal the Preliminary

Design within local views from adjoining properties. Extensive new plantings are also proposed to conceal the Stranorlar roundabout within local views from adjoining properties.

**Chainage 12200-13500 (Treanamullin / Castlebane to Knockfair / Mullaghagarry area of less intensively managed agricultural landscape):**

The landscape is generally low-lying and level, it is characterised by fields dominated with rushes. New woodlands are proposed between Ch 13300-13500 to integrate with adjoining areas. Elsewhere, proposed road embankments would remain open in response to local landscape character and to facilitate views from the Preliminary Design.

**Chainage 13500-15480 (Knockfair / Mullaghagarry to Lisnaree / Trevickmoy area of intensively managed agricultural landscape):**

Between Ch 13500-14000 extensive new broadleaved woodlands are proposed to link existing woodlands and to reinforce the wooded character of the local landscape. The Preliminary Design is in deep cutting between Ch 13900-14400 as it passes the settlement of Tircallen. New woodlands would reinstate the existing field pattern whilst unimproved grasslands/scrub are proposed on the cutting slopes for landscape and habitat diversity. Between Ch 14800-15480 new woodlands are proposed to conceal the Kilross roundabout with the existing N13 within local views from nearby properties. Hedgebanks are also proposed to reinstate the existing field pattern between Ch 14500-15000.

### 7.4.3 Vegetation Types

Final design of vegetation types will be dependent upon the suitability of available substrates and prevailing ground conditions. It is important that soil nutrient status and hydrological conditions are suitable for the habitat that it is aimed to create in a certain location. To assist with the future establishment of both planting and seeding areas a Soil Management Plan would be prepared as part of the Detailed Design in accordance with procedures within 'A Guide to Landscape Treatments for National Road Schemes in Ireland' (2006). This would cover the stripping, storage, management and re-use of soils (topsoil and subsoil) throughout the construction and reinstatement periods. All soils used in the reinstatement will be derived from works on-site. There would be no importation of soils. Further, detailed analysis of soils would be undertaken as part of the Detailed Design and would be undertaken as part of the detailed Ground Investigation (GI) (see also Chapter 14.0 Geology).

The vegetation types for each planting and seeding area are as follows (for detailed species lists refer to Fossitt, 2000):

**Proposed Grassland**

Generally GS1, GS2 and GS3 according to location but with Grasses 95% and Wildflower content no greater than 5%. The grass content of the mix will use as wide a selection of the species listed in Fossitt (2000), under the categories GS1, GS2, GS3 and GS4 as possible. The relative proportions of each grass species will also reflect that found in natural habitats.

**Proposed Scrub (WS1)**

The percentage cover to scrub areas shown on Figure 7.19 will be finalised at Detailed Design stage. At Year 15 shrubs will cover up to 50% of the total area where this reinstatement is proposed with the remainder grassland. Species will include Hawthorn

(*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Bramble (*Rubus fruticosus* agg), Hazel (*Corylus avellana*) and Willows (*Salix* spp), amongst others. Again, final species selection will be dependent upon soil/ground conditions and will use as wide a range of species naturally occurring within this habitat type as possible. The grasslands within areas of scrub will comply with the requirements stated above for these habitat types.

At Year 15 canopy height within scrub areas will generally be about 5m. Scattered trees will be present but they will not form a continuous canopy. When seen within the context of the road it is anticipated that scrub areas will form distinct pockets or clumps of vegetation of varied extents within grassland. Individual and smaller groups of shrubs will also occur. At Year 1, species will be planted at maximum 1m spacing and, generally, in single species groups of between 3, 5 or 7 of a single species. Plant stock will probably be between 45-90cm with occasional trees of up to 1.5m height at the time of planting. It is anticipated that, by Year 15, these plantings will have reached their intended height (about 5m) and will have formed impenetrable thickets of vegetation of varied size and with a scattered distribution.

#### **Proposed Hedgebanks / hedgerows (WL1)**

Species will include those listed above in relation to scrub with Holly (*Ilex aquifolium*) and Dog-rose (*Rosa canina*). Tree species will include Ash (*Fraxinus excelsior*), Sessile Oak (*Quercus petraea*) and Pedunculate Oak (*Quercus robur*), amongst others depending on location. Holly will be planted in sufficiently high densities in order to encourage the establishment of berries. Non-native species to Ireland will not be used, but as wide a variety as possible of native species will be planted. The objective of this planting is to establish in the long-term a dense understorey shrub layer with dense/bushy tree lines.

Hedgerows / hedgebanks are linear strips of shrubs, often with occasional trees that, within the existing landscape adjoining the Preliminary Design, form the field pattern. Generally, the field pattern adjoining the route is defined by hedgebanks. These comprise linear strips of shrubs with occasional trees planted upon a linear bank of earth. The earth to build the bank has, in the past, usually been derived from the excavation of ditches immediately adjoining the line of the hedgebank. The width of the earthen hedgebanks varies throughout the landscape adjoining the Preliminary Design. However, at Year 1, those hedgebanks constructed as part of the Preliminary Design are likely to be approximately 1-1.5m wide and approximately 1m in height. Shrubs with occasional trees will be planted on top of the hedgebank. The size of plant material is likely to be the same as that stated above for proposed areas of scrub planting. It is anticipated that planting will comprise some 90-95% shrubs with randomly scattered trees within the linear strip of planting. At Year 15 it is anticipated that the trees will be visible as distinct individual specimens or in small groups. Individual trees are anticipated as being some 6-8m in overall height whilst the shrub layer is likely to be maintained at approximately 1.0m height (overall height, including earthen bank and, assuming that the hedgebank vegetation is cut annually, 2-2.5m). Tree groupings will probably occur at intervals between 5-50m. Holly is proposed as a constituent species within the hedgebank planting (generally at about 5% of the overall plant mix).

Within those areas adjoining the Preliminary Design where hedgebanks do not form the prevailing type of field boundary, hedgerows are proposed. Within such areas plant species will generally be the same as that stated for the hedgebanks. However, the overall height of the hedgerows at Year 15 is anticipated as being 1-1.5m height with occasional trees of 6-8m overall height.

### **Proposed Woodlands**

These will include Oak-birch-holly woodland (WN1) on acid or base-poor soils, Oak-ash-hazel woodland (WN2) on base-rich or calcareous soils and Wet willow-alder-ash woodland (WN6) on permanently waterlogged sites. Woodland planting will encourage the establishment of a ground layer, shrub layer and canopy and will be planted upon soils salvaged from areas of existing woodland and hedgerows/hedgebanks removed to accommodate the Preliminary Design wherever possible. Mixed broadleaved woodlands (WD1) are proposed within the Croaghonagh Coniferous woodlands landscape character area in order to integrate the Preliminary Design within the local landscape setting.

The aim of this type of planting is to create a semi-natural woodland habitat type over time. This will include a planting structure containing trees, shrub understorey (including brambles) and, ultimately, a herb layer. The woodland types proposed will be planted in response to varying soil and ground conditions. It is anticipated that soils retained during ground clearance works for the Preliminary Design, including woodland areas and soils derived from hedgebanks will be carefully retained and re-used.

At Year 1, it is anticipated that plant stock will be planted at 1.5m spacing within groups of between 3, 5 and 7 of a single species. Generally, shrubs are likely to be between 45-90cm whilst trees may be planted between 0.9-1.5m in height. Planting will, most likely, be undertaken within areas already seeded with grassland. At Year 15, it is anticipated that woodland will have established and will have broadly reached a uniform height of between 6-8m.

## **7.5 Conclusions**

The Preliminary Design will run through landscape areas characterised by scattered settlements and narrow lanes. However, only a small section of the Preliminary Design is within the Lough Mourne landscape character area, which is of highest landscape quality. The remainder of the Preliminary Design in this study is in areas assessed as being of Ordinary, Good and Very Attractive landscape quality. Nonetheless the area is not without appeal with a prominent setting afforded by several distant hill formations, and as such local people value it for these characteristics.

The Preliminary Design will introduce a new scale of road within a hitherto rural landscape setting. Despite the incorporation of mitigation measures, the degree of landscape impact varies along the length of the Preliminary Design ranging from Slight Adverse on the Croaghonagh Coniferous Woodlands character area to Large Adverse on some Good Quality landscape areas. It will, however, improve the general environmental quality of the urban areas of Ballybofey / Stranorlar by reducing traffic volumes passing through the Twin Towns.

Whilst the Preliminary Design is the result of an iterative design process that has sought to define an alignment that minimises its potential environmental impact there are inevitable adverse effects upon a number of environmental disciplines, including landscape. Further consideration of ways in which to minimise the adverse landscape impact of the scheme will be given additional attention at Detailed Design stage, within the overall mitigation strategy.

The Preliminary Design is assessed to have its greatest landscape impact where it passes in deep cutting or on high embankment through areas of Good landscape quality. These include the following:



- Ch 9900-10500 where the Preliminary Design will include a major cutting through a prominent hillside within an area of the Less intensively Managed Agricultural Landscape surrounding the Ballybofey / Stranorlar (Type 2) landscape character area..
- Ch 10700-11900 where the Preliminary Design will cross part of the River Finn Floodplain landscape character area on high embankment.
- Ch 13900-14400 where the Preliminary Design will include a deep cutting through a prominent ridgeline within an area of the Intensively Managed Agricultural Landscape surrounding the Ballybofey / Stranorlar landscape character area.

The Preliminary Design is also adjudged as having its highest levels of adverse visual impact within views from viewpoints that are closest to its proposed route and where the viewpoint is from an elevated position relative to a section of the Preliminary Design that is on high embankment or in deep cutting. In some instances the Preliminary Design will also impact upon some outstanding views from a number of residential properties.

The Preliminary Design will also have a Moderate adverse impact upon the night-time landscape within the Lough Mourne, the Croaghonagh Coniferous woodlands, the River Finn floodplain and parts of both the intensively and less intensively farmed agricultural landscape surrounding Stranorlar / Ballybofey where it would introduce a new and more extensive source of light within largely dark areas. Elsewhere, it would have a Slight adverse impact upon areas of both intensively and less intensively farmed landscape between Ch 4850-10100, including the Ballybofey link road where the Preliminary Design would be seen within the context of existing point sources of light and occasional vehicle movements. There would also be a number of adverse visual impacts upon night-time views (see Table 7.5).

The Preliminary Design will have a residual adverse effect upon local landscape character and upon a number of local views. The potential impact of which would be partially mitigated by new planting and seeding works.

## 7.6 References

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## 8.0 Surface Water Quality and Drainage

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### 8.1 Introduction and Methodology

This Chapter discusses the implications of the Preliminary Design for the N13/N15 Ballybofey/Stranorlar Bypass on surface water quality and drainage. The surface waterbodies affected are identified and the potential impacts arising from the construction and operation of the Preliminary Design are examined. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

#### 8.1.1 Surface Water Quality

Drainage quality information is not available for the existing N13/N15. However, pollutants contained in highway runoff can be generated from a wide variety of sources (Design Manual for Roads and Bridges, Volume 11 and Construction Industry Research and Information Association, 2001), as follows:

- Maintenance activities such as de-icing and weed treatment;
- Accidental spillages;
- Other sources such as atmospheric deposition, illegal disposal, agricultural activities etc.

Pollutants generated from these processes can be divided into the following categories:

- Hydrocarbons including petrol, diesel, fuel oils and hydraulic oils;
- Metals including lead, cadmium, copper, zinc and iron;
- Sediments, which can act as a transport medium for other pollutants, especially hydrocarbons;
- Salts; and
- Pesticides.

The volume of surface runoff is determined by the intensity and duration of rainfall events and the surface area and permeability of the highway. The concentration of constituent contaminants is widely accepted to be dependent on traffic volumes and the duration of dry periods between rainfall events. In dry periods high concentrations of pollutants can build up on the surface of the road, such that following the first rainfall after the dry period, a concentrated pulse of polluting material may run off the road to the drainage system.

The consequences on water quality (e.g. sediment, oils and/or hydrocarbons into the watercourses) if heavy rain occurs during construction are potentially higher than when flooding occurs during operation. This is particularly pertinent where the Preliminary Design passes adjacent to the eastern part of Lough Mourne, because of the proximity of the water supply source.

The assessment has been based on a review of available water quality data from reports produced by the Environmental Protection Agency (EPA) (2002, 2004 & 2006), in addition to monitoring data provided by Donegal County Council (DCC). This data was also supplemented by sampling undertaken in 2002 and 2003.

#### 8.1.2 Flooding and Land Drainage

Hydrological and hydraulic studies have been undertaken for the River Finn and its tributaries. Flood estimates have been made using the Flood Estimation Handbook (FEH) methodology, developed by the Institute of Hydrology for the UK. The River Finn

is included in the FEH because it is a tributary of the Foyle, which crosses to Northern Ireland.

A hydraulic model has been created to simulate the effects of the proposed River Finn and Burn Durnett crossings using Mike11 software developed by the Danish Hydraulics Institute. Ten models were also created to determine the culvert sizes required to avoid flooding upstream of smaller stream crossings, using HECRAS software developed by the Hydrologic Engineering Centre of the US Army Corps of Engineers.

### 8.1.3 Assessment Criteria

The significance of the effect of the Preliminary Design on water quality, hydrology and drainage depends on the sensitivity of the affected receptor and the magnitude of the potential impact. The assessment has been undertaken based on general criteria set out in the EPA Advice Notes on Current Practice (EPA 2003), and as advocated in the NRA Environmental Impact Assessment of National Road Schemes – A Practical Guide (2005).

These criteria are described in Table 8.1 below, with examples relating to the surface water environment.

**Table 8.1 Significance Criteria**

Impact	Significance Criteria
Profound adverse impact	Permanent significant impact on a Class A, unpolluted, river or designated salmonid river under the Freshwater Fish Directive (78/659/EEC), which will affect its designation as such. Permanent loss of a major strategic potable surface water source. Potential for increased flooding of a large number of residential properties, roads, and agricultural land.
Significant adverse impact	Temporary impacts on a Class A river or designated salmonid river. Permanent impact on a Class B, slightly polluted / eutrophic, river and watercourses not classified but used as nursery grounds for protected fish species. Permanent significant impact on a major strategic potable surface water source. Potential for increased flooding of a small number of residential properties, roads and agricultural land.
Moderate adverse impact	Temporary impacts on a Class B river or watercourses used as a nursery ground for protected fish species. Permanent impacts on a Class C, moderately polluted, watercourse. Temporary impact on major potable water source. Permanent impact on local potable surface water source. Potential for increased flood risk to isolated number of residential properties (1 – 2 properties), roads and agricultural land.
Slight adverse impact	Temporary impacts on a Class C river or watercourse. Permanent or temporary impacts on a Class D, seriously polluted, or unclassified waterbody. Temporary impact on local potable water source. Potentially localised and limited increase to the flood risk to agricultural land, roads and residential areas, but no increase of flood risk to residential properties.
Imperceptible impact	Changes that are unlikely to affect the integrity of a resource or feature. No change to the existing flood risk (within the limitations of modelling accuracy).
Slight beneficial impact	Reduction in the potential pollution of waterbodies such as by the provision of pollution control measures where none exist. Localised reduction in flood risk for agricultural land.
Moderate beneficial impact	The removal of polluting discharges to Class A rivers and designated salmonid waters. Widespread reduction in flood risk or localised reduction in flood risk of residential properties, roads, areas of special importance and agricultural land.

### **Flood Risk Standards**

The Office of Public Works (OPW) has produced guidelines on applications for consent for bridges and culverts. They include the following summarised assessment criteria:

- Bridges and culverts should be designed to the 1-in-100 year flood for urban areas or where developments (existing, proposed or expected) are involved.
- Bridges and culverts should be designed to the 1-in-25 year flood for rural areas or where developments (existing, proposed or expected) are not involved.
- Bridge design must include a freeboard allowance of at least 0.3m between the bridge soffit and the design flood level.
- A minimum standard culvert size of 1500mm diameter is recommended permitting effective maintenance and inclusive of 500mm depth to allow natural channel bed materials to be retained through the culvert.
- The structure should not significantly increase the risk of upstream/downstream flooding over the entire flow range.

The above criteria have been used in interpreting the flood risk aspect of the significance criteria, e.g. the effect on flood risk on the River Finn floodplain has been assessed using the 1-in-100 year flood event.

## **8.2 Existing Environment**

### **8.2.1 Surface Waterbodies**

The main surface waterbodies in the vicinity of the route are shown on Figure 8.1. A description of the water quality, water uses and land drainage and flooding is given below.

#### **Water Quality – Data provided by the Environmental Protection Agency (EPA) (2006)**

Lough Mourne, situated at the southwestern end of the study area, is a mountain lake that is currently used as a reservoir for potable water supply (PWS) and also as a game fishery (EPA 2002). The surface area of the Lough is approximately 0.70km<sup>2</sup>. Water quality in the Lough is monitored by Donegal County Council and was sampled twice in 2003 and once in both 2004 and 2005 (EPA, 2006). These surveys indicate that Lough Mourne is oligotrophic i.e. that it has low levels of available nutrients, with low recorded levels of chlorophyll-a (maximum less than 1.0µg/l in 2005).

The Lough currently supports an abstraction of approximately 7,700m<sup>3</sup>/day for public water supply to the Twin Towns and surrounding settlements. Plans to increase the yield of the PWS abstraction from this source were approved by An Bord Pleanála in 2005. This will be achieved by constructing two dams to raise the water level of Lough Mourne, providing additional storage, and by diverting flows from the Bunadaowen River into the Lough. The main impounding structure will be located at the south-western end of the Lough, with a small retaining dam at the north eastern end. On completion of the scheme, the top water level of the Lough will be raised by a maximum of 4.5mAOD from approximately 166m Above Ordnance Datum (AOD) to 170m AOD, and the surface area of the Lough will be increased by approximately 0.2km<sup>2</sup>. The project is included in DCC 2007-2009 Water Services Investment Programme and construction of the scheme is scheduled to commence in 2008, with substantial completion achieved by early 2010.

The Burn Darnett rises near the northern end of Lough Mourne and is fed by a number of tributaries. Approximately 6km east of the Lough at Navenny, the Burn

Daurnett feeds into the River Finn. Biological surveys of this watercourse, undertaken by the EPA in 2004, indicate that this watercourse is classified as Q2-3. This is indicative of transitional, moderately polluted conditions (Class C). The EPA report that discharge from a wastewater treatment works located upstream of Burn Daurnett Bridge causes pollution of the river. This discharge still affects water quality as far downstream as the River Finn confluence. Whilst this watercourse is not classified under the Quality of Salmonid Waters Regulations (1988), it contains nursery habitat for lamprey species (Chapter 9.0).

The physico-chemical quality of the river is monitored by DCC. Data for the most recent sampling period (April 2006) indicate that Biological Oxygen Demand (BOD) marginally exceeds the guideline value for waters designated under the Freshwater Fish Directive. Recorded concentrations of total ammonia are within the guideline limit. Maximum levels of total phosphorous (0.136mg/l) considerably exceed the standards for phosphorus in rivers of 'Q3' quality (70µgP/l or 0.07 mgP/l) set under the Phosphorus Regulations (1998).

The River Finn runs generally eastwards and passes between the towns of Ballybofey and Stranorlar. There are four existing bridges in the vicinity of the towns, but the river continues for a further 6km before the next bridge at Killygordon. An unnamed tributary of the River Finn joins at Treanamullin. The River Finn is a designated salmonid water under the Freshwater Fish Directive (78/659/EEC), as transposed by the European Communities (Quality of Salmonid Waters) Regulations 1988 (known as the Quality of Salmonid Waters Regulations). The total length of the river is designated as a candidate Special Area of Conservation (cSAC) under the EU Habitats Directive (92/43/EEC), principally because of its value for salmon. Along various stretches of the river, nursery, spawning and holding areas for salmon have been identified (Chapter 9.0). The EPA/DCC monitors the physico-chemical and biological quality at a number of locations on the River Finn.

For the most recent sampling period (2004), the EPA monitored the biological quality in the River Finn at three locations (bridges) within the study area: 2.5km upstream of Ballybofey (Station No 0600), south of Stranorlar (Station No 0800) and south of Killygordon (Station No 0900). At the furthest upstream site, the Biological Quality Rating (Q Value) indicates that the river is moderately polluted, Q3 (Class C). Further downstream, the river achieves a Q3-4 rating (Class B), which indicates slight pollution. Comparing this data with monitoring results from previous years, a decline in the biological quality of the River Finn can be noted. At station 0600, upstream of Ballybofey, degraded water quality is attributed to pollution loads from a tributary of the Finn, the River Reelan. At station 0800 significant bridge engineering works is thought to have had a temporary effect on water quality.

Physico-chemical analysis of samples collected over the period 2002-2006 (summarised in Table 8.2 below) indicate that in the most upstream reaches of the River Finn, maximum levels of BOD exceed the standard set under the Quality of Salmonid Waters Regulations (1988) as suitable for salmonid fisheries. Further downstream however, lower BOD has been recorded, with the river achieving compliance with the most stringent guideline standards. Low BOD is also recorded in the Burn Daurnett.

Average concentrations of ammonia in the River Finn and the Burn Daurnett marginally exceed guideline concentrations prescribed in these regulations. Recorded maximum concentrations of phosphorous at all of the monitoring sites considerably exceed the standards set under the Phosphorus Regulations (1998).

**Table 8.2 Summarised results of physico-chemical analysis of Burn Daurnett & River Finn 2002-2006 (EPA)**

River	Monitored Period	Measured range					
		pH	SS mg/l	BOD mg/l	Ammonia mg N/l	Nitrates( N) mg/l	Total Phosphorous mgP/l
Burn Daurnett just u/s of Finn confluence	2006	6.33-7.23	2.8-5.4	0.33-0.47	0.012-0.034	0.081-0.242	0.087-0.137
River Finn – u/s of Ballybofey	2005	6.86-7.65	0.25-7.0	0.44-5.60	0.002-0.022	Trace-0.230	0.011-0.532
River Finn – south of Stranorlar	2005	6.59-7.64	Trace-6.75	0.80-8.93	0.013-0.037	Trace-0.202	0.031-0.649
River Finn – d/s of Killygordon	2004	6.58-6.81	0.05-2.80	0.05-1.69	Trace-0.037	0.16-0.392	Trace-0.041

In addition to the River Finn cSAC, two further designated areas are located within 0.5km of the Preliminary Design.

- Meenagarranroe Bog NHA (Natural Heritage Area), located 0.38km south of the route.
- Lough Hill Bog NHA (Natural Heritage Area), located 0.45km south of the route.

Further information regarding the ecology of these upland bogs is given in Chapter 9.0 Ecology Flora, fauna and fisheries).

Two further areas of undesignated Blanket Bog habitat have been identified. The Preliminary Design would cross one of these at Chainage 1400–2100, and another is located approximately 0.5km to the west of the scheme (west of Cashelnavenan).

#### **Water Quality Sampling 2002/2003**

Water quality samples were collected from the seven main watercourses (eight crossing points sampled) crossed by the Preliminary Design in July 2002 and March 2003 as part of the assessment process. Sampling was carried out in appropriate locations downstream of the proposed crossing points as shown on Figure 9.2. Results of the biotic water quality assessment are presented in Appendix 9.1. Physico-chemical analysis of the samples collected was carried out to establish a baseline for existing levels of pollution typically associated with roads. The parameters analysed for, and the results of the analysis are presented in Appendix 9.2.

During March 2003 all sites recorded levels of BOD, pH, Ammoniacal Nitrogen and dissolved Copper, which were all within the ranges for salmonid waters as set out in the Quality of Salmonid Waters Regulations (1988). However the BOD level at site D3 (River Finn main channel) during July 2002 was 13mg/l, higher than the standard of 5mg/l set out in the Regulations. For March 2003 levels of dissolved oxygen (at site D2), nitrites (sites D4 and D8) and total suspended solids (D8) were outside the ranges for salmonid waters set by the Regulations, however none of these sites are located on the River Finn main channel but on tributaries of this river. As such these watercourses are not designated as salmonid fisheries, although as tributaries of this river they may serve as spawning or nursery waters.

During March 2003 levels of mineral oil, and petrol and diesel range organics at all sites were all below 10 µg/l (the limit of detection). This, together with very low levels (below limit of detection) of benzene, toluene, xylene, (in both July 2002 and March 2003) which are typical constituents of a gasoline spill (Jeer, et al), indicates that no oil or petrol spills occurred in the vicinity of these sample sites prior to either sampling date.

Levels of dissolved lead, zinc, copper, toluene and total xylene in July 2002 and March 2003 are all within Environmental Quality Standards (EQS) set under the Water Quality (Dangerous Substances) Regulations 2001. In addition, levels of benzene and ethylbenzene, both polycyclic aromatic hydrocarbons (PAH), are below EPA proposed EQS (EPA 1997). However, levels of the 16 PAHs measured (those placed on the United States Environmental Protection Agency (USEPA) list of priority pollutants) at sites D5 (tributary of Burn Daurnett), D7 and D8 (Burn Daurnett main channel) are notably elevated (March 2003). This suggests that the source of these chemicals is a point source discharge upstream of site D5.

Overall the analysis of water quality samples collected in March 2003 indicates that the watercourses surveyed do not experience significant levels of organic pollution, or road runoff.

The existing N15 has filter drains adjacent to Lough Mourne that serve as preliminary treatment devices. Over the rest of the existing N13/N15, there is minor passive treatment provided by the road verges, but the effectiveness of the treatment is likely to be variable and has not been studied in detail.

#### **Water Uses**

Lough Mourne is used as a game fishery and reservoir for the public water source (7,675m<sup>3</sup>/day) for the Twin Towns and the outlying villages. The pumping station is located just to the east of the Lough and the head works is located approximately 1km to the east, adjacent to the banks of the Burn Daurnett. Construction of an impoundment scheme to facilitate an increased abstraction from the Lough is scheduled to commence in 2008, with scheme completion expected by early 2010. The implications of these construction works on the Preliminary Design and the potential for the construction of the Preliminary Design to affect the future impounded Lough Mourne have been considered in this assessment.

As outlined in Chapter 9.0, the watercourses within the study area support both salmon and brown trout populations. There are numerous angling clubs / syndicates on the River Finn.

The new waste water treatment works for Ballybofey and Stranorlar is located on the eastern bank of the River Finn just to the south of the towns. Treated waste water is discharged from the works into the River Finn. A search of the EPA database indicates that there are no surface water discharges from industrial processes or commercial sites in the vicinity of the River Finn or its tributaries that are licensed under the Integrated Pollution Prevention and Control Directive (IPPC) (Directive 96/61/EC).

#### **Land Drainage and Flooding**

The River Finn has a catchment of 354km<sup>2</sup> to the proposed N15 bridge crossing, including the catchment of the Burn Daurnett at 26.3km<sup>2</sup>. Flood flows spill out either side of the main river, onto the extensive floodplains. The floodplains are up to 1km wide downstream of the towns. Flood patterns have been analysed using a one-dimensional hydraulic model constructed using MIKE11 software.

The hydraulic study examined the impacts of a 1-in-100 year flood on the River Finn floodplains, using a combined peak inflow of 588m<sup>3</sup>/s, although this flow is naturally attenuated (reduced by temporary storage) on the floodplains. The main inflow is the River Finn, with smaller inflows from Burn Daurnett, Stranorlar Burn and the unnamed tributary at Treanamullin.

The geometry of the river channels and floodplains were defined in the model using a combination of on-site topographic survey and contour information obtained from 1:2,500 and 1:50,000 mapping. In the vicinity of the proposed River Finn bridge

crossing, the model used more detailed information from a digital terrain model of the land adjacent to the proposed Preliminary Design. Additionally, a survey of floor levels was undertaken at 20 properties in Navenny, which were identified as being potentially at risk of flooding.

Despite there being two water level gauging stations in the vicinity of the Preliminary Design, the model has limited calibration information since there have been insufficient gaugings at high flows to be confident of the actual flows already experienced in this catchment. However, following two flood events in January 2005, for which video records of flood extents and recorded water levels were available, model validation was undertaken. This process demonstrated that the model is accurate and reliable for use in predicting the likely change in flood risk as a result of the Preliminary Design.

The areas at risk of flooding from the River Finn have a predominantly rural land use, reflecting the risk associated with inundation. A few properties on the edges of the floodplains are at a higher risk of flooding than most of the Twin Towns, however, for the majority of properties, that risk may be only very slight (e.g. by a major blockage of the floodway or very extreme event). According to modelling undertaken during the Route Selection stage (2001), a small number of buildings in southern Ballybofey are at risk from flooding in a 1-in-50 year-flood event (and possibly in smaller events). This is supported by anecdotal evidence of repeated flooding in this area.

Peak flood levels in the lower Burn Daurnett and its floodplain are controlled by the water level in the River Finn, which can "back up" across the road adjacent to the Finn at Navenny. This effect is predicted to extend at least 500m upstream from the confluence of Burn Daurnett in the 1-in-100 year flood event. Flood events that affect the wider River Finn catchment appear to be more likely to cause extensive flooding in this area than localised events over the Burn Daurnett catchment.

The general drainage pattern along the Preliminary Design can be described from west to east, quoting approximate Chainages, as follows:

- Adjacent to Lough Mourne (Cashelnavean), a number of streams drain small, steep catchments, with one main stream incised into a deep channel.
- At the western extent of the Preliminary Design, an area of undesignated upland Blanket Bog habitat is located at Ch 1400–2100.
- At the head of Burn Daurnett (Meencrumlin), the stream gradient is relatively flat, following the line of the disused railway.
- In the area of forest (Croaghonagh, Ch 1900-Ch 4900), a large number of near-parallel man-made drainage channels run directly down the slopes on a moderate gradient north west towards the Burn Daurnett. Some of these are intercepted by the disused railway line or small natural streams.
- From Goland to Edenmore (Ch 4900-Ch 10900), numerous conventional agricultural drains join into natural tributaries of Burn Daurnett, on moderate to steep gradients. The largest of these tributaries has a catchment of 4.5km<sup>2</sup>. One stream is incised several metres below the general ground level in a gorge.
- The Preliminary Design crosses the floodplain of the River Finn from Ch 10900 to 11700.
- The Preliminary Design traverses several small agricultural drains between Treanamullin and Knockfair (Ch 11700 and Ch 13400), generally on moderate to flat slopes.
- An incised stream is crossed at Mullagaharry (Ch 13450).



- Several small drains with moderate slopes are crossed between Mullagaharry and Kilross (Ch 13600-Ch 15000).
- A flat, boggy area is crossed between Ch 15000 and Ch 15300. The area from Ch 11700-Ch 15300 drains to the unnamed tributary of the Finn at Treanamullin.
- No watercourses are crossed between Ch 15300 and the end of the Preliminary Design at Ch 15492 (Teevickmoy). This portion of the Preliminary Design is in the catchment of the Cloghroe River to the north.

In addition:

- The Ballybofey Link Road crosses the Burn Daurnett at Navenny.
- There is an existing twin arch culvert over the unnamed tributary at Treanamullin where a connection to the existing N15 is proposed.

## 8.3 Assessment of Effects: Construction

### 8.3.1 River Finn and Burn Daurnett Crossings

There is little difference in the assessment of changes to flood risk between construction and operation, although the timing and staging of some construction activities may be able to reduce the likelihood of occurrence of potential effects in some cases.

In general, the frequency of flooding upstream of the road embankments across the River Finn floodplain will be unchanged but the depth of flooding in the same event will increase progressively as the embankments are constructed, eventually reaching the final state of flood risk as described in Section 8.4 (Assessment of Effects: Operation). The most significant changes predicted for the 1-in-100 year flood are rises of up to 4cm on the floodplain upstream of the River Finn crossing and up to 9cm upstream of the Burn Daurnett crossing. Minor increases in flood level are predicted to occur on mainly agricultural land located in the floodplains. Comparison of the modelled flood levels with property floor levels in Navenny indicate that these rises are not sufficient to impact on any houses, however the floodplain area will increase marginally within this residential area. This will result in a slight adverse impact.

### 8.3.2 Road Drainage

Once the laying of tarmac commences, runoff from the road surface will increase, which will contribute to a marginal overall increase in flow rate in the main catchments as a whole (Burn Daurnett, unnamed tributary at Treanamullin and, to a lesser degree, the River Finn). Installation of mitigation measures such as swales and filter drains as described in Section 8.5 and Chapter 3.0 Description of the Specimen Design, will both slow down flows and maximise infiltration such that any increase in flooding will not be measurable. Therefore, it is considered there will be an imperceptible effect on flooding from increased road runoff in the Burn Daurnett and the unnamed tributary at Treanamullin upstream of the River Finn floodplain. This applies equally during the construction and operational phases.

### 8.3.3 Tributary Streams and Bogs

The construction of the various culverts has the potential to temporarily add significant sediment loads to the streams as the stream beds are disturbed. Mitigation measures to minimise this impact are presented in Section 8.5.

The sizing of culverts to avoid unacceptable increases in flood risk is described in Section 8.4.1.

Significant lengths of the road will intercept runoff from the adjacent slopes, which will generally be collected in boundary drains (embankment toe drains and interceptor ditches). The boundary drains will be constructed early in the construction phase, to avoid excessive flow across the works area. These drains will require sediment control measures to be in place until the drains are stabilised, such that excessive discharges of sediment to the receiving watercourse is avoided.

The boundary drains will generally discharge to watercourses just upstream of the proposed culvert crossings. For example, in Croaghonagh, between Ch 2970 and Ch 3910, a large number of forest drains will be intercepted by the boundary drains, which will discharge to the proposed culvert at Ch 3910. This will locally increase the flow rate in the "3910" stream, while reducing the flow in the existing forest drains down slope (north west) of the road. The flow in the Burn Durnett will be reduced over a short length upstream of the 3910 stream, but will be unchanged below the confluence with the 3910 stream. This applies equally during the construction stage as during the operational stage.

The same situation applies to several other minor streams and this has the potential to increase erosion within the streams and to increase the flood risk adjacent to these streams. The steepness and rural nature of the affected streams means that the resulting impact of any increased flooding will be minor. Because of minor increases in flow rate, there will be a slight adverse impact on sections of the existing watercourses. It should be noted that this is as a result of redistribution of water rather than an overall increase in flow rates. Details of mitigation measures are presented in Section 8.5.

Locally, it is likely that this interception of flows will have more of an effect than the additional runoff generated by the road itself, since additional road runoff will generally be attenuated by swales or ponds to Greenfield (existing) flow rates prior to discharge to the natural watercourses (see Section 8.4.3). Drainage ponds will be sized to accommodate a 1 in 30 year storm event, with an additional 15% capacity to allow for the predicted future effects of climate change. Proposed attenuation measures are shown on Figure 3.2.

Two designated conservation area bogs (Meenagarranroe and Lough Hill Bog) are located near the start of the Preliminary Design. As discussed in Section 8.4.6, these habitats are located such that construction of the Preliminary Design will result in no physical impact on the bogs. Also, they are hydraulically disconnected from the aquifer underlying the route therefore there will be no impact on the hydrology of these sites during the construction phase.

One area of undesignated blanket bog (Ch 1400 to 2100) will be crossed by the Preliminary Design. Construction activities such as vegetation stripping, top soil removal, excavation and soil compaction, have the potential to cause physical disruption to this habitat with implications for the sediment load of downstream water features, existing drainage mechanisms and ecological interests. Physical disruption will be relatively localised in extent however resulting in a moderate adverse impact. Further details are also provided in Chapter 14.0 Geology and Hydrogeology. One further area of undesignated blanket bog is located 0.5km to the west of the Preliminary Design, however this bog will not be physically, or hydrologically impacted.

### 8.3.4 Pollution from Construction

Construction works have the potential to cause contamination of adjacent waterbodies from a pollution incident resulting from the use or misuse of construction equipment

and materials on site (e.g. use and storage of fuels, chemicals, cement and concrete). Construction works also have the potential to cause contamination by silts and particulate matter due to disturbance of soils and handling of materials. This can contribute to a temporary decrease in water quality and restrict habitat diversity within waterbodies. The impact of this could be particularly significant on breeding and nursery habitat of salmonid fish species.

Implementation of mitigation measures (described in Section 8.5) will considerably reduce general site runoff, the risk of accidental spillage and in the event of spillage, the ability to contain it or minimise impacts. Even with these mitigation measures, the significance of impact, should a pollution incident on site occur and reach an adjacent waterbody, will remain as described below.

To avoid the potential disruption to the water supply from Lough Mourne, particular measures will be required to minimise the likelihood of contamination by excessive sediment or oil spillages during construction. Prior to the start of construction of the proposed scheme, a detailed method statement will be prepared. This construction method statement will be prepared in consultation with the relevant authorities and include mitigation measures to prevent contamination of the Lough Mourne public water supply. The start of construction of the road is likely to be 2010, therefore largely avoiding the construction period of the Lough impoundment scheme. However, should the construction phases of the two schemes overlap, there is potential for cumulative impacts on water quality, with the risk of contamination of the Lough being slightly increased.

As part of the Preliminary Design, one permanent pond is proposed along the route as it passes adjacent to the eastern end of Lough Mourne (Section 8.5). This pond (Drainage Pond 3), which forms a component part of the Preliminary Design drainage infrastructure, will be constructed early in the programme and constructed at an elevation such that it will not be subject to inundation when Lough Mourne reaches its future top water level (170m AOD). Embankments located in this area will be granular in base to prevent excessive hydrostatic pressures and constructed to incorporate suitable erosion control measures. The pond will also form part of the mitigation measures to reduce water quality impacts during construction.

Provisions will also be made for runoff from other road construction areas and construction compounds to be diverted to sediment ponds and silt traps to avoid the pollution of surface waters. A suite of mitigation measures has also been specified by An Bord Pleanála as a condition of planning permission for the construction of the Lough Mourne impoundment scheme.

Any impacts on waterbodies during construction will be limited to the duration of construction and will therefore be temporary:

- The impact in the event of construction pollution to the River Finn as a designated salmonid fishery will be significant adverse.
- The impact in the event of construction pollution to Lough Mourne, a major potable water source, will be moderate adverse.
- The impact in the event of construction pollution to the Burn Darnett, which provides nursery habitat for protected lamprey species (Chapter 9.0), will be moderate adverse.

## 8.4 Assessment of Effects: Operation

### 8.4.1 Culvert Sizing to Avoid Adverse Effects on Flood Risk

Ten small HECRAS hydraulic models of tributary streams of Lough Mourne, Burn Daurnett and the unnamed stream at Treanamullin were used to determine suitable culvert or bridge sizes for the Preliminary Design. In rural areas, culverts were sized to pass the 1-in-25 year flow without the water level "heading up" above their soffit (inside top level) and to avoid flooding the road in a 1-in-100 year event. In urban areas, the design flow used was the 1-in-100 year event (in line with OPW recommendations). Where the potential for blockage by debris was assessed as high, the culvert sizes were increased by a standard size (e.g. a 1500mm diameter culvert increased to a 1800mm culvert). In this way, effects on flood levels will be localised and minimal. As not every catchment was modelled, watercourses draining catchments with design flows equivalent to less than a 1500mm culvert capacity, will automatically be provided with the minimum 1500mm diameter culvert.

The Preliminary Design has been prepared with either box or circular cross-section culverts, depending on the requirements for fish and mammal passage (refer to Chapter 9.0), but provided the cross-section area is not reduced, similar sized circular, box or arch culverts are equally suitable for conveying flood flows. Therefore some culverts may be increased in size to aid construction and may be alternative shapes (e.g. arch) to minimise the adverse effect on habitat values. The box culverts include an additional allowance of 500mm depth so their invert can be buried to maintain natural bed conditions. The culverts may be subject to changes during Detailed Design, when formal consent for all structures over watercourses will be sought from the Commissioners of Public Works, under Section 50 of the Arterial Drainage Act.

In addition, a further culvert of minimum 600mm diameter will be provided at a higher level for mammal passage at some locations (Chapters 3.0 and 9.0). These could provide additional flow paths in extreme (greater than 1-in-100 year) events.

### 8.4.2 Lough Mourne Dam Proposals

The proposal, by Donegal County Council, to raise the top water level of Lough Mourne to approximately 170m AOD will have little impact on the required road culverts. An existing 750mm twin culvert (approximate Ch 1055), which will be replaced, will become submerged at its outlet (at the new top water level), but its hydraulic performance will not be significantly affected since it is a steep culvert, with the inlet well above the top water level. In order to mitigate against the potential for drainage from the outfalls adjacent to Lough Mourne to cause pollution of this waterbody and a public water supply, discharges will be directed to attenuation facilities, which would allow for containment and removal or treatment of any contaminated drainage discharges. The impoundment of Lough Mourne will result in there being less distance between the N15 and the Lough as a result of the increased surface area of the Lough and its new, higher, top water level. Inclusion of mitigation measures for the treatment of road runoff and measures to reduce the impact from accidental spillage, set out in Section 8.5, will ensure that any effect on Lough Mourne from operational or accidental spillage is minimised.

The likelihood of disruption to the water supply will be similar to that existing at present. It may be slightly reduced by improved drainage treatment systems, but this improvement may be negated by the closer proximity of the Lough to the road caused by the increase in the top water level of Lough Mourne as a result of the construction of the Lough Mourne Impoundment Scheme. No effect on the integrity of Lough Mourne

as a potable water source, or game fishery, is expected as a result of the operation of the Preliminary Design.

### 8.4.3 Pollution Control and Runoff Attenuation Measures

The drainage design for the Preliminary Design incorporates grassed swales, filter drains and ponds (Figure 3.2). CIRIA Report 142 Control of Pollution from Highway Discharges identifies swales and combined filter drains as among the most effective pollution removal measures for highway works such that additional facilities, such as petrol interceptors, will not be required to treat 'everyday' runoff. The UK Highways Agency Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment provides a comparison of the removal efficiency of various treatment systems of six of the major pollutants in highway runoff, and is presented (for those treatment systems included within the Preliminary Design) in Table 8.3.

**Table 8.3 Treatment System Removal Efficiency (DMRB Volume 11)**

Treatment System	Removal Efficiency (%)					
	Zinc (Total)	Copper (Dissolved)	Iron	Lead	Suspended Solids	Hydrocarbons
Combined Filter/French Drains	70-80	10-30	80-90	80-90	80-90	70-90
Sedimentation Lagoon/Settling Pond	60-80	20-30	90+	80-90	60-90	70-90
Swales/Grassed Ditches	70-90	50-70	90+	80-90	60-90	70-90

Lagoons and filter (french) drains have a high efficiency (70%) for Polycyclic Aromatic Hydrocarbon (PAH) removal (Perry & McIntyre 1987, quoted in Yonge *et al* 2002). These compounds, which are produced as a result of combustion, are constituents of road runoff. In association with particulates, they can exhibit toxic effects. Any measure that will increase the length of time from the source of the contamination to the receiving watercourse will provide settlement, containment and possibly degradation of potentially harmful materials.

The risk of an adverse impact on the quality of underlying aquifers, associated with infiltration of road drainage discharges is considered to be at an acceptable level. This is because there are predicted to be relatively limited traffic flows along the route and the geology of the study area is classified as poor aquifers or aquifers of only local importance. There is therefore no requirement for special drainage features e.g. lined swales.

Attenuation measures have been provided within the Preliminary Design at sensitive locations (such as Lough Mourne). These will also serve to contain spillages arising from road traffic accidents. In the event of an accidental spillage of pollutant on the road, the penstock at the outfall of the drainage pond will be closed to allow the polluted run off to be contained within the pond until it is either treated or pumped out and removed. Such measures will be likely to significantly decrease the probability that a spillage resulting from a road traffic accident will lead to a pollution incident in the receiving watercourse.

Given that treatment of operational drainage and spill containment is to be provided where there are currently only very localised facilities for preliminary treatment of road runoff, there is potential for a slight beneficial impact.

The water quality of runoff from areas adjacent to the Preliminary Design will be unaffected by the works and will generally not require pollution treatment measures. In the instances when it may be necessary to combine runoff from adjacent areas with runoff from the Preliminary Design, the entire volume of runoff will require treatment. However, combining the runoff from the two areas will result in increased dilution of pollutants and, after treatment, have a lesser impact on receiving water quality.

#### 8.4.4 River Finn Crossing

There will be little hydraulic impact on the main river channel because of the large clear-span structure, in line with NRA guidelines for the *Crossing of Watercourses during the Construction of National Road Schemes* (NRA, 2006). However, the proposed River Finn crossing will impact on the flood conveyance and flood storage of the Finn floodplain. The assessments in this section refer to the results of hydraulic modelling with Mike11 software. Figure 8.2 shows the predicted extent of the existing and proposed floodplain in the 1-in-100 year flood. Existing levels and proposed changes are also shown. At this scale of mapping, the difference in floodplain area is not discernible, although in practice there will be a small increase in area at the edge of the floodplain for the same flood event.

The floodplain is extensive, so the impact of the change to flood storage will be relatively minor, despite the long length of embankment and the Stranorlar Roundabout taking up storage within the floodplain. A larger impact will be caused by the skew of the embankments and bridge to the floodplain. Flow will tend to be forced first from the southern floodplain to the river and the northern floodplain upstream of the crossing, then back again from the northern floodplain to the river (see Figure 8.2).

The restriction of floodplain flow at the bridge embankment will cause minor increases in flood level upstream of the crossing in the 1-in-100 year event. With the proposed 3-span bridge (total length approximately 170m), a maximum rise of 4cm is anticipated on the floodplains immediately upstream of the crossing, reducing to less than 1cm at Navenny Bridge some 1500m upstream.

Downstream of the crossing, the floodplain flows directed through the skewed bridge will cause a differential level on the north and south floodplains – a rise of 2cm is predicted on the southern floodplain, with a 2cm fall on the northern floodplain. The predicted flood level at Treanamullin (connected hydraulically to the northern floodplain downstream of the embankment) will reduce marginally, despite the decreased floodplain storage in this area. This is because more flow is forced onto the southern floodplain and the embankment restricts the flow to the northern floodplain. At the peak of the flood, under baseline conditions, the maximum predicted difference in water levels upstream (15.14m AOD) and downstream (14.90m AOD) of the proposed River Finn crossing embankment is 24cm, and whilst marginal increases in flood water levels are predicted, the construction of the Preliminary Design would result in no increase in this differential.

Overall, the impact on the River Finn floodplain will be slight adverse. Whilst the OPW and Lough's Agency have raised no objections in principal to the proposed crossing of the River Finn, formal consent will be sought from the Commissioners of Public Works, under Section 50 of the Arterial Drainage Act during Detailed Design stage.

#### 8.4.5 Burn Darnett Crossing

A 800m length of Burn Darnett and its floodplains was included in the modelling of the River Finn. A bridge with a 20m span was included in the model at the location of the proposed Burn Darnett crossing. As illustrated in Figure 8.2, this resulted in peak flood levels rising by 9cm immediately upstream of the crossing. Further upstream the

impact is reduced, with a predicted rise of less than 2cm expected to occur 300m upstream of the bridge.

Minor increases in flood level are predicted to occur on mainly agricultural land located in the floodplains. Comparison of the modelled flood levels with property floor levels in Navenny show that these rises will not be sufficient to cause flooding of any houses in the 1-in-100 year event; however the floodplain will increase marginally within this residential area. Therefore, an impact of slight adverse significance is predicted.

Whilst the OPW and Lough's Agency have raised no objections in principal to the proposed crossing of the Burn Daurnett, formal consent will be sought from the Commissioners of Public Works, under Section 50 of the Arterial Drainage Act during Detailed Design.

#### 8.4.6 Bogs

Two designated conservation area bogs (Meenagarranroe and Lough Hill Bog) are located near the start of the Preliminary Design.

These bogs are located such that the construction of the Preliminary Design will not result in any physical disruption to these habitats. The potential for impacts on the hydrology of the systems has also been considered.

Lough Hill Bog is located approximately 0.45km from the Preliminary Design on the southern slopes of the Lough Mourne valley. The bog is underlain by granite geology and has an elevation varying from 190m to 221mAOD. The road along this reach will be constructed at an elevation ranging from approximately 174m to 172mAOD and works will occur to the north of the northern shores of the Lough.

Meenagarranroe Bog is located adjacent to eastern boundary of the Lough Hill Bog, approximately 0.38km from the Preliminary Design on the southern slopes of the Lough Mourne valley. The bog is underlain by granite bedrock geology and has an elevation varying from 175 to 204m AOD. The road along this reach will be constructed at an elevation ranging from approximately 168m to 160mAOD.

Ground elevations across the two bogs are therefore significantly higher than the Preliminary Design and all are located beyond the southern shores of Lough Mourne. There is therefore no potential for construction of the Preliminary Design to result in interception of the supporting groundwater table. Hydro-geological assessments also indicate that these habitats are hydraulically disconnected from the aquifer underlying the route. Therefore there is considered to be an imperceptible impact on the existing water level regimes of the designated conservation area bogs (See Chapter 14.0 for further details).

An area of undesignated upland blanket bog between Ch 1400 and 2100 will be crossed by the Preliminary Design. The construction of the road will result in the extraction and replacement of peat with a suitable fill material. There is potential therefore for disruption of the existing hydrological/hydrogeological regime that maintains this habitat, with an impact that is judged as having an overall moderate adverse significance.

### 8.5 Mitigation Proposals

The potential for significant adverse impacts on the surface water environment during the construction phase will be avoided/prevented or minimised by the preparation and implementation of an Environmental Operating Plan (EOP). The National Roads Authority has recently prepared the Guidelines on the Creation, Implementation and

Maintenance of an Environmental Operating Plan (2007). The EOP will outline procedures required to fulfil all of the Environmental Commitments for the Preliminary Design, including environmental legislative requirements and those emanating from consultations with third parties, for example, the OPW and Regional Fisheries Board. Contingency plans in the event of a contamination incident would also be included.

Environmental mitigation measures of relevance to the surface water environment are described in the following sections.

### 8.5.1 Mitigation for Water Quality

The assessment of impact to water quality includes the following mitigation:

- Implementation of good construction working practice on site including positioning of fuel storage, specification of minimum fuel bund capacity, containment of site runoff, handling of cement and concrete etc to minimise the risk of a pollution incident.
- Minimisation of sedimentation of watercourses by appropriate timing and sequencing of construction activities and minimisation of diversion distances for culvert construction. Further details of appropriate mitigation measures are included in Chapter 9.0.
- The Contractor will supply spill kits, which will be stored on-site during construction, and used in the event of a fuel or chemical spillage. Such kits will contain absorbent materials (such as absorbent granules, booms or mats) and plastic drain covers. Appropriate operatives responsible for handling chemicals or oils or for plant refuelling will be trained in the use of this kit.
- Mitigation measures will be detailed within the EOP, which will be prepared prior to construction commencing.
- Maintenance of fish and mammal passage by using appropriate culvert design including maintaining natural bed materials and stream gradients.
- Passive treatment of road runoff from the area adjacent to Lough Mourne via a drainage pond.
- Additional measures (e.g. ponds) for attenuation and treatment of road runoff where swales and filter drains are impractical. These facilities could also fulfill the function of pollution containment following any incidences of accidental spillage.
- Where the provision of a pond is not practicable, surface water runoff will flow through petrol interceptors prior to discharge to receiving watercourses.

### 8.5.2 Mitigation for Drainage

All works carried out on or near watercourses will be in accordance with the *Guidelines for the crossing of watercourses during the Construction of National Road Schemes* (NRA, 2006) and in consultation with the relevant statutory bodies.

Culverts have been preliminarily sized, shaped and located with the aim of conveying flood flows whilst minimising the changes to natural stream conditions, during both construction and operation. For example, where culverts are box in cross section an additional allowance has been made for burial of the culvert inverts on natural watercourses to allow natural bed materials to be retained so that hindrance to fish passage will be minimised.

The construction of the various culverts has the potential to temporarily add significant sediment loads to the streams as the stream beds are disturbed. To minimise this, for the larger streams, provided ground conditions permit, the culverts will be constructed adjacent and parallel to the existing stream prior to creation of the minor diversions required to join the existing stream to the culverts. Construction of the culverts parallel



to the existing stream will minimise stream disturbance by minimising the length of diversion required. Diversions will be designed to tie in to the existing channel and, where necessary, some rock or other erosion protection will be provided to minimise erosion at these outlets.

For smaller agricultural drains, the gradient and flow rates are typically significantly smaller than for the natural streams, so the erosive power is less. The culverts will be built perpendicular to the road (to minimise the length of the culvert) and joined to the existing drains with diversion drains. Where there is dense vegetal growth near to the proposed culvert outlets, the adjacent watercourse/ditch will be cleared to ensure sufficient conveyance of water away from the structure to avoid sedimentation of the opening.

Swales and combined filter drains will be used in preference to other drainage systems, to minimise the effects of road runoff on water quality and to attenuate flows to Greenfield rates. There is considered to be an acceptably low risk of pollution of underlying aquifers associated with this means of drainage, due to the relatively limited predicted traffic flows and the classification of the geology as poor aquifer or aquifer of only local importance. It should be noted that such structures can generally limit flooding impacts in the immediate vicinity (e.g. to the adjacent stream) but, since they are normally designed for attenuation of short, sharp storms, their efficiency can be reduced in the longer duration events that are more likely to affect the main catchments as a whole. However, because of the combined effect of low gradient swales slowing flow down and maximisation of infiltration, any increase in flooding is not likely to be measurable.

The road drainage and attenuation facilities proposed are intended to result in no net increase in flow from the Preliminary Design. The same facilities will provide a degree of treatment greater than that provided for the existing N13/N15, so the net effect on water quality will be a slight beneficial one.

Runoff intercepted by boundary drains (embankment toe ditches and interceptor drains) will generally discharge to existing watercourses. This will result in localised increases in flow, even though the net flow total is unchanged. Drainage ponds and an additional culvert (Ch 5275) are proposed to avoid any large increases in flow rate.

To mitigate the potential for moderate adverse impacts on one area of undesignated blanket bog (Ch 1400–2100), measures to facilitate maintenance of the existing drainage regime will be incorporated. In order to prevent the fill material beneath the road acting as a preferential flow path for sub surface flows, extracted peat would be replaced by a low permeability fill material. Also transferal drainage measures would be incorporated to ensure that a hydrological/hydro-geological connection is maintained between areas of bog to the north and south of the road (See Chapter 14.0 for further details).

Additional attenuation measures (drainage ponds) are also proposed for two catchments (tributaries of the River Finn at Ch 9300 and Ch 10670) where boundary drainage diversions will otherwise cause significant increases in flow rate.

The embankments either side of the proposed River Finn bridge will restrict and alter the pattern of floodplain flow. However, the Preliminary Design of the 3 span bridge proposed for the crossing does allow significant flows to continue down the floodplains as well as avoiding significant obstruction of the main river channel. No further mitigation is proposed because predicted flood level rises are small (maximum 4cm).

The Preliminary Design of the proposed Burn Durnett Bridge includes a substantial width for floodplain flow beyond the main river channel. Despite this, small flood level

risers are predicted upstream of the crossing. No further mitigation is proposed because predicted flood level rises are small (maximum 9cm).

## 8.6 Conclusions

With the exception of a small section where filter drains adjacent to Lough Mourne provide preliminary treatment, no mechanisms to treat highway drainage are present on the existing N13/N15. It is expected that the decrease in vehicle usage (and therefore potential for pollution arising from highway drainage) along the existing road will have an overall localised slight beneficial impact on water quality. As the River Finn is identified as being of high importance / sensitivity, the localised beneficial impact will be of greater significance. Similarly the water quality of road runoff entering the eastern part of Lough Mourne will also be improved, although the baseline water quality of the Lough is not expected to change significantly.

Mitigation of any potential impediment of existing flowpaths by the scheme design will be provided by integrating culverts at various locations where a flood risk from inadequate drainage may otherwise occur. The culverts have been designed to allow sufficient floodwater conveyance whilst minimising the effect on sediment transport through the watercourse. Stream diversions will be designed to tie in to the existing channel and, where necessary, some rock or other erosion protection will be provided to minimise erosion at these outlets.

The Preliminary Design drainage measures, including a combination of swales, filter drains and drainage ponds, will serve both to limit the runoff from the road to existing flow rates and to provide some treatment of the road runoff. There is considered to be an acceptably low risk of pollution of underlying aquifers associated with these means of drainage. Where the provision of drainage ponds is not practicable, surface water flows from the Preliminary Design will flow through petrol interceptors prior to discharge to receiving watercourses.

In summary the impacts on flooding and land drainage will include:

- A slight adverse impact on flood levels on a relatively wide area of the floodplain of the River Finn downstream of Ballybofey. Maximum level increases of 4cm have been modelled for the 1-in-100 year event.
- A slight beneficial impact on a small area of the northern floodplain downstream of the River Finn crossing. Maximum water level decreases of 2cm have been modelled for the 1-in-100 year event.
- A slight adverse impact on flood levels on the Burn Durnett floodplain upstream of the link road crossing. Maximum level increases of 9cm have been modelled for the 1-in-100 year event.
- Slight adverse effects on several small tributaries of the Burn Durnett and an unnamed tributary of the Finn at Treanamullin, by marginal localised increases in flow rate (but no appreciable effect on the extent of flooding).
- Small increases in flood levels are predicted in several areas during the 1-in-100 year event. In the case of the River Finn and Burn Durnett floodplains, this is largely as a result of the road embankments restricting floodplain flow. In the main, land experiencing a slight increase in floodplain area is used for agriculture. A small residential estate in Navenny will also experience slight increases in floodplain area, although the flood water level will not impact on any houses. By providing large waterway areas for the bridges crossing these rivers, the proposed increases in flood level have been kept to a practical minimum.

- Despite there being no net increase in runoff from diversion of hill slope runoff, the proposed boundary drainage will cause localised increases in flow rates in several small watercourses. This has been kept to a practical minimum by including attenuation measures and additional culverts where appropriate.

Two designated conservation areas of upland blanket bog and one area of undesignated blanket bog habitat, located to the west of the start of the Preliminary Design, will not be impacted during the construction or operational phases of the Preliminary Design. However, a moderate adverse impact on one area of undesignated bog, which will be crossed by the Preliminary Design (between Ch 1400 and 2100) has been identified. Mitigation measures to minimise disruption to existing surface and groundwater drainage patterns will be implemented to reduce this impact.

Any impacts on watercourses during construction will be temporary. Due to the sensitivity of the River Finn, any water quality impacts during construction on this watercourse would be a potentially significant adverse impact. There is potential for cumulative effects on the water quality of Lough Mourne resulting in a moderately adverse impact, if there are overlapping construction periods of the Preliminary Design and the Lough Mourne Impoundment scheme. Potential impacts on the Burn Darnett would also be moderate adverse during construction. Mitigation measures and good working practices will minimise the potential for pollution incidents during construction.

## 8.7 References

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## 9.0 Ecology (flora, fauna and fisheries)

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### 9.1 Introduction and Methodology

This assessment considers the ecological impact of the Preliminary Design for the N13/N15 Ballybofey/Stranorlar Bypass. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design). The methodology follows the *Guidelines on the information to be contained in Environmental Impact Statements* (Environmental Protection Agency, 2002), the *Advice Notes on Current Practice in the Preparation of Environmental Impact Assessments* (EPA, 2003) and the European Communities *Environmental Impact Assessment Regulations*, 1989-2000.

It has also been prepared in accordance with the Environmental Assessment and Construction Guidelines series, as published by the National Roads Authority.

- Environmental Impact Assessment of National Road Schemes - A Practical Guide.
- Guidelines for Assessment of Ecological Impacts of National Road Schemes.
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.
- Guidelines for the Treatment of Bats During the Construction of National Road Schemes.
- Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes.
- Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes.
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.
- Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes.
- A Guide to Landscape Treatments for National Road Schemes in Ireland.

While roads have effects / impacts on ecology along their entire length, this assessment focuses on the areas or features that are of particular ecological significance, primarily designated conservation areas, habitats listed in Annex I of the EU Habitats Directive (92/42/EEC), other key areas of semi-natural habitat that do not necessarily have a conservation designation, and rare or protected plant or animal species listed in Annex II or IV of the EU Habitats Directive, Annex I of the EU Birds Directive (79/409/EEC), in the Flora Protection Order 1999, the Wildlife Act 1976 and the Wildlife (Amendment) Act 2000.

Habitats along the Preliminary Design were surveyed during August 2002. The route was resurveyed in October 2006, to ensure that the EIS is fully up to date. Sections of the Preliminary Design were traversed on foot where access was permitted by landowners. Where this was not possible, habitats were viewed and described from the nearest access points in adjoining fields or from existing roads. Aerial photography (from 2000 and 2004) was also used to assess the full extent and boundaries of habitats. Habitats were classified using the Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000), and the dominant plant species were recorded. For this assessment an area up to 200m either side of the Preliminary Design was surveyed, the distance being dependant on field boundaries and other defining features. The

classification does not comprise a comprehensive list of plant species but is sufficient to describe the character of the vegetation and to evaluate the ecological significance of the habitats and flora. This approach is consistent with the advice set out in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2006).

Scientific and common names for plant species follow Webb *et al.* (1996) and Scannell and Synnott (1987) respectively. Nomenclature for vertebrate fauna follows Whilde (1993). The criteria for evaluating ecological sites are outlined in Table 9.2.

Mammals and birds were assessed in the course of the main habitat surveys in August 2002 and also in the follow-up survey in October 2006 using a combination of direct sightings and observations of signs, tracks and droppings. Additional information on mammals present in the vicinity of the Preliminary Design was obtained from the local National Parks and Wildlife Service (NPWS) ranger and derived from published literature.

Specific surveys were conducted for bats along the Preliminary Design. Buildings and other structures that were identified as potential bat roosting sites during the habitat field surveys (August 2002) were re-visited and inspected fully on 10<sup>th</sup> and 11<sup>th</sup> October 2002. The presence of bats in structures (buildings, bridges etc.) is indicated principally by staining, feeding signs or droppings. On the evening of 10<sup>th</sup> October 2002, a detector survey (using Petterson D200 and Batbox Duet Heterodyne detectors) was undertaken along parts of the route that were noted as having a high potential for supporting bats and this continued into the morning of 11<sup>th</sup> October 2002. This was carried out in two ways: firstly, by visiting sites of potential foraging habitat where the area was walked while listening to bat passes, and secondly, by detecting bats from a vehicle.

A subsequent survey was carried out on 19<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> August 2003 focusing on trees affected along the Preliminary Design. The culvert at Goland (Chainage (Ch) 5250) and the disused railway bridge at Croaghonagh (Ch 2920), which were identified as having potential as bat roosting sites in October 2002, were also re-visited and re-surveyed. The disused railway bridge at Croaghonagh had been destroyed by October 2006. All large trees along the Preliminary Design were inspected for potential as bat roosts. This included examination of cracks and crevices using an endoscope. The detector survey was repeated along the route on the evenings of 19<sup>th</sup> and 20<sup>th</sup> September 2003. Weather conditions were fair, with light drizzle at times, but with mild temperatures after dusk. The detector survey was carried out using Petterson D200 and Batbox Duet Heterodyne detectors. As before, this was carried out in two ways: firstly, by visiting sites of potentially good feeding habitat where the area was walked while listening for bat passes and, secondly, by detecting from a vehicle along a large proportion of the route corridor.

The NRA *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (National Roads Authority, 2005) normally require a bat survey to be carried out over four seasons. However, as there are no known underground sites in the area and it is outside the normal territory of the lesser horseshoe bat (*Rhinolophus hipposideros*), the three surveys carried out are adequate, particularly as two were in summer and one in autumn. This is because no hibernation sites will be impacted by the Preliminary Design so a winter survey would not provide any additional information on the local bat population.

A specific survey was undertaken to ascertain the presence or absence of the marsh fritillary butterfly (*Euphydryas aurinia*) at two sites along the Preliminary Design. These sites were identified as being potentially suitable for this species during habitat survey

work, due to the abundance of the main food plant of this species, devils-bit scabious (*Succisa pratensis*). The marsh fritillary is afforded protection under Annex II of the EU Habitats Directive (92/42/EEC). The two sites surveyed are at Carrickmagrath West (Ch 6000 to 6200) and at Kilross (Ch 14850 to 15000). Both sites are comprised primarily of wet grassland. Both sites were visited on 1<sup>st</sup> September 2003 and traversed on foot. Transects approximately 5m apart on both north-south and east-west axes were covered, giving effective grid coverage of both areas. Concentrations of the main food plant, devils-bit scabious, were examined in detail for signs of caterpillars, feeding damage and evidence of larval webs. Details of the habitat types (classified according to Fossitt, 2000) and plant species composition were recorded and mapped at a scale of 1:2500. Notes on sward length, grazing levels and other factors that may affect the suitability of the site for the marsh fritillary were recorded.

A survey was undertaken in July 2002 (peak flowering period) to check for the presence of the globe flower (*Trollius europaeus*) in areas where the Preliminary Design crosses its potential habitat. This plant is afforded protection under the Flora Protection Order, 1999, and is listed in the Irish Red Data Book 1: Vascular Plants (Curtis and McGough, 1988).

Consultations were held with NPWS in relation to designated areas, records of rare plants and any species listed for protection under Annex II of the EU Habitats Directive or Annex I of the Birds Directive in the vicinity of the Preliminary Design. Consultation was also undertaken with the Loughs Agency of Northern Ireland in relation to watercourses.

The water quality of the seven main watercourses (eight crossing points sampled) was assessed using the EPA's standard biological assessment technique (McGarrigle *et al.*, 2002). Sampling was carried out in appropriate locations downstream of the proposed crossing points. Macro-invertebrates were collected in July 2002 in a 2mm mesh hand-net by kick-sampling in a suitable gravel-stone substrate for 2 minutes. Samples were transferred to plastic buckets and preserved in 70% alcohol. The identification of invertebrates and evaluation of water quality were undertaken by freshwater biologists at Ecoserve Ltd. using the five-point 'Q value' system. The classification system is outlined in Table 9.1 and is based on the sensitivity or tolerance of various groups of invertebrates to pollution. Existing EPA water quality data were also sourced (where available) for these watercourses.

**Table 9.1 The Biological River Quality Classification System (Q value) (McGarrigle *et al.*, 2002).**

Biotic Index (Q value)	Quality class	Pollution status
Q5, Q4-5, Q4	Class A	Unpolluted
Q3-4	Class B	Slight pollution
Q3, Q2-3	Class C	Moderate pollution
Q2, Q1-2, Q1	Class D	Serious pollution

Water samples were taken for physico-chemical analysis from the seven main watercourses during March 2003, with the purpose of establishing a baseline for existing levels of pollution typically associated with roads. In addition basic parameters relating to nutrient enrichment were also examined. The samples were collected in March 2003 by NATURA and analyses were conducted by Alcontrol Ltd. The parameters analysed were pH, conductivity, total hardness, dissolved oxygen, biological oxygen demand (BOD), total suspended solids, chemical oxygen demand (COD), ammoniacal nitrogen, total oxidised nitrogen, nitrite, nitrate, chloride, orthophosphate benzene, ethylbenzene, toluene, xylene, polycyclic aromatic hydrocarbons (PAH), petrol range organics, diesel range organics, mineral oil, copper, lead, cadmium, zinc and iron. The results of the biological and physico-chemical analyses are presented in Appendices 9.1 and 9.2.



Ecological sites were evaluated and given an overall significance rating on the basis of the criteria presented in Table 9.2 below. The scale of likely impacts was rated on a seven-point scale as outlined in Table 9.3.

**Table 9.2 Evaluation of Ecological Sites and Watercourses.**

Rating	Criteria for assessing ecological importance of sites
<b>A</b>	<b>Internationally important</b> Sites designated (or qualifying for designation) as Special Area of Conservation (SAC) or Special Protection Area (SPA) under the EU Habitats or Birds Directives. Undesignated sites containing good examples of Annex I <i>priority</i> habitats under the EU Habitats Directive. Major salmon river fisheries. Major salmonid lake fisheries.
<b>B</b>	<b>Nationally important</b> Sites or waters designated or proposed as Natural Heritage Area (NHA) or statutory Nature Reserves. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). Undesignated sites containing <i>significant populations</i> of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. Major trout river fisheries. Waters with major amenity fishery value. Commercially important coarse fisheries.
<b>C</b>	<b>High value, locally important</b> Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. Small water bodies with known salmonid populations or with good potential salmonid habitat. Sites containing <i>any</i> listed Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
<b>D</b>	<b>Moderate value, locally important</b> Sites containing some semi-natural habitat or locally important for wildlife. Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any stream with an unpolluted Q-value rating.
<b>E</b>	<b>Low value, locally important</b> Artificial or highly modified habitats with low species diversity and low wildlife value. Water bodies with no current fisheries value and no significant potential fisheries value.

**Table 9.3 Criteria for Assessing the Significance of Impacts on Flora, Fauna and Fisheries.**

**Terrestrial Sites**

Site category* ► Impact level ▼	A sites Internationally important	B sites Nationally important	C Sites High value, locally important	D sites Moderate value, locally important	E sites Low value, locally important
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

\* Site categories A to E are defined in Table 9.2

**Table 9.3 Criteria for assessing impact significance continued**

**Aquatic Sites**

**A Sites**

	Temporary	Short-term	Medium-term	Long-term
Extensive	Major	Severe	Severe	Severe
Localised	Major	Major	Severe	Severe

**B Sites**

	Temporary	Short-term	Medium-term	Long-term
Extensive	Major	Major	Severe	Severe
Localised	Moderate	Moderate	Major	Major

**C Sites**

	Temporary	Short-term	Medium-term	Long-term
Extensive	Moderate	Moderate	Major	Major
Localised	Minor	Moderate	Moderate	Moderate

**D Sites**

	Temporary	Short-term	Medium-term	Long-term
Extensive	Minor	Minor	Moderate	Moderate
Localised	Not significant	Minor	Minor	Minor

**E Sites**

	Temporary	Short-term	Medium-term	Long-term
Extensive	Not significant	Not significant	Minor	Minor
Localised	Not significant	Not significant	Not significant	Not significant

In line with the EPA guidelines (EPA, 2002), the following terms are defined when quantifying duration:

- Temporary: up to 1 year.
- Short-term: from 1-7 years.
- Medium-term: 7-15 years.
- Long-term: 15-60 years.
- Permanent: over 60 years.

Localised impacts on rivers are loosely defined as impacts measurable no more than 250m from the impact source. Extensive impacts on rivers are defined as impacts measurable more than 250m from the impact source. Any impact on salmonid spawning or nursery habitat, where it is in short supply, would be regarded as an extensive impact as it is likely to have an impact on the salmonid population beyond the immediate vicinity of the impact source.

## 9.2 Existing Environment

### 9.2.1 General Description of Study Area

The topography of the surrounding area is undulating with a series of small hills and valleys converging on the River Finn. Land use is mainly agricultural, consisting of rush-dominated pasture but there are also large areas under coniferous forestry. The surrounding area is predominantly blanket bog, and this habitat fringes many of the areas surveyed. The underlying geology is characterised by metamorphic schists and gneisses.

There is a high diversity of habitats in the area including a number of semi-natural grassland types. These include wet grassland, dry-humid acid grassland and neutral grassland. The distinction between the grassland types is often not straightforward, and one grassland habitat often grades into another. Improved grassland is very often rush-dominated due to the high water table and in some cases it is reverting to wet grassland, although this is not characteristically species-rich. The peat substrate that underlies much of the study area creates acidic conditions and wet grassland can also be found grading into upland and lowland blanket bog. The grasslands surveyed were therefore classified on the basis of the dominant communities present, but it should be noted that there is no clear distinction between grassland types and a mosaic of one or more types often occurs.

Woodland in the area consists mainly of conifer plantations, with a low diversity of associated species. However, there are also a number of semi-natural woodlands and there are some areas of scrub.

### 9.2.2 Designated Conservation Areas

There are three designated areas, including one candidate Special Area of Conservation (cSAC), and two Natural Heritage Areas (NHA), within 0.5km of the Preliminary Design. Two other cSACs are located within 4km of the Preliminary Design. These are detailed in Table 9.4 below and presented in Figure 9.1.

The River Finn is a cSAC designated for active blanket bog, lowland oligotrophic lakes, wet heath and transition mires, all of which are habitats listed on Annex I of the EU Habitats Directive, and on account of its international importance for salmon (*Salmo salar*) and otter (*Lutra lutra*) (Site code: 002301). The site extends to include the headwaters and the tidal stretches, and includes a number of tributaries.

The River Foyle and Tributaries cSAC (UK0030320) is designated because of its importance for salmon and otter and because of the presence of watercourses of plain to montane levels with *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation, a habitat listed on Annex I of the EU Habitats Directive. Lough Mourne, to the south west of the Preliminary Design, flows into the Mournebeg River. Parts of the Mournebeg and Derg rivers are included in the River Foyle and Tributaries cSAC.

Croaghonagh bog (Site code 000129) is a small but intact example of blanket bog. It has been designated as a cSAC because Blanket bog is listed as a priority habitat in Annex I of the EU Habitats Directive. It is also noted for bird species such as the Greenland white-fronted goose and Merlin, which are listed on Annex I of the EU Birds Directive.

Meenagarranroe Bog (Site code 002437) is an area of blanket bog designated as a NHA. This occurs over an altitude range of 175m to 204m. The bedrock geology is granite and metamorphosed sediments.

Lough Hill Bog NHA (Site code 002452) is a designated upland blanket bog. This site occurs at an elevation of 190m to 221m and is underlain by granite and metamorphosed sediments. The north western and eastern sides of the site are undisturbed. The western and southwestern parts of the site contain cutover bog that has not been worked for many years and is regenerating well.

Cashelnavean Bog is also a designated NHA (Site code 000122). It consists primarily of upland blanket bog with areas of wet heath, re-vegetated cutover, an infilling lake and wet quaking areas. Bedrock geology is metamorphic sandstone and the altitude of the site ranges from 180m to 252m.

The impacts of the proposed development on a cSAC must be considered in line with Article 6(3) of the EU Habitats Directive (92/43/EEC) which states that "the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the (European) site concerned". Article 6(3) requires an "appropriate assessment" to be carried out where there is a possibility of significant effects of a development on the integrity of a Natura 2000 Site (i.e. SAC or SPA). The integrity of a site involves its ecological functions: the coherence of the site's ecological structure and function, across its whole area or habitats, complex of habitats and/or populations of species for which the site is or will be classified. An Appropriate Assessment report on the effects of the project on the integrity of the site is presented as Appendix 9.3 of this EIS. The assessment focuses on the conservation objectives of the site. The principal objectives of the River Finn cSAC are to maintain in favourable conservation status the habitats listed in Annex I, and species listed in Annex II, for which the site has been designated.

**Table 9.4: Designated Conservation Areas within 5km of the Preliminary Design**

Site name	Site code	Status*	Distance from the route
River Finn	002301	cSAC	Crossed by route
River Foyle and tributaries	UK0030320	cSAC	4km south of the route (Mourne Beg River)
Croaghonagh Bog	000129	cSAC	1km west of start of route (Croaghonagh)
Meenagarranroe Bog	002437	NHA	0.38km south of route
Lough Hill Bog	002452	NHA	0.45km south of route
Cashelnavean Bog	000122	NHA	1.1km west of start of route (Croaghonagh)

\* NHA = Natural Heritage Area

cSAC = candidate Special Area of Conservation

### 9.2.3 Rare and Protected Plants

Previous records indicate that the globe flower occurs at intervals along the banks of the River Finn between Cloghaun Bridge and Drumboe. This encompasses the location of the proposed river crossing. In Ireland, the globe flower is found only in Donegal and Fermanagh and is protected under the Flora (Protection) Order 1999. It is declining in Ireland due to drainage and land reclamation (Curtis & McGough, 1988). However, no evidence of globe flower was found in the vicinity of the Preliminary Design despite a dedicated search in appropriate habitats.

## 9.2.4 Other Ecological Sites

Areas of ecological value with semi-natural habitats are referred to as ecological sites (undesigned). These are shown in Figure 9.2 and are evaluated in Table 9.11.

### **Croaghonagh (Ch 2900-3200)**

This site includes conifer plantation (WD4), recently-felled woodland (WS5) and improved wet grassland (GS4/GA1). It also encompasses a disused railway embankment with outer tree lines (WL2) of mature beech (*Fagus sylvatica*) and a central region of semi-mature scrub (WS1).

The central region of semi-mature scrub is dominated by willows (*Salix* spp.), with occasional blackthorn (*Prunus spinosa*). The ground layer is dominated by grass species, including creeping bent (*Agrostis stolonifera*), and also contains a high diversity of woodland species. These include hard fern (*Blechnum spicant*), soft shield-fern (*Polytrichum setiferum*), male fern (*Dryopteris filix-mas*), lady fern (*Athyrium filix-femina*), broad buckler-fern (*Dryopteris dilatata*), great wood-rush (*Luzula sylvatica*), bramble (*Rubus fruticosus* agg.), common dog-violet (*Viola riviniana*), wood anemone (*Oxalis acetosella*), germander speedwell (*Veronica chamaedrys*) and the mosses *Thuidium tamariscinum* and *Rhytidiadelphus squarrosus*.

The conifer plantation, which is dominated by Sitka spruce (*Picea sitchensis*), covers a large proportion of the site to the north and south of the railway embankment. The ground flora is poor and includes the moss *Thuidium tamariscinum*, among others, and occasional grass species. Rowan (*Sorbus aucuparia*) and gorse (*Ulex europaeus*) occur at the edges of the plantation along with rushes (*Juncus* spp.), purple moor-grass (*Molinia caerulea*) and ling (*Calluna vulgaris*).

Adjacent to the plantation, on the south side of the embankment, an area of forestry has been clear-felled. A line of fir trees (*Abies* sp.) borders this area adjacent to the embankment. The dominant species are purple moor-grass and creeping bent, but there is also a wide range of other species reflecting the previous woodland history and the wet peaty nature of the soil. These include Yorkshire fog (*Holcus lanatus*), hard fern, broad buckler-fern, lousewort (*Pedicularis sylvatica*), tormentil (*Potentilla erecta*), marsh bedstraw (*Galium palustre*), marsh thistle (*Cirsium palustre*), foxglove (*Digitalis purpurea*), soft rush (*Juncus effusus*), star sedge (*Carex echinata*) and other sedge species. In wetter depressions the toad rush (*Juncus bufonius*) and tufted hair grass (*Deschampsia cespitosa*) occur. Devil's-bit scabious occurs occasionally. The mosses *Campyllum stellatum* and *Polytrichum* sp. are common.

The site also includes an improved field that has some of the species characteristic of wet grassland (GS4), including some rush species, but it is not species-rich. This is bordered by a hedgerow (WL1) of alder (*Alnus glutinosa*), hawthorn (*Crataegus monogyna*) and gorse.

During the surveys in August 2002 a badger sett was found on the south side of the railway embankment. This sett was rechecked in October 2006. A large heap of spoil and bedding was present outside the sett, however, at the time of this survey the sett was not in use. No other signs of recent badger activity were found at this location. Bats were observed feeding in the area during the bat surveys in August 2003. An old railway bridge contains potential hibernating crevices for bats, however this railway bridge had been destroyed by October 2006. Red deer were observed in the clear-fell forestry in 2002 and extensive deer activity was noted at this location in October 2006.

#### **Goland (Ch 4900-5500)**

At Goland the Preliminary Design runs parallel and adjacent to the disused railway for approximately 400m. The railway at this point is flanked by tree lines of beech and immediately to the south of the tree line there is a drain lined on the southern bank with willow trees. The in-filled railway consists of a grass sward, which is grazed by sheep and deer. It is moderately species-rich with self-heal (*Prunella vulgaris*), common mouse-ear (*Cerastium fontanum*) and abundant moss occurring in the sward. Fungi are also abundant and include fly agaric (*Amanita muscaria*) and bolete (*Boletus* spp.). The main part of the site occurs to the south of the railway and consists of wet grassland (GS4) with willow and gorse scrub (WS1) on old field banks and scattered holly (*Ilex aquifolium*), rowan, hawthorn and willow. The wet grassland becomes more acidic in places and contains *Sphagnum* moss with species such as tormentil, marsh pennywort (*Hydrocotyle vulgaris*) and marsh violet (*Viola palustris*). Due to re-consideration of route options in this region, the only part of the site that is crossed by the Preliminary Design is an area of wet grassland at the eastern end. This is rushy pasture rather than species-rich wet grassland. Some badger feeding signs were found along the disused railway line in October 2006 at Ch 5025.

#### **Carrickmagrath West (Ch 6000-6300)**

The main habitat at this site is wet grassland (GS4), with some areas of scrub (WS1) and some hedgerows (WL1). A tributary of the Burn Daurnett River (FW2) forms the western boundary of the site and scrub occurs along the east bank. The species present include birch (*Betula* sp.), ash (*Fraxinus excelsior*), willow and gorse. The wet grassland is dominated by sharp-flowered rush (*Juncus acutiflorus*), with abundant devil's-bit scabious and other species including marsh violet, silverweed (*Potentilla anserina*) and common bent (*Agrostis capillaris*). There is also a small region of oak-ash-hazel (*Quercus petraea*, *Fraxinus excelsior*, *Corylus avellana*) woodland (WN2). The presence of devil's-bit scabious in abundance indicates the potential of this site to support a breeding population of the marsh fritillary butterfly. No evidence of marsh fritillary was found during the survey for this species in September 2003. The habitat was deemed sub-optimal due to the height (>70cm) of the sward and recent grazing and trampling by cattle.

#### **Carrickmagrath East (Ch 6400-6700)**

This site covers an 800m section of the Preliminary Design, where the proposed alignment runs adjacent to the disused railway. The complex of habitats includes wet grassland (GS4), marsh (GM1), oak-ash-hazel woodland (WN2), (mixed) conifer woodland (WD3), immature woodland (WS2), scrub (WS1), hedgerows (WL1) and tree lines (WL2).

Along this section of the Preliminary Design, the disused railway embankment is lined with hazel, hawthorn, ash, holly, birch and occasional beech, alder and sessile oak (*Quercus petraea*). This provides an excellent habitat for foraging bats. Part of the embankment is enclosed by stone walls with abundant mosses, polypody fern (*Polypodium* sp.) and dog-lichen (*Peltigera* sp.).

At the western end of the site, the Preliminary Design crosses a region of oak-ash-hazel scrub/woodland (WN2) that lies adjacent to wet grassland. This is an important habitat, and one that has become extremely limited in its extent in Ireland. Hazel is the dominant species and there is abundant birch. Rowan and holly are also frequent. There is a rich ground flora consisting of mosses, ferns, wood anemone (*Anemone nemorosa*), bramble, bilberry (*Vaccinium myrtillus*), ivy (*Hedera helix*), honeysuckle (*Lonicera periclymenum*) and hard fern. There are also some wetter, flush/spring areas with willow and a ground flora dominated by *Sphagnum* moss. Immediately to the east of this there is a large area of mixed conifer woodland (WD3) dominated by fir, with

some birch and willow. Adjacent to this there is an area of immature woodland (WS2) dominated by birch, with some hazel and ash.

Further east, between Ch 6800 and 6950, there is a narrow strip of marsh (GM1) dominated by yellow iris (*Iris psuedacorus*) and rushes, with occasional willow. There are also areas of scrub (WS1) to the north and south of the proposed alignment at the western area of the site. These areas are dominated by hazel and willow.

#### **Navenny East (Ch 9050-9580)**

This site includes a continuous, linear section of wet grassland (GS4), neutral grassland (GS1), scrub (WS1), hedgerows (WL1), tree lines (WL2) and a small stream (FW2). The semi-natural grassland areas range from dry neutral grassland containing species such as Yorkshire fog, cock's-foot (*Dactylis glomerata*), and crested dog's-tail (*Cynosurus cristata*) to wetter areas dominated by rush species (*Juncus effusus*, *J. acutiflorus*). The scrub (WS1) is dominated by willow and alder, with occasional ash and abundant gorse and bramble. There are also some open rush-dominated areas.

#### **Dreenan (Ch 9900-10150)**

Two important semi-natural woodland habitats occur within this site; oak-birch-holly woodland (WN1) and wet willow-alder-ash woodland (WN6). The latter will be directly intersected by the Preliminary Design. There is also an adjoining area of rush-dominated wet grassland (GS4) that grades to *Sphagnum*-dominated blanket bog (PB3).

The oak-birch-holly woodland occurs on ground sloping to the north and is dominated by mature and over-mature oaks up to 12m in height. Birch, holly and hazel are also abundant with a high ground cover of bramble. It is bordered to the east and west by two areas of semi-natural wet woodland dominated by willow, alder and birch with patches of gorse-dominated scrub.

#### **Edenmore (Ch 10300-10600)**

This site consists of adjoining areas of scrub woodland (WS1) and mixed broadleaved / conifer woodland (WD2). The scrub is developing into woodland and is dominated by hazel with frequent ash, birch and holly and occasional rowan. The ground flora is very diverse and contains a suite of woodland species including mosses, bugle (*Ajuga reptans*), ferns (*Dryopteris* spp.), hard fern, honeysuckle, ivy, wood anemone, dog's mercury (*Mercurialis perennis*) and common dog-violet.

The mixed broadleaved / conifer woodland consists predominantly of broadleaved species. It is dominated by beech and has abundant ash. Sycamore occurs frequently and there is also some birch. The understorey consists of holly and hazel and the ground flora is rich in woodland species, with bluebell (*Hyacinthoides non-scripta*), dog's-mercury, ivy, male fern, lady fern, bugle, dog-lichen and the moss *Thuidium tamariscinum*. There are also rocky outcrops and boulders. During the surveys in August 2002 a single-entrance outlier badger sett was found to the north east of the site adjacent to a ruined building. At the time of the survey it was unoccupied. No signs of badger activity were noted within this site during the resurvey in October 2006.

Both woodland habitats (WS1 and WD2) are diverse in both structure and species composition.

#### **Castlebane South (Ch 12200-12700)**

At this point, the Preliminary Design runs adjacent and parallel to a tributary of the River Finn and will affect an area of scrub (WS1) and a band of mature wet willow-alder-ash woodland (WN6). The scrub is gorse-dominated with abundant bramble and a fringe of mature hawthorn, rowan and willow to the west. The woodland is dominated



by willow with occasional alder, ash, rowan, beech and holly. The understorey and ground flora consist of dense bramble with male fern, meadowsweet (*Filipendula ulmaria*), marsh ragwort (*Senecio aquaticus*), tufted hair-grass and sharp-flowered rush.

The River Finn tributary to the north of the scrub is lined with mature alder and occasional semi-mature ash and hawthorn. There are abundant ferns, grasses, mosses, liverworts, ivy and bramble. An active badger sett with three entrances was found on the east bank of this stream at Ch 12400 during the August 2002 and October 2006 surveys. An otter slide was noted on the bank of this stream where it crosses the local road, 150m west of Ch 12700 (Treanamullin).

#### **Castlebane North (Ch 12700-13200)**

This area includes several fields of wet grassland (GS4) with dividing hedgerows (WL1), an area of scrub (WS1), a wet ditch (FW4) and a stream (FW2). The wet grassland vegetation reaches a height of 2m and is dominated by soft rush and sharp-flowered rush. Other components of the vegetation include meadowsweet, Yorkshire fog, creeping buttercup (*Ranunculus repens*), meadow vetchling (*Lathyrus pratensis*), purple loosestrife (*Lythrum salicaria*), marsh thistle (*Cirsium palustre*) and tufted hair-grass. The height and density of the vegetation provides good cover for birds such as snipe.

#### **Mullaghagarry/Tircallan (Ch 13900-14120)**

This is an area of scrub with a broadleaved woodland (WD1) fringe. A large, five entrance sett was noted at this location in October 2006, including very large spoil heaps and signs of recent activity (trails and feeding signs). The scrub is dominated by hawthorn and willow with wet grassland in the open areas. There are also some areas of birch. In the open areas, species such as creeping thistle (*Cirsium arvense*), gorse, bramble and soft rush occur, along with colonising willow scrub.

The broadleaved woodland fringe contains ash, hawthorn, sycamore, hazel and holly, with a ground flora of opposite-leaved golden-saxifrage (*Chrysosplenium oppositifolium*), enchanter's nightshade (*Circaea lutetiana*), wood avens (*Geum urbanum*), nettle (*Urtica dioica*) and broad buckler fern.

To the north of the site there is a lane with stone walls and tree lines of semi-mature beech with ash and willow. There are typical woodland species beneath the canopy including wood anemone, male fern, enchanter's nightshade, herb-Robert (*Geranium robertianum*) and remote sedge (*Carex remota*). Badger trails and prints were observed along this lane way in August 2002 and October 2006.

#### **Kilross/Lisnaree (Ch 14850-14950)**

This site is a complex of rush-dominated wet grassland (GS4), colonising and semi-mature scrub, and wet willow-alder-ash woodland (WN6). The grassland is dominated by soft rush and sharp-flowered rush with abundant devil's-bit scabious and Yorkshire fog. Other species include marsh thistle, marsh ragwort greater bird's-foot-trefoil (*Lotus uliginosus*) and black knapweed (*Centaurea nigra*). The presence of devil's-bit scabious in abundance indicates the potential of this site to support a breeding population of the marsh fritillary butterfly (see section 9.2.6). No evidence of marsh fritillary was found during the September 2003 survey. The habitat was deemed sub-optimal due to the height of the sward and recent grazing by cattle.

To the south of the site, the scrub is developing into alder-dominated woodland with hawthorn and occasional holly. The ground flora is rich with opposite-leaved golden-saxifrage, herb-robert, bramble, ground ivy (*Glechoma hederacea*) and common dog-violet.

## 9.2.5 Other Habitats

The main habitat occurring outside ecological sites is conifer plantation (WD4), which forms large blocks along the route. Wet grassland (GS4) and scrub (WS1) are also dominant habitats and are present throughout the route, frequently forming mosaics. These have moderate ecological value and an area of note will be impacted between Ch 7700 and 7900. An additional area will be impacted at Ch 9800 where it is proposed to locate a storage compound. Upland blanket bog and wet grassland (PB2 and GS4) occurs in the western section of the route and an area of this habitat will be impacted between Ch 1400 and 1700. Other habitats include immature woodland (WS2), recently-felled woodland (WS5), broadleaved woodland (WD1), mixed broadleaved/conifer woodland (WD2), mixed conifer woodland (WD3), neutral grassland (GS1) and dry-humid acid grassland (GS3).

Improved agricultural grassland (GA1) is a common feature of the landscape throughout the area and is typically dominated by perennial ryegrass (*Lolium perenne*). Due to previous re-seeding and fertilisation, species diversity is usually low. The peaty substrate and high water table throughout much of the area have encouraged growth of rushes, such as toad rush, and other species such as sneezewort (*Achillea ptarmica*), but species diversity remains low.

### Hedgerows (WL1)

The hedgerows along the Preliminary Design are highly varied and dominated by a range of native broadleaved species. Various combinations of ash, willow, hawthorn, hazel, birch, beech, gorse and alder are present. There are many mature or semi-mature trees. Holly, blackthorn and sycamore are found occasionally. Due to the high water table in the area, willows, particularly grey willow (*Salix cinerea*), are a dominant feature of many hedgerows and alder and birch also occur frequently. Bramble and dog-rose (*Rosa canina*) are found in the understorey. The ground flora component of the hedgerows is also varied and species present include ivy, bush vetch (*Vicia sepium*), ground ivy, herb-Robert, foxglove (*Digitalis purpurea*), common dog-violet, hart's-tongue fern (*Phyllitis scolopendrium*), male fern and broad buckler fern. Associated ditches are a common feature, particularly wet ditches. Species present include various common grass and rush species, lady fern, polypody fern, wild angelica (*Angelica sylvestris*), purple loosestrife, marsh thistle, meadowsweet and marsh horsetail (*Equisetum palustre*). Most of the hedgerows are unmanaged, with a small number of low, managed hawthorn hedges occurring only along road sides.

### Tree lines (WL2)

Tree lines along the route vary in their maturity, structure and species composition. In areas of peaty soil or impeded drainage, alder, willow, rowan and ash dominate, with beech occurring in areas of better drainage. Beech also occurs almost exclusively along the old railway where it was evidently managed as a hedgerow in the past but has subsequently matured into a canopy of up to 10m high in places.

## 9.2.6 Fauna

### Otters

The otter (*Lutra lutra*) is a legally protected species under Annexes II and IV of the EU Habitats Directive (92/43/EEC) and under the Wildlife (Amendment) Act (2000). This species is found throughout Ireland, rarely far away from water and tends to occupy linear territories along watercourses (Hayden and Harrington, 2000). Otters require suitable bankside vegetation as cover for their breeding sites, known as holts. Evidence of otter presence was recorded at the River Finn crossing point where a potential holt or couch (resting place) was located amongst boulders on the north bank. A large amount of otter prints, slides and spraints (droppings) were noted at this

location during the October 2006 survey. Otter presence was also recorded from the Burn Durnett and its tributaries at Ch 8200 and Ch 7400, and at the River Finn tributary at Treanamullin (Ch 12700), during the survey in October 2006. All watercourses along the Preliminary Design are likely to either support otter or to be used by them as corridors. There is likely to be otter movement between the Burn Durnett and Lough Mourne and also along the tributaries of the River Finn to the north of the river.

### Badgers

The badger (*Meles meles*) is protected in Ireland under the Wildlife (Amendment) Act, 2002 and is listed in Appendix III of the Bern Convention. Badgers are common and widespread in Ireland, being found in all habitats where the soil is dry and not subject to flooding (Hayden & Harrington, 2000). Details of the locations of badger setts along the route were provided by the local NPWS Ranger. These setts were checked for occupancy during the survey in August 2002 and an assessment of mammal activity along the route corridor was undertaken in October 2006. Additional setts were located during both surveys. Tracks and other signs of activity, such as latrine sites and signs of foraging, were also noted. Details of setts and other signs of badger activity noted during the field surveys are presented in Table 9.5 and the locations of setts are marked on Figure 9.2. The definitions of different types of badger sett follow those given by Smal (1995).

Table 9.5: Details of Badger Activity along the Preliminary Design (August 2002 and October 2006)

Location	Chainage	Location	Badger signs noted
Croaghonagh	2950	Online	Sett with single entrance. Large spoil heap with bedding. Not in use during survey in October 2006.
Goland	5025	Within CPO	Badger feeding signs (October 2006).
Sessiagh O'Neill	7300-7900	Two setts within CPO and four setts within 60m of CPO	Six subsidiary / outlier badger setts located along disused railway line. Signs of activity (feeding signs and trails) present in October 2006.
Sessiagh O'Neill / Navenny	8250	Within CPO	Subsidiary / outlier sett on west bank of Burn Durnett tributary. No evidence of badger activity at this site in October 2006.
Navenny	8700	Online	Sett with 4 entrances on north side field boundary. Active in August 2002 but inactive in October 2006.
Edenmore	10300-10600	30m east of CPO	During the surveys in August 2002 an unoccupied single-entrance outlier badger sett was found at this location. No signs of badger activity were noted within this site during the resurvey in October 2006.
Tributary to the River Finn at Treanamullin (Castlebane South)	12400	40m east of CPO	Sett with 3 entrances on east bank of river. Active during both the August 2002 and October 2006 surveys.
Knockfair	13250	Online	Subsidiary sett, 4 entrances.
Mullaghagarry / Tircallan	13970	On edge of CPO	Active sett with 5 entrances. Large spoil heaps present and signs of recent activity including trails and feeding sites noted in October 2006.
Mullaghagarry / Tircallan	14200-14300	75m east of CPO	Badger trail and prints noted along laneway to the east of the Preliminary Design in October 2006.

### **Pine marten**

The pine marten (*Martes martes*) is protected under the Wildlife (Amendment) Act (2000), and is listed in the Irish Red Data Book 2: Vertebrates (Whilde, 1993) as internationally important. Its habitat is coniferous and deciduous woodland and scrub. It is known to occur along the disused railway line and has been recorded at Carrickmagrath (between Ch 6400 and 6700) and at Knockfair (Ch 13400) by the local NPWS Ranger. Although pine marten were not observed during the surveys in 2002 or 2006 it is probable that the species occurs more widely within the study area given the abundance of suitable habitat.

### **Deer**

Red deer (*Cervus elaphus*) are protected under the Wildlife (Amendment) Act (2000), though they are a designated quarry species and may be hunted under licence from NPWS during a specified open season. They are prevalent throughout the study area, particularly in the areas of plantation and clear-fell forestry. There is extensive movement at the western end of the scheme in the area of Croaghonagh and Golland where there are extensive plantations and upland areas. Some movement is also expected in the area of Mullaghagarry and Tircallan.

Abundant deer tracks along stretches of the disused railway west of the River Finn indicate that it is regularly used as a corridor for movement. Deer wallows and deer tracks were found in areas of willow scrub in wetter areas of the railway along the western section of the route (Ch 2900) in August 2002 and again in October 2006.

### **Bats**

Bats are widespread in Ireland but little information is available as to their current status and distribution. All Irish bats are protected under Annex IV of the EU Habitats Directive (92/43/EEC). They can generally be found in areas where suitable roost sites (trees, disused buildings, old stone walls, bridges or caves) occur in close proximity to areas of suitable foraging habitat (woodland, scrub, hedgerows, wetland areas and open water). Bats commonly feed and commute along linear habitats such as hedgerows, tree lines and watercourses for cover and because of the high densities of insects that are usually present.

As part of this study, a bat survey was carried out in October 2002 on all buildings and structures that are due to be demolished along the route. The properties and areas surveyed are listed in Table 9.6 and shown in Figure 9.2. Weather conditions were fair during the survey with no rain, but temperatures were low after dusk.

It should be noted that there are seasonal constraints with regard to surveying for bat species. The period from mid-June to mid-August is the optimal time to survey as the combination of night surveys and internal and external inspections of buildings will usually provide conclusive results. Bats hibernate over winter and may leave their summer roosts in late August/early September to mate and find hibernation sites. If a colony has vacated a building for the winter, there may be no visible evidence that they were ever present, since some species roost within cavity walls or under slates, rather than in the attic itself so droppings may not be evident. However, during the October 2002 survey, bat activity on site was high with many individuals of several species recorded.

A subsequent survey was carried out in August 2003 to determine bat roosting potential in trees along the route. During this survey, recorded bat activity was high and many individuals of several species were noted in the area. There were no seasonal constraints as the period of survey, August, is the optimum month for assessing bat activity due to the young being on the wing as well as the adults, and summer roosts are still in use. However, no tree roost was located.

Locating roosts within trees is very difficult. Roosts can be present with no outward sign being visible. Trees that are densely covered with ivy are problematic. Roosts can also be transient and signs such as droppings may not last long due to being devoured by invertebrates. The fact that no roost was located during the August 2003 survey cannot therefore be taken as conclusive evidence that no roost or roosts exist within trees along the proposed route.

#### **October 2002 Survey Results**

In total, six species of bat were observed in the area during the survey: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), Leisler's bat (*Nyctalus leisleri*), Daubenton's bat (*Myotis daubentonii*) and a sixth species which was either a Natterer's bat (*Myotis nattereri*) or whiskered bat (*Myotis mystacinus*). There are no known records of the lesser horseshoe bat from the immediate area and no observations of this species were made during the survey (the lesser horseshoe bat is listed in Annex II of the EU Habitats Directive). Another scarce bat species, Nathusius's pipistrelle (*Pipistrellus nathusii*), may potentially occur in Co. Donegal but was not recorded during the survey.

None of the surveyed buildings or structures contained colonies of bats. Small amounts of droppings were found within the Lough House complex but these were old and the structures are unlikely to house large colonies. It is more probable that individual bats may use the buildings as temporary roosts. No bat signs were recorded at the railway bridge at Croaghonagh but the site is ideal for hibernation. The deciduous scrub surrounding both railway bridges and along the disused railway line is excellent foraging and commuting habitat and bats were observed feeding in both areas. The culvert at Goland offers a few crevices, which may potentially be used by bats during the winter months for hibernation. The water flowing through the structure can prevent dehydration during hibernation enhancing the suitability of the location as a hibernation site. Water-loving species such as Daubenton's bat may well use the site.

No tree roosts were identified during this survey. However, many of the trees along the Preliminary Design have features with potential for use as bat roosts. These include crevices or raised bark in which bats may secrete themselves. Some trees have dead or broken branches, which may provide cavities, while others have dense ivy growth beneath which bats may roost.

Habitats along the Preliminary Design that are suitable for use by bats include areas of scrub, woodland and watercourses. Linear semi-natural features such as hedgerows and tree lines are particularly valuable for both commuting and feeding and the scrub and tree-lined disused railway is an important feature of the landscape.

#### **August 2003 Survey Results**

It was noted during this survey that some immature trees had been felled since the previous survey. This occurred along the old railway line at both Carrigmagrath East and Goland townlands.

In total, five species of bat were observed in the area: common and soprano pipistrelle, Leisler's bat, Daubenton's bat and whiskered bat. Brown long-eared bat is known to be present in the area as it was observed during the earlier survey of October 2002 but it was not recorded during this survey. Nathusius's pipistrelle was not recorded during this survey.

Bat activity within the area was high. Observations of commuting and foraging bats were made over a wide area. As before, the most common species recorded on detector in the area was the soprano pipistrelle. This species was widespread and was

encountered across the valley at several locations, such as Dreenan, Carrimagrath, Tircallan and the Glebe area of Stranorlar. Common pipistrelles were also heard and seen in Dreenan, Tircallan and Carrimagrath.

Leisler's bat was heard in Dreenan as it commuted to its feeding area and also at Edenmore. Several Daubenton's bats were seen hunting over the River Finn at Dreenan Bridge and a single whiskered bat was recorded feeding near the woodland at Edenmore.

Two structures identified as potential bat roosting sites during the survey undertaken in October 2002 were re-inspected. These were the culvert at Goland (Ch 5340) and the disused railway bridge at Croaghonagh (Ch 2940) (subsequently destroyed). Neither showed signs of current bat use.

No definite tree roosts were identified during this survey. However, many of the trees along the proposed route, especially oak and beech and, in one case, horse chestnut (*Aesculus hippocastanum*), show potential features for use as bat roosts. These include crevices or raised bark in which bats may secrete themselves, dead or broken branches, and dense ivy growth beneath which bats may roost. As utilisation of roost sites may vary both seasonally and even on a nightly basis, trees identified as potential bat roosts should be treated in the same manner as those identified as supporting a bat roost.

Other trees along the Preliminary Design are immature with no sign of hollows developing but these are often taller ash, beech and sycamore with dense ivy cover. The areas of scrub, mainly birch, willow and hazel, along the Preliminary Design offer poor potential for roosting sites, although they are good as foraging areas for bats.

The main potential tree roosts are listed below.

*Mature trees at Cashelnavean (400m west of start of the Preliminary Design)*

These large beech and coniferous trees offer potential roosting sites within crevices and under loose bark.

*Mature trees at Navenny - Ch 8700*

Here, a beech is located within the main route corridor at Ch 8700

*Scrub and woodland at Edenmore - Ch 10500 - 10700*

Part of this area has been felled recently. The remaining trees are tall but immature with little ivy cover or holes. The potential for roosts is, therefore, negligible. However, a single old birch with ivy cover is present.

*Mature trees at Edenmore - Ch 11000 - 11100*

These oak and ash trees are large and offer crevices and ivy as potential bat roosting sites.

*Mature trees at Edenmore and Mullandrait - Ch 11200 - 11400*

These ash and sycamore trees, on both the north and south banks of the River Finn, are densely covered in ivy.

*Deciduous trees at Castlebane North - Ch 13300 - 13400*

These are very large, mature beech trees forming a tree line around the still young coniferous plantation. Although no roost was located, these trees offer high potential as roosting sites for bats.

*Semi-mature trees bordering scrub at Tircallan – Ch 14100*

Some of these beech trees are developing crevices and so offer some potential as roosting sites for bats.

**Table 9.6: Sites Surveyed for Bats along the Preliminary Design (2002 and 2003)**

Location	Description / habitats	Bat signs recorded
The Lough House (Ch 200 - 400m west of start of Preliminary Design))	Abandoned house with intact roof with dry attic space	Pipistrelle droppings in attic – old
Lough House cottage (Ch 200 - 400m west of start of Preliminary Design))	Slated and corrugated iron-roofed building	Brown long-eared bat droppings – old
Lough House barns and shed (Ch 200 - 400m west of start of Preliminary Design))	Barns and sheds	No bat signs
Croaghonagh (Ch 2940)	Railway bridge	No bat signs in bridge. Bats observed feeding in the area. This bridge has since been destroyed (noted in October 2006)
Goland (Ch 5340)	Culvert	No signs
Carrickmagrath (Ch 7120)	Old railway bridge	No signs
Kilross (Ch 14980)	Modern sheds	No signs

**Other Mammals**

Other mammals recorded along the proposed route include the fox (*Vulpes vulpes*), signs of which were found to be widespread throughout the area. Rabbits (*Oryctolagus cuniculus*) were encountered frequently during the habitat surveys. Irish hare (*Lepus timidus hibernicus*) were observed in the Goland and Mullaghgarry areas but are also likely to be widely distributed. Red squirrel (*Sciurus vulgaris*) has been recorded from the old railway track at Ch 4900 - Ch 5200 and at Ch 11000 (NPWS Ranger, pers. comm.). The introduced American mink (*Mustela vison*) appears to be present in most watercourses within the study area, having been recorded from the Burn Daurnett, and its tributaries at Ch 7400 and Ch 8200 and also on the River Finn tributary at Ch 12700 (observed during October 2006 survey and NPWS Ranger, pers. comm.). In addition to these species, other mammals that are likely to be present throughout the study area include hedgehog (*Erinaceus europaeus*), stoat (*Mustela erminea*), brown rat (*Rattus norvegicus*), wood mouse (*Apodemus sylvaticus*) and pygmy shrew (*Sorex minutus*) (Hayden and Harrington, 2000).

**Birds**

A range of bird species was observed along the route, most of which are common and widespread in suitable habitat. These include raptors; sparrowhawk (*Accipiter nisus*) and kestrel (*Falco tinnunculus*), corvids; raven (*Corvus corax*), hooded crow (*Corvus corone corvix*), magpie (*Pica pica*), rook (*Corvus frugilegus*) and jackdaw (*Corvus monedula*), thrushes; blackbird (*Turdus merula*), mistle thrush (*Turdus viscivorus*) and song thrush (*Turdus philomelos*), finches; chaffinch (*Fringilla coelebs*), bullfinch (*Pyrrhula pyrrhula*), greenfinch (*Carduelis chloris*) and goldfinch (*Carduelis carduelis*), tits; great tit (*Parus major*), blue tit (*Parus caeruleus*), coal tit (*Parus ater*) and long-tailed tit (*Aegithalos caudatus*), warblers; goldcrest (*Regulus regulus*), willow warbler (*Phylloscopus trochilus*) and chiffchaff (*Phylloscopus collybita*), and other passerines including dunnoek (*Prunella modularis*), robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*), pied wagtail (*Motacilla alba*) and grey wagtail (*Motacilla cinerea*) as well as snipe (*Gallinago gallinago*). A number of other species typically associated with aquatic environments were observed including heron (*Ardea cinerea*), cormorant

(*Phalacrocorax carbo*), moorhen (*Gallinula chloropus*) and mallard (*Anas platyrhynchos*). Other species that are likely to occur along the watercourses are kingfisher (*Alcedo atthis*) (listed in Annex I of the EU Birds Directive), dipper (*Cinclus cinclus*) and sedge warbler (*Acrocephalus schoenobaenus*). No suitable nest sites for the kingfisher were noted along the line of the proposed route.

The hen harrier (*Circus cyaneus*) (listed in Annex I of the EU Birds Directive (79/409/EEC)) is recorded as breeding close to the western end of the Preliminary Design (J. Cromie, Birdwatch Ireland, pers. comm.). The hen harrier has its breeding stronghold in the south west of the country, with only a small number of breeding sites in the northwest (Norris *et al.*, 2002). There is no suitable habitat for this species to breed within the area affected by the Preliminary Design, though it is possible that some areas are hunted over.

A golden eagle (*Aquila chrysaetos*) was seen at Tircallan on 20<sup>th</sup> August 2003 (J. Cromie, Birdwatch Ireland, pers. comm.). This was undoubtedly one of the birds recently re-introduced to Glenveagh National Park in northwest Donegal. Golden eagles are not likely to feed over or utilise habitat along the Preliminary Design, being primarily a bird of mountain and moorland.

## **Invertebrates**

### **Background**

The marsh fritillary is the only Irish species of butterfly to be afforded protection under the EU habitats Directive (92/43/EEC) (Annex II). The species has a distribution extending from Western Europe across to Russia, Asia Minor and as far east as Korea. Throughout Europe, populations of marsh fritillary have undergone considerable decline in recent years. Records for the species within Ireland are extremely limited and there is no up-to-date database.

The habitat utilised by the marsh fritillary is quite varied and includes bogs, wet grassland, grassy banks, dunes, lake margins and heathland up to 1500m. However, in Ireland it appears that the main habitats where the species is found are damp acidic grassland and unimproved calcareous grassland (Lavery, 1993). A number of linear colonies are known to exist along road verges crossing cutaway bogs, and populations are known from dune systems in Donegal and on limestone in the Burren (Asher *et al.*, 2001). The main food plant of the larva is devils-bit scabious, though field scabious (*Knautia arvensis*) and plantains (*Plantago* spp.) are also used to a lesser extent (Higgins and Riley, 1980).

The butterfly is single-brooded with adults flying from the middle of May to the middle of July. Egg laying occurs on larger, more prominent food plants, or on patches of shorter vegetation where the food plant is abundant. The larvae, which are gregarious, spin a protective web that becomes conspicuous during late August and September. This web is typically placed in intermediate length swards where the vegetation is 12-25cm tall, though shorter swards (5-12cm) are used where the food plant is abundant (Hobson *et al.*, 2002). The larvae over-winter in smaller webs close to the ground in a dense tussock of grass. They emerge in early spring and eventually become more solitary before pupating in dense vegetation.

The marsh fritillary is renowned for the large fluctuations in population size that it undergoes, which make it prone to local extinctions. Equally, however, in good years it can colonise sub-optimal sites in the vicinity of the core site (up to approximately 15km). Within Ireland, the stronghold of the species is in Counties Fermanagh, Donegal, Sligo, Galway, Clare and Limerick (Asher *et al.*, 2001; Lavery, 1993).



The decline of the marsh fritillary has been linked to three main factors (Asher *et al.*, 2001):

- Agricultural intensification and land reclamation.
- Altered management of remaining suitable habitat.
- The combination of population fluctuation with increased fragmentation of remaining habitat.

Devil's-bit scabious occurs in abundance at Carrickmagrath West (Ch 6000 to 6200) and at Kilross / Lisnaree (Ch 14850 to 15100), and this has implications for the potential occurrence of breeding populations of the marsh fritillary butterfly. The presence of the food plant alone, however, does not determine whether a site is used by the marsh fritillary; height and vegetation structure are also crucial factors (optimal 12-25cm for breeding with a mosaic of structure in vicinity (Hobson *et al.*, 2002)).

#### *Surveys*

Specific surveys were therefore undertaken at Carrickmagrath West and Kilross/Lisnaree on 1<sup>st</sup> September 2003 to determine whether the marsh fritillary butterfly occurs at these locations. The larvae group together in feeding colonies surrounded by a protective web and are therefore easily detected during the feeding season, which spans from late July to late September. The optimum survey time is late August as this is the peak feeding period when the webs become more conspicuous and the larvae have not yet begun to hibernate (Asher *et al.*, 2001).

This survey utilised the presence of such webs as the basis for determination of the status of the species. This method is recognised as being a standard survey technique and enables some level of population size to be determined (Asher *et al.*, 2001).

#### *Carrickmagrath Survey Results*

The main habitat at Carrickmagrath is wet grassland (GS4), with some areas of scrub (WS1) and occasional hedgerows (WL1). A tributary of the Burn Daurnett River (FW2) forms the western boundary of the site and is fringed by scrub. The species present include birch, ash, willow and gorse, which are spreading into the main part of the site. The wet grassland is dominated by sharp-flowered rush, with abundant devil's-bit scabious and other species including marsh violet, silverweed and common bent. The site is drier to the south, though rushes still dominate the sward, while to the north there is evidence of peat development and sphagnum mosses are present along with some heather. Purple moor-grass is occasional to frequent in the wetter parts of the site.

The sward height within the site varies between approximately 70cm and 100cm and, until recently, apparently has had little grazing. However, at the time of the survey, evidence of recent trampling by cattle was apparent and large areas of the sward were flattened.

No evidence of marsh fritillary was found and it is evident that the sward height does not provide the optimal conditions for the species even though the food plant, devil's-bit scabious, is abundant.

#### *Kilross Survey Results*

This site is a complex of rush-dominated wet grassland (GS4), colonising and semi-mature scrub, and wet willow-alder-ash woodland (WN6). The site occupies a shallow depression centred on a drainage line with fringing woodland and scrub. The grassland is dominated by soft rush and sharp-flowered rush with abundant devil's-bit scabious

and Yorkshire fog. Other species present include marsh thistle, marsh ragwort, greater bird's-foot-trefoil and black knapweed.

The composition and height of the sward varies throughout the site depending on drainage, slope and grazing pressure. The most promising location for marsh fritillary was found to occur adjacent to the drainage ditch where devil's-bit scabious was abundant in a sward approximately 50cm high. Purple moor-grass also occurred in this area and the hummocky nature of the ground provided conditions for butterwort (*Pinguicula vulgaris*) and sphagnum mosses. No evidence of the larvae was found. Elsewhere on the site, the sward height was typically closer to 100cm and a considerable portion of the area had recently been grazed by cattle with resultant disturbance and trampling.

## 9.2.7 The Aquatic Environment

### Watercourses

The Preliminary Design is located within the catchment of the River Finn and crosses a total of seven watercourses, including the River Finn itself. This is a designated salmonid water and is a cSAC. At the proposed crossing point of the River Finn the cSAC boundary extends approximately 2-5m beyond the edges of the river channel. The Burn Durnett, a major tributary of the Finn, is also crossed by the route. Table 9.7 summarises the riparian and aquatic habitats, fisheries value and presence of protected species on the seven watercourses.

Lough Mourne is an acid lake occurring at the western end of the Preliminary Design. It lies at approximately 167m AOD and covers an area of approximately 0.7km<sup>2</sup>. The lake is drained by the Mourne Beg River, which flows into the River Derg, an independent tributary of the Foyle system. The lake, which is utilised for water abstraction purposes, was not assessed for its water quality as part of this survey.

### Riparian and aquatic habitats

The River Finn has been subjected to arterial drainage in the vicinity of the proposed crossing point at Edenmore. The banks are steep and to the south have a narrow band of blackthorn-dominated scrub, with occasional semi-mature and mature ash and alder. The exotic species, Indian balsam (*Impatiens glandulifera*), is abundant close to the river along with bramble, knapweed and nettle. On the north bank, a belt of mature ash and alder occurs at a point approximately midway across the route. This has a well-developed woodland-type understorey including great woodrush, bluebell and various ferns. The belt of trees terminates at a boulder pile which is a potential otter holt or couch (see Section 9.2.6). East of this the vegetation is dominated by ruderal herbaceous species with Indian balsam, nettle, hogweed (*Heracleum sphondylium*), broad-leaved dock (*Rumex obtusifolius*) and reed canary-grass (*Phalaris arundinacea*) along the water's edge. On the upper bank, the vegetation has a more dry grassland composition with red fescue (*Festuca rubra*), St. John's-wort (*Hypericum* sp.), self-heal, chickweed (*Stellaria media*) and occasional hawthorn.

The other watercourses crossed by the Preliminary Design are mainly small spate rivers with steep gradients, which have not been affected by drainage. The Burn Durnett and its tributaries have typically formed small gorges over exposed bedrock, with fringing mature scrub-woodland and abundant riffles and small cascades. The River Finn tributary to the south has a limited catchment and, overall, a more varied flow regime with areas of slack flow in the Castlebane North townland.

### **Fisheries**

The River Finn is a river of international importance for salmon and for this reason is a cSAC under the EU Habitats Directive (92/43/EEC). It is noted as one of the premier spring salmon rivers in Ireland (O'Reilly, 2006).

The site of the proposed crossing is not a salmonid spawning area and is not subject to intensive angling. However, downstream of the crossing point, there is an important holding area that is heavily fished. The fishing season on the River Finn extends from 1<sup>st</sup> March to 15<sup>th</sup> September. The primary concern for fisheries is the risk of siltation that may occur during construction of the Preliminary Design crossing (Loughs Agency, pers. comm.).

The Burn Daurnett River and its tributaries contain some brown trout (*Salmo trutta*) and spawning salmon but these are not considered to have any significant fisheries value (Loughs Agency, pers. comm.).

The tributary of the River Finn at Treanamullin (D1 and D2) does not support significant fish stocks though brown trout do occur in its lower reaches. Lough Mourne has stocks of brown trout but does not currently have any significant fisheries value.

### **Protected aquatic fauna**

The River Finn contains a number of species listed in Annex II of the EU Habitats Directive. The river is of international importance for salmon and is a cSAC for the species. The site of the proposed crossing is not a spawning area for salmon and most of the spawning grounds on the river are located upstream of Ballybofey (Loughs Agency, pers. comm.). The three nationally occurring lamprey species, brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*), are known to be present within the River Finn, though it is unlikely that river and sea lamprey will extend so far upstream to spawn. River lamprey may occur in the River Finn tributary at Treanamullin.

A potential otter holt or couch is present amongst boulders on the north bank of the River Finn at the proposed crossing point (see Section 9.2.6). Otter signs have been recorded on the Burn Daurnett and its tributaries at Ch 8200 and 7400 and at the River Finn tributary at Treanamullin (Ch 12700), during the survey in October 2006. Otter may also utilise the headwaters of the Burn Daurnett as a corridor linking the River Finn catchment to Lough Mourne.

While kingfisher (an Annex I species under the EU Birds Directive) was not observed during the field survey, the conditions prevailing along the River Finn are eminently suited to this species. No evidence of nesting sites (holes in steep or vertical faces of soft sediments adjacent to the river) was found during the survey. The rivers Finn and Burn Daurnett do not contain freshwater pearl mussel (*Margaritifera margaritifera*) (Moorkens, 1999) or white-clawed crayfish (*Austropotamobius pallipes*) (Reynolds, 1998).

According to information provided by the Loughs Agency, annual semi-quantitative electrofishing surveys have shown the presence of juvenile salmonids and redd counting data for spawning Atlantic salmon in the Burn Daurnett. Potentially suitable spawning habitat for brook lamprey, river lamprey and sea lamprey occurs along the river and to a lesser extent in its tributaries. Suitable conditions for ammocoete larvae of lamprey were present in the vicinity of sampling point D1 at Mullaghagarry.

Table 9.7: Description of the Riparian and Aquatic Habitats at the Crossing Points of Watercourses along the Preliminary Design

Watercourse	River crossing No. (see Figure 9.2)	Aquatic habitat	Riparian habitat	Fisheries value	Annex II species	Overall evaluation*
River Finn Main channel	D3	Depth: up to 1m, width: c40m. Tannin-rich pool/glide with substrate of cobbles and boulders. Sand and gravel occurs at the edges with occasional areas of silt. Small amount of water-starwort ( <i>Callitriche</i> sp.). Reed canary grass occurs along the banks where there are sand banks.	North bank: Steep 4-5m bank with ash, alder and occasional sycamore to west of crossing point. Associated species include grasses, upright hedge-parsley ( <i>Torilis japonica</i> ), nipplewort ( <i>Lapsana communis</i> ), figwort ( <i>Scrophularia</i> sp.), nodding bur-marigold ( <i>Bidens cernua</i> ), bluebell, great wood-rush, liverworts and ferns. Open vegetation to east of crossing point with dense Indian balsam, hogweed, nettle, broad-leaved dock and meadowsweet. Reed sweet-grass ( <i>Glyceria maxima</i> ) occurs lower down the slope while cock's-foot, meadow grass ( <i>Poa</i> sp.), red fescue, St. John's-wort, self-heal and black knapweed occur on the upper slope. South bank: 3-4m bank with alder, ash, sycamore and willow woodland overhanging river. The stream runs through a pre-thicket conifer plantation of fir, which has abundant saplings of birch, ash, willow, holly and laurel ( <i>Prunus laurocerasus</i> ). The steep banks are overhung frequently by laurel, willow and bramble and this gives heavy shading of the channel. Other species include meadowsweet, nettle and grasses, with abundant mosses and liverworts.	Internationally important salmonid river. Heavily fished	Salmon, otter, kingfisher and lamprey.	A
Tributary	D1	Depth: 20-25cm, width: 1-1.5m. Moderate to swift –flowing stream with riffles and pools and a substrate of silty sand to gravel and cobble. Aquatic vegetation consists only of the aquatic moss <i>Fritillaria</i> sp.	Tree-lined channel with mature alder and occasional ash and hawthorn. Bramble, ferns, grasses mosses, liverworts and ivy on banks. Reed sweet-grass at base. Predominantly rushy pasture surrounding channel.	Potential as nursery stream but no significant value**	Possibly brook lamprey, otter and kingfisher.	C
Tributary	D2	Depth: 15-30cm, width 1.5-2.5m. Meandering channel with moderate-swift flow and riffle/pool sequence. Substrate of rock with abundant cobbles and sand/silt in the pools. <i>Fritillaria</i> sp. in channel, water-starwort and bur-reed ( <i>Sparganium</i> sp.) at margins. Heavy bacterial plumes.		Not significant**	Possibly brook lamprey, otter and kingfisher.	C

\*\* Loughs Agency  
\* See Table 9.2.

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Watercourse	River crossing No.	Aquatic habitat	Riparian habitat	Fisheries value	Annex II species	Overall Evaluation*
Burn Daurnett River						
Main channel	D7	Depth: 15-20cm, width 3-4m. Natural stream with swift flow over a gravel and cobble substrate. Sands in areas of slack flow. <i>Fontinalis</i> in channel. Raw sewage outflow.	North bank: Steep-vertical bank, 1.5-2m with overhang of mature alder, sycamore, ash and hazel up to 8m. Frequent mature multi-stemmed beech downstream. Heavy shading of channel. Ground flora of ferns, mosses and liverworts. South bank: Steep-vertical, 1-1.5m with occasional hawthorn, hazel and broom ( <i>Cytisus scoparius</i> ). Abundant bramble, nettle and false-oat grass ( <i>Arrhenatherum elatius</i> ). Damp, low-management fields to the north and south. Stream flowing through open moorland. Abundant purple moor-grass and rushes. Some gorse on top of the banks and occasional mature ash and willow. Conifer plantation to south – partially clear-felled. No biotic sample taken.	Potential for salmon and trout spawning and nursery**	Salmon, otter and brook lamprey.	C
Main channel	D8	Depth: 10cm, width: 50-200cm. Headwaters of the Burn Daurnett. Moderate flow over silt and peat. Heavily iron-enriched with flocculation. No aquatic vegetation.		None	Potential for otter to utilise the stream as a corridor between the Burn Daurnett and Lough Mourne.	D
Tributary	D4	Depth: 20cm, width: 1.5-2m. Swift stream with rapids and riffles over a substrate of bedrock, boulders and cobbles with gravel and sand in between. There is some siltation and possible organic enrichment. <i>Fontinalis</i> sp. occurs in the channel. Channel heavily shaded.	West bank: Steeply-sloping bank, 4-5m with exposed boulders along the river. Hazel-dominated woodland adjacent to the bank with abundant holly and occasional ash. Well-developed ground flora with bluebell, ferns, dog's mercury, bramble, opposite-leaved golden-saxifrage, bugle, dog-violet and wood anemone. Blackthorn occurs on the field edge. East bank: Steeply-sloping bank, 4-5m. Vertical with overhang in places. Holly-dominated woodland adjacent to channel. Abundant mosses, ferns and ivy.	Potential for brook trout – no spawning.	Potentially used by otter.	C
Tributary	D5	Depth: 20cm, width: 1.5-2m. Swift-flowing stream with a substrate of exposed bedrock, abundant boulders and cobbles and some gravels and sand. <i>Fontinalis</i> sp. in channel.	Both banks are moderate to steep 3-4m with boulders. Channel flowing through cut in hazel-dominated woodland with ash, willow, holly, gorse, hawthorn and bramble. Diverse ground layer with wood anemone, primrose ( <i>Primula vulgaris</i> ), ivy, herb-Robert, bluebell, meadowsweet and ferns.	Potential for brook trout – no spawning.	Potentially used by otter.	C
Tributary	D6	Depth: 10-15cm, width: 1-1.5m. Small stream with boulder and cobble substrate and small amounts of sand and gravel. Moderate to swift flow, heavily shaded with some <i>Fontinalis</i> sp. in channel.	Moderately-sloped banks, 1m in height. Dense cover of gorse and willow on banks with occasional broom and young ash. Sparse ground flora.	Limited potential for brook trout		C

\*\* Loughs Agency  
\* See Table 9.2.

### Water quality

Water quality was assessed at seven stations along the Preliminary Design using the standard EPA Biotic Index (Q Value) system. The EPA database was also accessed to determine recent trends in water quality where data were available. The summarised results of the biotic evaluation of water quality are shown in Table 9.8 while the full, tabulated results are given in Appendix 9.1.

**Table 9.8: Water Quality Status of Watercourses Crossed by the Preliminary Design (EPA data are included to show recent trends in water quality).**

Watercourse	Sampling station / EPA sampling point	Year	Q value	Water quality status
<b>River Finn</b>				
River Finn	D3	2002 <sup>2</sup>	3	Moderate pollution
	Br. south of Stranorlar	2004 <sup>1</sup>	3-4	Slight pollution
		2001 <sup>1</sup>	4	Unpolluted
		1998 <sup>1</sup>	2	Serious pollution
		1997 <sup>1</sup>	2-3	Moderate pollution
Tributary	D1	2002 <sup>2</sup>	3-4	Slight pollution
Tributary	D2	2002 <sup>2</sup>	3	Moderate pollution
<b>Burn Daurnett River</b>				
Burn Daurnett River	D7	2002 <sup>2</sup>	3	Moderate pollution
	Br. NW of Daisy Hill	2004 <sup>1</sup>	2-3	Moderate pollution
		2001 <sup>1</sup>	2-3	Moderate pollution
		1998 <sup>1</sup>	2-3	Moderate pollution
		1997 <sup>1</sup>	2-3	Moderate pollution
Tributary	D4	2002 <sup>2</sup>	3	Moderate pollution
Tributary	D5	2002 <sup>2</sup>	3	Moderate pollution
Tributary	D6	2002 <sup>2</sup>	3	Moderate pollution

Data sources: <sup>1</sup>EPA water quality data ([www.EPA.ie](http://www.EPA.ie)) <sup>2</sup> This study

All watercourses were shown to have some degree of pollution and there was a good correlation between the data from the biotic samples collected at the time of survey and the EPA data for the same watercourses. The River Finn has shown a degree of variation in its water quality over time, with the Q value given by the EPA in 1998 showing there to be serious pollution. Since 1998 however the water quality in this river improved to Q4 (unpolluted) in 2001 before deteriorating to Q3-4 (slight pollution) in 2004. Water quality in the Burn Daurnett has remained relatively constant at Q2-3 or Q3 (moderate pollution) over the period between 1997 and 2004.

Water samples were also taken for physico-chemical analysis in the seven main watercourses, with the purpose of establishing a baseline for existing levels of pollution typically associated with roads and the basic parameters relating to nutrient enrichment. The results will act as baseline data for future monitoring of water quality. The parameters examined and results of the analyses are presented in Appendix 9.2. and are discussed in detail in Chapter 8.2.1.

## 9.2.8 Evaluation of the Existing Environment

### Terrestrial Environment

Table 9.9 presents an evaluation of designated areas and ecological sites derived from information gathered during the desk study and surveys for the Preliminary Design.

**Table 9.9: Evaluation of Designated Areas and Ecological Sites**

Site	Location (Chainage)	Ecological value*
<b>Designated conservation areas</b>		
River Finn cSAC	11300	A
River Foyle and Tributaries cSAC	4km from Preliminary Design	A
Croaghonagh Bog cSAC	1km west of start of scheme	A
<b>Ecological sites</b>		
Croaghonagh	2900-3200	D
Goland	4900-5500	C
Carrickmagrath West	6000-6300	C
Carrickmagrath East	6400-6700	C
Navenny East	9050-9580	C
Dreenan	9900-10150	C
Edenmore	10300-10600	C
Castlebane South	12200-12600	C
Castlebane North	12700-13200	D
Mullaghagarry/Tircallan	13900-14250	C
Kilross/Lisnaree	14850-14950	C

\* See Table 9.2 for criteria for site evaluation

The River Finn cSAC is of international conservation value for its salmonid populations and is therefore the most sensitive area along the route. The River Foyle and tributaries cSAC is also of international conservation value, however the Preliminary Design would not directly impact this designated area. There are four designated areas of bog within 1.1km of the proposed route. These are Croaghonagh (cSAC), Cashelnavenean (NHA), Meenagarranroe (NHA), and Lough Hill (NHA) Bogs. Bogs are typically very sensitive to water table fluctuations and are dependent on some seasonal variation in the water level to maintain the species present. However these four protected bogs are on hills at elevations above the proposed route and are hydraulically disconnected from the aquifer underlying the Preliminary Design route. As such the Preliminary Design will not affect the hydrology of these four bogs.

The ecological sites are varied in their habitat and species composition but the majority of sites are of high local ecological value. The most significant habitats present are the three semi-natural woodland types: oak-birch-holly, oak-ash-hazel and wet willow-alder-ash woodland. These are of high local ecological value and occur in Carrickmagrath East, Dreenan, Castlebane South and Kilross. Another significant habitat is wet grassland, which occurs in two of the eleven sites, Carrickmagrath West and Kilross. The disused railway line is a prominent ecological feature in the area, of high local value and it serves as an important corridor for the movement of plant and animal species. Several important mammal species occur along the Preliminary Design. These include otter, badger, bat species, red deer and pine marten.

Hedgerows along the Preliminary Design are varied but the majority are unmanaged and dominated by native species. A high proportion have associated features such as ditches, which increase their ecological value, but overall this habitat is considered to be of moderate local ecological value. The tree lines along the route are also varied and although a large proportion of the total length of tree line is made up of beech, which is non-native, the trees are mature and provide a woodland-type corridor. Overall, this habitat is considered to be of high local ecological value.

Upland blanket bog and wet grassland (PB2 and GS4) occurs in the western section of the route and an area of this habitat, between Ch 1400 and Ch 1700, will be impacted. This has moderate ecological value.

#### Aquatic Environment

Table 9.10 presents the evaluation of watercourses derived from the information gathered during the desk study and surveys for the Preliminary Design.

Table 9.10: Evaluation of Watercourses

Watercourse	River crossing No. (see Figure 9.2)	Evaluation*
<b>River Finn</b>		
Main channel	D3	A
Tributary	D1	C
Tributary	D2	C
<b>Burn Durnett River</b>		
Main channel	D7	C
Tributary	D4	C
Tributary	D5	C
Tributary	D6	C
Tributary	D8	D

\* see Table 9.2 for evaluation criteria



## 9.3 Assessment of Effects: Construction and Operation

A summary of predicted impacts on designated areas and ecological sites is presented in Table 9.11 below. These impacts are discussed in detail in the relevant sections.

**Table 9.11: Evaluation of Impacts on Designated Areas and Ecological Sites**

Site	Location (Chainage)	Level of impact
<b>Designated conservation areas</b>		
River Finn cSAC	11,300	Moderate
River Foyle and Tributaries cSAC	4km from Preliminary Design	No direct impacts
Croaghonagh Bog cSAC	1km west of start of scheme (Croaghonagh)	No impacts
Meenagarranroe Bog NHA	0.38km south of route	No impacts
Lough Hill Bog NHA	0.45km south of route	No impacts
Cashelnavean Bog NHA	1.1km west of start of scheme	No impacts
<b>Ecological sites</b>		
Croaghonagh	2,900-3,200	Moderate negative
Goland	4,900-5,500	Minor negative
Carrickmagrath West	6,000-6,300	Major negative
Carrickmagrath East	6,400-6,700	Major negative
Navenney East	9,050-9,580	Major negative
Dreenan	9,900-10,150	Major negative
Edenmore	10,300-10,600	Major negative
Castlebane South	12,200-12,600	Moderate negative
Castlebane North	12,700-13,200	Moderate negative
Mullaghagarry/Tircallan	13,900-14,250	Major negative
Kilross/Lisnaree	14,850-14,950	Major negative

\*See Table 9.3 for criteria for site impact significance.

### 9.3.1 Designated Areas

The River Finn cSAC is crossed by the Preliminary Design and will therefore be directly impacted during the construction phase. However at the proposed crossing point of the River Finn the cSAC boundary extends approximately 2-5m beyond the edges of the river channel. It therefore only covers the river channel and the riverbanks at this location. The primary concerns are the loss of riparian habitat and any impacts on the existing potential otter holt or couch located at the crossing point, and the risk of siltation impacting on fisheries habitat. The passage of salmonids and otter will not be affected by the construction or operation of the proposed river crossing.

The construction of the bridge will result in the loss of some riparian habitat. The impact of this will be minimal on the north bank but on the south bank an area (approximately 0.2ha, of which only half is within the cSAC) of alder, ash, willow and sycamore woodland will be lost. A potential otter holt or couch was discovered on the north bank and disturbance to this will constitute a moderate negative impact. If necessary, otters will be temporarily excluded from this location prior to construction of the bridge, but the retention of the existing riverbanks will ensure that any holt is left intact and is accessible when the construction phase is complete. Details of mitigation measures required for otters are presented in Section 9.4.3.

Lough Foyle and Tributaries cSAC will not be directly impacted on by the Preliminary Design. There is the potential for indirect impacts on this designated area as a result of siltation or pollution of Lough Mourne, which in turn could impact on the Mourne Beg and Derg rivers. However, provided adequate mitigation measures are put in place as described in Section 9.4, the cSAC will not be impacted upon.

There will be no direct or indirect hydrological or hydrogeological impacts on the three NHAs (Cashelnavean Bog, Meenagarranroe Bog and Lough Hill Bog) or the cSAC (Croaghonagh Bog), which lie within 1.1km of the Preliminary Design. This is because these four protected bogs are on hills at elevations above the proposed route and are hydraulically disconnected from the aquifer underlying the route. As such the hydrology of these four bogs will not be affected by the Preliminary Design (See Chapter 8, Section 8.4.6).

### 9.3.2 Other Ecological Sites

The Preliminary Design will directly impact on eleven ecological sites, many of which contain a number of semi-natural habitats of high local ecological value. As a result, the impacts on ecological sites are considered to be significant and are predominantly major and moderate negative impacts as shown in Table 9.11.

The Preliminary Design has been revised to avoid some sensitive areas but significant impacts will still occur in a large proportion of the sites. Ecological sites containing semi-natural woodland are particularly sensitive and such habitats occur at Carrickmagrath East and Dreenan, and to a lesser extent at Kilross/Lisnaree and Castlebane South. At Carrickmagrath East, 0.3ha of oak-ash-hazel woodland will be removed and at Dreenan 0.09ha of oak-birch-holly woodland and 0.5ha of wet willow-alder-ash woodland will be removed. These are considered to be major negative impacts in the context of the small amount of similar semi-natural woodland habitats in the surrounding area.

A large amount of wet grassland habitat will also be impacted by the Preliminary Design. Drainage of the wet grassland may occur as a result of lowering of the water table. Changes to the hydrology of these habitats will be potentially significant sites such as Carrickmagrath West and Kilross / Lisnaree where the grassland is moderately species-rich. Impacts on these sites will therefore be major negative.

The Preliminary Design will have major negative impacts on three other ecological sites. These are Navenny East, Edenmore and Mullaghagarry / Tircallan. A long strip of semi-natural grassland and scrub covering 160m<sup>2</sup> will be removed at Navenny East, while at Edenmore and Mullaghagarry/Tircallan the principal habitat loss will be the removal of scrub.

The remaining ecological sites contain a high proportion of modified habitats, in particular conifer plantation. Impacts on these sites are considered to be negative with the exception of Goland where the Preliminary Design has been revised to avoid the sensitive areas and the impacts will be minor negative.

Impacts on ecological sites will be reduced by re-connection of severed habitats, through appropriate planting and habitat re-creation. These are discussed in Section 9.4.

### 9.3.3 Other Habitats

Impacts on other habitats occurring along the Preliminary Design will mainly be minor negative due to the small area impacted or the low ecological value of the habitats.

However, moderate negative impacts will occur on the area of scrub and wet grassland between Ch 7700 and 7900 and on the areas of upland blanket bog/wet grassland between Ch 1400 and Ch 1700. There will, in addition, be an impact on wet grassland at Ch 9800 where it is proposed to locate a storage compound. This however, will be temporary as the site will be rehabilitated on completion of construction, and the impact is therefore rated as being minor negative.

The loss of hedgerows along the Preliminary Design will constitute a minor negative impact. The removal of hedgerows for the construction of the Preliminary Design will result in the severing of wildlife corridors, but only small sections of hedgerow will be lost. The removal of tree lines will have a moderate negative effect due to the high local ecological value of the tree lines present along the route. Mature trees provide a valuable wildlife habitat and the double tree line present along a large proportion of the disused railway acts as a linear woodland-type habitat of high local ecological value.

### 9.3.4 Fauna

There will be negative impacts for fauna as a result of the Preliminary Design because of: disturbance (during construction but also during operation); loss and fragmentation of areas of suitable habitat for feeding, breeding, roosting and cover; severance of territories and creation of barriers to animal movement and isolation of populations.

#### **Otters**

Otters are sensitive to disturbance and deterioration of water quality. Any negative impacts on watercourses and fisheries as a result of the Preliminary Design will affect the otter population in the area. The location of otter signs and a potential otter holt or couch at the point where the Preliminary Design crosses the River Finn is significant. This potential holt will be excluded prior to construction, if necessary. Although otters will be displaced from this area during construction, they should return when construction is complete. Otters typically have a number of holts along their river territories and will be able to compensate for this temporary loss by utilising holts at alternative locations. Any works affecting otters will be carried out under licence from the NPWS, in accordance with the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2006). The impact on the local otter population is considered to be a moderate negative impact.

#### **Badgers**

Badger territories are likely to be severed by road construction. Badgers are animals of habit and, as the same setts and traditional pathways are typically used over generations (Hayden and Harrington 2000), this can result in badger deaths, particularly on new roads. Should the area of foraging habitat be reduced then any badger populations in the vicinity of the Preliminary Design will suffer loss and/or fragmentation of their territory. A total of seven badger setts will be directly impacted by the Preliminary Design. The most significant impacts will occur at Sessiagh O'Neill (Ch 7300-7900) and Mullaghagarry (Ch 13970) where large active setts occur with five or more entrances. However, badgers typically have a number of setts in their territories, and where setts occur in the line of the Preliminary Design, the badgers will be evacuated and can re-locate to other subsidiary setts. Any works affecting badger setts will be carried out under licence from the NPWS, in accordance with the *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (NRA, 2006). The impact on badger populations in the area is considered to be a moderate negative impact.

#### **Pine marten**

There is likely to be an increased risk of mortality for pine marten movement as a result of the road construction. Territories will be impacted in the same way as badgers. The impact of the Preliminary Design on this species is likely to be minor negative.

#### **Bats**

Bats are likely to be negatively impacted by road construction through the loss of feeding habitat, roost sites and flight paths or commuting routes. Areas of potential feeding habitat, such as wet grassland, woodland, hedgerow and tree line will be lost. Removal of mature trees along the Preliminary Design may also destroy small existing and potential bat roost sites. Flight paths between foraging and roosting sites will be lost or interrupted through the removal of hedgerows, tree lines and woodland. Bats tend not to fly over areas of open ground so the construction of roads can act as a barrier to their movement. Lighting associated with roads and junctions can also constitute a negative impact for some bat species. The main impacts will be in or close to areas of suitable habitat that were previously unlit.

Loss of the structures identified as having potential for bat use will have a minor negative impact: no summer roost site was found within these and use of the buildings by bats is limited.

The loss of approximately up to 3,000 metres of the old railway line is significant as it offers good foraging habitat for bats and other wildlife. The loss of a feature of high local interest may be considered to have a moderate negative impact.

The development of the Preliminary Design will inevitably lead to loss of roosting, commuting and foraging opportunities for bats, with a resultant minor to moderate negative impact on this group. However, given the extent of hedgerow and scrub in the vicinity, impacts arising from the loss of roosting and foraging habitat, if offset with suitable mitigation measures as outlined in Section 9.4.3, may be considered as minor negative.

#### **Deer**

Deer that utilise the conifer plantations and other areas of woodland in the general locality are likely to be impacted, as road construction will result in the fragmentation of habitat and an increased risk of mortality through traffic collision. In particular, the loss of parts of the disused railway line will impede movement of deer between woodland habitats as they are currently using this feature as a corridor as evidenced by tracks and droppings found during the survey period. Large blocks of conifer plantation at Croaghonagh and Goland will also be bisected by the Preliminary Design. These impacts constitute a moderate negative impact.

#### **Birds**

Birds will be impacted by the loss of feeding and nesting habitat, and by increased disturbance, particularly during construction of the proposed road. During operation there may also be reduced breeding success for songbirds close to the Preliminary Design due to traffic noise. The disturbance to birds and the loss of breeding and foraging habitat is considered to be a minor negative impact.

#### **Invertebrates**

No evidence of marsh fritillary butterfly was found. The Millennium Atlas of Butterflies in Britain and Ireland (Asher *et al.*, 2001) does not show any records of the species within approximately 20km of the Preliminary Design. The Preliminary Design should therefore have no impact on this species.

### 9.3.5 Watercourses

Impacts on watercourses that will be crossed by the Preliminary Design are predominantly minor negative impacts. However, the River Finn is particularly sensitive to disturbance due its designated status, the presence of salmonid populations and the location of a potential otter holt or couch at the crossing point and the impacts on this watercourse are therefore considered to be moderate negative. A summary of the predicted impacts on all watercourses crossed by the Preliminary Design is given in Table 9.12 below.

**Table 9.12: Summary of the Predicted Impacts on Watercourses**

Watercourse	River crossing No. (see Figure 9.2)	Level of Impact*
<b>River Finn</b>		
Main channel	D3	Moderate
Tributary	D1	Minor
Tributary	D2	Minor
<b>Burn Daurnett River</b>		
Main channel	D7	Minor
Tributary	D4	Minor
Tributary	D5	Minor
Tributary	D6	Minor
Main channel	D8	Not significant

\* See Table 9.3 for assessment criteria

The Preliminary Design will directly impact seven watercourses. These include the main channel of the River Finn cSAC. The Preliminary Design for the proposed crossing of the River Finn cSAC is a three span structure with no piers set in the river. The piers will be constructed away from the immediate banks and will be a minimum distance of 7m from the channel at the northeastern pier, and at a greater distance in all other locations. There will be no in-stream working necessary (either temporary or permanent) and the riverbank will be fenced off during the construction period for protection. All works carried out on watercourses will comply with the *Guidelines for the Crossing of Watercourses during the construction of National Road Schemes* (NRA, 2006).

The Preliminary Design for the Burn Daurnett crossing is a single span bridge approximately 20m in length. Existing banks and streambed will be left intact and, where any disturbance occurs, reinstatement will be carried out to replicate the existing profile and vegetation.

For all watercourses the greatest risk to the aquatic environment is by way of indirect impacts such as siltation or accidental spillage of hydrocarbons during construction, or through an increase in the discharge of polluting substances in surface run-off during road operation. The extent of such siltation or spillage will determine the scale of potential impact. In the case of the River Finn, extensive siltation or pollution would constitute a major negative impact.

There will be a permanent loss or alteration of aquatic and riparian habitat within the culverts of minor watercourses, and some obstruction may occur to the movement of fish, mammals and birds along these watercourses. This will constitute a moderate negative impact.

There will be temporary negative impacts at all crossing points of watercourses at the construction stage. Impacts will include loss and/or disturbance of riparian and in-

stream habitats, and siltation. As a result there may be knock-on effects for local fish populations and their spawning habitat, and for aquatic invertebrates and plants. The impacts may extend downstream of all crossing points. There will be some additional modification to watercourses D1, D4 and D5 for a distance upstream and downstream of the proposed crossing points to remove obstacles or impediments to water flow. The extent of these works will result in a more extensive loss of habitat, though recovery of vegetation will be expected to occur over a relatively short timeframe. This may result in an additional minor to moderate negative impact on these watercourses.

## 9.4 Mitigation Proposals

Consideration was given to avoidance and reduction of impacts on the ecological environment at the constraints and route selection stages of the project. However, as with any development, some degree of impact is inevitable. Outlined below are mitigation measures to avoid, reduce or remedy the predicted adverse impacts of the proposed road on the ecological environment.

Where appropriate, mitigation proposals have been based on recommendations in the *Environmental Assessment and Construction Guidelines*, published by the NRA:

- All site clearance works will comply with the current legislative requirements.
- Where programmed construction activities permit, there will be no removal of hedgerows, trees, treelines or areas of semi-natural habitat during bird breeding season of March to August inclusive.
- Active badger setts located within the CPO will be excluded under licence during the period July to November inclusive in accordance with the *NRA Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (National Roads Authority 2006).
- Any works affecting active otter holts will be carried out in accordance with the *NRA Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (National Roads Authority 2006).
- Bat roosts occurring within CPO will not be disturbed during the hibernation (November to February) or breeding periods (May to early August), in accordance with the *NRA Guidelines for the Treatment of Bats During the Construction of National Road Schemes* (National Roads Authority 2006).
- The *NRA Guidelines for the Crossing of Watercourses during the construction of National Road Schemes* (National Roads Authority 2006) will be used as a guide to the methods to be used to minimise impacts.
- Any alteration to or culverting of existing watercourses is to be carried out in consultation with the Office of Public Works and the Loughs Agency, including in relation to the timing of works.
- Individual mature trees that are to be retained will be afforded protection in accordance with the *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes* (National Roads Authority 2006).
- All habitat compensation will be carried out in compliance with the landscape design and in accordance with the NRA guidelines: "A Guide to Landscape Treatment for National Road Schemes in Ireland" (National Roads Authority 2006).

The potential for significant adverse impacts on the ecological environment during the construction phase will be avoided / prevented or minimised by the preparation and

implementation of an Environmental Operating Plan (EOP). The EOP will outline procedures required to fulfil all of the Environmental Commitments for the Preliminary Design, including environmental legislative requirements and those emanating from consultations with third parties, for example, the NPWS.

#### 9.4.1 Designated Areas

Best practice and the mitigation measures detailed in Section 9.4.4 will be adopted during the construction phase to minimise the risks of siltation or accidental spillage to the River Finn cSAC. The boundaries of the construction area will be defined at the outset of works with fencing to avoid accidental disturbance beyond the site.

#### 9.4.2 Other Ecological Sites

No special mitigation measures are required for improved grassland and arable land that are of low ecological value. The impact on other habitats and the treelines and hedgerows that are intersected by the Preliminary Design has been reduced, where practicable through the route selection process and determination of the proposed land take.

The working area will be defined at the outset by the erection of fencing to define the limits of site works. Any trees, tree lines or hedgerows that are to be retained within the site works will also be fenced at the root protection area (RPA) in accordance with the *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes* (NRA 2006).

All woody vegetation that is to be retained will be afforded protection in line with British Standards (BS 3998:1989 *Recommendations for Tree Work* and BS 5837:2005 *Trees in Relation to Construction*). In addition, the *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub, prior to, during and post construction of National Road Schemes*, (NRA, 2006) state that alterations of ground levels within the root protection area should only be carried out following a considered assessment of the likely impact on the tree. In general ground alteration in excess of 75mm should be avoided.

Where other ecological sites, hedgerows, tree lines and mature trees cannot be avoided, direct mitigation is not feasible. To compensate for the loss of this habitat resource, new areas of semi-natural habitat will be created using native seed sources where feasible and new hedgerows, tree lines and small stands of woodland will be planted in appropriate locations. Where practicable hedgerows and treelines will be planted along new field boundaries and road margins to reconnect severed hedgerows and treelines, to re-establish the network of ecological corridors, and to interlink with other areas of semi-natural habitat. The trees and shrubs will be predominantly native species, which are readily available, and of local provenance and the species composition will reflect that of the habitat or habitats being lost. More details of mitigation planting are contained in Chapter 7.0 Landscape and Aesthetics.

Topsoil and subsoil from agricultural land-use will be identified on-site and thereafter stripped and stored separately. Subsoil may be retained for use in semi-natural habitat treatments. Where suitable ecological and site conditions exist, and with appropriate management during the initial stages of development, natural recolonisation should be considered the most appropriate and cost-effective treatment along a new road scheme. In particular, natural recolonisation should be considered as an appropriate and cost effective treatment for sensitive locations.

Any habitat compensation will be carried out in association with the landscape design (Chapter 7.0 Landscape and Aesthetics, Section 7.4) and in accordance with the NRA guidelines: *"A Guide to Landscape Treatment for National Road Schemes in Ireland"* (National Roads Authority 2006). Appropriate and adequate landscape design will serve to compensate over time for the loss of habitat, connect severed areas and offer opportunities for habitat creation.

#### 9.4.3 Fauna

All recommendations are based on the *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (NRA, 2006), the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2006) and the *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* (NRA, 2006) and refer to the Preliminary Design.

##### **Otters**

Otters use most of the watercourses in the study area and will traverse along smaller as well as larger streams and rivers and also along small streams and larger drains, where they access the hinterland. Otters do not limit their movements to watercourses and enter hinterlands to search for prey species such as frogs in particular. Each of the culverts and bridges will incorporate provision for mammal passage in accordance with the *NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* and the *NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*.

A potential otter holt or couch was found at the proposed River Finn crossing. A detailed pre-construction survey will check for any otter holts within or close to the CPO if 36 months or more has elapsed between obtaining statutory approval of the Preliminary Design and initiation of the construction phase, as per the *NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*.

If required, evacuation of otter holts within the CPO line will be carried out by an appropriately qualified ecologist under licence from the NPWS. Evacuation, and destruction if required, will be undertaken in accordance with the *NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*.

##### **Badgers**

In addition to those already found, badgers may also create new setts. In accordance with the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*, where 36 months or more has elapsed between obtaining statutory approval of a road scheme and initiation of the construction phase, an appropriate level of resurvey will be required.

The mammal surveys carried out as part of the ecological assessments in August 2002 and October 2006 will be supplemented by a further inspection of the development area immediately prior to site clearance to ensure that no new setts were established in the intervening period and that setts previously identified continue to be used by badgers.

Evacuation and destruction of any active badger setts within the CPO line will be carried out by an appropriately qualified ecologist under licence from the NPWS, if it is required. Evacuation and destruction will be undertaken during the period July to November, in accordance with the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*.



Until such time as they can be evacuated and destroyed, affected setts will be protected from interference or disturbance by an exclusion zone of 30m within which no machinery or removal of vegetation takes place. Light work, such as hand digging or scrub clearance will not take place within 10m of sett entrances. Around affected setts, the area from which vehicles are prohibited will be clearly marked by fencing (and appropriate signage).

If active setts located within the CPO line require evacuation and destruction this is to be carried out by an appropriately qualified ecologist under licence from the NPWS.

In accordance with the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*, no heavy machinery should be used within 30m of badger setts (unless carried out under licence from the NPWS) and neither blasting nor piledriving should be undertaken within 150m of active setts during the breeding season (December to June inclusive).

Badger underpasses can be combined with proposed culverts greater than 1m in diameter by the incorporation of raised mammal ledges, in accordance with the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*. The locations of mammal underpasses will be decided at the detailed design stage in conjunction with Design Engineers, as it will depend on the engineering requirements of the Preliminary Design. For example, it is not feasible to locate a badger underpass in an area of cut.

Badger fencing will be required to guide badgers to passage facilities and to prevent animals crossing the new roadway. The specification for badger-resistant fencing is given in the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*. Fencing is required in the vicinity of all facilities for the provision of mammal passage and should extend for a sufficient distance from underpasses to ensure that badgers will not find easy ways around them.

Badger resistant fencing will be incorporated at the earliest possible stage during road-construction, preferably during erection of the permanent fence-line with gaps left at locations recommended for underpasses. Gaps should be subsequently closed after underpasses have been constructed. Gates entering onto farm access roads will require concrete sills and mesh to exclude badgers from accessing the Preliminary Design.

In order to ensure that mitigation measures are operating effectively, badger-resistant fencing needs to be properly maintained and underpasses checked periodically in the first two years to ensure that they remain clear of debris or have not become waterlogged. Quarterly monitoring will be carried out to determine the success of the measures employed. Monitoring should be continued for a minimum of one year after construction ceases, in accordance with the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*.

#### **Pine marten**

The landscape mitigation proposals designed to replace the loss of pine marten habitat along the Preliminary Design will over time, serve to minimise the loss of habitat for this species.

#### **Bats**

Bats utilise the area for feeding, and small summer roosts may be present in mature trees, especially the older mature trees as outlined in Section 9.2.6. All proposed mitigation measures for the loss of roosts follow the *NRA Guidelines (Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes &*

*Guidelines for the Treatment of Bats during the construction of National Road Schemes* (NRA, 2006).

Buildings with roosting bats will not be demolished during the breeding period (late May to mid-August) as the risk of accidental death or injury is too great at this time. Known hibernation sites should not be demolished in winter. In exceptional circumstances where demolition must proceed in buildings known to contain bats, the special mitigation measures as detailed in the *Guidelines for the Treatment of Bats during the Construction of National Road Schemes* (National Roads Authority 2006) to protect bats will be put in place and a licence to derogate from the conservation legislation will be sought from the NPWS.

The procedure to be followed for the demolition of buildings depends on whether bats are suspected or known to be present. In all cases, immediately in advance of demolition, a bat specialist will undertake a comprehensive examination of the building. Should bats be encountered the building demolition will proceed as per the *NRA Guidelines for the Treatment of Bats during the Construction of National Road Schemes* (National Roads Authority 2006).

The local NPWS conservation ranger will also be informed of the location of any new roosts found.

The construction of the new bridge at the River Finn crossing will incorporate access points and roosting areas for bats in line with best practice roost construction. Ready-made artificial roost units are available for inclusion in such situations and should be included on the new river bridges. This will not hinder the future maintenance operations of the bridge.

Trees that are to be removed will ideally be felled in the period late August to late October, or early November, in order to avoid the disturbance of any roosting bats as per NRA guidelines. The felling of trees identified as existing or potential roosts (as identified in Section 9.2.6) will be completed by Mid-November at the latest because bats roosting in trees are very vulnerable to disturbance during their hibernation period (November – April). Ivy covered trees, once felled, will be left intact on site for 24 hours to allow any bats within them to escape prior to disposal.

The loss of feeding areas and severance of commuting routes will be mitigated by measures as outlined in the *NRA Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (National Roads Authority 2006). Areas described in Section 7.4 (Landscape), which are replanted with native species, will also serve as feeding areas for bats.

Bat roosting boxes will be erected in appropriate sites to compensate for the loss of roost sites. 'Schwegler' woodcrete or concrete bat boxes have been proven to be acceptable alternatives for bats and they are readily occupied. The precise location of alternative roost sites and the specific types of roost to be used will be determined at the detailed design stage.

In general, bright lighting creates a barrier to commuting bats so, lighting will be designed to minimise disruption to bats, bearing in mind the need for adequate lighting to ensure road safety standards are met.

#### **Deer**

Provision for the passage of deer will be met by allowing unimpeded access across the proposed road on appropriate stretches where visibility by motorists is adequate.

Signage, deer fencing and appropriate road side landscaping will be considered at the detailed design stage in conjunction with the Design Team.

#### **Birds**

Where programmed construction activities permit, there will be no removal of mature trees or hedgerows during the period March to August inclusive to prevent disturbance to breeding bird populations.

### **9.4.4 Watercourses**

All works carried out on or near watercourses will be in accordance with the *Guidelines for the crossing of watercourses during the Construction of National Road Schemes* (NRA, 2006) and in consultation with the relevant statutory bodies.

The impact of road development and improvement works on natural watercourses can be minimised by applying sound design principles and following good work practices.

The mitigation measures proposed are aimed at reducing the impact of road development and construction works on the general ecology of affected watercourses, with particular reference to protecting fish stocks and angling amenity and providing for mammals. All works will be conducted in consultation with the Loughs Agency and NPWS.

Bunds, siltation ponds, hydrocarbon and grit interceptors will be put in place, as appropriate, to control pollution and run-off, as per the *Guidelines for the crossing of watercourses during the Construction of National Road Schemes* (NRA, 2006) and in consultation with the Loughs Agency.

Bankside vegetation will be left intact where feasible. The extent of bankside interference and vegetation removal should be agreed, identified and documented and demarcated with appropriate fencing in advance of undertaking construction works. Adequate protection will be afforded by fencing prior to the commencement of any site works, with the fence set at a minimum distance of 5m from the bank of the watercourse or at the edge of the woody canopy (whichever is greater), wherever instream works are not being carried out.

Where natural bankside vegetation is to be removed, machinery will operate from the bank and pull the vegetation back from the edge of the watercourse. If temporary or permanent diversion of the watercourse is required, this will be carried out prior to the removal of bankside vegetation. Where permanent diversion is taking place, existing vegetation will be removed in sods for replanting on the new river banks where feasible. Where clearance of bankside vegetation or modification of river channels is required upstream or downstream of a proposed crossing point, these works will be carried out in a manner that aims to minimise the extent of impact.

Replanting or rehabilitation of banksides will be carried out following sensitive grading of the banks to replicate a natural topography using a capping of salvaged topsoil. Planting will be conducted using native species and will follow a natural zonation that is appropriate to the river profile. Temporary deer proof fencing will be erected to protect newly planted areas.

#### **Bridge / Culvert design**

Provision for fish passage will be allowed for in all watercourses with evidence of, or the potential to support, trout (i.e. all watercourses with the exception of D2 and D8). This will be in accordance with Loughs Agency guidelines and requirements and the

*Guidelines for the crossing of watercourses during the Construction of National Road Schemes* (NRA, 2006).

The Rivers Finn and Burn Daurnett will be bridged. The Preliminary Design for the River Finn crossing is a three span structure with no piers set in the channel of the river. There will be no modification to the riverbanks and no in stream works. Angler and mammal passage will be unimpeded by the bridge and all works will comply with the *Guidelines for the crossing of watercourses during the Construction of National Road Schemes* (NRA, 2006).

The Burn Daurnett will be bridged using clear-span design so as to leave the natural bed and banks undisturbed, and leaving a natural bank-path at each side for mammals and anglers, in accordance with the *Guidelines for the crossing of watercourses during the Construction of National Road Schemes* (NRA, 2006).

All other watercourses crossed by the Preliminary Design will be culverted. Bridge and culvert design and construction will be as per the NRA Guidelines and will incorporate mammal passage facilities as appropriate.

If a stream runs parallel to the line of the Preliminary Design and inside the toe-line of the embankment, consideration will be given to the option of diverting it laterally rather than culverting (see Watercourse Diversions, below).

#### **In-stream works**

The Loughs Agency will be consulted on the timing of in-stream works in watercourses frequented by salmon or trout.

If required, instream containment and dewatering operations to enable working in the dry may facilitate construction during the closed periods. All dewatering flow from surface watercourses will be passed through settlement ponds or tanks to remove sediments. Dewatering will be preceded by a fish salvage operation carried out by, or on behalf of, the Loughs Agency by fully qualified personnel. Operation of machinery in-stream will be kept to a minimum.

All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid etc. Machinery will be steam-cleaned and checked prior to commencement of in-stream works.

Fording of watercourses to gain access to the opposite bank will only be considered where no alternative option exists and under approval of the Loughs Agency, as appropriate. Where required, access will be restricted to one crossing point and traffic limited. In-stream and bankside preparation and rehabilitation will be required as per the *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes*, NRA 2006.

The use of concrete for preventing erosion of streambeds and banks will be avoided. Use will be made of natural bank protection techniques such as willow-fagotting, stone armour, or composite protection using products such as coir-matting or geoweb with appropriate planting (reeds, willow, etc.).

#### **Watercourse Diversions**

Diversions of watercourses will not be carried out unless there is no practicable alternative. Diversions will be designed to replicate a natural watercourse system and should include meanders, riparian vegetation and other features of a natural watercourse. Watercourse diversions will be carried out in the dry, in isolation from the existing watercourse. The compensation diversion channel will be designed in detail

under the guidance of suitably qualified personnel and to the satisfaction of the statutory bodies. Once the construction is completed and re-vegetation has been established, the connection to the existing watercourse will be made. This will only occur within the approved operational window for in-stream works. The salvage of fish from the section of watercourse to be abandoned will be carried out by qualified, licensed personnel.

#### **Pollution Prevention**

Pouring of cement for aprons, sills, and other works will be carried out in the dry and allowed to cure for 48 hours before re-flooding. Pumped concrete will be monitored carefully to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to water. No storage of hydrocarbons or any chemicals will occur within 50m of a watercourse. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank. Re-fuelling of plant will not occur within 50m of any watercourse. Filter systems or settlement ponds will be used to minimise siltation in site run-off being discharged to receiving waters.

#### **Discharge Quality**

It is proposed to utilise drainage ponds for the treatment of carriageway runoff on closed drainage networks. Only where drainage ponds are not feasible, oil/petrol interceptors will be used as a substitute. The forms of treatment offered by the use of drainage ponds are the settlement of heavier suspended solids and biological and physico-chemical treatment of the discharge.

The drainage ponds will be designed in accordance with the following document:

- CIRIA Report C521 – Sustainable urban drainage systems – design manual for Scotland and Northern Ireland

## **9.5 Conclusions**

Potentially, the most significant impact of the Preliminary Design will be the crossing of the River Finn, a cSAC. The scale of potential impact on this site is dependent on the precise method of construction, the care taken during the construction phase, and the measures employed to reduce the risk of pollution during the operational phase. The bridge design for the Finn crossing has no piers instream and retains the existing banks intact. This river is an internationally important watercourse, and the impacts arising from the construction and operation phase have been potentially assessed as moderate, however, with adequate mitigation these impacts will be temporary.

A total of eleven other sites of ecological value have been identified along the proposed route, nine of which are rated as being of high local importance. The scale of impact on seven of these sites will constitute a major negative impact. Within the CPO boundary, there may be scope to reduce the potential impact on some sites through minor alignment refinements at the detailed design stage. Appropriate and adequate landscape design will serve to compensate over time for the loss of habitat, connect severed areas and offer opportunities for habitat creation as part of the mitigation of adverse impacts.

The mammalian and avian fauna occurring within the vicinity of the Preliminary Design are diverse and abundant. Impacts will occur directly through habitat loss and disturbance during construction, as well as through increased risks associated with crossing the Preliminary Design. Provision for the passage of mammals through sensitive culvert design, dedicated underpasses, and appropriate fencing and signage will reduce road casualties.

The ecological value of the various minor watercourses crossed by the Preliminary Design will be maintained through sensitive culvert design, construction timing and methodologies, landscape design and pollution control measures.

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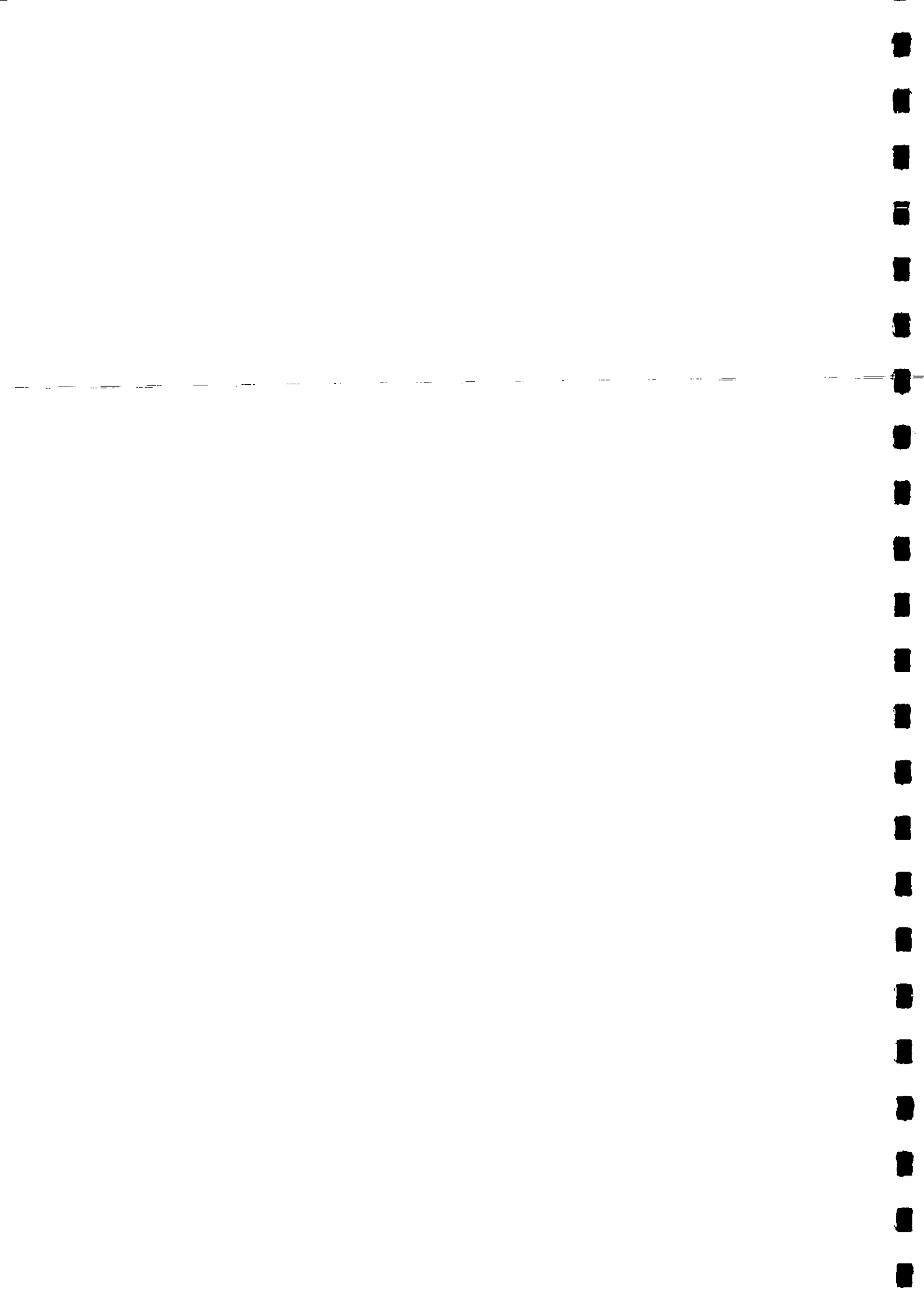
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## 10.0 Architectural, Archaeological and Cultural Heritage

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### 10.1 Introduction and Methodology

This Chapter sets out the architectural and archaeological heritage resource and features of cultural heritage significance along the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass, and provides a description of the nature of the impacts of the Preliminary Design on those resources. A full description of the Preliminary Design is presented in Chapter 3.0 (Description of the Preliminary Design).

The study determines, as far as is reasonably possible from existing records, the nature of the architectural, archaeological and cultural heritage resource along the Preliminary Design.

For the purpose of examining the impact of the development on the architectural, archaeological and cultural heritage a 100m wide corridor (development corridor) was established along the length of the Preliminary Design (Figure 10.1). In instances where there was a Record of Monuments and Places (RMP) site within the corridor, the area under assessment was widened by approximately 100m to 200m to accommodate any possible adjustment to the line of the Preliminary Design. The development corridor was assessed in the context of the wider 100m study area, which was also examined in order to ascertain the nature of the architectural, archaeological and cultural heritage of the surrounding area.

The assessment of the impact of the Preliminary Design on the architectural, archaeological and cultural heritage resource was undertaken in five phases.

The first phase involved researching all available documentary, cartographic, photographic and recorded information to identify all known features of architectural, archaeological and cultural heritage significance in the area. Full details of data sources are given in Appendix 10.1. This data included information from the Record of Monuments and Places of County Donegal, the Topographical Files of the National Museum of Ireland (Appendix 10.6) and all available cartographic and documentary records. Aerial photographs were analysed for potential features. A number of "areas of archaeological potential" were also identified during this phase.

Phase 1 was followed by a second phase of consultations with the following statutory and voluntary organisations (Phase 2):

- Heritage Policy and Legislation Division, Department of Environment, Heritage and Local Government (DEHLG)
- The National Inventory of Architectural Heritage (Draft), (DEHLG)
- The National Monuments and Historic Properties Section, Heritage and Planning Division, (DEHLG)
- Department of Irish Folklore (previously The Irish Folklore Commission), University College Dublin
- The Irish Antiquities Division of The National Museum of Ireland
- Donegal County Council, Planning Section
- Donegal County Library

- The National Roads Authority (NRA) Project Archaeologist for Donegal County Council
- Donegal Historical Society

The third phase involved the mapping and numbering the location of all those features of architectural, archaeological and cultural heritage significance identified during phases one and two.

The fourth phase comprised a field inspection of the entire route of the Preliminary Design, which was carried out from the 16<sup>th</sup> to the 24<sup>th</sup> July 2002. The inspection visited all identified features to collate data on the extent and condition of each. The field walkover also comprised an examination of the entire development corridor to inspect for previously unknown features. A field inspection of Edenmore House and Estate was carried out on the 29<sup>th</sup> July 2003. A Field Record Sheet, designed specifically for this Phase, was utilised during the walkover (Appendix 10.2).

The fifth phase was the impact assessment and mitigation strategy undertaken on a site-by-site basis. The impact assessment was undertaken to outline potential adverse impacts that the Preliminary Design may have on the architectural, archaeological and cultural heritage resource, while the mitigation strategy is designed to avoid, reduce or offset such adverse impacts. The impact on each site was then classified using the following criteria:

**Table 10.1a Impact Definition: Archaeological Heritage**

Type of Impact	Definitions relating to sites of an archaeological nature
Profound	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise when an archaeological site is completely and irreversibly destroyed by a proposed development.
Significant	An impact that, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site.
Moderate	A moderate direct impact arises where a change to the site is proposed, which although noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into modern day development without damage and that all procedures used to facilitate this are reversible.
Slight	An impact which causes changes to the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.
Imperceptible	An impact capable of measurement but without noticeable consequences.

Definitions as outlined in the National Road Authority's *Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005)*.

**Table 10.1b Impact Definition: Architectural Heritage**

Type of Impact	Definitions relating to sites of an architectural nature
Profound	An impact that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse impacts.
Significant	An impact that, by its magnitude, duration or intensity alters the character and/or setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigation is unlikely to reduce the impact.
Moderate	An impact that results in a change to the architectural heritage, which although noticeable, is not such that it alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Impacts are probably reversible and may be of a relatively short duration. Appropriate mitigation is very likely to reduce the impact.
Slight	An impact that causes some minor changes to the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. Appropriate mitigation will reduce the impact.
Imperceptible	An impact on architectural heritage of local importance that is capable of measurement but without noticeable consequences.

Magnitude of Impact	Local Importance	Regional Importance	National Importance	International Importance
Very High	Significant	Significant	Profound	Profound
High	Moderate	Significant	Significant	Profound
Medium	Slight	Moderate	Significant	Significant
Low	Imperceptible	Slight	Moderate	Significant

Definitions as outlined in the National Road Authority's *Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes (2005)*.

The assessment resulted in Archaeological Development Services Ltd undertaking further investigation of key areas near the Preliminary Design in Autumn 2005. A series of archaeological test trenches were excavated at six Test Areas along the route (see Figure 10.1). The purpose of these test excavations was to determine the archaeological significance, if any, of the Test Areas in terms of the nature and extent of any archaeological features there. This work took place within the townlands of Croaghonagh, Meencrumlin, Goland Upper, Croghanagh, Kilross and Tircallen and assessed the archaeological potential of the sites identified as Recorded Archaeological Monuments (RMP) 1 and 3 and Areas of Archaeological Potential (AAP) 8, 9, 32, 38 and 39. Access to two further Test Areas; 5 & 7 was not possible at the time of the test excavations. Test Area 5 was intended to assess the potential of AAP 13, whilst Test Area 7 was intended to assess AAP 36. These areas and the entire remaining greenfield length of the Preliminary Design will be investigated at a later date, in advance of construction. Results of the 2005 archaeological testing are summarised within the relevant RMP and AAP descriptions below (Sections 10.2.1.1 and 10.2.1.2).

## 10.2 Existing Environment

Ballybofey (the market town) or *Bealach Féich* means either Fiach's Road or the Town of the cows of Fiach and Stranorlar (the garrison town) or *Srath an Urláir*, meaning the place in the valley beside the river.

For the purposes of this assessment, the landscape of the study area through which the Preliminary Design passes can be broadly divided into four zones, i.e. the urban environment of Ballybofey and Stranorlar, the floodplain of the River Finn, the enclosed agricultural land of the surrounding area and the upland area to the south of the towns.

The landscape through which the Preliminary Design runs lies in relatively good agricultural land within the Barony of Raphoe, in East Co. Donegal. As can be seen from the relevant maps (Figure 10.1), the Preliminary Design runs through a landscape that contains sites which represent over 6000 years of human occupation from the Neolithic period to the Industrial period of the late 19<sup>th</sup> and early 20<sup>th</sup> Centuries. The detailed archaeological and historical background of the area is included in Appendix 10.3. Cultural heritage plates referred to in the following sections are included in Appendix 10.7.

The existing environment has been considered within three main sections: archaeological heritage sub-divided into Recorded Archaeological Monuments (RMP) as registered on the Record of Monuments and Places and Areas of Archaeological Potential (AAP); Architectural Heritage, including features of industrial heritage significance (AH); and Cultural Heritage (CH).

In addition, information provided during private and public consultations has been reviewed to determine if any sites identified will be affected. The protection afforded to sites referred to in the following assessment is described in detail in Appendix 10.4.

### 10.2.1 Archaeological Heritage

#### 10.2.1.1 Recorded Archaeological Monuments (RMP)

Two RMP lie within the 100m study area. RMP 1 (DG077-029), which is located in the townland of Goland is a standing stone, which will be directly impacted on by the Preliminary Design and RMP 2 (DG077-015), also located in the townland of Goland, is a possible cashel. The 2005 test excavations determined that the 'standing stone' was in fact of no archaeological significance. A third recorded archaeological monument, RMP 3 is located approximately 32m to the south of the CPO. RMP 3 (DG086-002 01 and DG086-002 02) comprises a megalithic tomb and standing stone situated in the townland of Croaghonagh. One further recorded archaeological monument lies just over 100m from the Preliminary Design, which is RMP 4, an enclosure site (DG078-018) that is located in the townland of Mullandrait.

Details of other RMP sites found within the wider area (over 150m away) are included in Appendix 10.5.

<b>Unique No.:</b>	RMP 1 (Figure 10.1 (Sheet 2), Plates 1 and 2)
<b>Type of Feature:</b>	Possible Standing Stone
<b>Legal Protection:</b>	Yes - Recorded Monument
<b>RMP No.:</b>	DG077-029
<b>Townland:</b>	Goland Lower
<b>Field No.:</b>	64

**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 21660/39306  
**Source(s) of Information:** Record of Monuments and Places

**Distance from the edge of CPO:** 0m – Within the landtake of the Preliminary Design.

**Description:** This standing stone is situated in a ditch on the north side of the northern railway embankment of the Old Donegal Railway. It is orientated northwest-southeast and protrudes 1.4m from the base of the ditch. It measures from 0.2m-0.4m in thickness and 0.7m-0.8m in width. It is very possible that this stone may have been pulled upright as a result of clearance and levelling associated with the construction of the railway. The fields in the area immediately surrounding this stone are scattered with boulders and it is more than likely that this possible standing stone was removed from the line of the railway and is not currently resting in its original location.

**Significance:** This site is of local significance with reference being made to the need for its preservation during the public consultations held for the project. The stone will be directly impacted on by the Preliminary Design.

As a result of this potential impact, archaeological testing was carried out at this site in 2005 under licence 05E1158 (ADS Ltd Testing Report, Test Area 4). The test area covered an area of 0.24 hectares. The topsoil depth varied between 0.15-0.8m and covered a light brown clayey natural. Three drains were discovered during the testing exercise, one of which travelled beneath the standing stone. These drains are likely to be of a post medieval date, most likely associated with drainage for the adjacent railway line. The drains prove the standing stone was not erected in its current position during antiquity. The stone is likely to have been erected to simply mark the location of the drain, as other similar features are visible in the nearby area along the railway line. No features of archaeological significance were discovered during the testing exercise.

**Unique No.:** RMP 2 (Figures 10.1 (Sheet 2), Figures 10.2 and 10.4, Plates 3 and 4)  
**Type of Feature:** Enclosure (Possible Cashel)  
**Legal Protection:** Yes- Recorded Monument  
**RMP No.:** DG077-015  
**Townland:** Goland Lower  
**Field No.:** 69  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 21087/39219

**Source(s) of Information:** Record of Monuments and Places

**Distance from the edge of CPO:** 10m to feature

**Description:** Marked on the Ordnance Survey (OS) 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition map as *Lisnascado*. It is a 'D' shaped stone walled enclosure situated in fairly rocky grazing land on the north slope of the hill. The enclosure has been compromised along its north-western perimeter by the railway cutting, giving the site its 'D' shape. There are two rectangular structures (the southern structure measures 11.5m in length and 6.5m in width and the northern structure measures 9m in length and 7m in width) at the northeast perimeter of the enclosure, which are most likely sheep pens. The southwest wall of the enclosure survives to about 50cms in height. The remainder of the enclosed wall survives to a maximum height of 1.4m. There is a break in the wall in the northeast sector and again in the southern sector. It is not possible to say whether these are original or modern entrances. There are no internal features. The internal diameter of the enclosure is 18m. There is a limekiln marked in the north east of the enclosure in the 1<sup>st</sup> (1836) edition OS 6" Map (1835, SH. 77; Figure 10.2). There is no fosse surrounding the enclosure and it is suggested that this site possibly represents a medieval/post-medieval farmstead (house and animal enclosure).

**Significance:** This site is significant as it is a well-preserved recorded monument, which may date to the early medieval period. It is also of local significance and reference to its importance and need for preservation was identified during the public consultations. This RMP will be located 10m outside of the CPO and as a result there will be no direct impact at this site.

**Unique No.:** RMP 3 (Figure 10.1 (Sheet 1), Figure 10.3, Plate 36)  
**Type of Feature:** Megalithic Tomb and Standing Stones site  
**Legal Protection:** Yes - Recorded Monument  
**RMP No.:** DG086-002 01 and DG086-002 02  
**Townland:** Croaghonagh  
**Field No.:** 33  
**County:** Donegal  
**OS 6"sheet No.:** 86  
**Nat. Grid. Ref.:** 20780/39013-8

**Source(s) of Information:** Record of Monuments and Places

**Distance from the edge of CPO:** 32m

**Description:** The megalithic tomb (marked as *Giant's Bed*) and 2 standing stones are depicted on the OS 1<sup>st</sup> (1836) edition map, with only the former appearing on the OS 2<sup>nd</sup> (1906) edition map. The RMP suggests this may not be a megalithic tomb, but rather a group of standing stones. The RMP site is located in an area of blanket bog at the northeast tip of Lough Mourne. There is no visible surface trace of the megalithic tomb or standing stones. A laneway runs southeast from the existing N15 and continues around the lake, with two small concrete structures, possibly pumping stations, located on the east side of the laneway.

**Significance:** As yet unknown. However, blanket bog conditions are conducive to the preservation of archaeological material.

As a result of a possible impact, archaeological testing was carried out at this site in 2005 under licence 05E1152 (ADS Ltd Testing Report, Test Area 1). The Test Area covered an area of 0.17 hectare. The basic stratigraphy consisted of peat deposits that varied in depth from 0.3m to 2.5m, which covered a pinkish brown silty sand subsoil. Occasional deposits of bog fir and charcoal were discovered as the peat deposits deepened, which is consistent with slash and burn field clearance. No features of archaeological significance were discovered during the testing exercise. Since archaeological testing has been carried out, changes to the Preliminary Design means that this RMP will be located 32m outside of the CPO and as a result there will be no direct impact at this site.

**Unique No.:** RMP 4 (Figure 10.1, Sheet 4)  
**Type of Feature:** Enclosure site  
**Legal Protection:** Yes - Recorded Monument  
**RMP No.:** DG078-018  
**Townland:** Mullandrait  
**Field No.:** None - Outside study area  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 21614/39495

**Source(s) of Information:** Record of Monuments and Places

**Distance from the edge of CPO:** 109m

**Description:** Marked on OS 1<sup>st</sup> edition (1836) as 'fort'. Field systems in the locality have subsequently changed. Consequently, it is difficult to locate the RMP site but a slightly raised semi-circular platform may represent the remains of the site. This platform measures c. 20 – 25m in diameter.

**Significance:** This site is significant as it is a recorded monument, which may date to the early medieval period. The RMP site will not be directly impacted by the Preliminary Design.

#### 10.2.1.2 Areas of Archaeological Potential (AAP) and Stray Finds

The Preliminary Design traverses a number of areas of archaeological potential (AAP). These AAP include areas adjacent to known monuments, where the increased survival of archaeological remains may be a possibility and other topographical, landscape features or anomalies, which may indicate the presence below ground of archaeological remains.

The geographical topography can also be studied to predict areas where there is an increased probability of archaeological activity. For example the Ballybofey / Stranorlar study area contains a number of rivers including the River Finn and its numerous tributaries. River bank occupation sites have been favoured from prehistoric times for their proximity to rich food sources and are often represented by habitation sites and middens. Rivers were also important areas of activity serving as routeways, boundaries, defences and ritual sites. River banks and river beds are considered areas of high archaeological potential, containing features such as *fulachta fiadh*, fords, ancient bridging sites, mills, longphorts and other habitation sites, and also producing archaeological artefacts such as logboats, organic material or votive offerings of swords, axeheads and other archaeological finds. It is possible that archaeological material may remain *in situ* in the riverine area. Furthermore artificial water such as reservoirs may contain submerged shoreline settlements.

In addition to the River Finn crossing, there are seven streams that cross part of the Preliminary Design, plus numerous other small drainage channels. Typically, the streams measure less than 2m in width and have depths varying between 0.1m and 0.3m, except for the largest streams crossed by the Link Road (this includes Burn Daurnett, which is approximately 6m wide and 0.1-1m deep). Many of these streams form the townland boundaries and are described, where relevant in this section.

AAP may be less visible due to man made interferences such as intensive ploughing and farming activity and natural interferences such as woodland growth and weathering and erosion.

Information on artefact finds from the study area (known as Stray Finds) in County Donegal has been recorded by the National Museum of Ireland since the late 18th century. Locational information relating to these finds is important in establishing prehistoric and historic activity in the study area. A study was made of all the townlands that the Preliminary Design will pass through as well as those within the immediate vicinity. There were no stray finds recorded within sixteen of the townlands, whilst four of the townlands contained recorded finds. These are listed within Appendix 10.6.

The Preliminary Design impacts on thirty-eight areas of archaeological potential, although at 9 of these sites the impact of the construction of the Preliminary Design has been designated as imperceptible. This designation occurs where there is an increased likelihood for the occurrence and survival of sub-surface archaeological features and stray finds. AAP are illustrated in Figures 10.1 (Sheet 1-5), 10.6 and 10.7, and the Stray Finds within the study area are detailed in Appendix 10.6.

<b>Unique No.:</b>	AAP 4 (Figure 10.1 (Sheet 1), Plates 17 and 18)
<b>Type of Feature:</b>	Possible Standing Stone
<b>Legal Protection:</b>	None



**Townland:** Cashelnavean  
**Field No.:** 10 and 11  
**County:** Donegal  
**OS 6"sheet No.:** 86  
**Nat. Grid. Ref.:** 206992/389940

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 66m

**Description:** This site is located within the stone wall/field boundary located between two fields of untreated pasture, which gently slope to the south. The standing stone is the only upright stone in an irregularly coursed low stone wall and appears to have a deeper foundation than the adjoining stones. The stone measures 90cm in height, 30cm in maximum thickness and 30cm in maximum width. There is a possible *ogham* inscription along the south-eastern edge of the stone, which is very feint, and visible as a four apparent scored lines. The stone has a northwest-southeast orientation.

**Significance:** As yet unknown

**Unique No.:** AAP 5 (Figure 10.1 (Sheet 1), Plate 10)  
**Type of Feature:** Possible Cairn  
**Legal Protection:** None  
**Townland:** Cashelnavean  
**Field No.:** 22  
**County:** Donegal  
**OS 6"sheet No.:** 86  
**Nat. Grid. Ref.:** 206907/390024

**Source(s) of Information:** Aerial photograph and Field Survey

**Distance from the edge of CPO:** 107m

**Description:** This site is located in a field of untreated pasture that slopes steeply to the south. It is apparent in the field as an oval shaped area of raised differential growth (i.e. heather and moss). The highest part of this area is circular in shape and has a stone foundation, some of which is visible at the western side of the possible cairn. This stone does not appear to be burnt or heat shattered so it is unlikely to form part of a *fulacht fia*. The site is situated 12m from the western field boundary and c.40m from the edge of the land take of the Preliminary Design. It measures 17.4m east to west, 17m north-south and has a maximum height of c.3m. It is visible in the aerial photograph as an oval shaped patch of darker growth. This may represent a field clearance Cairn however its location in the centre of the field coupled with the fact the ground surrounding the site is quite unimproved may imply that this is not the case.

**Significance:** As yet unknown

**Unique No.:** AAP 6 (Figure 10.1 (Sheet 1), Plate 20)  
**Type of Feature:** Possible pre-bog wall (part of)  
**Legal Protection:** None  
**Townland:** Cashelnavean  
**Field No.:** 29  
**County:** Donegal  
**OS 6"sheet No.:** 96  
**Nat. Grid. Ref.:** 207608/390292

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 28m

**Description:** This potential site is located in the east of the field of untreated pasture that slopes gently to the south. It comprises five slabs, which are set in the ground in a linear arrangement. The possible wall measures c.1.7m in length and c.0.4m in width.

**Significance:** As yet unknown

**Unique No.:** AAP 7 (Figure 10.1 Sheet 1)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Meencrumlin / Cashelnavean  
**Field No.:** 32, 33, 34 and 35  
**County:** Donegal  
**OS 6"sheet No.:** 77, 86  
**Nat. Grid. Ref.:** 207716/390315  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This boundary comprises a north-south running stream and a low earthen bank. The stream measures c.1.2m in width and has a depth of c.20cm.  
**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 8 (Figure 10.1 Sheet 1)  
**Type of Feature:** Area of Archaeological Potential – Blanket Bog.  
**Legal Protection:** None  
**Townlands:** Meencrumlin  
**Field No.:** 36  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 208000/390522  
**Source(s) of Information:** Field Survey  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This area of archaeological potential comprises Blanket bog in Meencrumlin townland. This has an average depth of c.2m. The area of Blanket Bog that may be affected by the Preliminary Design measures c.600m in length and between 30m – 50 m in width.  
**Significance:** As yet unknown however Blanket Bog conditions are conducive to the preservation of archaeological material.

As a result of this potential impact, archaeological testing was carried out in this area in 2005 under licence 05E1153 (ADS Ltd Testing Report, Test Area 2). The Test Area covered an area of 0.78 hectares. The basic stratigraphy consisted of peat deposits that varied in depth from 0.5m to 1.95m, which covered a pinkish brown silty sand subsoil. Several modern drainage features were uncovered during testing, but nothing of archaeological significance was discovered. Since the undertaking of archaeological testing, the route of the Preliminary Design has been altered, which means a larger part of APP 8 will now be impacted on by the scheme. Therefore, further archaeological assessment will be required within this area.

**Unique No.:** AAP 9 (Figure 10.1 (Sheet 1), Plate 21)  
**Type of Feature:** Possible pre-bog wall (part of)  
**Legal Protection:** None  
**Townland:** Croghanagh  
**Field No.:** 54  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 209510/391482  
**Source(s) of Information:** Field Survey  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This possible feature is located in a field of untreated pasture that slopes gently to the north. It is currently apparent as a north-south running low bank

constructed of large limestone slabs and overgrown with mosses and grass. This wall is apparent above ground for a distance of c.35m where it is c.0.8m in average width and 0.3m in height.

**Significance:** As yet unknown

As a result of this potential impact, archaeological testing was carried out at this site in 2005 under licence 05E1159 (ADS Ltd Testing Report, Test Area 3). The Test Area covered an area of 0.72 hectares. The basic stratigraphy consisted of topsoil that varied in depth from 0.25m to 1.4m. A total of nine modern field drains were identified as crossing the test area, which appear to be associated with a lazy bed system within this area. The wall identified as AAP 9 was identified as a drainage ditch that had been subsequently filled with stones of varying sizes. No features of archaeological significance were discovered at this site.

**Unique No.:** AAP 10 (Figure 10.1 Sheet 1)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Croghanagh / Goland  
**Field No.:** 55  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 209955/391621  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** The original defining line of this boundary has been destroyed and replaced by a coniferous forestry plantation.  
**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 11 (Figure 10.1 (Sheet 1) and 10.7)  
**Type of Feature:** Circular Cropmark  
**Legal Protection:** None  
**Townland:** Croghonagh  
**Field No.:** 56  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 210230/319734  
**Source(s) of Information:** Aerial Photograph  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This possible feature is located in an area of dense coniferous forestry that slopes gently to the north. As the tree growth is very thick and the field is inaccessible in many places, it was impossible to distinguish any features at ground level. It is apparent in the aerial photographs as a circular cropmark, c.35m in diameter.  
**Significance:** As yet unknown

**Unique No** AAP 12 (Figure 10.1 Sheet 2)  
**Type of Feature:** Possible post-medieval field system  
**Legal Protection:** None  
**Townland:** Goland Lower  
**Field No.:** 67 and 71  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 211216/392373  
**Source(s) of Information:** Field Survey

**Distance from the edge of CPO: 10m**

**Description:** This possible site is located in two adjoining fields of improved pasture, which slope very gently to the north. Together, these fields are broadly triangular in shape and are bounded along the south and west by stone walls and trees, along the north by the dismantled railway line and along the east by a line of trees. There are lazy-beds in the site within the fields and these have a north-south orientation with clearly defined drains.

**Significance:** This site serves as an example of post-medieval farming practices in this area.

**Unique No.:** AAP 13 (Figure 10.1 Sheet 2)  
**Type of Feature:** Possible post-medieval field system  
**Legal Protection:** None  
**Townland:** Goland Lower  
**Field No.:** 73  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 211132/392295

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This site comprises a small triangular field of improved pasture that slopes gently to the north. It is bound on the south and west by a stone wall and along the east by a drainage ditch. There are traces of lazy-beds within the field. These have a north - south orientation. It was intended to archaeological test this site under Test Area 5 but access during 2005 was not granted and as a result this work will be carried out at a later date.

**Significance:** This site serves as an example of post-medieval farming practices in this area.

**Unique No.:** AAP 14 (Figure 10.1 Sheet 2)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Goland / Carrickmagrath  
**Field No.:** 91  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 211783/392597

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** The original boundary has been destroyed and ploughed out.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 15 (Figure 10.1 (Sheet 2), Plate 22)  
**Type of Feature:** Possible pre-bog wall  
**Legal Protection:** None  
**Townland:** Carrickmagrath  
**Field No.:** 93  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 211832/392640

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This possible feature is located in a field of unimproved pasture that slopes gently to the north. It comprises a stone wall that is collapsed in places and has a foundation depth below present ground level. It is constructed of limestone slabs and runs in an east-west direction along and inside the southern boundary of Field 93. It survives to a maximum height of 0.7m, is on average 0.4m in thickness and extends for a distance of c.45m.

**Significance:** As yet unknown

**Unique No.:** AAP 16 (Figure 10.1 (Sheet 2), Plate 23)  
**Type of Feature:** Spring well known locally as a 'Fairy Well'  
**Legal Protection:** None  
**Townland:** Carrickmagrath  
**Field No.:** 100  
**County:** Donegal  
**OS 6"sheet No.:** 77  
**Nat. Grid. Ref.:** 212309/392816

**Source(s) of Information:** Field survey and landowner

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This site is located in an area of forestry, comprising both native tree species and planted (coniferous) sitka spruce that slopes gently to the north west. In the south west of the field and immediately north of the railway is a water source known locally as a 'Fairy Well' (*pers. comm. landowner*). This consists of a large limestone outcrop (fairy rock) from under which flows a south/north running stream. A well, c.0.5m deep, has been constructed at the point where the stream flows out under the north face of the outcrop. This is currently used as a water source for livestock.

**Significance:** The site may have local significance.

**Unique No.:** AAP 17 (Figure 10.1 Sheet 3)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Carrickmagrath / Sessiagh O' Neill  
**Field No.:** 115, 116, 117 and 118  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 213141/393003

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This boundary comprises a north-south running stream which itself is bounded by banks and chain fencing. The stream is fast-flowing and measures c.2m in width and c.20cm in depth.

**Significance:** This boundary is of local significance and serves to define a feature of the local historic landscape.

**Unique No.:** AAP 18 (Figure 10.1 Sheet 3)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Sessiagh O' Neill / Navenny  
**Field No.:** 126, 127 and 128  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 213910/393387

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This boundary comprises a north-south running stream. The stream is situated c.2m below surrounding ground level and the banks of the stream slope steeply towards the water. The stream itself is fast flowing and measures c.1.2m in width and c. 25cm in depth.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 19 (Figure 10.1 Sheet 3)

**Type of Feature:** Historic Townland Boundary

**Legal Protection:** None

**Townlands:** Navenny / Ballybofey

**Field No.:** 241 and 242

**County:** Donegal

**OS 6"sheet No.:** 78

**Nat. Grid. Ref.:** 214131/394042

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This boundary comprises an east-west running stream that is bounded by deciduous trees. The stream is situated c.1m below surrounding ground level and measures c. 2m in width and c.50cm in depth.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 20 (Figure 10.1 Sheet 3)

**Type of Feature:** Historic Townland Boundary

**Legal Protection:** None

**Townlands:** Navenny / Dreenan

**Field No.:** 144, 148 and 149.

**County:** Donegal

**OS 6"sheet No.:** 78

**Nat. Grid. Ref.:** 214978/393593

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This boundary is demarcated by a low earthen bank that has been planted with deciduous native tree species.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 21 (Figure 10.1 (Sheet 3), Plate 25)

**Type of Feature:** Mound

**Legal Protection:** None

**Townland:** Dreenan

**Field No.:** 154

**County:** Donegal

**OS 6"sheet No.:** 78

**Nat. Grid. Ref.:** 215299/393721

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This mound feature is located at the northern end of a field of undulating open pasture. It comprises a circular mound (c.20m in diameter, max. height of 2.5m) on which stones have been placed (possible as a result of field clearance). There is dense furze growth on the mound.

**Significance:** As yet unknown. This may be a natural topographic feature augmented by field clearance activity.

**Unique No.:** AAP 22 (Figure 10.1 Sheet 3)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Dreenan / Edenmore  
**Field No.:** 165/166  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 215959/394143

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This boundary is situated in an area of deciduous forestry and is therefore not immediately apparent at ground level.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 23 (Figure 10.1 (Sheet 3), Plate 26)  
**Type of Feature:** Possible standing stone  
**Legal Protection:** None  
**Townland:** Dreenan / Edenmore  
**Field No.:** 166  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 215991/394250

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This possible standing stone is located in a forested area to the west of Edenmore Road heading upslope into Dreenan Townland. There are several large erratic boulders within the area. This stone is located c.30m west of the townland boundary. It measures 0.6m in width, 0.5m in height and 0.25m in thickness and has a very flat top.

**Significance:** As yet unknown. There are a number of large, naturally occurring erratics in the area and at this stage it cannot be said with certainty that this stone is of any archaeological significance.

**Unique No.:** AAP 24 (Figure 10.1 (Sheet 3), Plate 27)  
**Type of Feature:** Possible Mound  
**Legal Protection:** None  
**Townland:** Edenmore  
**Field No.:** 169  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 216237/391598

**Source(s) of Information:** Field Survey

**Distance from the edge of CPO:** 9m

**Description:** This site comprises a low mound situated in the southeast corner of a field of improved pasture. The possible mound measures c.6m in maximum diameter and c.0.3m in maximum height.

**Significance:** As yet unknown. There is a strong possibility that this is a natural topographic feature of no archaeological significance.

**Unique No.:** AAP 25 (Figure 10.1 (Sheet 3), Plate 31)  
**Type of Feature:** River Crossing and Historic Townland Boundary.  
**Legal Protection:** No  
**Townland:** Edenmore / Mullandrait  
**Field No.:** 170/171  
**County:** Donegal  
**OS 6"sheet No.:** 78  
**Nat. Grid. Ref.:** 216334/394842  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This area of archaeological potential encompasses the location where the Preliminary Design crosses the River Finn. The width of the River Finn at this point is c.35m. In the Office of Public Works (OPW) Drainage Files there is no record of drainage work having been undertaken at this location.

**Significance:** As yet unknown. However, the potential impact of rivers on the recovery of archaeological remains is recognised and appropriate mitigation is proposed (Section 10.4).

**Unique No.:** AAP 26 (Figure 10.1 Sheet 4)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Mullandrait / Castlebane  
**Field No.:** 154, 186 and 187  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216515/395753  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This Townland Boundary comprises a low earthen bank and trees.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 27 (Figure 10.1 Sheet 5)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Castlebane / Knockfair  
**Field No.:** 197 and 198  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216582/396695  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This Townland Boundary comprises a low earthen bank and trees.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 28 (Figures 10.1 Sheet 5)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Knockfair / Mullaghagarry  
**Field No.:** 198 and 199  
**County:** Donegal



**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216594/396839  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This Townland Boundary is demarcated by the edge of a forest of deciduous trees.  
**Significance:** Boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 29 (Figures 10.1 (Sheet 5) and 10.6)  
**Type of Feature:** Former Gravel Pit  
**Legal Protection:** None  
**Townland:** Mullaghagarry  
**Field No.:** 201  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216615/397135  
**Source(s) of Information:** 2<sup>nd</sup> (1906) edition OS 6"map Sheet No 69  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This site is located in a field of improved pasture that slopes gradually to the south. The area of the former gravel pit is currently visible as a circular patch of differential growth.  
**Significance:** This site serves as an example of late 19<sup>th</sup> Century and early 20<sup>th</sup> Century industrial practices in this area.

**Unique No.:** AAP 30 (Figure 10.1 (Sheet 5), Plate 28)  
**Type of Feature:** Possible Standing Stone  
**Legal Protection:** None  
**Townland:** Mullaghagarry  
**Field No.:** 204  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216650/397533  
**Source(s) of Information:** Field Survey  
**Distance from the edge of CPO:** 10m to possible standing stone.  
**Description:** This site is located in an area of dense wild vegetation and undergrowth that slopes gradually to the south. It is situated c.8-10m west of the north-eastern boundary of the field and c.30m from the southern boundary. The stone measures 1.4m in height and 1m in maximum thickness. It is orientated with its long axis east-west. There are two sub-rectangular holes cut into the east side of the stone, the highest is 0.6m from the ground and is 0.05m deep, the lower of the two is 0.45m from the ground and is 0.12m deep. The stone is irregular in shape with no smoothed corner or markings.  
**Significance:** As yet unknown

**Unique No.:** AAP 31 (Figure 10.1 (Sheet 5), Plate 32)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Mullaghagarry / Tircallan  
**Field No.:** 205, 206 and 207  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216672/397571

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This Townland is demarcated by a stone wall planted with deciduous trees.

**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 32 (Figure 10.1 (Sheet 5), Plate 11)

**Type of Feature:** Circular Cropmark

**Legal Protection:** None

**Townland:** Tircallan

**Field No.:** 209

**County:** Donegal

**OS 6"sheet No.:** 69

**Nat. Grid. Ref.:** 216720/397802

**Source(s) of Information:** Aerial Photographs and Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This potential site is located in a gently undulating field of improved pasture. The ground slopes to the west at its eastern side, is fairly level at its centre and slopes steeply to the west at its western edge. There is a Whitethorn tree in the north of the field. c. 80m south of the northern boundary of the field is a small circular area of differential growth (c.11m in diameter), which is visible in the aerial photographs as a circular cropmark.

**Significance:** As yet unknown

As a result of this potential impact, archaeological testing was carried out at this site in 2005 under licence 05E1156 (ADS Ltd Testing Report, Test Area 6). The Test Area covered an area of 1.3 hectares. The basic stratigraphy consisted of topsoil with an average depth of 0.3m that covered a silty subsoil. Several modern drainage features, plough furrows and an old field boundary were uncovered during testing, but nothing of archaeological significance was discovered.

**Unique No.:** AAP 33 (Figure 10.1 (Sheet 5), Plate 12)

**Type of Feature:** Possible Boreen

**Legal Protection:** None

**Townland:** Tircallan

**Field No.:** 209

**County:** Donegal

**OS 6"sheet No.:** 69

**Nat. Grid. Ref.:** 216720/397802

**Source(s) of Information:** Aerial Photographs, Field Survey and 1<sup>st</sup> (1836) edition (1836) OS 6"map

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This site is located in a gently undulating field of improved pasture. The ground slopes to the west at its eastern side, is fairly level at its centre and slopes steeply to the west at its western edge. There is a Whitethorn tree in the north of the field. Running along the northeast and northern boundaries of the field is an ordered foundation of level stones, raised c.0.3-0.4m above ground level and measuring c.0.6m in width. This extends for a length of c.125m. This may be the old pathway or boreen depicted in an area of forestry in the first (1836) edition OS 6" Map of the area.

**Significance:** As yet unknown

**Unique No.:** AAP 34 (Figure 10.1 Sheet 5)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Tircallan / Kilross  
**Field No.:** 209 and 211  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216670/397902  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This Townland Boundary comprises a stone wall and trees.  
**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 35 (Figure 10.1 (Sheet 5), Plate 29)  
**Type of Feature:** Possible mound  
**Legal Protection:** None  
**Townland:** Kilross  
**Field No.:** 214  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216612/398194  
**Source(s) of Information:** Field survey  
**Distance from the edge of CPO:** 36m  
**Description:** This site is located in a field of unimproved pasture, which is level at its highest point and from this, slopes to all sides. There is a large (c.60m in maximum diameter) sub-circular mound situated at the highest point of the field. The top of the mound (c.2m in maximum height) is quite level and breaks away steadily on all sides. AAP 33 forms the north-eastern boundary of this field.  
**Significance:** As yet unknown

**Unique No.:** AAP 36 (Figure 10.1 (Sheet 5), Plate 13)  
**Type of Feature:** Curvilinear Field Boundary  
**Legal Protection:** None  
**Townland:** Kilross  
**Field No.:** 214  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216620/398221  
**Source(s) of Information:** Aerial photographs and Field Survey  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This potential site is located in a field used for cereal cultivation that slopes steeply to the north. The site comprises an earthen bank (c.1.2m in height) forming a well-pronounced semi-circular shape in the northern and eastern boundary of the field and has a maximum diameter of c.70m. It was intended to archaeological test this site under Test Area 7 but access during 2005 was not granted and as a result this work will be carried out at a later date.  
**Significance:** As yet unknown.

**Unique No.:** AAP 37 (Figure 10.1 Sheet 5)  
**Type of Feature:** Cropmark  
**Legal Protection:** None  
**Townland:** Kilross  
**Field No.:** 216

**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216620/398221

**Source(s) of Information:** Aerial photographs and Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This potential feature is located in a field used for cereal cultivation that slopes steeply to the north. This site was identified in the aerial photographs as an irregularly shaped cropmark. It is apparent in the northeast of the field as a circular raised area with a flat top (c.0.3m above surrounding ground level and 40m in diameter).

**Significance:** As yet unknown.

**Unique No.:** AAP 38 (Figure 10.1 (Sheet 5), Plate 30)  
**Type of Feature:** Raised earthen platform  
**Legal Protection:** None  
**Townland:** Kilross  
**Field No.:** 224  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216421/398586

**Source(s) of Information:** 1<sup>st</sup> (1836) edition OS 6"map and field survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This area of archaeological potential is located in a gently undulating field of unimproved pasture that slopes gently to the northwest. This potential site measures c.30m in diameter, 0.3m in maximum height and is situated c.30m south east of AAP 39 (see below). This forms one of two dry areas (with AAP 39) in an otherwise wet and boggy field.

**Significance:** As yet unknown.

As a result of this potential impact, archaeological testing was carried out at this site and AAP 39 in 2005 under licence 05E1154 (ADS Ltd Testing Report, Test Area 8). AAP 38 and 39 covered a combined area of 0.18 hectares. The basic stratigraphy consisted of topsoil with an average depth of 0.3m that covered a silty subsoil. Several modern drainage features were uncovered during testing, but nothing of archaeological significance was discovered at AAP 38.

**Unique No.:** AAP 39 (Figure 10.1 Sheet 5)  
**Type of Feature:** Raised earthen platform  
**Legal Protection:** None  
**Townland:** Kilross  
**Field No.:** 224  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216421/398586

**Source(s) of Information:** 1<sup>st</sup> edition (1836) OS 6"Map and Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This area of archaeological potential is located in a gently undulating field of unimproved pasture that slopes gently to the northwest. AAP 39 is located in the north east corner of the field and comprises a broadly circular raised platform, c.30m in diameter and 0.3m in maximum height. This forms one of two dry areas (with AAP 38) in an otherwise wet and boggy field.

**Significance:** As yet unknown.

As a result of this potential impact, archaeological testing was carried out at this site and AAP 38 in 2005 under licence 05E1154 (ADS Ltd Testing Report, Test Area 8).

The Test Area incorporating AAP 38 and 39 covered a combined area of 0.18 hectares. The basic stratigraphy consisted of topsoil with an average depth of 0.3m that covered a silty subsoil. Several modern drainage features were uncovered during testing, but nothing of archaeological significance was discovered at AAP 39.

**Unique No.:** AAP 40 (Figure 10.1 Sheet 5)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Kilross / Lisnaree  
**Field No.:** 211, 219 and 220  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**Nat. Grid. Ref.:** 216465/398578  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This Townland Boundary is located in an area of deciduous forestry and is not immediately apparent at ground level.  
**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

**Unique No.:** AAP 41 (Figure 10.1 Sheet 5)  
**Type of Feature:** Historic Townland Boundary  
**Legal Protection:** None  
**Townlands:** Lisnaree / Teevickmoy  
**Field No.:** 224, 225 and 226  
**County:** Donegal  
**OS 6"sheet No.:** 69  
**55Nat. Grid. Ref.:** 216432/398659  
**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Maps and other maps of the area.  
**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.  
**Description:** This Townland Boundary is demarcated by a low earthen bank and trees.  
**Significance:** This boundary is of local significance as it serves to define a feature of the local historic landscape.

## 10.2.2 Architectural Heritage (AH)

There are eight sites of Architectural Heritage significance, including features of industrial heritage interest within the 100m study area, two of which are listed in the draft National Inventory of Architectural Heritage (NIAH).

**Unique No.:** AH 1 (Figures 10.1 (Sheet 1-4), Plates 14 and 15)  
**Type of Feature:** Disused Railway Line  
**Legal Protection:** None  
**Townland:** Cashelnavean, Meencrumlin, Croghanagh, Goland Upper, Goland Middle, Carrickmagrath, Sessiagh O' Neill, Navenny and Mullandrait  
**Field No.:** 2,5,7-12, 31-37, 40, 44, 47-55, 58, 60-74, 76-77, 99-108, 110-114, 121-123,172-173.  
**County:** Donegal  
**OS 6"sheet No.:** 69, 77, 78, 86,  
**Source(s) of Information:** 2<sup>nd</sup> (1906) edition OS Map and Field Survey.  
**Distance from the edge of CPO:** 0m – sections are located within land take of the Preliminary Design.

**Description:** AH 1 comprises the line of the disused Donegal Railway constructed between 1863 and 1891. Where extant, the line comprises a raised level linear area, c.8m in width, which slopes steeply at either side. It is bordered by stone walls and earthen banks, which have been planted with native tree species. There are numerous field drains and streams running underneath the railway line which have been accommodated through the construction of stone drains/conduits, most of which are still apparent. The remains of one level crossing lie extant in Croghanagh and there is no trace of that depicted in the 2<sup>nd</sup> edition OS map in Carrickmagrath townland. At least two railway bridges were extant along the line of the Preliminary Design during the period where field inspection was undertaken as part of this assessment, one in Croghanagh and the other at Carrickmagrath / Sessiagh O'Neill. However, the bridge at Croghanagh was found to have been destroyed during 2006. Dotted along the line of the disused railway are a number of vernacular gateposts. They are of limestone, and measure c.1.5m in height, square in section (c. 0.2m in width) with chiselled faces and pointed tops.

**Significance:** This site has local significance.

**Unique No.:** AH 3 (Figure 10.2 (Sheet 1) and 10.3, Plate 19)  
**Type of Feature:** Vernacular Architecture  
**Legal Protection:** None  
**Townland:** Cashelnavean  
**Field No.:** 25  
**County:** Donegal  
**OS 6"sheet No.:** 86  
**Nat. Grid. Ref.:** 207332/390135

**Source(s) of Information:** 1<sup>st</sup> (1836) edition OS 6" Map, sheet no. 86

**Distance from the edge of CPO:** To the immediate north of the Preliminary Design.

**Description:** This site is situated immediately inside a field boundary on the northern side of the existing N15 and comprises a largely collapsed vernacular house. Three walls (the west (1.4m high), north (0.4m-1.5m high) and east (0.4m high)) survive of the original dwelling and there is a trace of a central dividing wall. The walls are of dry stone construction and are irregularly coursed. The west wall of the house appears to have formed the east wall of an outbuilding as debris to the west of this possibly indicated the presence of another building. There is no remaining evidence of doors or windows within either structure.

**Significance:** This site serves as an example of 19<sup>th</sup> Century vernacular architecture in this area.

**Unique No.:** AH 4 (Figure 10.1 Sheet 1)  
**Type of Feature:** Vernacular Architecture  
**Legal Protection:** None  
**Townland:** Croghanagh  
**Field No.:** 37  
**County:** Donegal  
**OS 6"sheet No.:** 86/77  
**Nat. Grid. Ref.:** 208290/390518

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" Map and Field Survey

**Distance from the edge of CPO:** 55m

**Description:** This site is located in an area of coniferous forestry that slopes gently to the north. It comprises a single story dwelling and two outhouses. The dwelling house is of dry stone (limestone) construction and has a central doorway (facing east) with windows at either side. The house is wider at its southern end and there is one window at the rear (west). It is a two roomed structure with a central divide north of the doorway. The fireplace and chimney are located in the south wall. All four walls survive

to their original height however no evidence of the roof remains. There are the collapsed remains of two walls, which possibly formed part of a lean-to structure, against the north wall of the house. Immediately north of this are the collapsed remains of a small square outhouse. To the rear and south of the dwelling house is a three-roomed outhouse. This is also of dry stone construction and there is no remaining evidence of windows or a roof. A stone walled laneway extends from south of the house.

**Significance:** This site serves as an example of 19<sup>th</sup> Century vernacular architecture in this area.

**Unique No.:** AH 5 (Figure 10.1 (Sheet 3) and 10.5, Plate 24)

**Type of Feature:** Vernacular Architecture

**Legal Protection:** None

**Townland:** Sessiagh O' Neill

**Field No.:** 126

**County:** Donegal

**OS 6" sheet No.:** 78

**Nat. Grid. Ref.:** 213851/393257

**Source(s) of Information:** 1<sup>st</sup> (1836) edition OS 6" Map and Field Survey

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This site is located in a small wooded area in the southwest part of an undulating field otherwise devoted to improved pasture. All that remains of the building structure is a north-south running line of a foundation wall c. 8.0m in length and 0.2m in height. This area also contains numerous rocks deposited there probably as a result of field clearance.

**Significance:** This site serves as an example of 19<sup>th</sup> Century vernacular architecture in this area, being the probable remains of a farmstead.

**Unique No.:** AH 6 (Figures 10.1 (Sheet 3) and 10.5)

**Type of Feature:** Site of Millpond

**Legal Protection:** None

**Townland:** Dreenan

**Field No.:** 147

**County:** Donegal

**OS 6" sheet No.:** 78

**Nat. Grid. Ref.:** 215033/393645

**Source(s) of Information:** 2<sup>nd</sup> edition (1906) OS 6" Map

**Distance from the edge of CPO:** 10m

**Description:** There is no visible evidence of this Millpond depicted on the 1906 2<sup>nd</sup> edition OS 6" Map. The site is a field of unimproved pasture, sloping to the south.

**Significance:** This site serves as an example of industrial practices in this area during the later 19<sup>th</sup> and early 20<sup>th</sup> Centuries.

**Unique No.:** AH 7 (Figures 10.1 (Sheet 3) and 10.5)

**Type of Feature:** Possible Vernacular Architecture site

**Legal Protection:** None

**Townland:** Dreenan

**Field No.:** 159

**County:** Donegal

**OS 6" sheet No.:** 78

**Nat. Grid. Ref.:** 215670/393820

**Source(s) of Information:** 1<sup>st</sup> (1836) edition OS 6" Map

**Distance from the edge of CPO:** 0m – within land take of the Preliminary Design.

**Description:** This possible site, identified from documentary sources only, is located in a field of unimproved pasture that slopes moderately to the north. It is apparent on the

1<sup>st</sup> edition OS map as a dwelling house. However the vegetation at the site was too dense at the time of the field inspection to discern any upstanding features.

**Significance:** This site serves as a possible example of 19<sup>th</sup> vernacular architecture in this area.

**Unique No.:** AH 8 (Figures 10.1 (Sheet 4) and 10.5, Plates 5, 6, 33, 34 and 35)

**Type of Feature** Edenmore House and Estate

**Legal Protection:** Protected Structure listed in County Development Plan 2006-2012

**National Inventory of Archaeological Heritage (NIAH) No.:** DG 40907813

**Townland:** Edenmore

**Field No.:** 167-170, 243

**County:** Donegal

**OS 6"sheet No.:** 78

**Nat. Grid. Ref.:** 216386/394568

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" map, NIAH.

**Distance from the edge of CPO:** 0m (Estate) 110m (House)

**Description:** Edenmore House (dating from between 1770 – 1810) lies 1.5km east of Ballybofey on the south bank of the River Finn. It is harled and whitewashed and consists of two storeys with a central canted bay. It has long flanking wings screening the yards behind and ending in canted bay pavilions. There are a number of associated outhouses and farm buildings. There is an area of deciduous forestry to the rear (north) of Edenmore House, which appears to be a remnant example of demesne landscaping. A row of tall, mature deciduous trees forms the southwestern and western boundary of the estate as far as the outhouses and farm buildings. To the north of these buildings the boundary consists of low hedging, which is sparse in places and interspersed with small trees. There were no extant estate walls or gateways along these field boundaries. The current Land Ownership plans indicate that the original demesne of Edenmore (as depicted on the 1836 1<sup>st</sup> edition OS 6" Map in Figure 10.5) has been fragmented and is currently owned by at least three separate individuals.

**Significance:** In the Draft National Inventory of Architectural Heritage Edenmore House is afforded regional significance. The building is also afforded regional significance within the County Development Plan (2006-2012) where it is listed as a Protected Structure.

**Unique No.:** AH 9 (Figures 10.1 (Sheet 5) and 10.6, Plates 7 and 8)

**Type of Feature:** Tircallan House and Estate

**Legal Protection:** None

**NIAH No.:** DG 40906914

**Townland:** Tircallan

**Field No.:** 207-209, 211

**County:** Donegal

**OS 6"sheet No.:** 69

**Nat. Grid. Ref.:** 216517/397545

**Source(s) of Information:** 1<sup>st</sup> (1836) and 2<sup>nd</sup> (1906) edition OS 6" map, NIAH.

**Distance from the edge of CPO:** 0m (estate) 103m (house)

**Description:** Tircallan House (dating from between 1790 – 1820) lies approximately 3km to the north east of Stranorlar. It is a five bay, single storey shooting lodge built about 1800 by Sir Henry Stewart, who also had an observatory there. Originally, the area of forestry surrounding the building may have served as a hunting estate. This forestry is now under the management of Coillte. Substantial sections of the estate to the west of the shooting lodge have been sold for private housing. Land Ownership plans of the area indicate that the original demesne of Tircallan (Figure 10.6) has been fragmented and is currently owned by at least five separate individuals.



**Significance:** In the Draft National Inventory of Architectural Heritage (DG 40906914), Tircallan House is afforded regional significance.

### 10.2.3 Cultural Heritage

The archives of the Department of Irish Folklore were consulted to obtain information relating to the cultural heritage of the study area. Examination of Volumes 1095 and 1096 of the Schools Collection (1937-8), relating to the Parish of Stranorlar in the Barony of Raphoe, produced no information relevant to the cultural heritage of the study area. Manuscripts 684, 904, 1854, 1857 and 1881 from the general archive also failed to produce any information relevant to the cultural heritage of the study area.

### 10.2.4 Sites Identified through Private Consultations

One local historian and member of the Donegal Historical Society, who was consulted, made reference to a number of historical sites within the study area. The information retrieved from these private consultations supported information identified during the course of research and field investigation.

### 10.2.5 Sites Identified through Public Consultations

During the course of the Constraints Study (McCarthy Hyder Consultants, 2000) and subsequent Route Selection Study (McCarthy Hyder Consultants, 2001) two public consultations were held in Ballybofey / Stranorlar (Chapter 2.0). With respect to the architectural and archaeological heritage, the public referred to a number of sites of archaeological and historical importance with general concern voiced about their possible destruction or damage by road construction. The majority of these sites have been identified previously and are dealt with in the body of this assessment.

Information was provided in relation to 'ruines' at Carrickmagrath. Field investigation of the area failed to produce any evidence of these 'ruines'. It is possible that the information provided refers to the archaeological sites at Goland or the 'Fairy Well' (AAP 16) identified (with the help of the landowner) in Carrickmagrath. Information was also provided in relation to a mass rock. Again field assessment and discussions with landowners failed to identify this site. It is suggested that this may refer to the 'Fairy Rock' (AAP 16) in Carrickmagrath townland, which may possibly have been used as a mass rock during penal times.

During the public consultations, concern was expressed regarding damage to recorded monuments RMP1 and RMP2, the dismantled Railway line (AH 1) and Edenmore House and Gardens (AH 8).

## 10.3 Assessment of Potential Effects: Construction and Operation

Any effects on sub-ground archaeological features will only be caused by construction activities. Operation of the road will only affect nearby remains in terms of their setting.

The Preliminary Design will reduce traffic volumes on the existing N15 and N13. The reduction in traffic will lead to a moderate beneficial impact for the buildings listed on the NIAH sited on the existing road.

**Table 10.2 Assessment of Potential Impacts: Construction and Operation**

Unique No.	Type of Feature	Assessment of Potential Impact: Construction	Assessment of Potential Impact: Operation
RMP 1	Possible standing stone	Imperceptible Impact. The site has been subject to archaeological testing, which has found that the stone is non-archaeological and that nothing of archaeological significance is present within the RMP designation.	Imperceptible impact
RMP 2	Enclosure (Possible Cashel)	Slight impact	Slight impact
RMP 3	Megalithic tomb and standing stones site	Imperceptible impact due to alteration in the CPO. The area within the original CPO, adjacent to the RMP site was tested but nothing of archaeological significance was noted.	Imperceptible impact
RMP 4	Enclosure Site	Imperceptible Impact	Imperceptible Impact
AAP 4	Possible standing stone	Imperceptible impact	Imperceptible impact
AAP 5	Possible cairn	Imperceptible impact	Imperceptible impact
AAP 6	Possible pre-bog wall (part of)	Imperceptible impact	Imperceptible impact.
AAP 7	Historic townland boundary	Moderate impact	Imperceptible impact.
AAP 8	Area of archaeological potential – Blanket bog	Moderate impact Part of this area has already been subject to archaeological testing and nothing of archaeological significance was found. However, due to subsequent changes in the CPO a larger part of this AAP will now be impacted on, which will require further archaeological assessment.	Imperceptible impact
AAP 9	Possible pre-bog wall (part of)	Imperceptible Impact The area has been subject to archaeological testing and nothing of archaeological significance was found within the Test Area.	Imperceptible impact.
AAP 10	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 11	Circular cropmark	Potential profound impact	Imperceptible impact
AAP 12	Possible post-medieval field system	Imperceptible impact	Imperceptible impact
AAP 13	Possible post-medieval field system	Moderate impact	Imperceptible impact
AAP 14	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 15	Possible pre-bog wall	Slight adverse impact	Imperceptible impact
AAP 16	Spring well, known locally as a 'Fairy Well'	Profound impact	Imperceptible impact

Unique No.	Type of Feature	Assessment of Potential Impact: Construction	Assessment of Potential Impact: Operation
AAP 17	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 18	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 19	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 20	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 21	Mound	Potential profound impact	Imperceptible impact
AAP 22	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 23	Possible standing stone	Potential profound impact	Imperceptible impact
AAP 24	Possible mound	Slight impact	Imperceptible impact
AAP 25	River crossing and Historic townland boundary	Moderate impact	Imperceptible impact
AAP 26	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 27	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 28	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 29	Former gravel pit	Significant impact	Imperceptible impact
AAP 30	Possible standing stone	Potential profound impact	Imperceptible impact
AAP 31	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 32	Circular cropmark	Imperceptible Impact The area has been subject to archaeological testing and nothing of archaeological significance was found within the Test Area.	Imperceptible impact
AAP 33	Possible boreen	Moderate impact	Imperceptible impact
AAP 34	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 35	Possible mound	Imperceptible impact	Imperceptible impact
AAP 36	Curvilinear field boundary	Potential significant impact	Imperceptible impact
AAP 37	Cropmark	Moderate impact	Imperceptible impact
AAP 38	Raised earthen platform	Imperceptible Impact The area has been subject to archaeological testing and nothing of archaeological significance was found within the Test Area.	Imperceptible impact
AAP 39	Raised earthen platform	Imperceptible Impact The area has been subject to archaeological testing and nothing of archaeological significance was found	Imperceptible impact

Unique No.	Type of Feature	Assessment of Potential Impact: Construction	Assessment of Potential Impact: Operation
		within the Test Area.	
AAP 40	Historic townland boundary	Moderate impact	Imperceptible impact
AAP 41	Historic townland boundary	Moderate impact	Imperceptible impact
AH 1	Disused railway line	Significant impact on those sections of AH 1 which lie within the route corridor	Moderate impact
AH 3	Vernacular architecture	Moderate impact	Imperceptible impact
AH 4	Vernacular architecture	Imperceptible impact	Imperceptible impact
AH 5	Vernacular architecture	Significant impact	Imperceptible impact
AH 6	Site of millpond	Slight impact	Imperceptible impact
AH 7	Possible vernacular architecture site	Significant impact	Imperceptible impact
AH 8	Edenmore House and Estate	There will be a slight impact. The Preliminary Design impacts on a small portion of the historic attendant grounds of the estate, the character of which has changed since its foundation. The present field boundaries comprise modern fencing and/or hedging and this section of the estate comprises open fields with no extant estate walls or original boundaries. The fact that the attendant grounds have been fragmented through multiple ownership and land use change to an extent that they may be deemed to no longer represent an intact, historic landscape entity considerably lessens any adverse impact	Imperceptible impact
AH 9	Tircallan House and Estate	There will be a slight impact. The proposed road development impacts on the historic attendant grounds of the estate, the character of which has changed substantially since its foundation. The fact that the attendant grounds have been fragmented through multiple ownership, land use change and development to an extent that they may be deemed to no longer represent an intact, historic landscape entity considerably lessens any adverse impact	Imperceptible impact

### 10.3.1 Summary

The landscape through which the Preliminary Design traverses contains sites dating from the Neolithic through to the late industrial period. A field inspection along the corridor of the Preliminary Design and the 100m wide study area that the scheme is located within, has confirmed the location of four recorded archaeological monuments (RMP 1, RMP 2, RMP 3 and RMP 4). RMP 1 lies within the landtake of the Preliminary Design and RMP 2 lies 10m to the south. RMP 3 lies 32m to the southeast of the CPO of the Preliminary Design, whilst RMP 4 lies just outside the study area. RMP 3 and RMP 4 will not be directly impacted by the scheme.

A further 38 areas of archaeological potential were identified through aerial photography, cartographic analysis and field assessment and 29 of these will be adversely affected by the construction of the Preliminary Design, whilst 9 sites will only be imperceptibly impacted upon. These sites include circular cropmarks, several possible standing stones, and historic townland boundaries. In some areas, particularly the Coillte owned lands in Croghanagh and Golland townlands, the tree growth was extremely dense which precluded field inspection of those areas. However, with the ground disturbance associated with forest planting, it is expected that any sites within these areas will have had considerable damage caused to them at the time of planting. Where relevant, this has been noted in the Inventory of Areas of Archaeological Potential (Section 10.2.1.2).

As a result of the assessment of potential impacts on the possible archaeological resource, it was decided that a limited program of archaeological testing should be carried out on some of the sites. Testing was undertaken in 2005 by ADS Ltd under licence to the Department of Environment, Heritage and Local Government. Six test areas were investigated, which included RMPs 1 and 3 and AAP 8, 9, 32, 38 and 39. Nothing of archaeological significance was discovered within any of these Test Areas and the RMP (RMP 1) being directly impacted on by the Preliminary Design has been determined to be of no archaeological significance. It should be noted that changes to the route of the Preliminary Design, which took place after the archaeological testing, has meant that a larger part of AAP 8 will now be impacted on by the proposed route. Nothing of archaeological significance was discovered within this area when it underwent testing in 2005. Due to those changes, RMP 3 is now located outside of the proposed CPO and will not be impacted on by the Preliminary Design.

Two of the architectural heritage sites identified are 18<sup>th</sup> Century houses (AH 8 Edenmore and AH 9 Tircallan Houses) and both structures are located approximately 110 - 103m respectively from the edge of the Preliminary Design. Attendant estate grounds historically associated with these two buildings will be affected in minor ways by the Preliminary Design. These structures are listed in the Draft National Inventory of Architectural Heritage (DNIAH) and Edenmore House is listed as a Protected Structure within the Donegal Development Plan (2006-2012). Five other sites, AH 1 (dismantled railway line), AH 3 (Vernacular Architecture), AH 5 (wall foundation), AH 6 and AH 7 will be impacted on adversely by the Preliminary Design.

Any construction activity within the Preliminary Design corridor may have a significant adverse impact on any *in situ* archaeological remains that may exist. The presence of archaeological monuments within the immediate vicinity of the Preliminary Design increases the likelihood of the survival of associated sub-surface deposits.

The research and field survey presents a thorough and accurate depiction of the cultural heritage landscape that may be affected by the Preliminary Design. A

significant number of those sites recorded within the Inventories of Architectural, Archaeological and Cultural Heritage Sites (Section 10.2.1- 10.2.3) and identified during the field survey will not be directly impacted. However, it was felt essential to include them in the assessment in order to submit a faithful representation of the Cultural Heritage potential of this area.

## 10.4 Mitigation Proposals

This section of the assessment provides a description of the mitigation measures proposed which will have the effect of minimising/eliminating negative impacts. While the Preliminary Design was developed to minimise impact on sites of architectural, archaeological heritage and cultural heritage significance, there will be some degree of impact and, wherever possible, measures have been proposed to mitigate the adverse nature of these impacts. Mitigation measures will depend on certain factors such as new information on the significance of surviving archaeological remains, if any, ground conditions etc. which may in some cases not be accurately determined until initial archaeological test excavations have taken place. Where this is the case mitigation measures will be revised appropriately. All mitigation measures will be finalised and agreed in consultation with the National Monument Section of the Department of Environment, Heritage and Local Government.

Please note that although previous archaeological testing associated with the Preliminary Design (in 2005) has been carried out under licence to the Department of Environment, Heritage and Local Government, any further archaeological mitigation, works subsequent to the planning approval of the Preliminary Design shall be carried out under Ministerial Directions, as prescribed by the 2004 Amendment to the National Monument Act.

- With regard to RMP 2, an enclosure in Golland Upper, the Preliminary Design poses no direct impact. The disused railway line, which when built removed part of the enclosure, lies between the enclosure and the Preliminary Design thereby reducing the possibility of associated sub-surface archaeological remains being uncovered. A programme of test trenching will be carried out, under Ministerial Direction within the area of the Preliminary Design in order to determine the presence of any archaeological remains associated with the enclosure. Further strategies will be formulated following information received from the test trenching exercise.
- With regard to AH 1 the Old Donegal Railway Line, a written and photographic survey will be undertaken of those sections of the railway that will be impacted on. This will provide information for public dissemination and archive on the history of the railway; with a suitable medium for distribution being the Donegal Railway Museum in Donegal town.
- With regard to AH 3 vernacular architecture in Cashelnavean, a written and photographic survey of the site will be undertaken as the building will be located to the immediate north of the proposed CPO.
- A written and photographic survey will be undertaken at AH 5, a vernacular architecture site located in Sessiagh O' Neill in order to record the structural remains present at the site. As continuity of settlement is a possibility, the area of the building will also be tested to determine the presence of any earlier settlement on the site.

- With regard to AH 6, the site of a Millpond in Dreenan Townland, a programme of test trenching will be carried out, under Ministerial Direction, within the area of Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with the millpond. Further strategies will be formulated following information received from the test trenching exercise.
- With regard to AH 7, a possible vernacular architecture site in Dreenan Townland, a written and photographic survey of the site will be undertaken.
- With regard to AH 8 Edenmore House (a Protected Structure) and Estate, a written and photographic survey will be undertaken of the area of the once historic attendant grounds that will be impacted on by the Preliminary Design.
- With regard to AH 9 Tircallen House and Estate, a written and photographic survey will be undertaken on the area of the once historic attendant grounds that will be impacted on by the Preliminary Design.
- With regard to AAP 8, it should be noted that part of this area has already been subject to archaeological testing. Nothing of archaeological significance was discovered. However, subsequent to this testing in 2005, the scheme design has been changed and as a result the area will be impacted on to the higher degree. Therefore a programme of test trenches should be carried out under Ministerial Consent within the area yet to be assessed. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site.
- AAP 11 is a circular area of archaeological potential identified through aerial photography in Croghanagh townland. As this potential site is located in an area of dense coniferous forestry it is unsuitable for geophysical survey. A programme of test trenching will be carried out, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the test trenching exercise.
- With regard to AAP 13, a possible vernacular / post-medieval field system in Goland Lower a topographical survey of the site will be undertaken along with a programme of archaeological test trenching, under Ministerial Direction. This will determine, if possible, the date of the site.
- With regard to AAP 15, a possible pre-bog wall in Carrickmagrath Townland, a programme of test trenching will be carried out, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. This will be done in tandem with a prospective probing survey to determine whether the feature; if archaeological, continues for any length. Further strategies will be formulated following information received from the test trenching exercise.
- AAP 16, a 'Fairy Well and Fairy Rock' in Carrickmagrath Townland has been recorded for the purposes of this EIS. A written and photographic survey will be undertaken of the area. This will be followed by a programme of test trenching, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the written and photographic survey and test trenching exercise.

- With regard to AAP 21, a mound and possible archaeological feature in Dreenan Townland, a programme of test trenching will be carried out, Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with this site. Further strategies will be formulated following information received from the test trenching exercise.
- With regard to AAP 23, a possible standing stone in Dreenan / Edenmore, geophysical survey will be undertaken at the location of the stone in order to determine the nature and extent of the possible remains at this site. This should be followed, where appropriate, by a programme of test trenching, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the test trenching exercise and geophysical assessment.
- With regard to AAP 24, a mound and possible archaeological site at Edenmore, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with this site. Further strategies will be formulated following information received from the test trenching exercise.
- With regard to AAP 25, an area of archaeological potential where the Preliminary Design crosses the River Finn, the area will be inspected by a suitable qualified archaeologist, prior to construction to determine the presence, if any, of archaeological material. Further strategies may be formulated following information received from this inspection.
- With regard to AAP 29, a disused gravel pit in Mullaghagarry, a written and photographic survey of the site will be undertaken.
- With regard to AAP 30, a possible standing stone in Mullaghagarry, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with this site. Further strategies will be formulated following information received from the test trenching exercise.
- With regard to AAP 33, a possible breen in Tircallan Townland, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the test trenching exercise.
- AAP 36 is a curvilinear field boundary in Kilross Townland, geophysical survey will be undertaken in the area of the boundary in order to determine the nature and extent of any possible remains at the site. This will be followed, where appropriate, by a programme of test trenching, under Ministerial Direction, within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of any sub-surface archaeology at this site. Further strategies may be



formulated following information received from the geophysical assessment and test trenching exercise.

- With regard to AAP 37, an irregularly shaped cropmark in Kilross Townland, geophysical survey will be undertaken at the location of the site in order to determine the nature and extent of any possible remains. This will be followed, where appropriate, by a programme of test trenching in the environs of the site, under Ministerial Direction, within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of any sub-surface archaeology at this site. Further strategies may be formulated following information received from the geophysical assessment and test trenching exercise.
- With regard to AAP 7, 10, 14, 17, 18-9, 20, 22, 26-8, 31, 34, 40-1, a series of Historic Townland Boundaries within the land take of the Preliminary Design and, in addition, where AAP 18 and 27 lie within the easement for large debris clearance and vegetation clearance respectively, a written and photographic survey will be undertaken at the location of each boundary in order to identify and fully record the nature of each boundary.
- With regard to any minor watercourses, streams or drains that will be impacted by the Preliminary Design, these sites will be inspected by a suitably qualified archaeologist, prior to construction to determine the presence, if any, of archaeological material at these locations. Further strategies may be formulated following information received from this inspection.
- Provision will be made for the full recording and excavation of any archaeological features or deposits that may be exposed during the course of any archaeological test trenching outlined in the above recommendations and the reporting of the results of those archaeological investigations, including publication when appropriate.
- With regard to further mitigation of the Preliminary Design as a whole, appropriate levels of mitigation will be taken when appropriate, to locate features that may lie within the road. This may include centre line archaeological test-trenching, herring-bone trenching, site-specific trenching, total topsoil stripping, topsoil ploughing, field-walking, topographical survey, geophysics, photographic and written surveys, archaeological monitoring and preservation *in situ*. This will be decided in consultation with the National Monument Section of the Department of Environment, Heritage and Local Government to ensure preservation by record of features of archaeological interest that may be impacted on by the Preliminary Design. To ensure proper management of archaeological mitigation all efforts will be made to carry it out prior to the commencement of construction.

## 10.5 Conclusions

The landscape through which the Preliminary Design traverses contains sites dating from the Neolithic through to the late industrial period. A field inspection along the corridor of the Preliminary Design has confirmed the location of four archaeological monuments within 350m of the Preliminary Design, RMP 1, RMP 2, RMP 3 and RMP 4.

RMP 2 lies to the south of the Preliminary Design and there will be a slight impact on this RMP. The area of the Preliminary Design that will travel closest to this site will be subject to archaeological test trenching in order to determine whether archaeological features are present in the area.

The site of RMP 1 is located within the land take of the Preliminary Design, and will be directly impacted upon. A programme of test trenching was carried out under licence to the Department of Environment, Heritage and Local Government in 2005 at this site and nothing of archaeological significance was discovered. The constraint area of RMP 3 lies to the immediate southeast of the CPO of the Preliminary Design at the northern tip of Lough Mourne. Test trenching at this site in 2005 discovered nothing of archaeological significance. Due to design changes relating to the proposed scheme there will no longer be an impact on the constraint area surrounding RMP 3. RMP 4 lies outside the study area. The Preliminary Design will have an imperceptible impact on RMP 1, RMP 3 and RMP 4 and no further mitigation measures are therefore required.

A further 38 Areas of Archaeological Potential (AAP) were identified through aerial photography, cartographic analysis and field assessment and 29 of these will be adversely affected by the construction of the Preliminary Design, whilst 9 of the sites will only be imperceptibly impacted upon. Mitigation measures recommended for these sites include archaeological test trenching, geophysical survey, topographic survey, written and photographic records and further walkover surveys. Archaeological testing was carried out under licence to the Department of Environment, Heritage and Local Government during 2005 at AAP 8, 9, 32, 38 and 39. Nothing of archaeological significance was discovered at any of these sites. However, it should be noted that since testing was undertaken, the route of the Preliminary Design has been subject to a small amount of change. As a result AAP 8 (blanket bog) will now be impacted on to a higher degree and will require further archaeological testing.

A total of eight architectural heritage (AH) sites were identified including two 18<sup>th</sup> Century houses (AH 8 Edenmore House and AH 9 Tircallan House), the first of which is located c. 110m from the edge of the Preliminary Design whereas the second is located c. 103m away. Attendant estate grounds historically associated with these two buildings will be affected in minor ways by the Preliminary Design. Edenmore House is listed as a Protected Structure within the Donegal County Development Plan (2006-2012). It has been recommended that a written and photographic record be made of those parts of the grounds of Edenmore and Tircallan Houses that will be affected. It has also been recommended that written and photographic records be made of the five other sites which will be impacted on adversely by the Preliminary Design (AH 1 Disused railway line, AH 3 vernacular architecture, AH 5 vernacular architecture, AH 7 possible vernacular architecture site) and a programme of testing trenching is recommended at AH 6 (millpond).

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## 11.0 Air Quality

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### 11.1 Introduction and Methodology

An air quality impact assessment of the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass, during construction and operation, was undertaken in accordance with the "Guidelines for Treatment of Air Quality in National Road Schemes issued by the National Roads Authority (NRA), 2006 (hereafter known as the NRA guidelines). Full details of the Preliminary Design are presented within Chapter 3.0 (Description of the Preliminary Design).

The study area comprises the towns of Ballybofey and Stranorlar, with a population of about 4000, surrounded by rural areas. There are no significant industrial sources of pollution. The main source of pollution is existing traffic, with some contribution from domestic heating, and long-range transport of pollutants from other regions. The existing route goes through the town centre, with property located close to the road. The housing density is decreased and property is farther from the road along the access routes to the towns. The Preliminary Design is predominately rural in character.

The stages in the assessment are:

- Evaluation of the existing ambient air quality;
- Qualitative assessment of the impact during construction of the Preliminary Design;
- Comparison of the impact on population exposure to nitrogen oxides and particulate (PM<sub>10</sub>) emissions along the existing road network and the Preliminary Design, using the Index of Overall Change in Exposure;
- Calculation of pollutant concentrations at representative worst case receptors and evaluation of the change in pollutant concentrations as a consequence of the Preliminary Design;
- Assessment of the impact at national / international level by calculation of the total emissions of main pollutants for the Do Minimum and Do Something scenarios;
- Assessment of the impact on the candidate Special Area of Conservation (cSAC) of the River Finn.

The assessment was undertaken for the base year 2006, the year of opening 2011, and the design year, 2026.

#### 11.1.1 Pollutants

The principal components of vehicular emissions are carbon dioxide (CO<sub>2</sub>) and water. Carbon dioxide emissions, which constitute 95% of total transport emissions, are one of the primary greenhouse gases. CO<sub>2</sub> emissions from transport are responsible for a total of about 15% of greenhouse gas emissions in Ireland (Environmental Protection Agency (EPA) Environmental Research Technological Development and Innovation Programme (ERTDI) Report No. 9, 2002). It does not pose a direct hazard to health.

At elevated combustion temperatures, the nitrogen contained in the air and fuel reacts with the available oxygen to form oxides of nitrogen (NO<sub>x</sub>), primarily nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>). The NO generated is later converted to NO<sub>2</sub> by reaction with ozone in the atmosphere. These pollutants are potentially harmful to health and to vegetation.

Particulate matter, carbon monoxide (CO) and hydrocarbons are formed as a result of incomplete combustion.

Particulate matter of small particle size poses a greater hazard to health than larger particles. The particulate pollutant of interest is respirable dust, with an aerodynamic particle diameter of less than 10 microns ( $\mu\text{m}$ ). This is referred to as  $\text{PM}_{10}$ . There is a wide range of sources of  $\text{PM}_{10}$  in addition to transport. Other man-made sources include power plants, industry and quarries. Natural sources include salts of marine origin, pollen, soil, road dust etc.

Of the hydrocarbons, benzene and 1,3-butadiene are of particular concern due to their toxicity. As there is a fixed relationship between the emissions of benzene and 1,3-butadiene, and benzene is the more hazardous, the emissions of benzene only are evaluated in this assessment.

Sulphur contained in the fuel forms sulphur dioxide on combustion, a precursor of acid rain. Transport contributes about 3% of the total sulphur dioxide emissions in Ireland (EPA "Environment in Focus 2006"). As the contribution of vehicular emissions to  $\text{SO}_2$  levels is low, it is not assessed as a significant transport pollutant.

Due to the widespread use of unleaded fuel, lead is no longer a pollutant of concern associated with vehicular emissions.

To summarise, the pollutants that are considered in this assessment are:

- $\text{NO}_x$  – total emissions of oxides of nitrogen ( $\text{NO}$  – nitric oxide and  $\text{NO}_2$  – nitrogen dioxide).  $\text{NO}_2$  is a sensitive indicator of the impact on the environment due to traffic;  $\text{NO}_x$  is of concern with respect to the impact on vegetation.
- $\text{PM}_{10}$  – fine particulate material with an aerodynamic diameter of less than 10 microns.
- CO, carbon monoxide.
- $\text{C}_6\text{H}_6$ , benzene.
- $\text{CO}_2$ , carbon dioxide (regional air quality assessment only).
- Deposition dust (during construction only).

### 11.1.2 Methodology

The environmental impact assessment was carried out in accordance with the NRA guidelines.

The existing environment is described using default air quality data contained in the NRA guidelines, by monitoring in 2006 and by modelling.

The predicted impact during construction considered the potential impact due to surface soiling by dust and increased  $\text{PM}_{10}$  levels. Due to the highly variable nature of the source and the continuous change in distance between the source and receivers along the extent of the Preliminary Design, there is limited benefit from predicting dust emissions by dispersion modelling. This assessment was therefore based on the semi-quantitative approach recommended in the NRA guidelines, which is based on observation at a range of construction sites, and measurement experience.

The modelling of pollutant emissions was based on the UK Design Manual for Roads and Bridges (DMRB) (Volume 11, Section 3, Part 1, Air Quality, May 2007), as implemented in the DMRB Screening Method Spreadsheet v1.03c (July 2007) issued

by the Highways Agency. Details on traffic data, speed, road links and distances are provided in the body of this Chapter or an appendix as appropriate. DMRB modelling tools do not extend beyond 2025. Predictions for 2026 were carried out using traffic data for 2026 and DMRB calculations for 2025. This would not significantly affect the outcome, as the change between consecutive years is not significant.

In determining the overall concentration, the background concentrations used were NRA default values for rural areas and small towns. These default values were scaled to 2006, 2011 and 2026 values using the correction factors contained in the Local Air Quality Management (LAQM) Technical Guidance (03).

An index of overall change in exposure was derived for the existing route and the Preliminary Design for the pollutants  $\text{NO}_2$  and  $\text{PM}_{10}$ . All roads that experience a change as a consequence of the Preliminary Design were included. The total emissions of  $\text{PM}_{10}$  and  $\text{NO}_2$  were calculated using the DMRB regional method. The index of overall change in exposure was derived by multiplying the annual emissions for the existing route and Preliminary Design by the number of properties within 50m of the roadway. The assessment was undertaken for the year of opening, 2011.

The DMRB air quality model was used to predict ground level concentrations of  $\text{NO}_2$ ,  $\text{PM}_{10}$ , CO and benzene ( $\text{C}_6\text{H}_6$ ) at fourteen receptor locations for 2006, 2011 and 2026. It was also used to predict the total emissions of  $\text{NO}_x$ , CO, total hydrocarbons (THC) and  $\text{CO}_2$  from the road network in 2011 and 2026.

The River Finn is a cSAC, as indicated in Figure 9.1 and discussed further in Chapter 9.0 Ecology (Flora, fauna and fisheries). The Preliminary Design traverses the river at Chainage (Ch) 11300. A stretch of approximately 700m of river runs within 200m of the Preliminary Design. The cSAC close to the Preliminary Design is mainly along the riverbank, with an area of about 3000m<sup>2</sup> to the north, which lies within 200m of the Preliminary Design. In accordance with the NRA guidelines, the impact on the ecosystem was assessed by calculation of the concentration of  $\text{NO}_x$  using DMRB methodology at distances from 10m up to 200m. The dry deposition of nitrogen due to the Preliminary Design is determined from the calculated change in  $\text{NO}_2$  levels, assuming a deposition velocity of 0.001 m/s (NRA guidelines).

### 11.1.3 Assessment Criteria

#### Construction

The NRA guidelines include criteria which indicate the potential distance from the source for significant effects with respect to soiling,  $\text{PM}_{10}$  and vegetation effects. These are presented in Table 11.1.

The scale of the construction works associated with the Preliminary Design is considered to be moderate.



**Table 11.1 Assessment Criteria for the Impact of Dust Emission from Construction Activities, with standard mitigation in place (from NRA guidelines)**

Source		Potential distance from source for Significant Effects		
Scale	Description	Soiling	PM <sub>10</sub>	Vegetation effects
<b>Major</b>	Large construction sites, with high use of haul routes	100m	25m	25m
<b>Moderate</b>	Moderate sized construction with moderate use of haul routes	50m	15m	15m
<b>Minor</b>	Minor sized construction with limited use of haul routes	25m	10m	10m

## Index of Overall Change in Exposure

This assessment index provides quantitative evaluation of the overall impact on air quality along the Preliminary Design and the existing route. The index of overall change in exposure is derived by considering the change in annual emissions of NO<sub>2</sub> and PM<sub>10</sub> over the entire network affected, and the number of properties within 50m of the network. A positive index denotes a deterioration in air quality. A negative index denotes an improvement in air quality. The magnitude of the change is a measure of the impact.

## Local Scale Air Pollutant Concentrations

Pollutant concentrations were predicted at fourteen receptors along the existing road network and the Preliminary Design. These concentrations were compared with standards specified in the Air Quality Standards Regulations, Statutory Instrument 271 of 2002, referred to as AQSR. These regulations transpose EU Directives 1996/62/EC, 1999/30/EC and 2000/69/EC and are to be fully implemented by 2010.

AQSR assign a Limit Value (LV) to the harmful pollutants associated with vehicle emissions. The LV is the concentration of pollutant that must not be exceeded. The annual mean LV's are presented in Table 11.2.

In accordance with the NRA guidelines, if concentrations are predicted to exceed 90% of the standard for any route option, or if sensitive receptors are within 50m of a complex road layout (e.g. grade separated junctions), detailed dispersion modelling should be undertaken.

This element of the guidelines is not applied directly in this assessment with respect to particulate matter. The current air quality standards set a LV of 20µg/m<sup>3</sup> for PM<sub>10</sub>, to be achieved by 2010. However, the current measurement technique for fine airborne particulate matter makes no distinction between natural particulate matter, such as windblown sea salt and organic matter, and man-made (pollutant) particulate matter such as solid fuel and vehicular combustion products and industrial emissions.

Following on the proposals by Clean Air for Europe (CAFÉ), the measurement and reporting of airborne particulate matter is expected to change by EU Directive when the interpretation and limitation of PM<sub>10</sub> will be revised. The critical air quality standard with respect to human health will be expressed in terms of PM<sub>2.5</sub> (particles less than 2.5 µm, in size). PM<sub>2.5</sub> is believed to correlate better with man-made pollutant particulate matter.

Elevated PM<sub>10</sub> levels have been measured nationwide. The mean PM<sub>10</sub> concentration was 19µg/m<sup>3</sup> at the 17 EPA monitoring locations in 2006. There was no significant difference between PM<sub>10</sub> concentrations in urban and rural areas.

Consequently, as PM<sub>10</sub> levels are elevated nationwide, are not solely associated with vehicular emissions, and the interpretation of particulate matter parameters and data is under review within the EU, no significance is attached to elevated PM<sub>10</sub> levels where the contribution from local traffic is minor.

The NRA guidelines include significance criteria for the assessment of the impact of a scheme on air quality. The magnitude of the impacts due to a scheme is described using the criteria outlined in Table 11.3. The significance of the impact, which takes account of the magnitude of the change and the levels in relation to the standards, are presented in Table 11.4.

The NRA assessment criteria are considered to be conservative; for example, an increase in NO<sub>2</sub> levels from 8µg/m<sup>3</sup> to 10 µg/m<sup>3</sup> is classified as a moderate adverse impact. However, this is not a noteworthy increase in accordance with DMRB. Also, the predicted level is well below the LV of 40µg/m<sup>3</sup> and would be classified as good air quality. Nevertheless, the NRA criteria are used in this assessment as they provide a replicable, standardised approach.

**Table 11.2 Limit Values and Assessment Thresholds for Pollutants associated with Vehicular Emissions, from the Air Quality Standards Regulations 2002**

Pollutant	Averaging Period	Limit Value
Nitrogen dioxide, NO <sub>2</sub>	Annual mean	40 µg/m <sup>3</sup>
Nitrogen oxide, NO <sub>x</sub>	Annual mean	30 µg/m <sup>3</sup>
Fine particulate matter, PM <sub>10</sub>	Annual mean	20 µg/m <sup>3</sup>
Carbon monoxide, CO	Maximum daily 8-hour mean	10 <sup>1</sup> mg/m <sup>3</sup>
Benzene, C <sub>6</sub> H <sub>6</sub>	Annual mean	5 µg/m <sup>3</sup>

Source: Air Quality Standards Regulations 2002

<sup>1</sup> The impact with respect to CO in this Chapter is assessed against an annual mean of 2 mg/m<sup>3</sup> in accordance with NRA methodology

**Table 11.3 Qualitative Description of the Magnitude of Changes**

Annual Mean NO <sub>2</sub> and PM <sub>10</sub>	Magnitude of change
Increase/decrease > 25%	Very Large
Increase/decrease ≥ 15-25%	Large
Increase/decrease ≥ 10-15%	Medium
Increase/ decrease ≥ 5-10%	Small
Increase/decrease 1-5%	Very small
Increase/decrease < 1%	Extremely small

Source: NRA Guidelines (2006)

Table 11.4 Air Quality Impact Significance Criteria

Absolute concentration In relation to Standard	Change in concentration				
	Extremely small <1%	Very small 1 – 5%	Small 5 – 10 %	Medium 10 – 15%	Large 15 – 25%
	Decrease with Scheme				
Above Standard WS	Slight beneficial	Slight beneficial	Substantial beneficial	Substantial beneficial	Very substantial beneficial
Above Standard DM, Below WS	Slight beneficial	Moderate beneficial	Substantial beneficial	Substantial beneficial	Very substantial beneficial
Below Standard DM, but not well below	Negligible	Slight beneficial	Slight beneficial	Moderate beneficial	Substantial beneficial
Well below standard DM	Negligible	Negligible	Slight beneficial	Slight beneficial	Moderate beneficial
	Increase with Scheme				
	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse
	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse
Above Standard WS	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse
Below Standard DM, Above WS	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse
Below Standard WS, but not well below	Negligible	Slight adverse	Slight adverse	Moderate adverse	Substantial adverse
Well below standard WS	Negligible	Negligible	Slight adverse	Slight adverse	Moderate adverse

Well below standard = < 75% of the air quality standard limit value.

DM Do Minimum, WS with Scheme

Source: NRA Guidelines (2006)

## Impact at National / International level

The objective of the regional air quality impact assessment was to establish the net contribution to overall air pollution on a national / international level as a consequence of the Preliminary Design.

The change in emissions of carbon dioxide is of particular importance, due to its properties as a greenhouse gas and the impact on climate change. NO<sub>x</sub> is a significant transboundary pollutant due to its role in the formation of acid rain.

The National Climate Change Strategy (Department of Environment, Heritage and Local Government, 2000, and strategy review document 2006) provides a framework for achieving greenhouse gas emissions reductions in the most efficient and equitable manner while continuing to support economic growth. The Strategy is based on the fundamental principles of sustainable development, which are set out in "Sustainable Development: A Strategy for Ireland" (Department of Environment 1997), and takes account of the need to protect economic development and competitiveness. The revised national strategy was published in April 2007, *National Climate Change Strategy 2007-2012*.

For emissions of CO<sub>2</sub> from the transport sector, the Strategy allows for a growth of 126%, relative to emissions in 1990. This compares with a projected increase of 179% with no strategy in place. The control initiatives proposed for the transport sector are: fuel efficiency, demand management, modal shift in transport, biofuels obligation scheme for fuel sales in 2009, and maximising the efficiency of the road network. These initiatives are to be implemented on a national basis, and are outside of the scope of the road design process. The control initiatives are planned to reduce emissions from the transport sector, by 30% below the levels that would occur in the absence of the Strategy.

In 2005, the transport sector accounted for approximately 19% of the total national greenhouse gas emissions. Emissions from the transport sector in 2005 were 159% above the 1990 emissions, and were significantly in excess of the growth envelope envisaged in the original strategy.

Also of concern is the emission of NO<sub>x</sub>, which is associated with acid rain and consequent degradation of vegetation and internal waterways.

A road scheme of this scale has no inherent capacity for influencing climate on a local, regional or global scale. Nevertheless, the road development is considered in the context of the National Climate Change Strategy, in terms of compliance with the stated objectives of the Strategy.

## Designated Ecosystem

The impact on the designated ecosystem is assessed by comparison of the predicted NO<sub>x</sub> concentration with the AQSR LV for the protection of vegetation of 30 µg/m<sup>3</sup>, annual mean.

The change in concentration with the Preliminary Design is also evaluated. In accordance with NRA guidelines the sensitivity of the habitat to NO<sub>x</sub> should be assessed by the project ecologist, where the Preliminary Design is expected to cause an increase in concentrations of more than 2µg/m<sup>3</sup>.

The dry deposition of nitrogen was compared with published critical load criteria for habitats (UNECE 2003). The River Finn has candidate SAC designation on account of its importance for salmon (*Salmo salar*) and otter (*Lutra lutra*) (Site code: 002301). There is no critical load for dry deposition of nitrogen specified for a riverside ecosystem. The critical load for inland water habitats such as oligotrophic waters and softwater lakes is 5-10 kg(N)/ha/year. This critical load has therefore been used in this assessment.

## 11.2 Existing Environment

The study area is predominately rural in nature with no major industrial sources or power plants. Existing regional traffic and long distance transport of air pollutants are likely to be the primary source of air pollutants, with the exception of PM<sub>10</sub>, where agricultural and domestic sources may be significant.

### 11.2.1 Baseline Air Quality Data

Long-term air quality data for the specific area under study was not available.

The Environmental Protection Agency (EPA) in conjunction with local authorities is responsible for monitoring of national air quality standards. For air quality monitoring purposes, the country is divided into four zones: Zone A Dublin; Zone B Cork; Zone C towns >15000; and Zone D remainder (small towns and rural areas). Based on this classification, the Preliminary Design would lie within a Zone D area. Published EPA air quality data for Zone D areas in Ireland indicates that the current air quality in the vicinity of the Preliminary Design is likely to be within air quality standards, and could be described as "good".

The assessment procedure for the air quality impact of the Preliminary Design requires quantitative values for the existing air quality. The NRA guidelines include typical pollutant concentrations across Ireland according to site type. This data was derived from EPA and local authority network monitoring from 2003 and from mapped pollutant concentrations in the UK.

The NRA typical values are used in this impact assessment to define the existing air quality conditions, scaled to 2006 values. These are presented in Table 11.5. The default values for small towns are used in the town centre and outskirts. The default rural values are used in the outlying areas.

The expected annual mean background pollutant concentration for NO<sub>2</sub> in the rural and urban areas is 8 µg/m<sup>3</sup> and 19 µg/m<sup>3</sup> respectively. These NO<sub>2</sub> levels are well below the annual mean LV of 40 µg/m<sup>3</sup>.

The PM<sub>10</sub> default rural background concentration level is close to the 2010 LV of 20µg/m<sup>3</sup>, while the level in small towns exceeds the 2010 LV.

**Table 11.5 Estimated Background Concentrations of Pollutants of Concern in Study Area**

Pollutant	Units	Background concentration 2006	
		Rural	Small Town
Nitrogen oxide, NO <sub>x</sub>	µg/m <sup>3</sup>	9.0	27
Nitrogen dioxide, NO <sub>2</sub>	µg/m <sup>3</sup>	7.5	19
Fine particulate matter PM <sub>10</sub>	µg/m <sup>3</sup>	17	22
Carbon monoxide, CO	mg/m <sup>3</sup>	0.2	0.4
Benzene, C <sub>6</sub> H <sub>6</sub>	µg/m <sup>3</sup>	0.5	0.9

Source: NRA guidelines / LAQM

### 11.2.2 Baseline Surveys

Short duration background air quality monitoring was undertaken in the study area in 2002 as part of the assessment for the Preliminary Design. The mean NO<sub>2</sub> concentration measured in two locations over a period of 5 weeks was 6 µg/m<sup>3</sup>. The mean NO<sub>2</sub> concentration measured at two urban locations was 13 µg/m<sup>3</sup>. This data is slightly lower than the background concentrations in the NRA guidelines.

PM<sub>10</sub> levels were measured at about 20m from the existing N15 over two days at two locations, namely at Mullandrait and at Cappry. This data, although elevated, is consistent with daily PM<sub>10</sub> levels nationwide. Further details are provided in Appendix 11.1.

Further air quality monitoring was undertaken by Hyder Consulting in 2006 comprising the following:

- NO<sub>2</sub> monitoring at 11 locations over a five month period between August and December 2006 (a diffusion sampler exposed for a month at each location).
- PM<sub>10</sub> monitoring at 2 locations (one rural, one urban) over a three week period, using light scattering instrumentation with 15 minute averages.

The results provided by Hyder Consulting are summarised in Table 11.6 and 11.7. The measurement locations are illustrated in Figure 11.1. Further details are provided in Appendix 11.1.

The NO<sub>2</sub> levels varied between 4µg/m<sup>3</sup> and 40µg/m<sup>3</sup>, depending on the location. The highest concentration of NO<sub>2</sub> was monitored at diffusion tube locations DT5 and DT6 which are located on the N15, within the town centres of Ballybofey and Stranorlar respectively. This area is subjected to high traffic flows and is often heavily congested. The lowest concentrations of NO<sub>2</sub> were recorded at diffusion tube locations DT4 and DT10 which are background sites and are remote from the influence of any major road source. The measured PM<sub>10</sub> levels, of 13 µg/m<sup>3</sup> and 16 µg/m<sup>3</sup>, are similar to the background concentrations in the NRA guidelines.

**Table 11.6. Summary of Measured NO<sub>2</sub> Concentrations, August to December 2006**

Tube Id	Location Description	Distance from road centre, m	Average NO <sub>2</sub> concentration µg/m <sup>3</sup>	Range NO <sub>2</sub> concentration µg/m <sup>3</sup>
DT1	N15 Woodland Doish	14	10.8	7.1-13.8
DT2	N15 Cappry	5	14.5 <sup>1</sup>	13.6-15.9
DT3	N15 Cappry	7.5	12.4	9.6-16.5
DT4	Background Carrickmagrath	>200m from major road source	4.1	3.9-4.4
DT5	N15 Main St Ballybofey	5	38.7	33.0-44.0
DT6	N15 Main St Stranorlar	5	39.3	32.7-47.9
DT7	N15 Pound St	4.5	28.5	22.1-33.1
DT8	N15 Pound St	6	18.8	15.3-24.2
DT9	Junction N13 and R236	8.5	18.4	16.2-21.3
DT10	Background Navenney	>200m from major road source	4.3	3.3-5.0
DT11	Meeting House Lane	5.5	29.9	23.9-34.6

<sup>1</sup> One sampler missing

**Table 11.7 Summary of Measured PM<sub>10</sub> Concentrations, November / December 2006**

Monitor Location	Location Description	Monitoring Period	Average PM <sub>10</sub> Concentration µg/m <sup>3</sup>
Site 1	Roadside location, N15 Cappry	13/11/06 – 03/12/06	16.0
Site 2	Rural location, Navenney	13/11/06 – 03/12/06	13.4

### 11.3 Assessment of Effects: Construction

The impact of construction activity on air quality is primarily with regard to generation of dust. Construction activities such as earth moving, excavation and traffic movement generate dust during dry periods. The principal impact associated with this is dust deposition on surfaces, cars and windows of properties. The dust may also give rise to elevated PM<sub>10</sub> levels. Dust generation is a temporary impact and weather dependent.

According to NRA guidelines, construction associated with the Preliminary Design may give rise to significant effects with respect to dust deposition within 50m of the construction works. Approximately 20 properties will be within 50 m of the construction works at some stage during the project. This is considered a minor adverse impact, which is of short-term duration.

There are no properties within 15m of the likely construction works, and hence, according to the criteria within the NRA guidelines, no potential for significant impact with respect to PM<sub>10</sub>.

The impact on air quality due to exhaust emissions from heavy vehicles associated with the construction work will be negligible. The extent of vehicle movement will be small compared with traffic levels once the Preliminary Design is opened to the public and will be of limited duration. Consequently, this is not assessed further here.

## 11.4 Assessment of Effects: Operation

### 11.4.1 Assumptions for DMRB Model

The DMRB modelling methodology was used to establish the comparative, local and regional impact assessment. Some assumptions that are common to each of these assessments are given here.

#### Background Concentration

When modelling the local air pollutant concentration, the predicted traffic-related concentrations are added to the background concentration to give the overall concentration.

In this assessment, the default data for 2003 in the NRA guidelines are used as the background concentrations, scaled to the year of interest using factors provided in LAQM.

The estimated background concentration values for 2006, 2011 and 2026 are presented in Table 11.8. The default values for small towns are used in the town centre and approach roads. The default rural values are used in the outlying areas.

**Table 11.8 Background Concentration Values for Pollutants, used in DMRB Modelling**

Year	Area	Background Concentration Values				
		NO <sub>x</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )
2006	Rural	9	7.5	17	0.2	0.5
	Small town	27	19	22	0.4	0.9
2011	Rural	7.3	6.6	16	0.2	0.4
	Small town	22	16	20	0.3	0.7
2025	Rural	6.5	6	15	0.2	0.5
	Small town	19.6	15	18	0.3	0.8

Source: NRA guidelines 2006, scaled according to LAQM

#### Traffic

The traffic volumes used in modelling the emissions were based on those presented within the "N15/N13 Local Model Validation Report" (Jacobs October 2007). These are presented in Table 11.9. Further details regarding assumptions on road type and speed are presented in Appendix 11.2.

The percentage of heavy commercial vehicles (HCV's) on all routes is 10%. The assessment was undertaken based on the following speeds:

Proposed and existing N15	100km/hour
Town Centre	30km/hour
Outskirts of town	50-60km/hour
All other routes	80km/hour



Although the town centre speed limit is 50km/hour, mean speeds are likely to be lower due to congestion and stopping/starting and thus, 30km/hour has been used in the assessment.

**Table 11.9 Traffic Flows along Existing Road Network and Preliminary Design. The nominal percentage of heavy commercial vehicles is 10% for all routes.**

Road Section	Traffic Flow AADT (includes HCV)				
	2006	2011		2026	
	Existing	Do Minimum	Do Something	Do Minimum	Do Something
Existing N15: West of Meencrumlin	8400	9900	9900	12700	12700
Existing N15: Meencrumlin - Cappry Road	8400	9900	1500	12700	1700
Existing N15: Cappry Rd – R252 Junction	13100	15500	7100	19800	9100
Existing N15: R252 Junction – Navenny Road	16900	20100	7500	25700	8800
Existing N15: Navenny Road - N13/N15 Junction	16800	19900	7300	25500	8600
Existing N15: N15/N13 Junction - Lifford Road Roundabout	6800	7900	3000	10100	4300
Existing N15: East of Lifford Road Roundabout	6800	7900	8500	10100	11000
Existing N13: North of Kilross	9800	11500	11800	14300	14900
Existing N13: Kilross - N13/N15 Junction	11700	13800	5000	17500	6000
Existing R252: R252 Junction – Cappry Road	3900	4600	4600	5800	5800
Cappry Road	1000	1200	1200	1500	1500
Navenny / Edenmore Road	5200	6100	6100	7800	7800
R236: East of Kilross Junction	3100	3900	3600	5400	4800
Preliminary Design: Meencrumlin - Link Road Interchange	-	-	8400	-	10800
Preliminary Design: Link Road Interchange - Stranorlar Roundabout	-	-	12600	-	16900
Preliminary Design: Stranorlar Roundabout – Kilross	-	-	9400	-	12400
Preliminary Design: Link Road	-	-	7900	-	10800

AADT = Annual Average Daily Traffic HCV: Heavy Commercial Vehicles

#### 11.4.2 Comparison of Modelled and Measured NO<sub>2</sub> Concentrations

The NO<sub>2</sub> concentrations measured over a five month period in 2006 were compared with concentrations calculated in accordance with DMRB in order to establish the accuracy of the model. The measured concentrations were annualised in accordance with NRA guidelines using EPA data from Kilkitt and Glashaboy in 2005.

The results are presented in Table 11.10. The mean deviation of the modelled concentration from the measured concentration was 3.6µg/m<sup>3</sup>, and the deviation ranged from +7.9 µg/m<sup>3</sup> to -3.7 µg/m<sup>3</sup>.

The predicted concentrations were about 3µg/m<sup>3</sup> lower than measured concentrations along the main streets of Ballybofey and Stranorlar. This indicates that the congested

nature of the traffic movement in this area may give rise to higher concentrations than are predicted in the model.

The predicted concentration at DT8 was 7.9  $\mu\text{g}/\text{m}^3$  higher than measured. This location is on the outskirts of Stranorlar, and it is expected that background  $\text{NO}_2$  concentrations would lie between "small town" background levels and "rural" levels. This location was assigned a "small town" background  $\text{NO}_2$  level, which is an overestimate for this suburban location.

The predicted concentrations in rural areas DT3, DT4 and DT10 were about 4  $\mu\text{g}/\text{m}^3$  higher than measured. A "rural" background level of 9  $\mu\text{g}/\text{m}^3$  is provided in the NRA guidelines. The mean annual  $\text{NO}_2$  concentrations in rural areas measured by the EPA in 2005 ranged from 2  $\mu\text{g}/\text{m}^3$  in Kilkitt to 12  $\mu\text{g}/\text{m}^3$  in Mountrath. The measured concentrations in the 2006 survey indicate that the actual background concentration is about 5  $\mu\text{g}/\text{m}^3$  lower than the NRA value of 9  $\mu\text{g}/\text{m}^3$ . The NRA values were used for consistency however.

Overall, there is reasonable agreement between the measured and modelled concentrations, indicating that the DMRB approach is a valid methodology. There was insufficient measured  $\text{PM}_{10}$  data to enable a comparison to be made between the measured and modelled concentrations.

Table 11.10. Comparison of Measured and Modelled  $\text{NO}_2$  Concentrations, 2006

Location Label	Location Description	Distance from road centre, m	Average measured $\text{NO}_2$ concentration $\mu\text{g}/\text{m}^3$	Annualised <sup>1</sup> measured $\text{NO}_2$ concentration $\mu\text{g}/\text{m}^3$	DMRB modelled $\text{NO}_2$ concentration $\mu\text{g}/\text{m}^3$	Difference modelled – measured $\text{NO}_2$ concentration $\mu\text{g}/\text{m}^3$
DT1	N15 Woodland Doish	14	10.8	9.0	12.1	3.1
DT2	N15 Cappry	5	14.5	12.0	12.9	0.9
DT3	N15 Cappry	7.5	12.4	10.3	15.3	5.0
DT4	Background Carrickmagrath	>200m	4.1	3.4	7.5	4.1
DT5	N15 Main St Ballybofey	5	38.7	32.1	28.9	-3.2
DT6	N15 Main St Stranorlar	5	39.3	32.6	28.9	-3.7
DT7	N15 Pound St	4.5	28.5	23.7	24.2	0.5
DT8	N15 Pound St	6	18.8	15.6	23.5	7.9
DT9	Junction N13 and R236	8.5	18.4	15.3	14.1	-1.2
DT10	Background Navenny	>200m	4.3	3.6	7.5	3.9
DT11	Meeting House Lane	5.5	29.9	24.8	26.2	1.4

<sup>1</sup> Annualised using EPA data from Kilkitt and Glashaboy, 2005

### 11.4.3 Overall Change in Exposure

An index of overall change in exposure was derived for the existing route and the Preliminary Design for the pollutants  $\text{NO}_2$  and  $\text{PM}_{10}$ . The results are summarised in

Table 11.11 and detailed in Appendix 11.3. A positive index indicates a deterioration. A negative index indicates an improvement.

There is an overall predicted improvement with the Preliminary Design in terms of air quality at properties in the study area. There is an improvement in air quality for properties along the existing route. There is a deterioration in air quality for properties along the Preliminary Design. Over 95% of the properties affected will experience an improvement in air quality during operation of the Preliminary Design.

**Table 11.11 Overall Change in Exposure, 2011**

Route	Approx. Number of properties within 50m	NO <sub>2</sub>		PM <sub>10</sub>	
		Overall Exposure Index	Change compared with Do Minimum	Overall Exposure Index	Change compared with Do Minimum
Preliminary Design	20	49500	Worse	1500	Worse
Existing N13/15	369	-593000	Better	-17000	Better
<b>Overall</b>	<b>382</b>	<b>-543500</b>	<b>Better</b>	<b>-15500</b>	<b>Better</b>

#### 11.4.4 Local Air Quality Assessment

The DMRB air quality model was used to predict ground level concentrations of NO<sub>2</sub>, PM<sub>10</sub>, CO and benzene (C<sub>6</sub>H<sub>6</sub>) at fourteen selected locations.

The objective was to compare the concentrations with the AQSR LV and to assess the impact in accordance with NRA guidelines.

The modelling assessment was undertaken for the following scenarios:

- Existing Environment 2006
- Do Minimum 2011 – no alteration to the existing road network
- Do Something 2011 – along existing route and with the Preliminary Design in operation
- Do Minimum 2026 – no alteration to the existing road network
- Do Something 2026 – along existing route and with the Preliminary Design in operation

##### Assessment Locations

A total of 14 representative sensitive receptors along the existing route and Preliminary Design were selected. These receptors were chosen as being likely to experience the highest pollutant levels and/or be subject to the greatest change in air quality, both beneficial and adverse. Where appropriate, a receptor was selected which was representative of a cluster of properties.

The receptors are illustrated in Figure 11.1 and described in Table 11.12.

The predicted concentration levels for selected receptors are presented as follows:

Table 11.13	Baseline Year (2006)
Table 11.14	Do Minimum and Do Something, 2011

Table 11.15	Do Minimum and Do Something, 2026
Table 11.16	The difference in concentration between the Do Minimum and Do Something scenarios, 2011 and 2026
Table 11.17	Description of change in NO <sub>2</sub> concentration in accordance with NRA guidelines
Table 11.18	Description of change in PM <sub>10</sub> concentration in accordance with NRA guidelines
Table 11.19	Impact assessment in accordance with NRA guidelines.

All concentration levels presented are the combination of the background concentration and the road traffic component, unless otherwise stated.

### Local Air Quality in 2006

The PM<sub>10</sub> concentration was calculated to approach or exceed the AQSR limit in 2006, at locations close to the N13/15, as identified in Table 11.13. This is due primarily to the relatively high default background levels, which are included in the predicted concentrations, as shown in Table 11.8, and not due to a major contribution from local traffic.

As the elevated PM<sub>10</sub> levels are not due primarily to local vehicular emissions, no significance is attached to these elevated PM<sub>10</sub> levels.

The concentrations of all other pollutants were well below the AQSR LV. The AQSR limits are effective from 2010.

The air quality at all locations is considered overall to be good.

### Local Air Quality in 2011 and 2026

The predicted air quality concentrations are well below the AQSR LVs for NO<sub>2</sub>, CO and benzene at all locations both in the Do Minimum and Do Something scenarios for 2011 and 2026, as shown in Tables 11.14 and 11.15 respectively.

In 2011 (Table 11.14), the LV for PM<sub>10</sub> is predicted to be reached or exceeded in town centre locations, close to the road, in both the Do Minimum and Do Something scenarios. Again, this is due to the relatively high default background concentrations included in the predicted concentrations. It is not due to a major contribution from local traffic and hence is not considered significant.

In 2026 (Table 11.15), the predicted PM<sub>10</sub> concentration in urban locations is at the LV in the Do Minimum scenario, and below the LV in the Do Something scenario. It is below the LV at all rural locations.

The air quality at all locations is considered to be good overall both with and without the Preliminary Design in 2011 and 2026.

### Assessment of Impact

The difference in the predicted concentration between the Do Something scenario and the Do Minimum scenario was determined. The change in pollutant concentrations presented in Tables 11.14 and 11.15 is shown in Table 11.16. A negative value indicates an improvement and a positive value indicates a deterioration in air quality

According to DMRB, a noteworthy change is defined as 10% of the LV. From Table 11.16, no properties will experience a noteworthy change in concentration of any pollutants between the Do Minimum and Do Something scenarios.

Properties fronting the Main St in Ballybofey (R3) and Stranorlar (R4) and at R1 in Meencrumlin will experience the greatest absolute reduction. Properties at Creamery Road (R9) will experience the greatest absolute increase

The impact was also evaluated in accordance with the NRA guidelines criteria. The percentage change in NO<sub>2</sub> and PM<sub>10</sub> concentrations in 2011 and 2026 are shown in Tables 11.17 and 11.18 respectively. Also included is the corresponding description of the magnitude of the change and the absolute concentration of the pollutant in relation to the standard, in accordance with the NRA guidelines criteria. From this, the qualitative description of the air quality impact was determined. This is shown in Table 11.19.

Receptors along the Main Streets of Ballybofey (R3) and Stranorlar (R4) are predicted to experience a substantial benefit with respect to reduction in PM<sub>10</sub> concentration and a slight benefit with respect to NO<sub>2</sub> concentration. An estimated 100 properties within 5m of the Preliminary Design would experience this benefit.

The property at Meencrumlin, R1, is predicted to experience a moderate beneficial impact with respect to NO<sub>2</sub> concentrations. All other properties assessed along the existing route are predicted to experience a slight beneficial impact.

No properties were predicted to experience a substantial adverse impact. Six receptor locations, with a total of approximately twenty-one properties, were predicted to experience a moderate adverse impact with respect to NO<sub>2</sub>. These lie adjacent to the Preliminary Design or Ballybofey Link Road and are as follows:

- R8; the nearest property at the Trusk Road Junction on the Link Road
- R9; the nearest property at the Creamery Road Junction on the Link Road
- R10; a property near the Preliminary Design at Edenmore (Ch 10600)
- R11; a property near the Preliminary Design at Carrickmagrath (Ch 7300)
- R13; approximately 10 properties within 80m of the Preliminary Design at the new Lawnsdale housing development at Navenny, north of the Preliminary Design
- R14; approximately 7 properties within 50m of the Ballybofey Link Road at the new development on Trusk Road, opposite Tesco.

This assignment of a moderate adverse impact is in accordance with criteria within the NRA guidelines. The total predicted NO<sub>2</sub> concentration at those properties that are subject to a moderate adverse impact is less than 10µg/m<sup>3</sup>. This concentration is comfortably within the AQSR. Also, the increase in NO<sub>2</sub> concentrations at all properties is less than 4µg/m<sup>3</sup>, the change identified as noteworthy in DMRB. Consequently the NRA guidelines classification as a moderate adverse impact is considered to be conservative.

All other receptors assessed along the Preliminary Design are subject to a slight or negligible adverse impact. This includes the properties adjacent to the receptors which experience a moderate adverse impact, but which are slightly further from the Preliminary Design.

### Requirement for Further Assessment

As outlined previously, the DMRB methodology is a screening assessment based on a "worst case" assessment. Based on the NRA guidelines, if pollutant concentrations are predicted to exceed 90% of the standard for any route option (as identified in Table 11.2), or if sensitive receptors are within 50m of a complex road layout detailed dispersion modelling should be undertaken.

The above assessment indicates that LVs will not be exceeded for any pollutant in 2011 or 2026 with or without the Preliminary Design, with the exception of PM<sub>10</sub>. As the elevated PM<sub>10</sub> levels are not due primarily to local vehicular emissions, no significance is attached to these elevated PM<sub>10</sub> levels. Also, there are no sensitive receptors within 50m of a complex road layout along the length of the Preliminary Design. No further assessment is therefore indicated.

Table 11.12 Location of Sensitive Receptors selected for Local Air Pollution Assessment

Ref. no.	Coordinates	Description	Preliminary Design Ch	Distance from Preliminary Design, m	Distance from existing major road, m	Comment
R1	210340,392730	Meencrumlin	-	>100	10	Nearest property to existing road on this section
R2	213810,394400	Donegal Rd.	-	>100	20	Nominal distance of property on entrance to town
R3	-	Main St. Ballybofey	-	>100	5	Nominal property, typical of properties fronting Main St.
R4	-	Main St. Stranorlar	-	>100	5	Nominal property, typical of properties fronting Main St.
R5	215040,395700	Kilross Road, near Stranorlar town centre	-	>100	25	
R6	216399,398460	Kilross Road junction	15000	53	52	Two adjacent properties here
R7	216434,395245	Lifford Road junction	11700	70	30	Adjacent house is 85m from Preliminary Design
R8	213930,394140	Trusk Road adjacent Link Road	800 (link)	30	>100	Distance to link road given. Adjacent house is 50m from Preliminary Design
R9	214170,393940	Creamery Road, adjacent Link Road	400 (link)	17	>100	Distance to link road given. Adjacent house is 50m from Preliminary Design
R10	215950,394290	Edenmore Junction	10600	56	>100	Adjacent house is 80m from Preliminary Design
R11	213000,393000	Preliminary Design Ch 7300	7300	48	>100	Property opposite is 82m from Preliminary Design
R12	211960,392730	Preliminary Design Ch 6200	6200	67	>100	Adjacent property is 83m from Preliminary Design
R13	214370, 393450	Lawnsdale	8800	50	>100	Housing development ranges from 50m to 450m from Preliminary Design. Nearest houses are over 100m from Ballybofey Link Road
R14	214100, 394050	New development (Trusk Road)	700 (link)	30	>100	Nearest distance. Housing development ranges from approximately 30m to 150m from Ballybofey Link Road

Table 11.13 Baseline Year (2006) Modelled Pollutant Concentrations for the Receptor Locations, and the Limit Values applicable in 2010

Receptor number	Description	NRA Default Background 2006				Calculated Annual Mean Concentration <sup>1</sup>				
		NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	
R1	Meencrumlin	7.5	17	0.23	0.51	13	19	0.27	0.54	
R2	Donegal Rd.	19	22	0.39	0.85	24	24	0.44	0.90	
R3	Main St. Ballybofey	19	22	0.39	0.85	28	26	0.52	1.0	
R4	Main St. Stranorlar	19	22	0.39	0.85	28	26	0.52	1.0	
R5	Kilross Road, near Stranorlar town centre	19	22	0.39	0.85	23	23	0.43	0.89	
R6	Kilross Road junction	7.5	17	0.23	0.51	9.8	18	0.25	0.53	
R7	Lifford Road junction	7.5	17	0.23	0.51	9.8	18	0.25	0.53	
R8	Trusk Road	7.5	17	0.23	0.51	7.6	17	0.23	0.51	
R9	Creamery Road	7.5	17	0.23	0.51	7.6	17	0.23	0.51	
R10	Edenmore Junction	7.5	17	0.23	0.51	7.6	17	0.23	0.51	
R11	Preliminary Design Ch 7300	7.5	17	0.23	0.51	7.6	17	0.23	0.51	
R12	Preliminary Design Ch 6200	7.5	17	0.23	0.51	7.6	17	0.23	0.51	
R13	Lawnsdale	7.5	17	0.23	0.51	7.5	17	0.23	0.51	
R14	New development Link Road Ch 700	7.5	17	0.23	0.51	7.5	17	0.23	0.51	
<b>AQSR</b>	<b>LV effective 2010</b>	<b>40</b>	<b>20</b>	<b>2<sup>2</sup></b>	<b>5</b>	<b>40</b>	<b>20</b>	<b>2<sup>2</sup></b>	<b>5</b>	

<sup>1</sup> Calculated NRA default background and road traffic component

<sup>2</sup> The 8-hour average limit value for CO was converted to an annual average using a correction factor of 0.2, in accordance with NRA guidelines



Table 11.14 Predicted Pollutant Concentrations at Selected Receptors, 2011, Do Minimum and Do Something

		Calculated Annual Mean Concentration <sup>1</sup>							
		Do Minimum 2011				Do Something 2011			
Receptor number	Description	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>
R1	Meencrumlin	11	17	0.20	0.47	7.4	16	0.17	0.44
R2	Donegal Rd.	20	21	0.33	0.79	18	21	0.30	0.76
R3	Main St. Ballybofey	23	23	0.39	0.88	19	21	0.33	0.79
R4	Main St. Stranorlar	23	23	0.39	0.88	19	21	0.33	0.79
R5	Kilross Road, near Stranorlar town centre	19	21	0.31	0.78	17	20	0.29	0.75
R6	Kilross Road junction	8.5	16	0.19	0.46	8.5	17	0.18	0.45
R7	Lifford Road junction	8.5	16	0.19	0.46	8.1	16	0.18	0.45
R8	Trusk Road	6.6	16	0.17	0.44	9.1	17	0.19	0.45
R9	Creamery Road	6.6	16	0.17	0.44	10	17	0.19	0.46
R10	Edenmore Junction	6.6	16	0.17	0.44	8.9	17	0.18	0.45
R11	Preliminary Design Ch 7300	6.6	16	0.17	0.44	8.5	17	0.18	0.45
R12	Preliminary Design Ch 6200	6.6	16	0.17	0.44	7.8	16	0.18	0.45
R13	Lawnsdale	6.6	16	0.17	0.44	9.2	17	0.19	0.45
R14	New development Link Road Ch 700	6.6	16	0.17	0.44	9.1	17	0.19	0.45
<b>AQSR</b>	<b>LV effective 2010</b>	<b>40</b>	<b>20</b>	<b>2<sup>2</sup></b>	<b>5</b>	<b>40</b>	<b>20</b>	<b>2<sup>2</sup></b>	<b>5</b>

<sup>1</sup> Calculated NRA default background and road traffic component

<sup>2</sup> The 8-hour average limit value for CO was converted to an annual average using a correction factor of 0.2, in accordance with NRA guidelines

Table 11.15 Predicted Pollutant Concentrations at Selected Receptors, 2026, Do Minimum and Do Something

		Calculated Annual Mean Concentration <sup>1</sup>									
		Do Minimum 2026					Do Something 2026				
Receptor number	Description	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>
R1	Meencrumlin	10	16	0.21	0.50	6.6	15	0.18	0.47		
R2	Donegal Rd.	18	19	0.33	0.83	17	18	0.31	0.80		
R3	Main St. Ballybofey	20	20	0.40	0.94	18	19	0.33	0.83		
R4	Main St. Stranorlar	20	20	0.40	0.94	18	19	0.33	0.83		
R5	Kilross Road, near Stranorlar town centre	18	19	0.32	0.81	16	18	0.30	0.79		
R6	Kilross Road junction	7.6	15	0.19	0.48	7.8	16	0.18	0.47		
R7	Lifford Road junction	7.7	15	0.19	0.48	7.3	15	0.18	0.47		
R8	Trusk Road	6.0	15	0.17	0.46	8.4	16	0.19	0.48		
R9	Creamery Road	6.0	15	0.17	0.46	9.3	16	0.20	0.49		
R10	Edenmore Junction	6.0	15	0.17	0.46	8.1	16	0.19	0.47		
R11	Preliminary Design Ch 7300	6.0	15	0.17	0.46	7.7	16	0.18	0.47		
R12	Preliminary Design Ch 6200	6.0	15	0.17	0.46	7.1	15	0.18	0.47		
R13	Lawnsdale	6.0	15	0.17	0.46	8.3	16	0.19	0.48		
R14	New development Link Road Ch 700	6.0	15	0.17	0.46	8.4	16	0.19	0.48		
<b>AQSR</b>	<b>LV effective 2010</b>	<b>40</b>	<b>20</b>	<b>2<sup>2</sup></b>	<b>5</b>	<b>40</b>	<b>20</b>	<b>2<sup>2</sup></b>	<b>5</b>	<b>2<sup>2</sup></b>	<b>5</b>

<sup>1</sup> Calculated NRA default background and road traffic component

<sup>2</sup> The 8-hour average limit value for CO was converted to an annual average using a correction factor of 0.2, in accordance with NRA guidelines

Table 11.16 Change in Pollutant Concentrations at Selected Receptors, 2011 and 2026

		Change in annual mean concentration									
		2011					2026				
Receptor number	Description	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	PM <sub>10</sub> µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>	CO mg/m <sup>3</sup>	Benzene µg/m <sup>3</sup>
R1	Meencrumlin	-3.6	-1.0	-0.03	-0.03	-3.4	-0.9	-0.03	-0.03	-0.03	-0.03
R2	Donegal Rd.	-2.0	-0.6	-0.03	-0.03	-1.3	-0.4	-0.02	-0.02	-0.02	-0.03
R3	Main St. Ballybofey	-3.5	-1.4	-0.06	-0.09	-2.6	-1.0	-0.06	-0.06	-0.06	-0.11
R4	Main St. Stranorlar	-3.6	-1.5	-0.06	-0.09	-2.6	-1.0	-0.06	-0.06	-0.06	-0.11
R5	Kilross Road, near Stranorlar town centre	-1.9	-0.5	-0.02	-0.02	-1.5	-0.4	-0.02	-0.02	-0.02	-0.03
R6	Kilross Road junction	-0.1	0.1	-0.01	-0.01	0.2	0.2	-0.01	-0.01	-0.01	-0.01
R7	Lifford Road junction	-0.5	-0.1	-0.01	-0.01	-0.4	-0.1	-0.01	-0.01	-0.01	-0.01
R8	Trusk Road	2.5	0.7	0.02	0.01	2.4	0.8	0.02	0.02	0.02	0.02
R9	Creamery Road	3.4	1.0	0.02	0.02	3.3	1.1	0.03	0.03	0.03	0.03
R10	Edenmore Junction	2.3	0.6	0.01	0.01	2.1	0.6	0.02	0.02	0.02	0.01
R11	Preliminary Design Ch 7300	1.9	0.5	0.01	0.01	1.7	0.5	0.01	0.01	0.01	0.01
R12	Preliminary Design Ch 6200	1.2	0.3	0.01	0.01	1.1	0.3	0.01	0.01	0.01	0.01
R13	Lawnsdale	2.6	0.7	0.02	0.01	2.3	0.7	0.02	0.02	0.02	0.02
R14	New development Link Road Ch 700	2.5	0.7	0.02	0.01	2.4	0.8	0.02	0.02	0.02	0.02
	Noteworthy change (10% of Limit Value)	4	2	0.2	0.5	4	2	0.2	0.5	0.2	0.5

Note: The change in concentration is the predicted concentration for the do something scenario less the predicted concentration for the do minimum scenario. A negative value indicates an improvement and a positive value indicates deterioration in air quality. Values have been rounded to two significant figures.

Table 11.17 Description of Change in NO<sub>2</sub> Concentration in accordance with NRA Guidelines

Receptor number	Receptor Description	2011			2026		
		Percentage change	Magnitude of Change	Absolute concentration in relation to standard	Percentage change	Magnitude of Change	Absolute concentration in relation to standard
R1	Meencrumlin	-33%	Very large	Well below standard	-34%	Very large	Well below standard
R2	Donegal Rd.	-10%	Medium	Well below standard	-7%	Small	Well below standard
R3	Main St. Ballybofey	-15%	Large	Well below standard	-13%	Medium	Well below standard
R4	Main St. Stranorlar	-16%	Large	Well below standard	-13%	Medium	Well below standard
R5	Kilross Road, near Stranorlar town centre	-10%	Medium	Well below standard	-9%	Small	Well below standard
R6	Kilross Road junction	-1%	Very small	Well below standard	3%	Very small	Well below standard
R7	Lifford Road junction	-5%	Very small	Well below standard	-5%	Small	Well below standard
R8	Trusk Road	38%	Very large	Well below standard	41%	Very large	Well below standard
R9	Creamery Road	51%	Very large	Well below standard	55%	Very large	Well below standard
R10	Edenmore Junction	35%	Very large	Well below standard	34%	Very large	Well below standard
R11	Preliminary Design Ch 7300	28%	Very large	Well below standard	29%	Very large	Well below standard
R12	Preliminary Design Ch 6200	19%	Large	Well below standard	19%	Large	Well below standard
R13	Lawnsdale	39%	Very large	Well below standard	39%	Very large	Well below standard
R14	New development Link Road Ch 700	38%	Very large	Well below standard	41%	Very large	Well below standard

Table 11.18 Description of Change in  $PM_{10}$  Concentration in accordance with NRA Guidelines

Receptor number	Receptor Description	2011			2026		
		Percentage change	Magnitude of Change	Absolute concentration in relation to standard	Percentage change	Magnitude of Change	Absolute concentration in relation to standard
R1	Meencrumlin	-6%	Small	Below Standard DM, not Well Below	-6%	Small	Below Standard DM, not Well Below
R2	Donegal Rd.	-3%	Very small	Above standard with scheme	-2%	Very small	Below Standard DM, not Well Below
R3	Main St. Ballyboley	-6%	Small	Above standard with scheme	-5%	Small	Below Standard DM, not Well Below
R4	Main St. Stranorlar	-6%	Small	Above standard with scheme	-5%	Small	Below Standard DM, not Well Below
R5	Kilross Road, near Stranorlar town centre	-3%	Very small	Above standard with scheme	-2%	Very small	Below Standard DM, not Well Below
R6	Kilross Road junction	0%	Extremely small	Below Standard WS, not Well Below	1%	Extremely small	Below Standard WS, not Well Below
R7	Lifford Road junction	-0.6%	Extremely small	Below Standard DM, not Well Below	-1%	Extremely small	Below Standard DM, not Well Below
R8	Trusk Road	5%	Very small	Below Standard WS, not Well Below	5%	Small	Below Standard WS, not Well Below
R9	Creamery Road	6%	Small	Below Standard WS, not Well Below	7%	Small	Below Standard WS, not Well Below
R10	Edenmore Junction	4%	Very small	Below Standard WS, not Well Below	4%	Very small	Below Standard WS, not Well Below
R11	Preliminary Design Ch 7300	3%	Very small	Below Standard WS, not Well Below	3%	Very small	Below Standard WS, not Well Below
R12	Preliminary Design Ch 6200	2%	Very small	Below Standard WS, not Well Below	2%	Very small	Below Standard WS, not Well Below
R13	Lawnsdale	5%	Very small	Below Standard WS, not Well Below	5%	Small	Below Standard WS, not Well Below
R14	New development Link Road Ch 700	5%	Very small	Below Standard WS, not Well Below	5%	Small	Below Standard WS, not Well Below

Table 11.19 Impact Assessment in accordance with NRA Guidelines

Receptor number	Receptor Description	Description of impact			
		2011		2026	
		NO <sub>2</sub>	PM <sub>10</sub>	NO <sub>2</sub>	PM <sub>10</sub>
R1	Meencrumlin	Moderate beneficial	Slight beneficial	Moderate beneficial	Slight beneficial
R2	Donegal Rd.	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
R3	Main St. Ballybofey	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
R4	Main St. Stranorlar	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
R5	Kilross Road, near Stranorlar town centre	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
R6	Kilross Road junction	Negligible	Negligible	Negligible	Negligible
R7	Lifford Road junction	Negligible	Negligible	Slight beneficial	Negligible
R8	Trusk Road	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
R9	Creamery Road	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
R10	Edenmore Junction	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
R11	Preliminary Design Ch 7300	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
R12	Preliminary Design Ch 6200	Slight adverse	Slight adverse	Slight adverse	Slight adverse
R13	Lawnsdale	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
R14	New development Link Road Ch 700	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse

### 11.4.5 Impact at National / International Level

The objective of the regional air quality impact assessment was to establish the net contribution to overall air pollution on a national / international level as a consequence of the Preliminary Design.

The assessment determined the change in total annual emissions from the road network both with the proposed scheme (Do Something) and for the Do Minimum in 2011 and 2026. The assessment was undertaken for carbon (C), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), Total Hydrocarbons (THC) and fine particulate matter (PM<sub>10</sub>).

The total annual pollutant emissions and the comparison with and without the Preliminary Design are presented in Table 11.20. Details of the information used in this prediction are provided in Appendix 11.4.

The total emissions vary with pollutant. This is due to the variation in emission rates for each pollutant as a function of speed. For example, emissions of NO<sub>x</sub> are at a minimum at about 30km/hour but increase rapidly with increasing speed. Emissions of hydrocarbons are relatively constant between 40 and 100km/hour. The overall distance travelled along the existing road and the Preliminary Design is similar.

**Table 11.20 Total Emissions and Comparison of Route Network Emissions for the Wider Scale Impact**

Year	Scenario	Pollutant Emissions tonnes/year				
		C	CO	NO <sub>x</sub>	THC	PM <sub>10</sub>
2011	Do minimum	4,854	68	50	9.8	1.4
	Do something	5,679	60	63	8.9	1.8
	<b>Change</b>	825	-7.9	12.2	-0.9	0.4
	<b>% Difference</b>	17%	-12%	24%	-10%	31%
2026	Do minimum	5,796	82	44	12	1.2
	Do something	6,759	71	55	10	1.7
	<b>Change</b>	963	-10.7	11.6	-1.3	0.5
	<b>% Difference</b>	17%	-13%	27%	-11%	42%

In terms of greenhouse gases, in 2011 the Preliminary Design will result in an increase in carbon emissions of 825 tonnes per year, or 17% when compared to the Do Minimum scenario. Similarly, in 2026, there will be an increase in carbon emissions of 963 tonnes per year (again 17%).

Emissions of NO<sub>x</sub> and PM<sub>10</sub> are predicted to increase as a consequence of the Preliminary Design both in 2011 and 2026, mainly due to increased vehicle speeds. Overall emissions of carbon monoxide and total hydrocarbons decrease slightly with the Preliminary Design in both 2011 and 2026.

This assessment methodology does not take account of traffic congestion and queuing at junctions that currently occurs on the road network. The emissions in the Do Minimum scenario are likely to be greater than predicted. The assessment of regional impact may therefore tend to overestimate the adverse impact of the Preliminary Design. Traffic will be free flowing on the new road, as there will be limited access on

and off the Preliminary Design (restricted to junctions and roundabouts). This will minimise the generation of traffic related pollutants, compared with the stop-start nature of traffic movement in Ballybofey/Stranorlar along the existing N13/N15.

While there is a predicted overall increase in carbon, NO<sub>x</sub> and PM<sub>10</sub> emissions, the mechanism for dealing with such change is at a strategic policy making level. It is the subject of a range of policies including the National Climate Change Strategy and the National Program for Ireland for the Progressive Reduction of National Emissions of Transboundary Air Pollutants by 2010.

#### 11.4.6 Impact on Ecosystems

The NO<sub>x</sub> concentrations at various distances from the centreline of the Preliminary Design at Ch 11300 (River Finn crossing point) were calculated and presented in Table 11.21. The NO<sub>x</sub> LV of 30µg/m<sup>3</sup> (AQSR LV for protection of vegetation) is likely to be reached or exceeded within approximately 5m from the centreline of the roadway in 2011. The LV is not exceeded in 2026.

The Do Minimum NO<sub>x</sub> concentration is predicted to be 7.3µg/m<sup>3</sup> and 6.5 µg/m<sup>3</sup> in 2011 and 2026 respectively at Ch 11300. The increase in NO<sub>x</sub> concentration as a consequence of the Preliminary Design is included in Table 11.21. The increase exceeds 2 µg/m<sup>3</sup> at distances within 110m of the centreline of the roadway. As the River Finn runs oblique with the road for a short distance, a stretch of the river of about 500m lies within 120m of the Specimen Design. The project ecologist concurs that this is not significant.

The NO<sub>2</sub> concentrations at various distances from the centreline of the roadway were calculated and presented in Table 11.22, together with the change as a consequence of the Preliminary Design. This is based on Do Minimum concentrations of 6.6µg/m<sup>3</sup> and 6.0µg/m<sup>3</sup> in 2011 and 2026 respectively.

The road contribution to dry deposition of nitrogen was calculated and is included in Table 11.22. Assuming a deposition velocity of 0.001m/s (NRA guidelines), the increase in dry deposition load as a consequence of the Preliminary Design between 10m and 200m from the road is less than 1kg(N)/ha/yr. This is well below the UNECE (2003) critical load of 5 kg (N)/ha/yr. The annual mean deposition of NO<sub>x</sub> in Donegal in 1994 was about 4 kg (N)/ha/yr (Source: "Mapping of rainfall chemistry in Ireland 1972 - 1994" Royal Irish Academy, 1997). The Preliminary Design would result in an increase of less than 25% in deposition levels.



**Table11.21 NO<sub>x</sub> Concentration as a function of distance from the Preliminary Design at Ch 11300**

Distance from N15 centreline, m	2011		2026	
	Annual mean NO <sub>x</sub> µg/m <sup>3</sup>	Change in NO <sub>x</sub> conc. with Preliminary Design µg/m <sup>3</sup>	Annual mean NO <sub>x</sub> µg/m <sup>3</sup>	Change in NO <sub>x</sub> conc. with Preliminary Design µg/m <sup>3</sup>
5	31	23	27	21
10	28	21	25	19
20	23	16	21	14
30	20	12	17	11
40	17	10	15	8
50	15	8	13	7
60	13	6	12	5
70	12	5	11	4
80	11	4	10	3
90	10	3	9	3
100	10	2	8	2
110	9	2	8	2
120	9	2	8	1
150	8	1	7	1
200	8	0	7	0

**Table11.22 NO<sub>2</sub> concentration and Dry Deposition of Nitrogen as a function of distance from the Preliminary Design at Ch 11300**

Distance from Preliminary Design centreline, m	2011			2026		
	Annual mean NO <sub>2</sub> µg/m <sup>3</sup>	Change in NO <sub>2</sub> conc. with Preliminary Design µg/m <sup>3</sup>	Change in dry deposition with Preliminary Design kgN/ha/yr	Annual mean NO <sub>2</sub> µg/m <sup>3</sup>	Change in NO <sub>2</sub> conc. with Preliminary Design µg/m <sup>3</sup>	Change in dry deposition with Preliminary Design kgN/ha/yr
5	14	7	0.7	12	6	0.6
10	13	6	0.6	12	6	0.6
20	12	5	0.5	11	5	0.5
30	11	4	0.4	10	4	0.4
40	10	3	0.3	9	3	0.3
50	9	3	0.3	8	2	0.2
60	9	2	0.2	8	2	0.2
70	8	2	0.2	8	2	0.2
80	8	1	0.1	7	1	0.1
90	8	1	0.1	7	1	0.1
100	7	1	0.1	7	1	0.1
110	7	1	0.1	7	1	0.1
120	7	1	0.1	7	1	0.1
150	7	0.3	0.0	6	0	0.0
200	7	0.2	0.0	6	0	0.0

<sup>1</sup> Dry deposition of nitrogen (from nitrogen oxide) has been calculated assuming a deposition velocity of 0.001 m/s, using the following: 1 µg/m<sup>3</sup> NO<sub>2</sub> = 0.1 N ha<sup>-1</sup> yr<sup>-1</sup>

## 11.5 Mitigation Proposals

### 11.5.1 Mitigation during Construction

Dust can be mitigated by imposing working restraints within the contract documentation. Effective measures for mitigating dust generation and dispersal will include the following:

- Wheel wash of vehicles prior to leaving the site
- Sheeting vehicles carrying dust-generating materials to and from site
- Spraying, sealing or re-vegetation of exposed earthworks
- Where practicable, construction of haul routes within the construction area away from sensitive sites, and the width kept to a minimum
- Paving or use of equivalent (e.g. geotextiles) around heavily used areas such as batching plant or haul routes
- Sweeping of paved haul roads and public roads regularly used by construction traffic
- Limiting of vehicle speeds
- Location of crushing plant away from sensitive sites.
- Location of stockpiles away from the site boundary and out of the wind (or wind breaks provided). These will be kept to minimum practicable height, and where appropriate re-vegetated or temporarily covered.
- Minimising works generating dust (e.g. cutting and grinding)
- Employment of appropriate equipment and techniques such as dust extraction to reduce dust.

Mitigation measures will be detailed in the Environmental Operating Plan (EOP) (See Chapter 3.0 Description of the Preliminary Design for more detail of the EOP), which will be prepared by the Contractor prior to construction commencing. The EOP will be developed, implemented and maintained in accordance with the NRA EOP guidelines (2007).

### 11.5.2 Mitigation during Operation

No mitigation measures are considered necessary during operation of the Preliminary Design. The air quality standards are not exceeded as a consequence of the scheme.

Progressively stricter EU vehicle controls and implementation of the National Climate Change Strategy are expected to result in reduced emissions. These are likely to have a similar impact on the Do Minimum and Do Something scenarios.

## 11.6 Conclusions

The impact on air quality of the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass was assessed in accordance with the methodology and assessment criteria of the National Roads Authority "Guidelines for Treatment of Air Quality in National Road Schemes, 2006" and the methodology detailed in UK Highways Agency "Design Manual for Roads and Bridges".

### **Existing Environment**

The existing air quality is generally good in the area of study. Levels of PM<sub>10</sub> approach and frequently exceed the Air Quality Standards Regulations (AQSR) Limit Values for 2010 throughout Ireland. The concentration of other pollutants such as nitrogen dioxide, carbon monoxide and benzene are well below the AQSR limits for 2010.

### **Impact during Construction**

Construction activities such as earth moving, excavation and traffic movement generate dust, particularly during dry periods. Properties within 50m of the construction works may be adversely affected, although any impact is likely to be minor. The number of properties predicted to be adversely affected is twenty. The impact can be minimised with the implementation of an effective EOP.

There will be negligible impacts on air quality due to exhaust emissions from heavy commercial vehicles associated with construction activities.

### **Impact during Operation**

The index of overall change in exposure for the existing route and the Preliminary Design for the pollutants NO<sub>2</sub> and PM<sub>10</sub> was determined. It was concluded that there will be an overall reduction in the exposure to pollutants. Over 95% of the properties affected will experience a benefit.

Pollutant concentrations were determined for those properties identified as being likely to experience the highest pollutant levels and/or be subject to the greatest change in air quality, both beneficial and adverse. Fourteen receptor locations were selected. The pollutant concentrations were determined, for the Do Minimum and Do Something scenarios in 2006, 2011 and 2026. The pollutant concentration levels will not exceed the AQSR LVs as a consequence of the Preliminary Design. The air quality at all locations is considered to be good.

The change in concentration with the Preliminary Design was evaluated in accordance with the NRA guideline criteria. Receptors along the Main Streets in Ballybofey and Stranorlar would experience a substantial benefit with respect to reduction in PM<sub>10</sub> concentration and a slight benefit with respect to NO<sub>2</sub> concentration. An estimated 100 properties would experience this benefit.

The property closest to the existing road at Meencrumlin, is predicted to experience a moderate beneficial impact with respect to NO<sub>2</sub> concentrations. All other properties assessed along the existing route are predicted to experience a slight beneficial impact.

Approximately twenty-one properties were predicted to experience a moderate adverse impact with respect to NO<sub>2</sub>, in accordance with criteria within the NRA guidelines. These were: ten properties in the new Lawnsdale development at Navenny, nine properties nearest the Ballybofey Link Road, a property near the Preliminary Design at Edenmore (Ch 10600) and a property at Carrickmagrath (Ch 7300).

The predicted NO<sub>2</sub> concentration level at those properties assigned a moderate adverse impact is less than 10µg/m<sup>3</sup>. This concentration is comfortably within standards in the AQSR. Also, the increase in NO<sub>2</sub> concentration at all properties is less than 4µg/m<sup>3</sup>, the change identified as noteworthy in DMRB.

All other receptors assessed along the Preliminary Design are subject to a slight or negligible adverse impact.

The impact at a national/international level was assessed by determining the total emissions of pollutants for the existing route and Preliminary Design. This assessment showed an increase in emissions of carbon, nitrogen oxides and PM<sub>10</sub> of 17%, 27% and 42% respectively as a consequence of the Preliminary Design in 2026.

The River Finn is a candidate Special Area of Conservation. The AQSR limit value for adverse impact on vegetation is reached at a distance of about 15m from the centre of the road in 2011. This affects a relatively small stretch of the river, about 30m. The dry deposition of nitrogen is well below UNECE (2003) critical load levels.

## 11.7 References

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## 12.0 Noise and Vibration

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### 12.1 Introduction and Methodology

This Chapter presents the results of the assessment of road traffic noise associated with the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass for the scheme's opening year (2011) and, 15 years hence (2026) in accordance with National Roads Authority's (NRA) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (Rev 1, October 2004) (hereafter known as the NRA Guidelines). In addition an assessment is also made of the impact on the local community of constructing the Preliminary Design. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

The study area includes receivers adjacent to the existing N13/N15, and receivers in the area of the Preliminary Design. The locations of the receivers assessed are indicated on Figure 12.1.

All noise and vibration terminology used in this assessment is described further in Appendix 12.1.

#### 12.1.1 Baseline Noise Surveys

In order to establish the existing ambient noise climate, noise surveys were carried out from 8<sup>th</sup> to 10<sup>th</sup> August 2006 at 6 receiver locations in the area of the Preliminary Design (Figure 12.1). Locations were chosen along public rights of way due to restrictions on access to private dwellings. All locations were chosen to be representative of nearby dwellings along the existing roads and Preliminary Design.

Rion NL-31 (Serial Number 341535) and Rion NL-32 (Serial Number 341536) sound level meters were used to take measurements of  $L_{A10}$ ,  $L_{A90}$ ,  $L_{Aeq}$  and  $L_{Amax}$  (see Appendix 12.1 for Glossary). The  $L_{A90}$  is used as a descriptor of the background levels, the  $L_{Aeq}$  level is the equivalent continuous sound level over the measurement period and  $L_{Amax}$  is an indicator of the highest noise level during the measurement period. The sound level meters were calibrated both before and after the surveys and exhibited zero drift from the calibrated level in every case.

At three of the monitoring locations (1 to 3) a full 24-hour survey was undertaken. These locations were chosen as ones likely to experience a significant impact. One, St. Joseph's Hospital, at the eastern end of the Preliminary Design was chosen as a particularly noise sensitive site. Of the two other monitoring points, the second, at Sessiagh O'Neill is approximately in the middle of the Preliminary Design, and the third, at Goland is towards the western extreme.

At the remaining three measurement locations (A-C) short term noise measurements were undertaken. All 3 locations are close to the existing N15; A is towards the eastern end of the Preliminary Design, location B is in Ballybofey and C is on the N15 after it leaves Ballybofey (western side).

All measurements were free field (i.e. there were no nearby reflecting surfaces) and were taken at a height of approximately 1.5m from ground level. The weather was overcast with the occasional spots of rain and wind speeds of less than 3 m/s.

The 24-hour measurement results (locations 1-3) were converted using the  $L_{den}$  parameter that takes into account the noise climate over the day, evening and nighttime periods. Hourly samples of the  $L_{Aeq}$  were logged to allow the  $L_{den}$  to be calculated using the following formula:

$$L_{den} = 10 \times \log_{10} \left( \frac{1}{24} \right) (12 \times 10^{L_{day}/10} + 4 \times 10^{(5+L_{evening})/10} + 8 \times 10^{(10+L_{night})/10}) \text{ dB(A)} \quad [\text{equation 1}]$$

where:  $L_{day}$  = 07:00 to 19:00 hours  
 $L_{evening}$  = 19:00 to 23:00 hours  
 $L_{night}$  = 23:00 to 07:00 hours

The  $L_{den}$  is the day-evening-night noise indicator, which incorporates a noise component for daytime and weighted evening (+5dB) and night (+10dB) components.

The surveys at locations A, B and C were undertaken in accordance with the shortened measurement procedure outlined in the NRA Guidelines. Fifteen-minute measurements of  $L_{A10}$  were taken in three consecutive hours between 10:00am and 5:00pm on a typical weekday. The arithmetic average of these measurements is calculated for each location and 1 dB is subtracted from the  $L_{A10,3\text{-hour}}$  measured level in order to find the equivalent  $L_{A10,18\text{-hour}}$  dB for the measurement location.

The full set of measurement data (including survey times) is presented in Appendix 12.2 and summarised in Section 12.2.

## 12.1.2 Construction Noise

There is no published Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities would normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion. The NRA Guidelines provide a set of limits that it considers acceptable for construction activity. These are presented in Table 12.1, and will be adopted for the construction of the Preliminary Design where practicable.

At this preliminary design stage, as details of construction plant and phasing of works have yet to be finalised, a detailed construction noise assessment could not be undertaken. However, an assessment has been undertaken of the potential noise impacts to sensitive receivers for lorry movements associated with the earthworks operations. Chapter 3.0 Description of the Preliminary Design outlines the earthworks operations required to construct the new road. The quantities presented within Chapter 3.0 will be reviewed at the Detailed Design stage. It is anticipated that the majority of material made available from excavation activities will be used in the construction of either the main earthworks or landscaping. Consideration will be given to using any material remaining after completion of the permanent works for agricultural / ecological improvement works in accordance with local planning controls. The final option will be disposal, which will be in accordance with waste management legislation.

For the minimal net requirement of imported material, potential primary sources of the imported fill material will include local commercial quarries (volume of suitable material to be imported to site: 0.41M m<sup>3</sup>). Figure 3.8 shows commercial quarries in the vicinity of the Preliminary Design. Based on the earthworks quantities outlined in Chapter 3.0 and the associated lorry movements to transport the material, an assessment has been undertaken of the potential noise impacts to sensitive receivers along the haul roads. Figure 3.8 shows the potential haul roads from each commercial quarry identified. Haul road traffic noise levels at fixed points up to 50m from the haul roads have been calculated based on BS5228: Part 1: Noise & Vibration Control on Construction and

Open Sites 1997 in order to indicate the likely construction noise impact of the haul road traffic.

**Table 12.1 Maximum Permissible Noise Levels at the Facade of Dwellings During Construction (from NRA Guidelines)**

Days & Times	$L_{Aeq(1hour)}$ dB	$L_{pA(max)slow}$ dB
Monday to Friday 0700 to 1900 hrs	70	80*
Monday to Friday 1900 to 2200 hrs	60*	65*
Saturday 0800 to 1630 hrs	65	75
Sundays and Public Holidays 0800 to 1630 hrs	60*	65*
* Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority		

### 12.1.3 Construction Vibration

The NRA Guidelines provide a considered review of construction vibration limits presented in various international standards and contain a table of recommended maximum construction vibration levels, which if met, will ensure there is negligible risk of cosmetic damage to buildings during construction. These limits are reproduced in Table 12.2.

**Table 12.2 Recommended Vibration Limits During Road Construction in Order to Minimise the Risk of Building Damage**

Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration, at a frequency of,		
Less than 10Hz	10 to 50Hz	50 to 100 Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

### 12.1.4 Operational Road Traffic Noise

The methodology followed in this assessment is in accordance with the NRA Guidelines. The NRA Guidelines recommend predicting free field traffic noise levels at sensitive receiver facade locations and comparing them with a design goal of 60dB  $L_{den}$ . The  $L_{den}$  is a 'noise annoyance indicator' representing the noise climate across the entire 24 hour period and comprises individual components to describe average noise levels during day (07:00-19:00hrs), evening (19:00-23:00hrs) and night (23:00hrs-07:00hrs).

In accordance with the NRA Guidelines, traffic noise levels are to be predicted using the guidance set out in CRTN. The CRTN methodology advises that noise predictions are only reliable for distances up to 300 metres from a road, beyond which the varying effects of wind and temperature can compromise accuracy. It must also be considered that CRTN predicts traffic noise levels in terms of the  $L_{A10,18hour}$  whereas the NRA Guidelines contain a criterion for determining mitigation requirements in terms of the  $L_{den}$  parameter indicator.

The  $L_{den}$  is derived from hourly  $L_{Aeq}$  levels, with weightings applied for evening and overnight periods. Two methods (A and B) are presented within the NRA's Guidelines



for deriving the  $L_{den}$  from  $L_{A10}$ . Method A requires hourly  $L_{A10}$  values to be calculated and then converted into hourly  $L_{Aeq}$ 's, thereby providing sufficient information to derive the  $L_{den}$ . Method B involves estimating the  $L_{den}$  from the  $L_{A10,18-hour}$  using a generalised approximation formula, which does not take into consideration hourly traffic flow patterns and is only accurate under a limited range of conditions. The more robust Method A calculation is therefore favoured by the NRA and has been used in this assessment to calculate  $L_{den}$  values.

In order to convert  $L_{A10,18-hour}$  values predicted for the Preliminary Design into the equivalent  $L_{den}$  values the 24-hour traffic flows have been used to calculate each hourly  $L_{A10,1-hour}$  across the 24-hour period. This is a relatively straightforward conversion to carry out, as the  $L_{A10,18-hour}$  is equal to the arithmetic average of the hourly  $L_{A10}$  values (between 06:00 and 24:00hrs), and the distribution of these values across the day is proportional to the hourly traffic flows. Hourly  $L_{Aeq}$  values have then been calculated using the following formula from the NRA Guidelines:

$$L_{Aeq(1\text{ hour})} = 0.94 \times L_{A10(1hour)} + 0.77\text{ dB} \quad [\text{equation 2}]$$

The  $L_{den}$  values at each receiver have then been calculated from the hourly  $L_{Aeq,1\text{ hour}}$  values using the guidance presented in the NRA Guidelines.

The derived  $L_{den}$  values from Method A should be rounded to the nearest whole number, with 0.5 being rounded up. As such the design goal at a sensitive receiver for noise from the Preliminary Design is 60.4 dB  $L_{den}$ .

The noise assessment calculations have been undertaken using the industry-standard road traffic noise modelling software package RoadNoise. This program generates a three-dimensional computer model from digitised inputs of road segments, barriers (e.g. buildings, landform etc.) and the receiver positions at which the noise level is to be calculated. The base data used to develop the model has included the following:

- Traffic Composition: 18-hour traffic flow, percentage of heavy goods vehicles and average traffic speeds. The traffic flows used for the noise assessment are derived from the traffic model developed for the Preliminary Design;
- Road Configuration: gradient, surface texture, vertical and horizontal alignment and depth / height of any cuttings or embankments;
- Receiver Location: distance from road, angle of view, ground absorption and shielding from natural or purpose built barriers; and
- Ground contour information.

RoadNoise has been used to predict free field traffic noise levels at one metre from the facades of 252 receiver locations along the existing N13/N15 corridor and at an additional 136 locations along the Preliminary Design (a high number of receiver locations were required to fully determine the need for noise mitigation). Each receiver in the model represents a sensitive receiver, or a group of sensitive receivers.

It should be noted that the selected receiver locations not only include the existing sensitive receivers but also the new residential developments, which are under construction or have planning permission at this study stage. However, due to the limited available information for two new residential developments along the Preliminary Design (Planning Application numbers 038128 and 992722), no noise assessment receiver was included in the noise model for these developments (between Chainages (Ch) 9050 and 9350). The need for noise mitigation measure for these developments will be reviewed during the Detailed Design stage subject to the information being available.

The predictions were based on a receiver height of 4m above ground level as noise levels are often higher at the first floor than ground floor. For those dwellings that have been identified as being of single storey construction, calculations were carried out at a height of 1.5m above ground level. The locations of all receivers are shown in Figure 12.1.

All calculations were carried out omitting any facade reflection corrections as the NRA Guidelines design criterion is presented in terms of a free-field level. 10% HGV and the predicted vehicle flows and speeds Jacobs (October 2007) "N15/N13 Local Model Validation Report" were used in the RoadNoise model (see Chapter 2.0 Background to the Project). The traffic data used in the noise model is given in Figure 2.1. This approach is fully in accordance with the relevant NRA Guidelines.

Data obtained during the ambient noise monitoring (2006) was also used to calibrate the noise model – i.e. checking noise levels calculated using existing traffic flows (with base year flows) against the measured noise levels. Calculations were also carried out for 2011 (the opening year) and 2026 (the design year) for both the Do-Minimum and Do-Something scenarios (the latter with and without proposed mitigation included in the model).

For sensitive buildings at which the 60dB  $L_{den}$  criterion will be exceeded the NRA Guidelines specify that the following three conditions must be satisfied in order for mitigation measures to be considered:

- The combined expected maximum traffic noise level, i.e. the relevant noise level, from the Preliminary Design together with other traffic in the vicinity is greater than the design goal (60dB  $L_{den}$ );
- The relevant noise level is at least 1dB more than the expected traffic noise level without the Preliminary Design; and
- The contribution to the increase in the relevant noise level from the Preliminary Design is at least 1dB.

The above conditions have been tested using the RoadNoise model by analysing the separate noise contributions from existing roads and the Preliminary Design.

### 12.1.5 Operational Road Traffic Vibration

Traffic generated vibrations arise most where road surfaces are uneven, e.g. on older roads that are damaged or require surfacing, and where they carry a significant proportion of heavy goods vehicles (the high axle loading passing over a break in the road surface imparts vibrational energy into the ground). Ground borne vibration is more often in the 8-20Hz range, and is produced by the interaction between rolling wheels and the road surface. However, in practice there is little evidence of traffic-induced vibrations from well-maintained roads behaving as a significant contributor to building damage. This is reflected in the NRA Guidelines Section 6.8 on Page 39, which identifies that the potential vibration impact from road development is not required to consider unless there are unusual circumstances under which higher than normal traffic vibration levels may be expected.

## 12.2 Existing Environment

The full survey results (including survey times) for the 24-hour monitoring locations (see Figure 12.1) carried out in August 2006 are presented in Appendix 12.2, and a summary in Table 12.3.

**Table 12.3 Summary of Measured Noise Levels at 24-hour Monitoring Locations**

Measurement Location	L <sub>A90</sub> dB	L <sub>Aeq,24-hour</sub> dB	L <sub>day</sub> dB(A)	L <sub>evening</sub> dB(A)	L <sub>night</sub> dB(A)	L <sub>den</sub> dB(A)
1	41.9	48.2	49.9	43.5	41.6	50.4
2	35.8	42.6	43.8	43.1	35.3	45.3
3	42.7	62.5	64.4	60.8	56.2	65.3

Monitoring locations 1 and 2 lie along the Preliminary Design and are removed from the influence of the existing N13/N15. Monitoring location 3 is situated approximately 3m from the existing N15 near to Saint Joseph's Hospital. The relative locations are reflected in the monitoring results where location 3 has the highest measured levels with an L<sub>den</sub> of 65.3 dB. Monitoring locations 1 and 2 have lower L<sub>den</sub> values of 50.4 and 45.3dB respectively. The surveyor noted that the existing N15 was just audible at these locations but both were quiet, rural sites where the main noise source was noted to be bird noise during the surveys.

The full survey results (including survey times) for the NRA Guideline's Short-term Measurements undertaken in August 2006 at three locations (see Figure 12.1) are presented in Appendix 12.2, and summarised in Table 12.4.

**Table 12.4 Summary of Measured Noise Levels using Short-term Measurements**

Measurement Location	L <sub>A10,3-hour</sub> dB	L <sub>A10,18-hour</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amax</sub> dB
A	79.2	78.2	74.3	47.9	93.2
B	69.7	68.7	66.7	59.3	78.8
C	74.6	73.6	69.8	49.7	87.9

Monitoring locations A, B and C lie along the existing N15 route. The L<sub>A10,18-hour</sub> noise levels are all high indicating that the current N15 is a busy road, with levels at locations A and C being the highest at 78.2 and 73.6dB respectively. At these locations traffic flows were noted to be free-flowing and fast-moving. The L<sub>A10,18-hour</sub> at location B is slightly lower at 68.7dB. This location was in the town centre, which had lower observed average traffic speeds, resulting in the lower measured noise level.

## 12.3 Assessment of Effects: Construction

### 12.3.1 Construction Noise

As outlined in Section 12.1.2, the lorry movements involved in the earthworks operation may cause potential noise impacts to the noise sensitive receivers within 50m of the haul roads. Outside of 50m any noise impacts would be less than those discussed here. Based on the forecast lorry movements (Figure 3.8), the haul road traffic noise levels have been calculated based on BS5228 for all locations within 50m of the haul routes (Table 12.5). At all locations within 50m of the haul routes, predicted traffic noise levels are below the noise limits set out within the NRA Guidelines (Table 12.1). The assessment (Table 12.5), therefore, indicates that disturbance from the noise impact is unlikely for any sensitive receptors located within 50m of the haul routes.

**Table 12.5 Predicted Haul Road Traffic Noise Levels**

Origin of Haul Road Traffic	Number of Lorries (veh / hr)	Speed (km / hr)	Distance between the noise sensitive receivers and the centre of haul road (metres)	Predicted Noise Levels $L_{Aeq}$ dB
Churchill Quarry	3	70	10	55
			20	52
			30	51
			40	49
			50	48
Mountain Top Quarry	5	70	10	58
			20	55
			30	53
			40	52
			50	52
Churchill Quarry + Mountain Top Quarry	8	70	10	60
			20	57
			30	55
			40	54
			50	53
A. S. Ballintine	3	70	10	55
			20	52
			30	51
			40	49
			50	48

As outlined in Section 12.1.2, as details of construction plant and phasing of works have yet to be finalised, a detailed construction noise assessment could not be undertaken. However, all construction noise will need to comply with any criteria imposed by the Local Authority and have appropriate regard to the NRA Guidelines (see Table 12.1) and to the noise control measures outlined in BS5228. Noise levels are likely to be noticeable at nearby residential properties due to the close proximity of the construction site and thus, the Contractor, in accordance with the principle of 'best practicable means', would need to minimise noise emissions throughout the construction period. Possible mitigation measures are discussed in Section 12.5.

### 12.3.2 Construction Vibration

The preliminary geological survey indicates that blasting is likely to be undertaken at Ch's 2000-2400, 9900-10500 and 13900-14400 where there are strengthened rocks requiring long or deep cuttings. However, the nature of blasting is likely to be of a small scale.

The effects of blasting operations in terms of both ground borne and airborne vibration would depend very much on the distance to the receiver, the meteorological conditions, the explosive charge weight and the depth of charge etc as well as the ground conditions.

It is usually the airborne vibration or air overpressure generated by the explosive that is of most significance owing to the fact that the individual charges, albeit relatively small, are often not able to be totally confined.

Vibration can be generated within the ground by a dynamic source of sufficient energy composed of various wave types known collectively as seismic waves. These seismic waves will spread from the vibration source decaying rapidly as distance increases. Experimentation and energy measurements have defined the maximum particle velocity energy level that represents the threshold of cosmetic damage as 19-50 millimetres/second dependent upon the frequency range.

Whenever an explosive is detonated, transient airborne pressure waves are generated. As these waves pass a given position, the pressure of the air rises rapidly to a value above the atmospheric pressure or ambient pressure. It then falls more slowly to a value below atmospheric before returning to the ambient value after a series of oscillations. The maximum pressure above atmospheric is known as the peak overpressure. Meteorological factors can also influence the intensity of air overpressure levels at any given location.

The closest noise receivers in the vicinity of the proposed blasting areas are Receivers 256, 347 and 372 which are approximately 130m, 52m and 144m from the blasting works respectively. Considered that these noise receivers are over 50m from the blasting works, and any blasting will be small in scale, it is expected that vibration noise impact will be minimal. However, mitigation measures as discussed in Section 12.5 are recommended to further minimise the potential vibration noise impact.

With respect to vibration, ground borne vibration propagation from construction activities is difficult to predict and relies on a detailed knowledge of the machinery and construction techniques being used together with geotechnical information describing earth types and soil compaction levels. Continuous vibration monitoring at sensitive buildings close to the construction sites would address any uncertainties relating to the potential vibration levels and verify that construction vibration criteria (see Table 12.2) are not exceeded. This monitoring would also enable the Contractor to take immediate corrective action (e.g. use of alternative equipment) if deemed necessary.

## 12.4 Assessment of Effects: Operation

The results of the noise predictions for the existing N13/N15 route are presented within Table A of Appendix 12.3, whilst Table B contains the results of similar analyses for receivers positioned along the Preliminary Design.

### 12.4.1 Calibration of Noise Model

The RoadNoise model results have been compared against the baseline noise survey results for measurement location B. This baseline location was chosen as the observed average traffic speeds here most closely corresponded with the average traffic speeds within the noise model. At monitoring locations A and C the traffic was observed to be moving very fast, faster than the 75kph used in the model.

Using the traffic data for 2006 Jacobs (October 2007) "N15/N13 Local Model Validation Report" the predicted  $L_{A10,18\text{-hour}}$  at location B is 67.8 dB, whilst the measured level was of 68.7 dB (Table 12.4). The difference between the two levels is 0.9 dB(A), which in terms of abrupt change would be considered to be imperceptible. Considering the potential influence of other noise sources, aside from the N15, on the higher measurement location result this is considered to be within a reasonable tolerance.

## 12.4.2 The Do-Minimum Situation

Noise levels for individual properties or groups of properties in the Do-Minimum scenario have been calculated as indicated on Figure 12.1. The results indicate that facades facing the existing N13/N15 will have free field noise levels in the range 43 to 77 dB  $L_{den}$  in 2011 depending on their relative position to the road. Similarly, noise levels on Pound Street towards St Joseph's Hospital (Receiver 154 on Figure 12.1) vary between 51 and 71 dB  $L_{den}$ . Noise levels of such magnitude are typical of urbanised areas. Measured night-time background noise levels drop to approximately 35 dB  $L_{A90}$ .

The majority of receivers currently facing the N13/N15 are residential, although there are 3 churches and 2 schools near to these roads and one hospital on Pound Street. There are a few pockets of relative tranquillity, namely in areas such as the centre of the public park in Stranorlar, where ambient noise levels are predicted to be in the order of 55 dB  $L_{den}$ .

The 2026 Do-Minimum noise levels in the study area along the existing N13/N15 corridor are predicted to increase by approximately 1.0 dB  $L_{den}$  relative to the calculated noise levels for 2011. This noise increase is due to predicted traffic growth, which would be considered normal over a 15-year period.

Do-Minimum noise levels have also been calculated for properties in the study area within 300m of the Preliminary Design. As discussed in Section 12.1.4, for locations that are more than 300m from roads in the Do-Minimum model, the CRTN prediction methodology is unreliable. Therefore, a minimum noise level of 45dB  $L_{den}$  has been assumed at these locations based upon the noise survey data.

## 12.4.3 The Do-Something Situation

Noise levels in the Do-Something, with the Preliminary Design, scenarios have been predicted for the years 2011 and 2026.

Where the Preliminary Design would pass through existing rural areas such as Sessiagh O'Neill, Goland, Edenmore and Mullandrait, noise levels are expected to increase by more than 15 dB at 100 receiver locations during the years 2011 and 2026.

However, noise levels along the existing N13/N15 corridor will fall by 3dB or more at 214 receiver locations (i.e. 85% of receivers) during 2011 and 2026 relative to the Do-Minimum scenario. Overall, the range of traffic noise levels in the Do-Minimum scenario along the existing N13/N15 corridor in 2011 and 2026 were predicted to be 43 – 77 dB and 44 – 78 dB  $L_{den}$  respectively. Under the Do-Something scenario these ranges are predicted to fall to 42 – 73 dB and 42 – 74 dB  $L_{den}$  during 2011 and 2026 respectively. This represents a net beneficial noise impact for receivers along the existing N13/N15 corridor.

The analysis has identified a total of 30 and 36 noise sensitive receivers along the Preliminary Design that will experience noise levels in excess of the NRA Guidelines design goal of 60 dB  $L_{den}$  during 2011 and 2026 respectively and which satisfy the associated test conditions for mitigation. However, a number of these receivers are grouped in close proximity. Outline proposals for noise mitigation have therefore been compiled and are presented within Section 12.5. The re-calculated noise levels, with mitigation, are also presented within Appendix 12.3.

It should be noted that the proposed noise mitigation proposal excludes two new residential developments along the Preliminary Design (Planning Application numbers 038128 and 992722) (Ch 9050-9350) due to the limited available information on the development details. However, the need for noise mitigation for these developments will be reviewed during the detailed design stage subject to the information available in accordance with established guidelines.

#### 12.4.4 Operational Vibration

With the reduction in traffic from the existing carriageway through Ballybofey and Stranorlar, a lower amount of vibration experienced by dwellings along the existing road corridor can be expected.

With regard to the Preliminary Design and its new road construction and improvement works, these will leave a smooth road surface, which, in the absence of road surface discontinuities, will minimise vibrations from road traffic vehicles using the new route.

The Preliminary Design will therefore reduce the levels of vibration experienced by dwellings adjacent to existing roads, whilst not having any adverse impact on dwellings located close to the Preliminary Design.

### 12.5 Mitigation Proposals

#### 12.5.1 Construction Mitigation

Once construction details are available, the Environmental Operating Plan (EOP) (See Chapter 3.0 Description of the Preliminary Design) will be formulated by the Contractor, to indicate which residential areas could potentially be affected by construction noise, and outlining the mitigation measures to be adopted. Guidelines on the creation, implementation and maintenance of an EOP have been produced by the National Roads Authority (2007).

Along the entire length of the Preliminary Design, particularly at the key noise receivers, phasing of works would be considered in order to minimise construction related noise levels. Although St Joseph's Hospital is approximately 300m from the main carriageway, it is likely that noise levels will need to be monitored to ensure that construction noise does not interfere with the efficient performance of medical diagnosis.

Practical control measures routinely applied to minimise noise effects include the following:

- The selection of appropriate plant using guidances in BS5228: Part 1 and the European Communities (Construction Plant and Equipment Permissible Noise Levels) Regulations 1988;

- Where reasonably practicable, noisy plant or processes should be replaced by less noisy alternatives;
- Plant should be properly and regularly maintained;
- Compressors should be "sound reduced" models fitted with properly lined and sealed acoustic covers which should be kept closed whenever machines are in use and ancillary pneumatic tools should be fitted with suitable silencer;
- Machinery, which is used intermittently, should be shut down or throttled back to a minimum during those periods when not in use;
- All vehicles and mechanical plant should be fitted with effective exhaust silencers;
- Noise from existing plant and equipment can be reduced by modification or by the application of improve sound reduction methods, but this should only be carried out after consultation with the manufacturer;
- Where deemed reasonably practicable, plant and site equipment should be located away from noise sensitive receptors;
- Plant known to emit noise strongly in one direction should, when possible, be oriented so that the noise is directed away from noise sensitive receptors;
- The use, where necessary and practicable, of enclosures and barriers around noisy plant;
- Reducing number of plant to be operated simultaneously;
- Appropriate phasing of works activity; and
- Strict adherence to any standards and or noise limits and hour of operation that are set.

If blasting is confirmed to be undertaken during the detailed design stage, the EOP will be formulated to show which residential areas may be potentially affected by blasting operations and include appropriate control measures. When blasting is due to occur, there would be a warning system for residents to minimise the potential disturbance.

During construction a point of contact would be made available for the general public, in order to provide 2-way communication, through which comments or concerns can be expressed and notification given of any unavoidable emergency works. Continuous vibration monitoring at sensitive buildings close to the construction sites is recommended to address any uncertainties relating to the potential vibration levels and verify that construction vibration criteria are not exceeded. This monitoring would also enable the Contractor to take immediate corrective action (e.g. use of alternative equipment) if deemed necessary.

### 12.5.2 Operation Mitigation

The assessment of traffic noise levels has confirmed that mitigation will be required at a number of noise sensitive locations in accordance with the conditions specified within the NRA Guidelines. Noise barriers physically obstruct the line of sight between the road and receiver, thereby helping to scatter and direct traffic noise back towards its source. It is the most common way to mitigate traffic noise. Considering the locations of the proposed new roads and identified receivers, noise barriers are considered to be effective in mitigating the adverse noise impact and are therefore recommended.

Other forms of noise mitigation measures such as the application of low noise surfacing can provide a noise reduction of between 2 to 8 dB(A) depending on the materials



used. However, the acoustic performance of the surfacing will deteriorate with time due to the vehicle damage on the dressing and the cost of low noise surface roads is more expensive than standard impervious roads. At this stage, the application of low noise surfacing is not known. If low noise surfacing is considered for the Preliminary Design at a later stage, the extent of noise barriers could be reduced subject to the acoustic performance of low noise surfacing.

The extent of noise barriers that would be required in order to reduce traffic noise to the 60 dB  $L_{den}$  design goal at receivers exposed to traffic noise (unmitigated) from the Preliminary Design has been determined. These are summarised in Table 12.6 for the Preliminary Design without the Link Road and Table 12.7 for the Link Road separately.

Where a barrier on one side of the road results in reflection effects increasing noise levels at a receiver on the opposite side of the road, the resultant noise level has been checked to ensure that the noise level at the opposite receiver is not increased over the threshold.

The locations of the proposed noise barriers are also shown in Figure 12.2.

Barriers will be solid (i.e. no openings) and comply with ISEN 1793 and ISEN 1794. Barriers may be close-boarded timber fence, concrete panels or proprietary eco-barrier systems or earth bunds. Barrier heights are given relative to the surface of the road. These mitigation measures will be developed further at the Detailed Design stage.

Prediction results with the proposed barriers in place for affected receivers are given in Tables A and B in Appendix 12.3.

**Table 12.6 Measures to Mitigate Operational Traffic Noise for the Preliminary Design (not including the Link Road)**

Barrier ID	Location of Barrier	Measures		Benefiting sensitive receiver location(s)
		Height above Ground (m)	Side of Carriageway	
1	Ch 5000 – 5100	2.0	Northern Edge	262, 264 & 265
	Ch 5100 – 5200	2.5		
	Ch 5200 – 5300	1.5		
2	Ch 5500 – 5700	1.0	Northern Edge	269
3	Ch 6100 – 6300	1.5	Southern Edge	276 & 277
4	Ch 6900 – 7100	2.5	Southern Edge	288 & 289
5	Ch 7100 – 7200	0.5	Northern Edge	291, 293 & 382
	Ch 7200 – 7500	2.5		
6	Ch 9500 – 9700	1.0	Northern Edge	339
7	Ch 10400 – 10600	1.5	Western Edge	347, 348, 352 & 385
	Ch 10600 – 10700	2.0		
	Ch 10700 – 10800	1.5		
8	Ch 10800 – 11100	1.5	Eastern Edge	358
9	Stranorlar Roundabout – Ch 11700	3.0	Western Edge	361
	Ch 11700 - 11800	2.0		
10	Ch 12900 – 13000	2.0	Western Edge	369 & 398
	Ch 13000 – 13100	2.5	Western Edge	
11	Ch 14900 – 15100	1.0	Eastern Edge	377 & 378
12	Ch 7900 – 8000	1.0	Southern Edge	304, 390, 394 & 308
	Ch 8000 – 8200	1.8		
13	Ch 8500 – 8800	3.0	Northern Edge	395, 396 & 397
	North-eastern slip road from Navenny Grade Separated Junction to Ch. 8830	3.5		
	Ch 8830 – 9000	3.0		

**Table 12.7 Measures to Mitigate Operational Traffic Noise for Ballybofey Link Road**

Barrier ID	Location of Barrier	Measures		Benefiting sensitive receiver location(s)
		Height above Ground (m)	Side of Carriageway	
A	Ch 820 – 870	2.0	Northern Edge	316, 317 & 318
	Ch 870 – 900	2.5		
	Ch 900 – 985	3.0		
	Ch 985 – 1090	2.5		
B	Ch 600 – Trusk Road Junction	2.5	Southern Edge	320, 383 & 384
	Trusk Road Junction – Ch. 900	3.0		
	Ch 900 – 935	2.0		
C	Ch 320 – Creamery Road Junction	3.0	Eastern Edge	324
	Creamery Road Junction – Ch 550	4.5		
	Ch. 500 – 550	4.0		
D	Ch 320 – 415	1.0	Western Edge	326
	Ch 450 – 550	1.5		

## 12.6 Conclusions

Baseline noise surveys carried out for the Preliminary Design indicate that existing noise levels along the N13/N15 are typical of a rural/ urban environment.

A quantitative noise assessment has been undertaken to study the potential haul road traffic noise impact associated with the earthworks operations. The assessment results indicate that all predicted noise levels would comply with the noise limits set out within the NRA Guidelines and there would be no significant noise impact.

All construction noise and vibration will need to comply with any criteria imposed by the local authority and have appropriate regard to the NRA Guidelines and to the noise control measures outlined in BS5228: Part 1: Construction noise and vibration monitoring at sensitive receiver locations is recommended in order to verify that these limits are being adhered to. They would also serve to alert the Contractor when corrective action is required, for example by adjusting the phasing of works or the type of plant being used.

Due to the geology along the length of the Preliminary Design, blasting may be required at certain locations. However, with consideration of a separation distance of over 50m between the noise sensitive receivers and the works areas and the small scale of blasting work to be involved, the potential vibration impact is anticipated to be minimal. If blasting is confirmed to be required during the detailed design stage, the EOP will be formulated to show which residential areas may be potentially affected by blasting operations and include appropriate control measures. A warning system will also be established to inform the residents of the blasting time. Continuous vibration

monitoring at sensitive buildings close to the blasting areas is recommended as an advance warning for the Contractor to take immediate corrective action if vibration exceedance is found.

Noise levels have been calculated at receiver locations along the existing N13/N15 corridor and along the Preliminary Design. Calculations have been carried out for the years 2006 (in order to calibrate the noise model), 2011 and 2026 for both the Do-Minimum and Do-Something scenarios (the latter with and without mitigation included in the model).

The 2026 Do-Minimum noise levels in the study area are predicted to be slightly greater than in 2011 due to traffic growth, leading to an increase in traffic noise levels of approximately 1.0 dB.

Under the Do-Something scenario, noise levels at sensitive receiver locations (e.g. Sessiagh O'Neill, Goland, Edenmore and Mullandrait) where the Preliminary Design would be introduced, are expected to increase by more than 15 dB  $L_{den}$  at 100 receiver locations during the years 2011 and 2026. However, noise levels along the existing N13/N15 corridor will fall by 3dB or more at 214 receiver locations (i.e. 85% of receivers) during 2011 and 2026 relative to the Do-Minimum scenario. Overall, the range of traffic noise levels in the Do-Minimum scenario along the existing corridor in 2011 and 2026 were predicted to be 43 – 77 dB and 44 – 78 dB  $L_{den}$  respectively. Under the Do-Something scenario these ranges are predicted to fall to 42 – 73 dB and 42 – 74 dB  $L_{den}$  during 2011 and 2026 respectively. This represents a net beneficial noise impact for receivers along the existing road corridor.

The analysis has identified a total of 36 receivers along the Preliminary Design in 2026 that would experience noise levels in excess of the NRA Guidelines design goal of 60dB  $L_{den}$  and satisfy the associated test conditions for mitigation. The use of noise barriers adjacent to these receivers along the length of the Preliminary Design would reduce noise levels to below the design goal. If low noise surfacing is considered for the proposed road at a later stage, the use of alternative noise extent of noise barriers could potentially be reduced subject to the acoustic performance of low noise surfacing. In addition, the landscape bunding along the Preliminary Design would provide noise screening effect for the identified noise sensitive receivers. These mitigation measures would be developed further at the Detailed Design stage.

The Preliminary Design will reduce the levels of vibration experienced by dwellings adjacent to existing roads, and is not expected to have any adverse impact on dwellings located close to the Preliminary Design.

## 12.7 References

British Standard 6472:1992, the 'Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)'

British Standard 5228: Part 1: 1997, 'Noise & Vibration Control on Construction and Open Sites'

Department of the Environment, Welsh Office, document, the 'Calculation of Road Traffic Noise, 1988'

Department of the Environment Food and Rural Affairs (2005) Update of Noise Database for Prediction of Noise on Construction and Open Sites.

Jacobs (October 2007) N15/N13 Local Model Validation Report

N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

National Roads Authority (October 2004), Guidelines for the Treatment of Noise and Vibration in National Road Schemes

National Roads Authority (2007) Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.

## 13.0 Land Use and Amenity

### 13.1 Introduction and Methodology

This Chapter examines the effect that the Preliminary Design for the N13/N15 Ballybofey / Stranorlar Bypass will have on the surrounding land use and amenity. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

The assessment builds upon the previously submitted Constraints Study (McCarthy Hyder Consultants, 2000) and Route Selection Report (McCarthy Hyder Consultants, 2001), which reviewed activities within the Twin Towns, land use and amenities. It considers the potential effects that the Preliminary Design will have on existing land use, properties and recreational facilities, as well as future proposed and safeguarded sites. Where appropriate, mitigation measures have been incorporated into the Preliminary Design in order to reduce or eliminate adverse impacts.

The assessment has been based on:

- A review of OS colour aerial photographs taken in 2004;
- A review of the County Donegal Development Plan 2006–2012 (2006) and Ballybofey Stranorlar Local Area Plan 2004–2010 (2005); and
- Consultations with relevant organisations (see Appendix 1.1), particularly the Ballybofey and Stranorlar Anglers Association and the Twin Towns Environmental Group.

In assessing impacts the following significance criteria have been used which are based on the National Roads Authority (2005) Environmental Impact Assessment of National Road Schemes – A Practical Guide.

Impact	Significance Criteria
Profound impact	Acquisition and / or demolition of occupied residential property, commercial property or complete loss of non-agricultural land holding, community facility, recreational or amenity land.
Significant impact	Significant land-take from occupied residential or commercial property, non-agricultural land holding, community facility, recreational or amenity land.
Moderate impact	Partial loss of land from occupied residential or commercial property, non-agricultural land holding, community facility, recreational or amenity land.
Slight impact	Demolition of unoccupied residential or commercial properties. Minor land-take or change of access arrangements to occupied residential or commercial property, non-agricultural land holding, community facility, recreational or amenity land.
Imperceptible impact	No demolition of occupied or unoccupied residential or commercial properties, no land take from non-agricultural land holding, recreational facilities or amenity land.

### 13.2 Existing Environment

Within the study area land use is mainly agricultural. The main settlements in the area are focused around the National Primary routes that run from Lifford to Donegal Town (N15) and from Letterkenny to Stranorlar (N13). The Twin Towns are the main centres

of population and are linked by a bridge over the River Finn, which runs between the towns. Each comprises of an extensive linear main street, which supports the main commercial / retail activities, surrounded by residential areas. The Twin Towns support small shopping centres, churches, public houses, a number of small hotels, filling stations, car parks and sports grounds. An 18-hole golf course also lies to the east of Stranorlar.

Fishing, walking and cycling are the main recreational activities in the area and are facilitated and encouraged by the presence of natural resources. These have a high amenity value and include the River Finn, Lough Alaun, Lough Mourne, Drumboe Woods and the nearby Blue Stack Mountains. The River Finn is an internationally renowned salmon river. It has a healthy run of both spring fish and grilse and some 5000 salmon are caught annually. There is good Sea Trout fishing downstream of Ballybofey. Due to the high quality of this section of the river numerous angling clubs and syndicates are active in this area.

In addition to existing recreational activities and resources, both the Ballybofey Stranorlar Local Area Plan 2004–2010 and County Donegal Development Plan 2006–2012 recognise the potential for the future development of tourism. Future developments are centred on utilising the existing amenity value of the River Finn as well as the sports/leisure facilities of the towns. There is a proposal to develop a multi-functional sports campus in Stranorlar. The need for safeguarding the dismantled railway for its potential longer term mixed recreational use has also been identified.

### 13.3 Assessment of Effects: Construction and Operation

As part of the Preliminary Design properties at Chainage (Ch) 6200 and Ch 7800 are within the Compulsory Purchase Order (CPO) boundary and will therefore be acquired, resulting in profound adverse impacts.

Impacts on the surrounding human environment are considered in Chapter 5.0 (Socio-Economics), Chapter 7.0 (Landscape and Aesthetics), Chapter 11.0 (Air Quality) and Chapter 12.0 (Noise and Vibration). Impacts on agricultural land use are assessed in Chapter 6.0 (Agricultural Land). Impacts on angling are assessed in Chapter 9.0 (Ecology (flora, fauna and fisheries)).

The Ballybofey Stranorlar Local Area Plan (2005) safeguards the dismantled railway for its potential future development as a recreational facility. Where possible the Preliminary Design has avoided crossing this feature. The Preliminary Design crosses the dismantled railway at four locations. Further sections of the dismantled railway will be affected by severance as a result of the Preliminary Design. The Preliminary Design will directly impact upon approximately 2655m of the dismantled railway. Table 13.1 summarises the effect on the dismantled railway from the Preliminary Design. The overall impact of the Preliminary Design on the dismantled railway will be slight adverse.

**Table 13.1 Impact of Preliminary Design on Dismantled Railway Line**

<b>Location (Chainage)</b>	<b>Length Affected (Metres)</b>	<b>Details of Effects</b>
600 to 850	250	Within land take of the Preliminary Design, some direct impact
1175 to 2050	875	Within land take of the Preliminary Design. Severance may occur due to the Meencrumlin junction. Scheme crosses over railway line at approximately Ch 1885.
2570 to 3320	475	Within land take of Preliminary Design with some direct impact. Scheme crosses over railway line at approximately Ch 2900.
4560 to 4580	20	Section of dismantled railway line within land take to allow tie-in work on an existing accommodation track crossing.
4775 to 5275	425	Within land take of Preliminary Design with some direct impact.
5275 to 6330	10	The Preliminary Design will have no direct impact, apart from a very small section of dismantled railway line within land take to allow tie-in work on an existing accommodation track crossing level with Ch 6200.
6330 to 6475	145	Section of dismantled railway line within land take of Preliminary Design
7130 to 7260	130	Within land take of Preliminary Design with some direct impact.
7675 to 7960	285	Severed by Preliminary Design crossing at 20 degree skew.
8500 to 8900	40	Severed by link road crossing at 90 degrees level with Ch 8600.
<b>Approximate length of dismantled railway line affected</b>	<b>2655</b>	

Although not a direct result of the Preliminary Design, the Lough Mourne dam proposals will result in further sections of the dismantled railway being flooded (see Chapter 8.0 Surface Water Quality and Drainage), between Ch 600 to 1300. The flooding of the dismantled railway, together with the effect of the construction of the Preliminary Design will result in a cumulative effect on the potential future development of the railway as a recreational facility in the vicinity of the Preliminary Design.

## 13.4 Mitigation Proposals

Where possible the Preliminary Design has avoided land take from the disused railway line. Further mitigation measures are outlined in the relevant Chapters as noted in Section 13.3.

## 13.5 Conclusions

Impacts on the surrounding human environment are considered in Chapter 5.0 (Socio-Economics), Chapter 7.0 (Landscape and Aesthetics), Chapter 11.0 (Air Quality) and Chapter 12.0 (Noise and Vibration). Impacts on agricultural land use are assessed in Chapter 6.0 (Agricultural land). Impacts on angling are assessed in Chapter 9.0 (Ecology (flora, fauna and fisheries)).

In addition to impacts considered in the above Chapters, the Preliminary Design will result in properties at Ch 6200 and Ch 7800 being acquired as part of the Compulsory Purchase Order, resulting in profound adverse impacts.



The Preliminary Design will have a slight adverse impact on the dismantled railway line, with approximately 2655m directly impacted upon, sections affected by severance and areas where the route crosses the dismantled railway. This feature has been identified for possible future development as a recreational facility in the Ballybofey Stranorlar Local Area Plan (2005).

## 13.6 References

Donegal County Council (2006). County Donegal Development Plan 2006 -2012

Donegal County Council (2005). Ballybofey Stranorlar Local Area Plan 2004 - 2010

McCarthy Hyder Consultants (2000), N15 Ballybofey / Stranorlar Bypass Constraints Study Report

McCarthy Hyder Consultants (2001), N15 Ballybofey / Stranorlar Bypass Route Selection Report

## 14.0 Geology and Hydrogeology

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### 14.1 Introduction and Methodology

This Chapter discusses the implications of the Preliminary Design for the N13/N15 Ballybofey / Stranorlar bypass on the local geology and hydrogeology. The existing geological and hydrogeological conditions are described and the potential effects are assessed. Mitigation measures are also proposed. Full details of the Preliminary Design are given in Chapter 3.0 (Description of the Preliminary Design).

There is some overlap between hydrogeology and sections on Ecology (flora, fauna and fisheries) (Chapter 9.0) and Surface Water Quality and Drainage (Chapter 8.0). Where necessary, supporting information from these chapters is referred to. Information on soils is included in Agricultural Land (Chapter 6.0).

The geology and hydrogeology in the area of the Preliminary Design have been assessed using regional scale mapping and local scale site investigations and surveys. For the purposes of this assessment, the study area extends to 500m from the centre line of the Preliminary Design.

The assessment has been based on the "Geology, in Environmental Impact Statements – A Guide", Institute of Geologists of Ireland (2002), as well as "Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)", Environmental Protection Agency (EPA) (2003) and "Guidelines on the Information to be Contained in an Environmental Impact Statements", EPA, (2002). "Environmental Impact Assessment of National Road Schemes – A Practical Guide", the National Roads Authority (NRA), (2005) has also been used in the assessment.

In accordance with these guidelines and general best practice the impact on the geology, hydrogeology and water features by the Preliminary Design has been assessed based on the criteria presented within Table 14.1. These impacts have been detailed and their likelihood and significance identified. Mitigation measures have been proposed which, where possible, address the impacts or identify how they will be addressed in the future.

**Table 14.1 Significance Criteria**

Impact	Significance Criteria
Profound Negative	An impact that would completely obliterate sensitive features including regionally important aquifers, public water supplies and designated conservation features (geological sites).
Significant Negative	A significant impact on sensitive features including regionally important aquifers, public water supplies and designated conservation features (geological sites).
Moderate Negative	A significant and/or widespread impact on areas of moderate geological importance (not designated). A significant and/or widespread impact on locally important aquifers or undesignated conservation features.
Slight Negative	A localised impact on an area of low geological importance. A localised impact on generally unproductive aquifers / private water supplies/ conservation features.
Imperceptible Impact	An impact which may be measured but without noticeable consequences.
Positive	Enhancement of local geological character/ heritage. Improved protection of hydrological resources.

#### 14.1.1 Geology

The geological assessment is based on a desk study of available information, on drift and solid 1:100,000 scale geological survey maps of the Geological Survey of Ireland (GSI), Sheet 3 and part of Sheet 4 (published in 1999), site visits and two preliminary intrusive ground investigations that were carried out to study the ground conditions for the Preliminary Design. One non-intrusive geophysical investigation was also undertaken.

The two ground investigations carried out along the Preliminary Design were:

- A Preliminary Ground Investigation carried out between April - July 2002 (McCarthy Hyder, 2002). This investigation comprised 25 No. boreholes (including cable percussion and rotary drilling), 36 No. trial pits with related sampling, in situ and laboratory testing, and 14 No. Mackintosh Probes in soft areas.
- A Ground Investigation between October 2003 to January 2004 (Geotech Specialists Ltd., 2004). The investigation comprised a total of 82 No. exploratory holes; 40 No. Cable Percussion boring and 42 No. Rotary Core drilling; and 89 No. trial pits with relevant in-situ and laboratory testing. A total of 13 No. Standpipe piezometers were installed along the Preliminary Design with piezometer tip depth ranging between 10 and 20m below existing ground level.

One non-intrusive geophysical investigation was undertaken:

- A Seismic refraction survey undertaken in October 2003 (Pelorus Surveys, 2004). The investigation was required to map the rockhead profile and provide information on rock strength over areas of proposed cutting. The geophysical survey was undertaken over a total length of approximately 4560m split into seven different areas.

#### 14.1.2 Hydrogeology

The hydrogeology study for the study area has been carried out based on available information provided by the GSI including the County Donegal Groundwater Protection Scheme (Lee and Fitzsimons, 2004), draft maps of bedrock aquifers (GSI, 2004) and groundwater vulnerability (GSI, 2002).

Information on the locations of wells, boreholes and springs were obtained from the GSI well database (interrogated in August 2006). Donegal County Council has confirmed the absence of any such features used for public or group water supply within the study area. A water interest survey was undertaken in December 2006 within a 500m radius of the centre line of the Preliminary Design. The search included domestic wells, domestic boreholes and springs along the length of the Preliminary Design, focussing on areas in the vicinity of proposed cuttings.

#### 14.1.3 Environmental Impact

There are several inter-related factors to be considered in order to assess the significance of the potential effects of the construction and operation of the Preliminary Design on geology and hydrogeology. Those considered relevant include:

- Earthworks – cutting or embankment;
- Cut fill balance;
- Road drainage systems and pollution prevention mechanisms;
- Aquifer classification;
- Aquifer vulnerability;
- Proximity to groundwater abstractions; and
- Groundwater fed features.

### 14.2 Existing Environment

#### 14.2.1 Geology

The bedrock geology of the study area comprises Dalradian metasedimentary rocks, which were deposited as sediments in intertidal to marine environments during Precambrian (Neoproterozoic) times. These were subsequently converted to metamorphic schists (after mudstones and muddy sandstones) and quartzites (after sandstones) during mountain forming in the Ordovician Period. Widespread Quaternary glaciation shaped the landscape, leaving behind unconsolidated glacial sediments that cover much of the bedrock in lowland areas.

Within the study area, a variably thick layer (up to 9.0m in places) of Superficial Deposits of various compositions overlays the igneous and metamorphosed country rock. The Superficial Deposits comprise peat, boulder clay, sands, gravels, cobbles and boulders, all products of Alluvial and Glacial deposition. The solid geology consists of a structurally deformed sequence of schist, gneiss, quartzite and marble Precambrian basement. The Superficial Deposits and Solid Geology are detailed in the sections below.

Geological information is presented in Figures 14.1 (plan view) and 14.2 (cross sectional view).

### Superficial Deposits

The Preliminary Design crosses sheets 69/2, 77/4, 78/1, 78/3 of the 6" to one mile scale field maps of the GSI (surveyed in the late 19<sup>th</sup> Century). The mapping of the area is incomplete and only the area south of the River Finn is mapped in any detail. In this area the Preliminary Design is shown to cross predominantly "peaty soil overlying boulder clay". No significant areas of bog are shown along the length of the Preliminary Design.

Site investigations show the thickness of the Superficial Deposits to vary from 1.0m to 7.0m and occasionally up to 9.0m (Geotech Specialists Ltd. 2004). The depth to rockhead identified through the seismic refraction survey generally corresponded with the findings from the intrusive site investigations. In the areas surveyed, overburden varied from a minimum of 0.7m to up to 9m in thickness.

Site investigations along the Preliminary Design have shown that peat is present locally, extending to a maximum depth of 4.0m, (Geotech Specialists Ltd, 2004). Between Chainages (Ch) 1560 and 1680, in the vicinity of Meencrumlin, trial pitting has revealed peat thicknesses of between 1.8 and 4m. The peat is described as spongy to firm fibrous dark brown peat. Details of peat bogs in the area with designated conservation status are given in section 14.2.3 under 'Groundwater Features Vulnerable to Drainage'.

Alluvial Deposits were encountered in close proximity to surface drainage channels and the River Finn, to a maximum of 7.7m depth. The deposits comprise mainly silts, sands and gravels.

The Glacial deposits comprise silt, sand, gravel, cobbles and boulders and include varying amounts of sub-rounded to rounded cobbles.

### Solid Geology

Solid geology information within the study area is identified on the 1:100,000 map of the Geology of South Donegal. Published geological maps (Sheets 3 and 4 of the GSI) indicate that the geology of the study area in the vicinity of the Preliminary Design is as shown in Table 14.2 and reproduced in Figure 14.1.

Table 14.2 Geological Sequence

Era	Formation	Lithological Description
Precambrian	Lough Mourne Formation (LM)	Coarse feldspathic pale pink psephites in a pale green chloritic matrix.
	Lough Eske Psammite Formation (LE)	Pale green massively bedded, feldspathic psammities with thin pelitic beds, and occasional minor quartzite and marble.
	Killeter Quartzite Formation (KT)	Fine grained, slightly impure quartzite with occasional graded pebbly beds.
	Aghyaran and Killygordon Limestone Formations (DG)	Commonly dark coloured and graphitic. Marbles and pelitic and psammitic schists with some quartzite and minor basic metavolcanics. Graphitic lithologies decrease and clastic material increases towards the southwest where marbles become sparse and thin.

There are a number of geological faults in the region as shown on Figure 14.1. Different geological formations may be present on either side of the fault causing an abrupt change of lithology.

The bedrock generally comprises mainly schist. To the north of the study area, the Preliminary Design crosses Quartzite and Limestone formations. In addition the 6" to one mile scale field maps of the GSI shows a basalt dyke at the location of the Sessiagh underbridge (Ch 7900).

Details of solid geology were also obtained from the ground investigations (Geotech Specialists Ltd. 2004). Bedrock was encountered from a minimum of 0.8m to a maximum of 9m depth from the existing ground level, with an approximated average of between 3m and 5m depth. The upper layers of the bedrock were described as weathered phyllite or schist gravel within heavily fractured horizons of the same composition. These were usually 1.0m to 1.5m in thickness. Below this the rock became more competent.

Rotary core logs and field observations (Geotech Specialists Ltd., 2004) suggest that dissolution features in the Precambrian limestone formations are limited or absent. Whilst some minor and localised dissolution features may be present, there is no evidence indicating extensive karst type solution features in the area.

#### **Additional Information**

The GSI is compiling a list of geological sites in need of protection through National Heritage Areas (NHA) designation. At time of writing, this information was not available.

Based upon visual assessment and information gathered during the ground investigations, contaminated land is not anticipated along the Preliminary Design route.

There is one small active quarry within the area of interest, approximately 2km north east of Stranorlar. The quarry has been excavated into the Killeter Quartzite formation.

## **14.2.2 Hydrogeology**

### **Aquifer Classification**

Details on aquifer classification have been obtained from the GSI, who are currently working on the classification for Co. Donegal. A National Classification Map is also currently in preparation in order to meet the requirements of the Water Framework Directive. For the purposes of this assessment, the National Draft Bedrock Aquifer Map (GSI, 2004) has been used.

#### ***Aquifer Categories***

The aquifer classification system used by the GSI has three main aquifer categories, with each category sub-divided into classes. These are based on the publication "Groundwater Protection Schemes" (DELG/EPA/GSI, 1999).

#### **Regionally Important (R) Aquifer**

- (i) Karstified Aquifer (Rk)
- (ii) Karstified Aquifer (conduit flow, Rk<sup>c</sup>)
- (iii) Karstified Aquifer (diffuse flow, Rk<sup>d</sup>)
- (iv) Fissured Bedrock Aquifer (Rf)
- (v) Extensive Sand/Gravel Aquifer (Rg)

#### **Locally Important (L) Aquifers**

- (i) Bedrock that is generally moderately productive (Lm)
- (ii) Bedrock that is moderately productive only in local zones (LI)
- (iii) Sand /gravel (Lg)

#### **Poor (P) Aquifer**

- (i) Bedrock that is generally unproductive except for local zones (PI)

(ii) Bedrock that is generally unproductive (Pu)

The aquifer categories given above take into account the following factors:

- the overall potential groundwater resources in each rock unit;
- the area of each rock unit;
- the localised nature of the higher permeability zones (e.g. fractures) in many bedrock units;
- the highly karstic nature of some of the limestone; and
- the fact that all bedrock types give enough water for domestic supplies and therefore, all are called "aquifers".

Based on the available data, the provisional GSI aquifer classifications for the formations underlying the Preliminary Design are presented in Table 14.3.

**Table 14.3 Provisional Aquifer Classification**

Rock Unit	Provisional Aquifer Classification
Precambrian quartzites, gneisses and schists	PI/Pu
Precambrian marbles	LI
Granites and other igneous intrusive rocks	PI

The draft GSI Bedrock Aquifer Map (GSI, 2004) (Figure 14.2) for Stranorlar / Ballybofey, Co. Donegal, indicates that along the majority of the route from Lough Mourne to north of Stranorlar the aquifers are generally unproductive except in local zones (PI), and moderately productive only in local zones (LI) in the Mullagharry area to the north of the Preliminary Design.

Groundwater was encountered in most of the trial pits and boreholes of both ground investigations (McCarthy Hyder, 2002 and 2004). Standpipe piezometers were installed in 24 No. boreholes with tip depth ranging between 10m and 20m. Groundwater was encountered mostly within the Superficial Deposits and occasionally within the bedrock.

**Groundwater Monitoring Data**

Groundwater levels in the thirteen standpipes installed in 2004 were monitored throughout the period of five days throughout the site works. Eleven standpipes were constructed to monitor groundwater within the bedrock. Two of the standpipes were constructed to monitor groundwater within the drift deposits. Borehole water levels ranged from 0.2m to 4.0m below ground level in the Superficial Deposits and from 5.0m to 7.4m below ground level in the bedrock. Groundwater level data is presented in detail in the Report on Ground Investigation (Geotech Specialists Ltd., 2004).

### 14.2.3 Groundwater Vulnerability

Groundwater vulnerability has been assessed in line with the "Groundwater Protection Schemes" document (DELG/EPA/GSI, 1999). Groundwater is hydrologically connected to the land surface. The effectiveness of this connection determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is more vulnerable than groundwater that receives water and contaminants more slowly and in lower quantities. Along with the vertical hydraulic gradients, the quantity of contaminants that reach groundwater is a function of the following natural geological and hydrogeological attributes of any area:

- the type and permeability of the subsoils that overlie the groundwater;
- the recharge type, whether point or diffuse, and
- the thickness of the unsaturated zone through which the contaminant moves.

Groundwater vulnerability is mapped on the basis of the type, permeability and thickness of the subsoils as indicated in Table 14.4.

There are four vulnerability categories: Extreme (E), High (H), Moderate (M) and Low (L).

**Table 14.4 Vulnerability Mapping Criteria (DELP/EPA/GSI, 1999).**

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge Subsoil permeability and type			Point Recharge	Unsaturated zone
	High Permeability (sand/gravel)	Moderate Permeability (sandy subsoil)	Low Permeability (clayey subsoil, clay, peat)	(swallow holes, losing streams)	(sand & gravel aquifers only)
0 – 3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3 – 5m	High	High	High	N/A	High
5 – 10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High
Notes:					
i. N/A – not applicable					
ii. Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.					
iii. Release point of contaminants is assumed to be 1 – 2m below ground surface					

A broad summary of the groundwater vulnerability for the Preliminary Design was based on the definitions and classifications in Table 14.4 and the GSI Draft Groundwater Vulnerability Map for Stranorlar / Ballybofey, Co. Donegal, 2002 (Figure 14.3) as summarised in Table 14.5.

**Table 14.5 Groundwater Vulnerability within the Study Area.**

Approximate Chainage	Location	Vulnerability
800 – 1700	Lough Mourne - Meenabrack	High
1700 – 3500	Meenabrack – Meenglass	Extreme
3500 – 4500	Meenglass - Goland	High
4500 – 10500	Goland - Edenmore	Extreme
10500 – 12000	Edenmore – Mullandrait	High
12000 – 15000	Mullandrait - Killross	Extreme



### **Wells, Public Water Supplies and Group Water Schemes**

Lough Mourne, located at the south western end of the Preliminary Design, is a surface water Public Water Supply. Donegal County Council has confirmed that there are no other Public Water Supplies within the area of the Preliminary Design.

The GSI well database was accessed in August 2006. The database records identified in Table 14.6 and shown on Figure 14.2 were noted to lie within 1km of the Preliminary Design. Properties in the vicinity of each of the records were visited during the field survey of December 2006.

Table 14.6 GSI Well Database

GSI reference	Grid Reference	Distance from road (m)	Approx. Chainage (m)	Type	Grid Accuracy	Field Notes
SWW015	210440 392220	200	4650	Borehole	1	Location in woodland with no vehicular access. Farm outbuildings nearby, no domestic properties.
SWW003	211020 392480	170	5300	Well	8	Self-assessment form left at Goland (residents absent). No reply received. Property thought to be on mains water.
SWW007	212710 394660	1019	230 (side road)	Borehole	2	Outside of survey area*.
SWW001	213890 395360	985	230 (side road)	Borehole	8	Outside of survey area*.
SEW043	217300 395330	785	11750	Borehole	2	Discussion with residents of Kia Meva house. Property is supplied by mains water. Owner has a shallow well in existing roadside verge. Unprotected from existing road runoff – not potable quality and unused for such.
SEW046	216340 394710	70	11160	Borehole	2	Discussion with resident of Edenmore. No knowledge of borehole at site. Property is supplied by mains water.
SEW035	217130 397430	474	13900	Spring	2	Only building in area is at Mullagharry, which is abandoned. No sign of any agricultural supplies.
SEW042	216470 397750	206	14250	Borehole	2	Self-assessment response from Tircallen. Spring at Kilross supplies farm animals in field.
SEW036	217040 398510	500	14850	Borehole	3	Self-assessment form left at Lisnaree (residents absent). No reply received. Property thought to be on mains water.

Grid accuracy refers to the accuracy of the grid reference where:  
 1 = 10m    2 = 20m    3 = 50m    4 = 100m    5 = 200m    6 = 500m    7 = 1km    8 = 2km    9 = 5km    10 = 10km  
 \* Survey area: 500m each side of Preliminary Design centre line

### Well Water Quality

Water Quality in Ireland 1998-2000, published by EPA, is the most recent national overview report on water quality. There are no groundwater national monitoring stations close to the Preliminary Design but at the nearest sites in County Donegal there are long term records of ammonia, nitrate, chloride, phosphate, iron and manganese concentrations. Mean groundwater quality concentrations for these determinands in 1998-2000 met EPA guideline values.

Shallow well supplies are often associated with bacteriological contamination and, in agricultural areas, elevated nitrate concentrations.

### Groundwater Fed Natural Features or Features Vulnerable to Drainage

Groundwater fed natural features and features vulnerable to drainage, e.g. peat bogs and wet grasslands are detailed in Chapter 9.0 Ecology (flora, fauna and fisheries).

There are two bogs within 0.5km of the Preliminary Design, which are designated conservation areas (Natural Heritage Areas).

- Meenagarranroe Bog, 0.38 km south of route
- Lough Hill Bog, 0.45 km south of route

Neither of these bogs is crossed by the Preliminary Design. The details of these features are given in Chapter 9.0, Section 9.2.2.

Two further areas of undesignated Blanket Bog habitat have been identified. The Preliminary Design would cross one of these at Chainage 1400 – 2100 (Figure 9.2). The other is located approximately 0.5km to the west of the scheme (west of Cashelnavan) and will not be affected by the scheme.

Areas of wet grassland on the line of or adjacent to the Preliminary Design are identified on Figure 9.2 and in Table 14.7 below.

**Table 14.7 Location of Wet Grassland**

Wet grassland Chainage	Location
800 – 1250	Lough Mourne
2100 – 2400	Meenabrack
2900-3200	Croaghonagh
3400 – 3500	Croaghonagh
4900-5750	Goland
6000-6500	Carrickmagrath West / Meenglass Road
6400-6700	Carrickmagrath East
7700 - 7800	Sessiagh O'Neill Road
9050-9580	Navenney East
9900-10150	Dreenan
12200-12700	Castlebane South
12700-13200	Castlebane North
14700-15100	Kilross / Lisnaree

## 14.3 Assessment of Effects: Construction and Operation

It is considered that providing the road construction works incorporate standard pollution control measures, then the effects of construction and of operation on the geology and hydrogeology can be considered together.

### 14.3.1 Geology

The main geological effects will be related to cuttings. The Preliminary Design will be constructed at grade, in cuttings and on embankments as dictated by the topography.

The locations of cuttings and embankments on the Preliminary Design are shown in Figure 3.2. Areas of cutting that are likely to exceed 2m depth are shown on Figure 14.2. The total length of cutting is approximately 3800m, along the main route, ranging in depth from shallow to approximately 16m.

Table 14.8 Location of Cuttings

Approx. Cutting Chainage	Approx. Length (m)	Approx. Maximum Depth (m)	Underbridge (if applicable)
1650-1800	150	2	-
2100-2520	320	16	-
4270	-	4	Goland
6230	-	2	Meenglas
6750-7520	770	3	-
8260-9100	840	8.5	Navenney Junction
9560	-	2	Daisy Hill
9900-10520	620	12	-
11950 - 12200	250	2	-
12320 - 12450	130	3	-
13910 - 14440	530	13	-
14610 - 14800	190	9	-

#### Rock Cuttings

The Preliminary Design incorporates 1:1 (vertical: height) side slopes in the competent rock, with potentially relaxed slopes (1:2) in the fractured zone. However if rock traps are provided, steeper slopes could be adopted.

The material excavated from cuttings consisting of "fresh" competent rock will be re-used in embankments where suitable.

For shallow structural foundations or cuttings founded in the upper 1-2m of rock, mechanical excavation should be possible, due to the weathered nature of the upper zone of rock. Generally throughout the Preliminary Design, however, where there are long or deep cuttings, the volume of material to be removed and strength of rock makes blasting likely. The potential noise and vibration effects of blasting are discussed in Chapter 12.0 (Noise and Vibration).

The majority of rock likely to be encountered in cuttings is likely to consist of various formations of the Metamorphic Schist. However Quartzite and Limestone is present in the north-eastern section of the Preliminary Design, south of the Link Road.

### **Superficial Deposits**

The majority of the Preliminary Design crosses glacial deposits, consisting of both silts and sandy gravels.

The Glacial and Alluvial deposits overlying the solid strata will generally be suitable for use in the Preliminary Design construction as a fill or foundation material for embankments. Glacial Till containing a high silt content will not be acceptable for re-use. Estimated volumes of acceptable material will be determined following the detailed ground investigation undertaken at the Detailed Design stage.

### **Soft Ground**

The peat deposit as observed in the trial pits (McCarthy Hyder, 2004) is up to 4.0m in thickness and was mainly encountered at the western end of the Preliminary Design at Meencrumlin (Ch 1400 to 2100). These deposits are of relatively minor extent and are situated in areas that have been worked for agriculture and forestry. They are considered to be of little significance in terms of geological heritage. For the construction of embankments, removal and replacement of peat by suitable material or cut slopes with drainage is likely to be required.

### **Cut Fill**

The construction of the proposed road will require an earthworks operation comprising the following elements:

- Volume of suitable material & rock excavated: 0.69M m<sup>3</sup>
- Volume of material required for embankment construction: 1.24M m<sup>3</sup>
- Volume of topsoil used for landscaping: 0.10M m<sup>3</sup>
- Volume of unsuitable material used for landscaping: 0.17M m<sup>3</sup>
- Volume of unsuitable material to be disposed of: 0.05M m<sup>3</sup>
- Volume of suitable material to be imported to site: 0.55M m<sup>3</sup>

The above quantities will be reviewed at the Detailed Design stage. It is anticipated that the majority of material made available from excavation activities will be used in the construction of either the main earthworks or landscaping. Consideration will be given to using any material remaining after completion of the permanent works for agricultural/ecological improvement works in accordance with local planning controls. The final option will be disposal, which will be in accordance with waste management legislation.

### **Overall Impact on Geology**

The Preliminary Design is in an area of low geological significance. Cuttings will result in local disturbance of both the superficial and solid rock geology, however, no significant impacts have been identified. Under the impact assessment criteria the overall impact of the Preliminary Design on the geology is considered to be Slight Negative.

## **14.3.2 Hydrogeology**

During the construction of the road there is potential for the hydrogeology to be affected by localised impacts to groundwater levels through the construction of road cuttings, and through pollution risk.

During operation the potential impacts are pollution, permanent alteration of the flow regime where cuttings or cut-off walls intercept groundwater flow, and effects on groundwater users and ecology through lowering of the water table.

The impact of the Preliminary Design is assessed based on the significance criteria in Table 14.1. The assessment has examined the following features in relation to the hydrogeological regime:

- Aquifers;
- Water Supplies; and
- Natural Features.

### **Aquifers**

The Preliminary Design is underlain by superficial deposits, which typically can provide localised storage and flow of groundwater. For the majority of the Preliminary Design, these overlie unproductive bedrock aquifers except for local zones within which groundwater is stored within highly fractured and weathered zones. Limestone bedrock is present beneath the northern end of the Preliminary Design within which greater quantities of groundwater storage and flow occur within fractures and possibly within solution features.

### ***Interception of groundwater within cuttings lowering groundwater tables and altering groundwater flow paths locally***

The hydrogeological assessment has identified that aquifers underlying and adjacent to the Preliminary Design are typically of local extent (superficial deposits) or are considered unproductive or moderately productive with only local zones where groundwater is considered significant as a possible supply resource. Cuttings below the groundwater table within these aquifers are likely to result in localised dewatering.

Given the large range of permeability within the drift deposits and bedrock, it is difficult to accurately predict the extent of influence of dewatering from cuttings (radius of influence,  $R_0$ ). A generic approach has been developed based upon CIRIA guidance (CIRIA report 515). The radius of influence can be estimated by applying the empirical formula of Sichardt (see Appendix 14.1).

Appendix 14.1 presents a sensitivity analysis for radius of influence calculations. Head values are based on the maximum depth of cutting below the water table. A range of hydraulic conductivities and head values are used which predict a range of values for the radius of influence.

Hydraulic Conductivity:  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  m/s

Head Values: 5 to 13m

The range of hydraulic conductivities used has been based on judgement. The calculated range of radius of influence values ranges from 9m to 228m. Therefore a worst-case radius of influence has been applied of 228m. Based on this calculation, only groundwater supplies or groundwater supported habitats within this distance of a major cutting could be affected.

### ***Contamination of groundwater within aquifers by runoff through road drainage***

Surface water drainage from the Preliminary Design will be carried via unlined swales and filter drains to attenuating facilities from which they will be discharged to surface watercourses at a controlled rate. The swales will offer significant attenuation capacity to water being transported laterally to the attenuating facilities and to water infiltrating to ground under less intense rainfall periods. Details of the drainage design are included

in Chapter 3.0 (Description of the Preliminary Design) and Chapter 8.0 (Surface Water Quality and Drainage).

The Design Manual for Roads and Bridges (DMRB, May 2006) states that pollution impacts from routine run off on receiving waters appear to be restricted primarily to roads carrying more than 30,000 Annual Average Daily Traffic (AADT). The future peak AADT (year 2026) for the Preliminary Design has been calculated to be 19,870 (see Figure 2.1).

Although the contamination risk from routine run off is considered low, a risk assessment has been undertaken as outlined in Annex I, Method C of DMRB. The method provides a mechanism to assess the potential impact on the quality of groundwater resources from routine discharges to the ground, and can be used to identify sites at high risk. The assessment takes into consideration traffic density, rainfall, soakaway geometry, depth of unsaturated zone, groundwater flow type, effective grain size and lithology. The results of the assessment are summarised in Appendix 14.2.

Based on the DMRB criteria, the assessment indicates that groundwater is at a Medium Risk of Impact.

#### **Water Supplies**

The public water supply for the Ballybofey / Stranorlar area is surface water from Lough Mourne located at the south-western end of the Preliminary Design. The potential impact on this supply is discussed in Chapter 8.0 (Surface Water Quality and Drainage).

Potential impacts on private well sources include the reduction of yields caused by adjacent road cuttings and pollution from routine road runoff and accidental road spillage.

During the field survey of December 2006, only one private water supply was found within 500m of the Preliminary Design. This is a spring serving a farm animal field at Kilross (SEW042 on Figure 14.2). The Preliminary Design includes a 9m cutting at the location of the spring and the supply will potentially be impacted by the new road. Further investigation and monitoring of the supply will determine the potential for derogation (see Section 14.4.2).

#### **Groundwater Fed Natural Features or Features Vulnerable to Drainage**

The potential impacts on ecological features have been assessed in Chapter 9.0 Ecology (flora, fauna and fisheries).

Bogs are typically very sensitive to water table fluctuations. They are dependent on some seasonal variation in water level to maintain the species present. The rate and timing of water level fluctuations can have a marked effect on some species.

There are two bogs within 0.5km of the Preliminary Design, which are designated conservation areas.

- Meenagarranroe Bog, 0.38 km south of Preliminary Design
- Lough Hill Bog, 0.45 km south of Preliminary Design

The details of these features are given in Chapter 9.0. Neither of the bogs are crossed by the new road and all lie on hills at elevations above the Preliminary Design. As such these features are hydraulically disconnected from the aquifer underlying the Preliminary Design and will not be affected.

One area of upland blanket bog has been identified between Ch 1400 to 2100 (Figure 9.2). The construction of the road will result in the extraction of soft soils and their

replacement by rock fill. The area of upland blanket bog lying in close proximity to the Preliminary Design will therefore be impacted.

Peat-based soils are at risk from progressive wastage through oxidation and shrinkage and special care is needed to retain these soils in the long-term interests of both agriculture and conservation. Wastage can be minimised by ensuring that such soils are hydrated throughout the year and seasonal water demands are therefore important. To ensure no impact from the Preliminary Design, the existing water regime needs to be retained. In effect, this means groundwater and surface water inputs must not be disrupted; equally, drainage and water outputs must be maintained.

Table 14.7 summarises the location of wet grassland in close proximity to, or directly affected by the Preliminary Design. These features may be groundwater fed. Drainage of the wet grassland may occur as a result of lowering the water table. Areas of wet grassland on the Preliminary Design will be hydrologically altered resulting in potentially significant impacts on their conservation value (see Chapter 9.0.)

#### **Overall Impact on Hydrogeology**

Groundwater is not widely used for water supply in the area, and the aquifers underlying the scheme are likely to be of limited resource potential. The water table may be lowered in areas immediately adjacent to deep cuttings. A single private water supply has been identified which is likely to be adversely affected. Without mitigation, there is also an increased risk of groundwater contamination from road runoff of the aquifer where it has extreme vulnerability.

No designated conservation sites will be affected by the Preliminary Design. The scheme does however pass across one area of upland bog and numerous areas of wet grassland, which may be impacted by changes in drainage. Based on the assessment criteria used in this Chapter, the hydrogeological impact has been assessed as Moderate Negative.

## **14.4 Mitigation Proposals**

The potential for significant adverse impacts on the geological and hydrogeological environment during the construction phase will be avoided/prevented or minimised by the preparation, implementation and maintenance of an Environmental Operating Plan (EOP). Guidance on the EOP has recently been prepared by the National Roads Authority (2007). The EOP will outline procedures required to fulfil all of the environmental commitments for the Preliminary Design, including environmental legislative requirements and those emanating from consultations with third parties, for example, the Office of Public Works.

Environmental mitigation measures of relevance to the geological and hydrogeological environment are described in the following sections.

### **14.4.1 Geology**

Investigations were undertaken in 2002 and 2004 to examine the depth and nature of the soft deposits. These have assisted with the optimisation of the Preliminary Design and will assist in the finalisation of methodologies for road construction. Methodologies prepared at the Detailed Design stage will be required to minimise excavation of cuttings and handling of materials necessary to ensure satisfactory construction of the road.

Consideration will be given at the Detailed Design stage to leaving any new cuttings in bedrock exposed to offer enhancement to the local geological heritage and character.



The impact of the Preliminary Design on the geology following the implementation of mitigation measures is considered to remain as Slight Negative.

## 14.4.2 Hydrogeology

### **Aquifers**

Groundwater in both the superficial deposits and bedrock will be drawn down locally at some cuttings along the length of the Preliminary Design. Dewatering associated with the construction of cuttings will be kept to a minimum depth to reduce the impacts on groundwater. It is not possible to further mitigate these impacts but the area of aquifer impacted is small compared with the aquifer extent.

Suitable drainage and pollution control measures will be adopted to minimise the potential impact of road drainage on groundwater quality.

### **Wells, Public Water Supplies and Group Water Supplies**

Although distance drawdown calculations give an estimation of the radius of influence that may be caused by dewatering, the actual potential for impact is related to a number of factors, which can only be assessed accurately as the construction work proceeds.

A single private water source has been identified as potentially at risk of derogation and/or contamination. A comprehensive monitoring programme will be developed for this source, and for any other sources which may come to light during Detailed Design, commencing a minimum of 12 months prior to construction and extending through construction and for a minimum of 24 months following the road completion. Where a source is derogated or likely to be derogated remedial works will be undertaken which may include modification of the existing source (e.g. deepening of the well), or installation of a new supply (such as a borehole).

### **Groundwater Fed Natural Features or Features Vulnerable to Drainage**

There are a number of areas of wet grassland on the route of the Preliminary Design, which will be lost or hydrologically altered by the road construction. It is not possible to mitigate this impact, however further consideration will be given at the Detailed Design stage to minimise the area impacted.

One area of upland blanket bog has been identified between Ch 1400 to 2100. The Preliminary Design crosses this bog, potentially affecting localised drainage. The construction of the road will result in the extraction of the peat with replacement by an appropriate medium which retains the present hydrological connection across the road, without creating a preferential flow-path that would drain the bog. The embankment construction will be designed to ensure drainage is maintained beneath the road. Further consideration will be given to localised drainage in this area at the Detailed Design stage to ensure any hydrological and conservation impacts are minimised.

### **Residual Impact on Hydrogeology Following Mitigation**

The impact of the Preliminary Design on the hydrogeology following the implementation of mitigation measures is considered to remain as Moderate Negative.

## 14.5 Conclusions

The Preliminary Design will require the construction of a number of cuttings and embankments, which will result in an impact on the geology and hydrogeology of the area. Minimisation of these impacts has been considered in the preparation of the Preliminary Design.

There will be localised disturbance of the subsoils and geology along the route of the Preliminary Design, although no areas of particular geological significance have been identified. Overall, the impact on the geology of the area is considered to be Slight Negative. Following mitigation the impact is considered to remain as Slight Negative.

Localised impacts on groundwater levels may occur adjacent to road cuttings. There is also an increased potential for contamination of groundwater from road runoff but this will be substantially mitigated by the use of drainage pollution control measures. Although the vulnerability of groundwater along the route is classified as "High" and "Extreme", the aquifers themselves are classified as "Poor" or "Locally Important". Groundwater is not widely used for water supply in the area and the area is not considered sensitive from a groundwater viewpoint.

A review of well supply sources and field survey has identified a single private water supply in the vicinity of the Preliminary Design. No public or group groundwater supplies have been identified in the vicinity of the Preliminary Design. Close monitoring of the private water supply is proposed and where derogation is predicted modifications to the sources or augmentation with alternative supplies will be necessary.

Conservation sites reliant on groundwater feeds have been identified and assessed in the vicinity of the Preliminary Design. No impact on any designated conservation sites is foreseen.

The Preliminary Design passes through one upland bog. Drainage will be maintained beneath the road by the placement of rock fill. Areas of identified wet grassland may be adversely affected along the Preliminary Design. Consideration will be given to maintaining the local drainage in these areas at the Detailed Design stage.

Overall, the impact on the hydrogeology of the area is considered to be Moderate Negative. Following mitigation the impact is considered to remain as Moderate Negative.

At the Detailed Design Stage, further studies will be undertaken and mitigation measures developed within the Environmental Operating Plan (EOP). The EOP will be prepared by the Contractor prior to construction commencing. The further investigations will comprise ground water monitoring; visiting and sampling private wells at potential risk and regular review of data.

## 14.6 References

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## 15.0 Inter-relationships and Schedule of Commitments

### 15.1 Introduction

This Chapter outlines the reactions between impacts on different environmental factors, whether between the impacts of the N13/N15 Ballybofey / Stranorlar Bypass (Section 15.2) or between the impacts of other projects in the area (Section 15.3). Section 15.4 outlines the basis of the Environmental Operating Plan (EOP), which will be prepared to assist the Contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase and presents the Schedule of Commitments.

### 15.2 Scheme Interactions/Inter-Relationships

As discussed in the Environmental Impact Statement (EIS) various aspects of the Preliminary Design can have different effects on a number of environmental subject areas. In addition mitigation to ameliorate an impact in one environmental area can have a knock on beneficial or detrimental effect on another subject area. For instance the construction of noise barriers to mitigate noise impacts would also have an effect on landscape. The consideration of interactions/inter-relationships between subject areas provides an opportunity to consider the overall impact of the scheme. Table 15.1 summarises the potential inter-relationships between subject areas after mitigation. These are then discussed further in more detail in Section 15.2.1.

Table 15.1 Matrix showing general Inter-Relationships of Environmental Effects

INTER-RELATIONSHIP MATRIX	Socio- Economics	Agricultural Land	Landscape and Aesthetics	Water Quality and / Drainage	Ecology (flora, fauna and fisheries)	Architectural, Archaeological and Cultural Heritage	Air Quality	Noise and Vibration	Land Use	Geology and Hydrogeology
Socio- Economics	.	.	.	.	.	.	.	.	.	.
Agricultural Land	.	.	.	.	.	.	.	.	.	.
Landscape and Aesthetics	.	.	.	.	.	.	.	.	.	.
Water Quality and / Drainage	.	.	.	.	.	.	.	.	.	.
Ecology (flora, fauna and fisheries)	.	.	.	.	.	.	.	.	.	.
Architectural, Archaeological and Cultural Heritage	.	.	.	.	.	.	.	.	.	.
Air Quality	.	.	.	.	.	.	.	.	.	.
Noise and Vibration	.	.	.	.	.	.	.	.	.	.
Land Use	.	.	.	.	.	.	.	.	.	.
Geology and Hydrogeology	.	.	.	.	.	.	.	.	.	.

In order to ensure that all aspects of environmental inter-relationships were considered and addressed during the development of the Preliminary Design, relevant extracts from the chapters of the EIS were distributed to the other specialists. This was particularly the case when mitigation (changes to the scheme design) was recommended by one specialist. In this way any knock on effects on other areas could be considered, and if necessary appropriate mitigation identified. As such the scheme design is an iterative process, with the Preliminary Design being amended in order to avoid or reduce environmental impacts identified by the various specialists in the course of their assessment.

### 15.3 Cumulative and Indirect Impacts

This Section identifies the potential for indirect (or secondary effects) and cumulative impacts of the N13/N15 Ballybofey / Stranorlar Bypass.

#### **Lough Mourne Dams**

An Bord Pleanála approved plans in 2005 by DCC Water Services Department to construct dams to raise the water level of Lough Mourne, providing additional storage, by diverting flows from the Bunadaowen River into the Lough. The top water level of Lough Mourne would be raised from approximately 166m AOD to 170m AOD, by damming the Lough at the southwestern end.

The vertical alignment of the proposed scheme will ensure that the road is above the proposed water level of the Lough. Parts of the embankment for the proposed road will encroach into the area that will ultimately come within the higher future waterline resulting in these sections (Ch 650–740 and Ch 1000–1300) of the embankment footings lying within the edges of the Lough, to a maximum depth of 2m. In these areas, the bottom of the embankment, up to the future water line, will be constructed of rock to ensure embankment stability and to allow free movement of water within the embankment construction up to the water line. Drainage Pond 3 will also require raised bund edges to prevent flooding from the higher waterline.

Recent communication (October 2007) with DCC has indicated that the Lough Mourne Letterkenny Water Supply Scheme is on the Water Services Investment Programme 2007-2009 to start construction in 2008. It is estimated that it will take 18 months to complete.

Depending on the timings of construction of the Preliminary Design and the Lough Mourne dams, there may be potential for cumulative impacts in terms of water quality, air quality, ecology, and archaeology as well as in other areas. In addition, there will also be potential cumulative operational impacts in terms of the areas of dismantled railway affected by the Preliminary Design and Lough Mourne proposals.

#### **Potential Recreational Facility – The Dismantled Railway**

The Ballybofey Stranorlar Local Area Plan 2004-2010 identifies the dismantled railway as having potential for future development as a recreational facility. Where possible the route of the Preliminary Design has tried to minimise impact on this feature. The Preliminary Design and accommodation roads will however cross the dismantled railway in four separate locations, and further sections will be affected by severance.

In addition to this, the Lough Mourne dam proposals will result in further sections of the dismantled railway being flooded (see Chapter 8.0 Surface Water Quality and Drainage). The flooding of the dismantled railway, together with the effect of the construction of the Preliminary Design, will result in a cumulative effect on the potential

future development of the railway as a recreational facility in the vicinity of the Preliminary Design.

#### **Potential New Developments**

Indirect effects associated with the Preliminary Design would include the potential environmental impact of new development within Ballybofey / Stranorlar or in areas directly adjoining the route. The Preliminary Design is likely to facilitate new development along the current N15 as a result of an upgrade to a major transport route and improving access to greenfield sites to the south of the Towns. However, any such new development will be subject to local planning controls.

#### **Proposed Sports Campus**

Donegal County Council has proposals for a multi-functional sports campus in Stranorlar adjacent to the River Finn. Potential exists for cumulative environmental impacts. Specific impacts in terms of flooding are outlined below. Other cumulative impacts may include visual impacts, loss of agricultural land and loss of ecological habitat.

#### **Potential Flooding on the Finn Floodplain**

Within the northern River Finn floodplain by the existing Stranorlar athletics ground (approximately 1100-1500m upstream of the River Finn Preliminary Design crossing), it is proposed to construct a Sports Campus (as discussed above).

This proposed development and other potential future residential and commercial development, as well as land drainage (for agriculture or forestry), have the potential to increase flood risk within the Finn catchment. Flood risk may increase as a result of the take up of floodplain storage and the increase in runoff rates and volumes. Prior to any development on the Finn floodplain, the cumulative effect of the N13/N15 Ballybofey / Stranorlar Bypass and any proposed development should be assessed, and where necessary, mitigation measures should be incorporated into the design of the proposed development.

## **15.4 Environmental Operating Plan and Schedule of Commitments**

The Environmental Operating Plan (EOP), whilst not a legal requirement, should be adopted by Contractors working on all National Road Authority (NRA) road schemes. Further details of the EOP are given in Chapter 3.0 Description of the Preliminary Design. Chapter 3.0 also outlines other guidance and mechanisms that will guide the construction and operation phases of the N13/N15 Ballybofey / Stranorlar Bypass, such as the NRA Assessment and Environmental Construction Guidelines (series of guidance documents) and the Construction and Demolition Waste Management Plan.

The EOP will set out the Contractors approach to managing environmental issues associated with the construction of the Preliminary Design. It will also provide a documented account of the implementation of the environmental commitments or mitigation. The EOP will assist the Contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase.

From the specialist assessment studies carried out and described within this EIS, the following mitigation measures will be incorporated into the Detailed Design of the proposed N15 Ballybofey / Stranorlar Bypass.

Table 15.2 Schedule of Commitments

Topic	Commitment
Note:	Final design of scheme to be completed at the detailed design stage, prior to construction, by the successful Design and Build Contractor. During the detail design stage, the design and the environmental mitigation measures will be refined and developed to ensure efficiency and effectiveness. This may result in some changes to the design as published in the EIS. Generally, the detailed design refinements will seek to develop the Preliminary Design so that it has no material change on the environmental impacts of the scheme. Indeed, opportunities may be identified that reduce the impacts of the scheme. Stringent contract requirements and close supervision will ensure that the final design will be of the required quality and that the necessary mitigation measures to minimise the impacts of the scheme will be fully implemented.
General Construction and Operation	Stringent contract requirements and close supervision.
	The EOP will be developed by the Contractor prior to the start of construction based on the NRA Environmental Operating Plan Guidance Document, legislation and good working practices. The EOP will be implemented and maintained by the Contractor.
	A Construction and Demolition Waste Management Plan will be prepared and maintained by the Contractor.
	Construction will follow NRA current guidance for specialist topics.
	Adequate site supervision.
	Programming to minimise environmental disturbance (e.g. working hours, avoiding ecologically sensitive periods).
	Appropriate construction traffic management and signing (including restricting heavy construction traffic to approved routes and access points)
	Supervision and control of deliveries and storage.
	Boundary fencing will be erected to delineate the site boundary and minimise disturbance to adjacent areas.
	Implementation of good construction working practice on site including positioning of fuel storage, re-fueling areas, specification of minimum fuel bund capacity, containment of site run-off.
	The Contractor will supply spill kits that will be stored and available in appropriate vehicles on-site during construction, and used in the event of a fuel or chemical spillage. Operatives will be trained in the use of this equipment and the emergency response procedures to be followed in the event of any accidental spillage.
Socio-economics	Landscape mitigation will be provided where appropriate to mitigate visual impact on residential property.
	Measures to mitigate the impact of severance of roads have been incorporated into the Preliminary Design.
	A hierarchy of signage and information points will be based on the Department of the Environment's Guidelines for Road Signs.
Agriculture	Detailed agricultural mitigation measures will be developed and discussed as part of the Detailed Design stage. These will include restoration of access to severed land areas, provision of gates, alternative sources of water and electricity, temporary and permanent stock-proof fencing, measures to control dust (see air quality), land drainage etc.

	<p>Liaison between the Contractor and farmers during the works will minimise difficulties caused by restricted access to severed land.</p> <p>Accommodation roads have been included within the Preliminary Design. Accommodation bridges have been included at Ch 4280 (Goland Accommodation bridge) and at Ch 14720 (Mullaghagarry Accommodation bridge).</p>
Landscape	<p>Landscape mitigation measures will be implemented. These include new planting; areas identified for natural regeneration and reinstatement of affected features e.g. hedgerows and verges.</p> <p>The reinstatement proposed will reflect the landscape character of the area through which the new road passes.</p> <p>Where practicable, hedgerows and treelines will be planted along new field boundaries and road margins to reconnect severed hedgerows and treelines.</p> <p>Where possible all plantings shall use native species of local provenance. Vegetation types include proposed grassland, scrub, hedgerows, hedgerows and woodlands.</p> <p>All landscape preparation, planting and seeding shall be completed at the earliest opportunity during the implementation period to assist early establishment.</p> <p>Pesticides shall not be used without specific prior written approval.</p> <p>Environmentally acceptable products would be used wherever possible, such as peat-free composts, biodegradable products and recycled materials.</p> <p>The use of fertilisers shall be avoided wherever possible and the use of herbicides shall be minimised with greater emphasis placed on the use of mulches.</p> <p>Landscape management/maintenance will be implemented throughout the establishment period for the planting and seeding areas shown in Figure 7.19. All works throughout this period would fully embrace the principles of sustainability embodied in the statements made in this EIS with respect to the implementation phase of the project.</p> <p>Individual mature trees that are to be retained will be afforded protection in accordance with the Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes (National Roads Authority 2006).</p> <p>Detail of the Landscape Plan will be completed at the Detailed Design stage with the purpose of integrating the proposed scheme and associated features into the surrounding landscape and to screen visual intrusion to reduce any negative impacts of the proposed road.</p>
Water Quality and Drainage	<p>The NRA Guidelines for the Crossing of Watercourses during the construction of National Road Schemes (National Roads Authority 2006) will be used as a guide to the methods to be used to minimise impacts. Consultation will continue with third parties, for example, the OPW and Regional Fisheries Board. Mitigation measures will be detailed within the Environmental Operating Plan (EOP), which will be prepared prior to construction commencing</p> <p>Implementation of good construction working practice on site including positioning of fuel storage, specification of minimum fuel bund capacity, containment of site runoff, handling of cement and concrete etc to minimise the risk of a pollution incident.</p>



	Minimisation of sedimentation of watercourses by appropriate timing and sequencing of construction activities and minimisation of diversion distances for culvert construction.
	The Contractor will supply spill kits, which will be stored on-site during construction, and used in the event of a fuel or chemical spillage. Such kits will contain absorbent materials (such as absorbent granules, booms or mats) and plastic drain covers. Appropriate operatives responsible for handling chemicals or oils or for plant refuelling will be trained in the use of this kit.
	Maintenance of fish and mammal passage by using appropriate culvert design including maintaining natural bed materials and stream gradients.
	Passive treatment of road runoff from the area adjacent to Lough Mourne via a drainage pond.
	Additional measures (e.g. ponds) for attenuation and treatment of road runoff where swales and filter drains are impractical. These facilities could also fulfill the function of pollution containment following any incidences of accidental spillage. Where the provision of a pond is not practicable, surface water runoff will flow through petrol interceptors prior to discharge to receiving watercourses.
	Culverts have been preliminarily sized, shaped and located with the aim of conveying flood flows whilst minimising the changes to natural stream conditions, during both construction and operation.
	To minimise the risk of temporary sediment loads to larger streams and watercourses as the streambeds are disturbed, culverts will be constructed adjacent and parallel to the stream prior to creation of the minor diversions required to join the existing stream to the culverts.
	Culverts will be constructed parallel to the existing stream, where practicable, to minimise stream disturbance by minimising the length of diversion required. Diversions will be designed to tie in to the existing channel and, where necessary, some rock or other erosion protection will be provided to minimise erosion at these outlets.
	For smaller agricultural drains, culverts will be built perpendicular to the road (to minimise the length of the culvert) and joined to the existing drains with diversion drains.
	Swales and combined filter drains will be used in preference to other drainage systems, to minimise the effects of road runoff on water quality and to attenuate flows to greenfield rates.
	Runoff intercepted by boundary drains (embankment toe ditches and interceptor drains) will generally discharge to existing watercourses. Drainage ponds and an additional culvert are proposed to avoid any large increases in flow rate.
	Additional attenuation measures (drainage ponds) are also proposed for two catchments (tributaries of the River Finn) where boundary drainage diversions will otherwise cause a significant increase in flow rate.
	To mitigate the potential for moderate adverse impacts on the undesignated blanket bog (Ch 1400–2100), measures to facilitate maintenance of the existing drainage regime will be incorporated. In order to prevent the fill material beneath the road acting as a preferential flow path for sub surface flows, extracted peat would be replaced by a low permeability fill material. Also transferal drainage measures would be incorporated to ensure that a hydrological/hydro-geological connection is maintained between areas of bog to the north and south of the road.

Ecology (Flora, Fauna and Fisheries)	The embankments either side of the proposed River Finn bridge will restrict and alter the pattern of floodplain flow. Provision of the 3 span bridge proposed for the crossing allows significant flows to continue down the floodplains as well as avoiding significant obstruction of the main river channel.
	The Preliminary Design of the proposed Burn Daurnett bridge includes a substantial width for floodplain flow beyond the main river channel.
	The EOP will outline procedures required to fulfil all of the environmental commitments for the Preliminary Design, including environmental legislation requirements and those emanating from consultations with third parties, for example, the NPWS.
	<b>Designated Conservation Areas</b>
	Best practice and the mitigation measures detailed in the Watercourses section below will be adopted during the construction phase to minimise the risks of siltation or accidental spillage to the River Finn cSAC. The boundaries of the construction area will be defined at the outset of works with fencing to avoid accidental disturbance beyond the site.
	<b>Other Ecological Sites</b>
	The working area will be defined at the outset by the erection of fencing to define the limits of site works. Any trees, tree lines or hedgerows that are to be retained within the site works will also be fenced at the root protection area (RPA) in accordance with the Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes (NRA 2006).
	All woody vegetation that is to be retained will be afforded protection in line with British Standards (BS 3998:1989 Recommendations for Tree Work and BS 5837:2005 Trees in Relation to Construction).
	Where ecological sites, hedgerows, tree lines and mature trees cannot be avoided, to compensate for the loss of this habitat resource, new areas of semi-natural habitat will be created using native seed sources where feasible and new hedgerows, tree lines and small stands of woodland will be planted in appropriate locations.
	Where practicable hedgerows and treelines will be planted along new field boundaries and road margins to reconnect severed hedgerows and treelines, to re-establish the network of ecological corridors, and to interlink with other areas of semi-natural habitat. The trees and shrubs will be predominantly native species, which are readily available, and of local provenance and the species composition will reflect that of the habitat or habitats being lost.
	<b>Otters</b>
	A detailed pre-construction survey will check for any otter holts within or close to the CPO if 36 months or more has elapsed between obtaining statutory approval of the Preliminary Design and initiation of the construction phase, as per the NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.
	Each of the culverts and bridges will incorporate provision for mammal passage in accordance with the NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes and the NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.

	<p>If required, evacuation of otter holts within the CPO line will be carried out by an appropriately qualified ecologist under licence from the NPWS. Evacuation, and destruction if required, will be undertaken in accordance with the NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.</p>
	<p><b>Badgers</b></p>
	<p>Where required, evacuation and destruction of active badger setts within the CPO will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS. Evacuation and destruction will be undertaken during the period 1st July to 30th November, in accordance with the NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.</p>
	<p>Until such time as they can be evacuated and destroyed, all active setts will be protected from interference or disturbance during construction by an exclusion zone of 30m (50m during the breeding season-December to June inclusive) within which no machinery or removal of vegetation will take place. Light work, such as hand digging or scrub clearance will not take place within 10m of sett entrances.</p>
	<p>Setts located immediately adjacent to the CPO will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage. Such marker fencing will be sufficiently durable and robust to cover the period of construction.</p>
	<p>Where practical, neither blasting nor pile driving should be undertaken within 150m of active setts during the breeding season (December to June inclusive).</p>
	<p>Badger underpasses can be combined with proposed culverts greater than 1m in diameter by the incorporation of raised mammal ledges, in accordance with the NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. The locations of mammal underpasses will be decided at the detailed design stage in conjunction with Design Engineers, as it will depend on the engineering requirements of the Preliminary Design.</p>
	<p>Badger fencing will be required to guide badgers to passage facilities and to prevent animals crossing the new roadway. The specification for badger-resistant fencing is given in the NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. Fencing is required in the vicinity of all facilities for the provision of mammal passage and should extend for a sufficient distance from underpasses to ensure that badgers will not find easy ways around them.</p>
	<p>Badger resistant fencing will be incorporated at the earliest possible stage during road-construction, preferably during erection of the permanent fence-line with gaps left at locations recommended for underpasses. Gaps should be subsequently closed after underpasses have been constructed. Gates entering onto farm access roads will require concrete sills and mesh to exclude badgers from accessing the Preliminary Design.</p>
	<p>In order to ensure that mitigation measures are operating effectively, badger-resistant fencing needs to be properly maintained and underpasses checked periodically in the first two years to ensure that they remain clear of debris or have not become waterlogged.</p>

	<p>Quarterly monitoring will be carried out to determine the success of the measures employed. Monitoring should be continued for a minimum of one year after construction ceases, in accordance with the NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.</p>
	<p><b>Pine Marten</b></p>
	<p>Landscape mitigation will minimise the loss of pine marten habitat along the Preliminary Design over time.</p>
	<p><b>Bats</b></p>
	<p>Buildings with roosting bats will not be demolished during the breeding period (late May to mid-August) as the risk of accidental death or injury is too great at this time. Known hibernation sites should not be demolished in winter. In exceptional circumstances where demolition must proceed in buildings known to contain bats, the special mitigation measures as detailed in the Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority 2006) to protect bats will be put in place and a licence to derogate from the conservation legislation will be sought from the NPWS.</p>
	<p>The procedure to be followed for the demolition of buildings depends on whether bats are suspected or known to be present. In all cases, immediately in advance of demolition, a bat specialist will undertake a comprehensive examination of the building. Should bats be encountered the building demolition will proceed as per the NRA Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority 2006).</p>
	<p>The local NPWS conservation ranger will be informed of the location of any new roosts found.</p>
	<p>The construction of the new bridge at the River Finn crossing will incorporate access points and roosting areas for bats in line with best practice roost construction. Ready-made artificial roost units are available for inclusion in such situations and should be included on the new river bridges. This will not hinder the future maintenance operations of the bridge.</p>
	<p>Trees that are to be removed will ideally be felled in the period late August to late October, or early November, in order to avoid the disturbance of any roosting bats as per NRA guidelines. The felling of trees identified as existing or potential roosts will be completed by Mid-November at the latest because bats roosting in trees are very vulnerable to disturbance during their hibernation period (November – April). Ivy covered trees, once felled, will be left intact on site for 24 hours to allow any bats within them to escape prior to disposal.</p>
	<p>The loss of feeding areas and severance of commuting routes will be mitigated by measures as outlined in the NRA Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority 2006).</p>
	<p>Bat roosting boxes will be erected in appropriate sites to compensate for the loss of roost sites. 'Schwegler' woodcrete or concrete bat boxes are proven to be acceptable alternatives for bats and they are readily occupied. The precise location of alternative roost sites and the specific types of roost to be used will be determined at the detailed design stage.</p>
	<p>Lighting will be designed to minimise disruption to bats, bearing in mind the need for adequate lighting to ensure road safety standards are met.</p>

	<b>Deer</b>
	Provision for the passage of deer will be met by allowing unimpeded access across the proposed road on appropriate stretches where visibility by motorists is adequate. Signage, deer fencing and appropriate road side landscaping will be considered at the detailed design stage in conjunction with the Design Team
	<b>Birds</b>
	Where programmed construction activities permit, there will be no removal of mature trees or hedgerows during the period March to August inclusive to prevent disturbance to breeding bird populations.
	<b>Watercourses</b>
	All works carried out on or near watercourses will be in accordance with the Guidelines for the crossing of watercourses during the Construction of National Road Schemes (NRA, 2006) and in consultation with the relevant statutory bodies, and in consultation with the Loughs Agency and NPWS.
	Bunds, siltation ponds, hydrocarbon and grit interceptors will be put in place, as appropriate, to control pollution and run-off, as per the Guidelines for the crossing of watercourses during the Construction of National Road Schemes (NRA, 2006) and in consultation with the Loughs Agency.
	Bankside vegetation will be left intact where feasible. The extent of bankside interference and vegetation removal should be agreed, identified and documented and demarcated with appropriate fencing in advance of undertaking construction works. Adequate protection will be afforded by fencing prior to the commencement of any site works, with the fence set at a minimum distance of 5m from the bank of the watercourse or at the edge of the woody canopy (whichever is greater), wherever in-stream works are not being carried out.
	Where natural bankside vegetation is to be removed, machinery will operate from the bank and pull the vegetation back from the edge of the watercourse. If temporary or permanent diversion of the watercourse is required, this will be carried out prior to the removal of bankside vegetation. Where permanent diversion is taking place, existing vegetation will be removed in sods for replanting on the new river banks where feasible. Where clearance of bankside vegetation or modification of river channels is required upstream or downstream of a proposed crossing point, these works will be carried out in a manner that aims to minimise the extent of impact.
	Replanting or rehabilitation of banksides will be carried out following sensitive grading of the banks to replicate a natural topography using a capping of salvaged topsoil. Planting will be conducted using native species and will follow a natural zonation that is appropriate to the river profile. Temporary deer proof fencing will be erected to protect newly planted areas.
	<b>Bridges/Culvert Design</b>
	Provision for fish passage will be allowed for in all watercourses with evidence of, or the potential to support, trout (i.e. all watercourses with the exception of D2 and D8). This will be in accordance with Loughs Agency guidelines and requirements and the Guidelines for the crossing of watercourses during the Construction of National Road Schemes (NRA, 2006).

	The Rivers Finn and Burn Daurnett will be bridged. The Preliminary Design for the River Finn crossing is a three span structure with no piers set in the channel of the river. There will be no modification to the riverbanks and no in stream works. Angler and mammal passage will be unimpeded by the bridge and all works will comply with the Guidelines for the crossing of watercourses during the Construction of National Road Schemes (NRA, 2006).
	The Burn Daurnett will be bridged using clear-span design so as to leave the natural bed and banks undisturbed, and leaving a natural bank-path at each side for mammals and anglers, in accordance with the Guidelines for the crossing of watercourses during the Construction of National Road Schemes (NRA, 2006).
	All other watercourses crossed by the Preliminary Design will be culverted. Bridge and culvert design and construction will be as per the NRA Guidelines and will incorporate mammal passage facilities as appropriate.
	If a stream runs parallel to the line of the Preliminary Design and inside the toe-line of the embankment, consideration will be given to the option of diverting it laterally rather than culverting.
	<b>In-stream works</b>
	The Loughs Agency will be consulted on the timing of in-stream works in watercourses frequented by salmon or trout.
	If required, in-stream containment and dewatering operations to enable working in the dry may facilitate construction during the closed periods. All dewatering flow from surface watercourses will be passed through settlement ponds or tanks to remove sediments. Dewatering will be preceded by a fish salvage operation carried out by, or on behalf of, the Loughs Agency by fully qualified personnel.
	Operation of machinery in-stream will be kept to a minimum.
	All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid etc. Machinery will be steam-cleaned and checked prior to commencement of in-stream works.
	Fording of watercourses to gain access to the opposite bank will only be considered where no alternative option exists and under approval of the Loughs Agency, as appropriate. Where required, access will be restricted to one crossing point and traffic limited.
	In-stream and bankside preparation and rehabilitation will be required as per the Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes, NRA 2006.
	The use of concrete for preventing erosion of streambeds and banks will be avoided. Use will be made of natural bank protection techniques such as willow-fagotting, stone armour, or composite protection using products such as coir-matting or geoweb with appropriate planting (reeds, willow, etc.).
	<b>Watercourse Diversions</b>
	Watercourse diversions will only occur within the approved operational window for in-stream works
	The salvage of fish from the section of watercourse to be abandoned will be carried out by qualified, licensed personnel.
	Diversions of watercourses will not be carried out unless there is no practicable alternative. Diversions will be designed to replicate a natural watercourse system and should include meanders, riparian vegetation and other features of a natural watercourse.

	Watercourse diversions will be carried out in the dry, in isolation from the existing watercourse.
	The compensation diversion channel will be designed in detail under the guidance of suitably qualified personnel and to the satisfaction of the statutory bodies. Once the construction is completed and re-vegetation has been established, the connection to the existing watercourse will be made.
	<b>Pollution Prevention</b>
	Pouring of cement for aprons, sills, and other works will be carried out in the dry and allowed to cure for 48 hours before re-flooding. Pumped concrete will be monitored carefully to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to water.
	No storage of hydrocarbons or any chemicals will occur within 50m of a watercourse. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank.
	Re-fuelling of plant will not occur within 50m of any watercourse. Filter systems or settlement ponds will be used to minimise siltation in site run-off being discharged to receiving waters.
	<b>Discharge Quality</b>
	It is proposed to utilise drainage ponds for the treatment of carriageway runoff on closed drainage networks. Only where drainage ponds are not feasible, oil/petrol interceptors will be used as a substitute. The forms of treatment offered by the use of drainage ponds are the settlement of heavier suspended solids and biological and physico-chemical treatment of the discharge.
	The drainage ponds will be designed in accordance with CIRIA Report C521 – Sustainable urban drainage systems – Design Manual for Scotland and Northern Ireland.

Archaeology, Architectural and Cultural Heritage	<p>Mitigation measures will be finalised and agreed in consultation with the National Monument Section of the Department of Environment, Heritage and Local Government. Any further archaeological mitigation works subsequent to the planning approval of the Preliminary Design shall be carried out under Ministerial Directions, as prescribed by the 2004 Amendment to the National Monument Act</p> <p>Mitigation measures recommended for specific features include archaeological test trenching, geophysical survey, topographic survey, written and photographic records and further walkover surveys.</p> <p>With regard to any minor watercourses, streams or drains that will be impacted by the Preliminary Design, these sites will be inspected by a suitably qualified archaeologist, prior to construction to determine the presence, if any, of archaeological material at these locations. Further strategies may be formulated following information received from these inspections.</p> <p>Provision will be made for the full recording and excavation of any archaeological features or deposits that may be exposed during the course of any archaeological test trenching outlined in the above recommendations and the reporting of the results of those archaeological investigations, including publication when appropriate.</p> <p>With regard to further mitigation of the Preliminary Design as a whole, appropriate levels of mitigation will be taken when appropriate, to locate features that may lie within the development corridor. This may include centre line archaeological test-trenching, herring-bone trenching, site-specific trenching, total topsoil stripping, topsoil ploughing, field-walking, topographical survey, geophysics, photographic and written surveys, archaeological monitoring and preservation in situ. This will be decided in consultation with the National Monument Section of the Department of Environment, Heritage and Local Government to ensure preservation by record of features of archaeological interest that may be impacted on by the Preliminary Design. To ensure proper management of archaeological mitigation all efforts will be made to carry it out prior to the commencement of construction.</p> <p>With regard to RMP 2, an enclosure in Golland Upper, the Preliminary Design poses no direct impact. The disused railway line, which when built removed part of the enclosure, lies between the enclosure and the Preliminary Design thereby reducing the possibility of associated sub-surface archaeological remains being uncovered. A programme of test trenching will be carried out, under Ministerial Direction within the area of the Preliminary Design in order to determine the presence of any archaeological remains associated with the enclosure.</p> <p>With regard to AH 1 the Old Donegal Railway Line, a written and photographic survey will be undertaken of those sections of the railway that will be impacted on. This will provide information for public dissemination and archive on the history of the railway; with a suitable medium for distribution being the Donegal Railway Museum in Donegal town.</p> <p>With regard to AH 3 vernacular architecture in Cashelnavean, a written and photographic survey of the site and its current context will be undertaken. as the building will be located to the immediate north of the proposed CPO.</p> <p>A written and photographic survey will be undertaken at AH 5, a vernacular architecture site located in Sessiagh O' Neill in order to record the structural remains present at the site. As continuity of settlement is a possibility, the area of the building will also be tested to determine the presence of any earlier settlement on the site.</p>
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	With regard to AH 6, the site of a Millpond in Dreenan Townland, a programme of test trenching will be carried out, under Ministerial Direction, within the area of Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with the millpond. Further strategies will be formulated following information received from the test trenching exercise.
	With regard to AH 7, a possible vernacular architecture site in Dreenan Townland, a written and photographic survey of the site will be undertaken.
	With regard to AH 8 Edenmore House (a Protected Structure) and Estate, a written and photographic survey will be undertaken of the area of the once historic attendant grounds that will be impacted on by the Preliminary Design.
	With regard to AH 9 Tircallen House and Estate, a written and photographic survey will be undertaken on the area of the once historic attendant grounds that will be impacted on by the Preliminary Design.
	With regard to AAP 8, it should be noted that part of this area has already been subject to archaeological testing. Nothing of archaeological significance was discovered. However, subsequent to this testing in 2005, the proposed CPO has been changed and as a result the area will be impacted on to the higher degree. Therefore a programme of test trenches should be carried out under Ministerial Consent within the area yet to be assessed. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site.
	AAP 11 is a circular area of archaeological potential identified through aerial photography in Croghanagh townland. As this potential site is located in an area of dense coniferous forestry it is unsuitable for geophysical survey. A programme of test trenching will be carried out, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the test trenching exercise.
	With regard to AAP 13, a possible vernacular/post-medieval field system in Goland Lower a topographical survey of the site will be undertaken along with a programme of archaeological test trenching, under Ministerial Direction. This will determine, if possible, the date of the site.
	With regard to AAP 15, a possible pre-bog wall in Carrickmagrath Townland, a programme of test trenching will be carried out, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. This will be done in tandem with a prospective probing survey to determine whether the feature; if archaeological, continues for any length. Further strategies will be formulated following information received from the test trenching exercise.
	AAP 16, a 'Fairy Well and Fairy Rock' in Carrickmagrath Townland has been recorded for the purposes of this EIS. A written and photographic survey will be undertaken of the area. This will be followed by a programme of test trenching, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the written and photographic survey and test trenching exercise.

	<p>With regard to AAP 21, a mound and possible archaeological feature in Dreenan Townland, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with this site. Further strategies will be formulated following information received from the test trenching exercise.</p>
	<p>With regard to AAP 23, a possible standing stone in Dreenan / Edenmore, geophysical survey will be undertaken at the location of the stone in order to determine the nature and extent of the possible remains at this site. This will be followed, where appropriate, by a programme of test trenching, under Ministerial Direction, within the area of the Preliminary Design. This will ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the test trenching exercise and geophysical assessment.</p>
	<p>With regard to AAP 24, a mound and possible archaeological site at Edenmore, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with this site. Further strategies will be formulated following information received from the test trenching exercise.</p>
	<p>With regard to AAP 25, an area of archaeological potential where the Preliminary Design crosses the River Finn, the area will be inspected by a suitable qualified archaeologist, prior to construction to determine the presence, if any, of archaeological material. Further strategies may be formulated following information received from this inspection.</p>
	<p>With regard to AAP 29, a disused gravel pit in Mullaghagarry, a written and photographic survey of the site will be undertaken.</p>
	<p>With regard to AAP 30, a possible standing stone in Mullaghagarry, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology associated with this site. Further strategies will be formulated following information received from the test trenching exercise.</p>
	<p>With regard to AAP 33, a possible boreen in Tircallan Townland, a programme of test trenching will be carried out, under Ministerial Direction. This will be undertaken within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of sub-surface archaeology at this site. Further strategies will be formulated following information received from the test trenching exercise.</p>
	<p>AAP 36 is a curvilinear field boundary in Kilross Townland. Geophysical survey will be undertaken in the area of the boundary in order to determine the nature and extent of any possible remains at the site. This will be followed, where appropriate, by a programme of test trenching, under Ministerial Direction, within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of any sub-surface archaeology at this site. Further strategies may be formulated following information received from the geophysical assessment and test trenching exercise.</p>

	<p>With regard to AAP 37, an irregularly shaped cropmark in Kilross Townland, geophysical survey will be undertaken at the location of the site in order to determine the nature and extent of any possible remains. This will be followed, where appropriate, by a programme of test trenching in the environs of the site, under Ministerial Direction, within the area of the Preliminary Design in order to ascertain the exact location, nature, extent and condition of any sub-surface archaeology at this site. Further strategies may be formulated following information received from the geophysical assessment and test trenching exercise.</p>
	<p>With regard to AAP 7, 10, 14, 17, 18-9, 20, 22, 26-8, 31, 34, 40-1, a series of Historic Townland Boundaries within the land take of the Preliminary Design and, in addition, where AAP 18 and 27 lie within the easement for large debris clearance and vegetation clearance respectively, a written and photographic survey will be undertaken at the location of each boundary in order to identify and fully record the nature of each boundary.</p>
Air Quality	<p>Dust can be mitigated to a certain extent by imposing working restraints within the contract documentation. Effective measures for mitigating dust generation and dispersal to be presented within the EOP:</p> <ul style="list-style-type: none"> <li>• Wheel wash of vehicles prior to leaving the site</li> <li>• Sheeting vehicles carrying dust-generating materials to and from site</li> <li>• Spraying, sealing or re-vegetation of exposed earthworks</li> <li>• Where practicable, construction of haul routes within the construction area away from sensitive sites, and the width kept to a minimum</li> <li>• Paving or use of equivalent (e.g. geotextiles) around heavily used areas such as batching plant or haul routes</li> <li>• Sweeping of paved haul roads and public roads regularly used by construction traffic</li> <li>• Limiting of vehicle speeds</li> <li>• Location of crushing plant away from sensitive sites.</li> <li>• Location of stockpiles away from the site boundary and out of the wind (or wind breaks provided). These will be kept to minimum practicable height, and where appropriate re-vegetated or temporarily covered.</li> <li>• Minimising works generating dust (e.g. cutting and grinding).</li> <li>• Employment of appropriate equipment and techniques such as dust extraction to reduce dust.</li> </ul>
Noise and Vibration	<p>Once construction details are available, the EOP will indicate which residential areas could potentially be affected by construction noise.</p> <p>The selection of appropriate plant using relevant guidance in BS5228: Part 1 and the European Communities (Construction Plant and Equipment Permissible Noise Levels) Regulations 1988.</p> <p>Where reasonably practicable, noisy plant or processes should be replaced by less noisy alternatives.</p> <p>Plant should be properly and regularly maintained.</p> <p>Compressors should be "sound reduced" models fitted with properly lined and sealed acoustic covers which should be kept closed whenever machines are in use and ancillary pneumatic tools should be fitted with suitable silencer.</p> <p>Machinery, which is used intermittently, should be shut down or throttled back to a minimum during those periods when not in use.</p>

	All vehicles and mechanical plant should be fitted with effective exhaust silencers
	Noise from existing plant and equipment can be reduced by modification or by the application of improve sound reduction methods, but this should only be carried out after consultation with the manufacturer
	Where deemed reasonably practicable, plant and site equipment should be located away from noise sensitive receptors
	Plant known to emit noise strongly in one direction should, when possible, be oriented so that the noise is directed away from noise sensitive receptors
	The use, where necessary and practicable, of enclosures and barriers around noisy plant
	Reducing number of plant to be operated simultaneously
	Appropriate phasing of works activity
	Strict adherence to any standards and or noise limits and hours of operation that are set
	If blasting is confirmed to be required during the detailed design stage, the EOP will be formulated to show which residential areas may be potentially affected by blasting operations and include appropriate control measures
	When blasting is due to occur, there would be a warning system for residents to minimise the potential disturbance
	During construction a point of contact would be made available for the general public, in order to provide 2-way communication, through which comments or concerns can be expressed and notification given of any unavoidable emergency works.
Geology and Hydrogeology	Continuous vibration monitoring at sensitive buildings close to the construction sites is recommended to address any uncertainties relating to the potential vibration levels and verify that construction vibration criteria are not exceeded. This monitoring would also enable the Contractor to take immediate corrective action (e.g. use of alternative equipment) if deemed necessary.
	Methodologies prepared at the Detailed Design stage will be required to minimise excavations of cuttings and handling of materials necessary to ensure satisfactory construction of the road.
	Consideration will be given to leaving any new cuttings in bedrock exposed to offer enhancement to the local geological heritage and character.
	Dewatering associated with the construction of cuttings will be kept to a minimum depth to reduce the impacts on groundwater. It is not possible to further mitigate these impacts but the area of aquifer impacted is small compared with the aquifer extent.
	Suitable drainage and pollution control measures will be adopted to minimise the potential impact of road drainage on groundwater quality.
	A single private water source has been identified as potentially at risk of derogation and/or contamination. A comprehensive monitoring programme will be developed for this source, and for any other sources which may come to light during Detailed Design, commencing a minimum of 12 months prior to construction and extending through construction and for a minimum of 24 months following the road completion.

	Where a private water source is derogated or likely to be derogated, remedial works will be undertaken which may include modification of the existing resource (e.g. deepening of the well), or installation of a new supply (such as a borehole).
	One area of upland blanket bog has been identified between Ch 1400 to 2100. The Preliminary Design crosses this bog, potentially affecting localised drainage. The construction of the road will result in the extraction of the peat with replacement by an appropriate medium which retains the present lateral hydrological connection across the road, without creating a preferential flow-path that would drain the bog. The embankment construction will be designed to ensure drainage is maintained beneath the road. Further consideration will be given to localised drainage in this area at the Detailed Design stage to ensure any hydrological and conservation impacts are minimised.

## 15.5 References

Donegal County Council (2005) Ballybofey Stranorlar Local Area Plan 2004-2010.

Donegal County Council (2006) County Development Plan 2006-2012.

NRA (2005) Environmental Assessment and Construction Guidelines. National Roads Authority

NRA (2005) Guidelines for the crossing of watercourses during the construction of National Road Schemes. National Roads Authority.

NRA (2005) Guidelines for the treatment of badgers prior to the construction of National Road Schemes. National Roads Authority.

NRA (2005) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes National Roads Authority.

NRA (2005) Guidelines for the treatment of bats during the construction of National Road Schemes. National Roads Authority.

NRA (2006) A Guide to Landscape Treatment for National Road Schemes. National Roads Authority.

NRA (2006) Guidelines for the treatment of otters prior to the construction of National Road Schemes. National Roads Authority.

National Roads Authority (2007) Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.

## Glossary

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**Attenuation Pond**

Constructed basin that functions to limit the rate of runoff passing to the receiving water, so that the capacity of the downstream channel is not exceeded.

**Bann Flakes**

Flint tools (blades and flakes used as knives) dated to the later Mesolithic period (5500–4000 BC). Many are found in the River Bann in Northern Ireland.

**Boreen**

Properly '*bóthrin*'. An Irish word describing a narrow country lane.

**Canted**

An architectural term meaning 'set at an angle'. In this case, a 'canted central bay', indicates that the central part of the house projects outward and is angled, in much the same way as a bay window.

**Cashel**

Monuments similar in types to earthen ringforts (see below) but enclosed by walls of dry stone construction. Usually referred to as '*cashels*', although '*cahir*' and '*dun*' are also used popularly and in place names. While some stone built circular enclosures have been dated to the late Bronze Age (1000–600 BC), the bulk of these monuments are probably merely the stone equivalents of the earthen ringforts and date to the same period.

**Cairn**

A mound of stone and/or earth usually covering a burial.

**Catchment Area**

Area of land over which all water drains into a river, reservoir or other water body.

**Cist**

A stone-lined grave, usually built of slabs set upright to form a box-like construction and capped by a large slab or several smaller lintels. Use of cists for burial began during the Bronze Age (2400–600 BC).

**Combined Filter Drain**

Perforated drainage pipe, normally laid along the edge of roads, used to collect surface runoff. Combined Filter Drains have a dual function of conveyance and treatment.

**Cumec**

Measure of water flow. Cubic meters per second (unit).

**Demesne**

The land attached to a manorial house or other landed property.

**Embankment Toe Drain**

Drainage conduit used to carry seepage water away from an embankment.

**Floodplain**

Any normally dry land area that is susceptible to inundation by water from any natural source.

**Fosse**

A ditch or moat, usually defensive in nature.

**Fulacht Fia (dh) (singular) / Fulachta Fiadh (plural)**

These sites are regarded as ancient cooking places which date to the Bronze Age (2400–600 BC). A fulacht fia consists of a horse-shoe or kidney shaped mound of fire cracked stone, surrounding a slight hollow in which either a clay lined pit or wood lined trough is normally found. They are usually located in low-lying areas near a water source, and are often found in clusters.

**Furze**

A type of vegetation also known as gorse.

**Greenfield Rates**

This occurs when the rate of discharge of surface water runoff remains the same upon completion of the development

**Haggart**

A small backyard.

**Harled**

Harled is when the external walls of a building have been covered with plaster mixed with a coarse aggregate such as gravel.

**Interceptor drains**

Drains constructed to intercept and carry away surface water from higher ground.

**Lazy-beds**

An agricultural term, also called ridge-and-furrow. Describes a system of farming used during the medieval and post medieval periods whereby small trenches (furrows) were dug into the ground to form the ridges where crops were placed.

**Longphorts**

A defended Viking harbour. Used to describe the first Viking settlements in Ireland in the mid 9<sup>th</sup> Century AD.

**Middens**

A refuse mound usually consisting of the remains of foodstuff, such as animal bone and seashells, thus also referred to as 'kitchen midden'. Frequently indicates the site of a prehistoric habitation.

**Ogham**

An ancient Irish alphabet or cypher system. Appears to have been used predominantly during the early Christian period (5<sup>th</sup>–10 Century AD), although it probably originated in pre-Christian times. It consists of notches engraved on, diagonally across, or on either side of a central line. It survives almost exclusively on upright stones, with one sharper edge acting as the central line for the inscription, but literary evidence suggests it was also used on wood and iron. The extant examples are mostly boundary markers or memorial inscriptions.

**Oligotrophic**

Lake or other water body having extremely low nutrient concentrations.

**Penal**

As in 'Penal Times', from 1691 to 1760 AD. Refers to the introduction of the Penal Laws, a code of laws passed by the Protestant Parliament of Ireland, which regulated the status of Roman Catholics through most of the 18<sup>th</sup> Century. This was essentially the suppression of 'popery' and resulted in the disenfranchisement of the Catholic population.

**Probing**

A proven archaeological prospective technique for locating pre-bog built structures.

**Ringfort**

Roughly circular enclosure delimited by a bank and ditch. Regarded as defended family homesteads and were constructed to protect farmsteads. The extant dating evidence suggests they were primarily built between the 7<sup>th</sup> and 9<sup>th</sup> Centuries AD. These are the most frequently recorded archaeological site type and c.50,000 examples are recorded in the Irish landscape.

**Souterrain**

Artificial underground structures, usually built of dry stone walling and containing passages and chambers. They are most commonly found in association with early medieval habitation sites.

**Swales**

Shallow grassed channels, normally located adjacent to carriageways, providing a means of conveyance for surface water runoff.

**Tumulus**

A simple earthen mound used in the Neolithic period (4000–2400 BC) and Bronze Age (2400–600 BC) to cover burials.

**Votive**

Used to describe offerings that were made to a deity in fulfilment of a vow or as a gesture of devotion or gratitude.



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## Abbreviations

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AADT	Annual Average Daily Traffic Flow
AAP	Areas of Archaeological Potential
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQSR	Air Quality Standards
ATC	Automatic Traffic Count
AWU	Annual Work Unit
BMW	Border, Midland and Western
BOD	Biological Oxygen Demand
BS	British Standard
BSLAP	Ballybofey / Stranorlar Local Area Plan
CDP	County Development Plan
C <sub>6</sub> H <sub>6</sub>	Benzene
CH	Cultural Heritage
Ch	Chainage
CIRIA	Construction Industry Research and Information Association
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CBA	Cost Benefit Analysis
COD	Chemical Oxygen Demand
CPO	Compulsory Purchase Order
CRTN	Calculation of Road Traffic Noise
CSO	Central Statistics Office
cSAC	candidate Special Area for Conservation
dB	decibels
dB(A)	decibels (Adjusted)
DCC	Donegal County Council

DCDP	Donegal County Development Plan
DED	District Electoral Divisions
DEHLG	Department of Environment, Heritage and Local Government
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges
DNIAH	Draft National Inventory of Architectural Heritage
EC	European Community
EEC	European Economic Community
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EHSA	Especially High Scenic Amenity
EPA	Environmental Protection Agency
EPO	Environmental Protection Officer
ERTDI	Environmental Research, Technological Development and Innovation
EQS	Environmental Quality Standards
ESB	Electricity Supply Board
EU	European Union
FEH	Flood Estimation Handbook
FIA	Flood Impact Assessment
GSI	Geological Survey Ireland
ha	hectares
HC	Hydrocarbons
HCV	Heavy Commercial Vehicles
HGV	Heavy Good Vehicle
Hrs	Hours
Hz	Hertz
IEMA	Institute of Environmental Management and Assessment
IFA	Institute of Field Archaeologists

IH	Industrial Heritage
IPPC	Integrated Pollution Prevention and Control
LAQM	Local Air Quality Management
LGV	Light Goods Vehicle
LI	Landscape Institute
LOS D	Level of Service 'D'
LV	Limit Value
M	Meters
MHC	McCarthy Hyder Consultants
Mm	Millimeters
mph	miles per hour
NDP	National Development Plan
NHA	National Heritage Area
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrous Oxides
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NRDO	National Roads Design Office
NSS	National Spatial Strategy
NTS	Non Technical Summary
OPW	Office of Public Works
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbons
PM <sub>10</sub>	Particulate Material
RMP	Record of Monuments and Places
RPG	Regional Planning Guidance
RSR	Route Selection Report

SAC	Special Area of Conservation
S&E	Southern and Eastern
SI	Statutory Instrument
SPA	Special Protection Area
SO <sub>2</sub>	Sulphur Dioxide
SUDS	Sustainable Urban Drainage Systems
THC	Total Hydrocarbons
TPO	Tree Preservation Order
UAA	Utilisable Agricultural Area
Um	Microns
USEPA	United States Environmental Protection Agency
WDC	Western Development Commission
WS	With Scheme
ZVI	Zone of Visual Influence

# N13/N15 Ballybofey/Stranorlar Bypass

## Environmental Impact Statement

### Volume 2: Figures



November 2007

DONEGAL COUNTY COUNCIL

N13 / N15 BALLYBOFEY/STRANORLAR BYPASS

ENVIRONMENTAL IMPACT STATEMENT

VOLUME 2 FIGURES

Document Title:	Environmental Impact Statement
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Date	Edition/Rev	Status	Originator	Checked	Approved
12/11/07	Final	Final	RR	HT	HT

This report has been prepared for Donegal County Council in accordance with the terms and conditions of appointment for consulting engineering services in connection with proposed national roads project N13/N15 Ballybofey/Stranorlar Bypass. McCarthy Hyder Consultants cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

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DUBLIN 18

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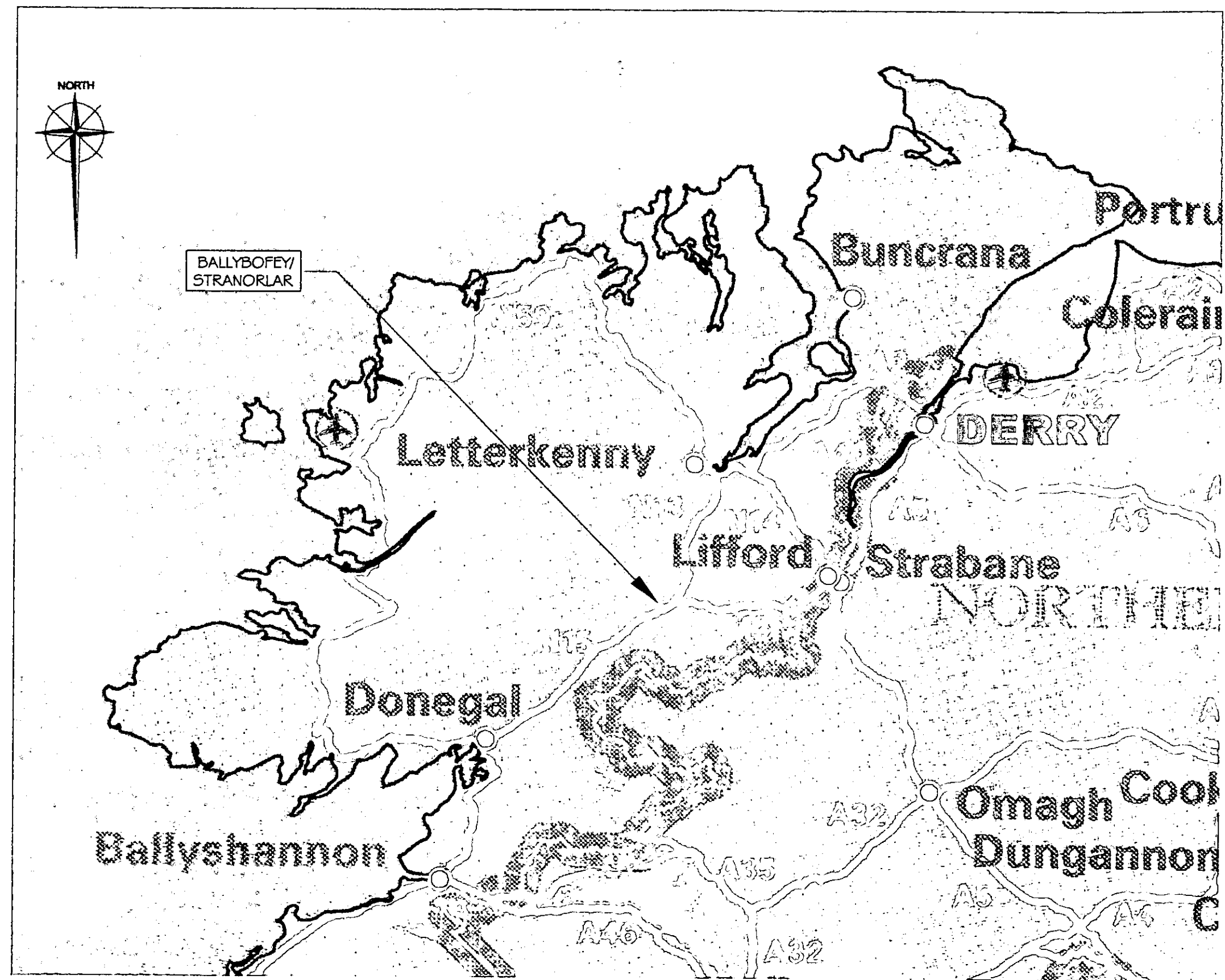
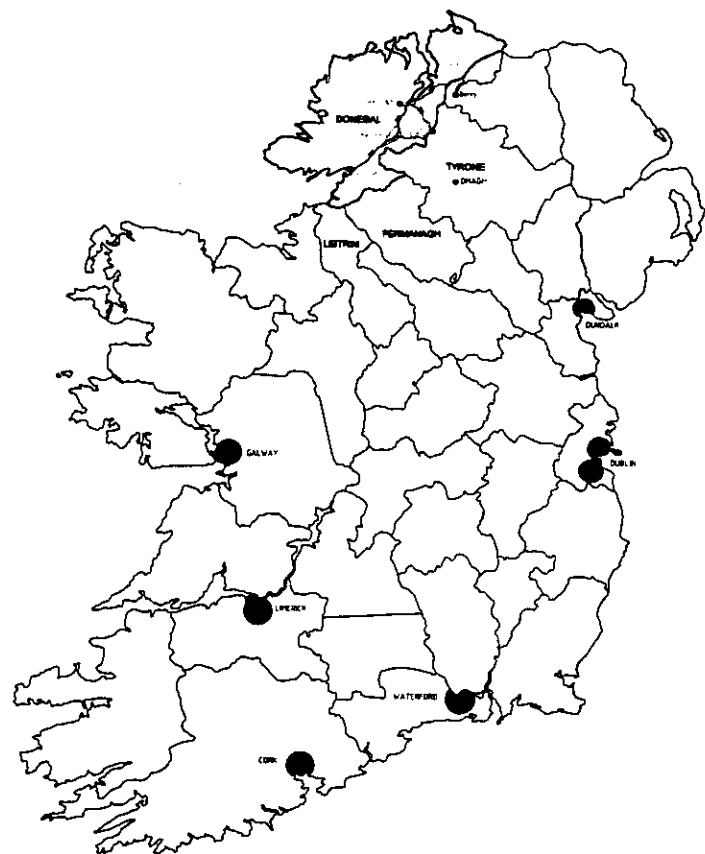
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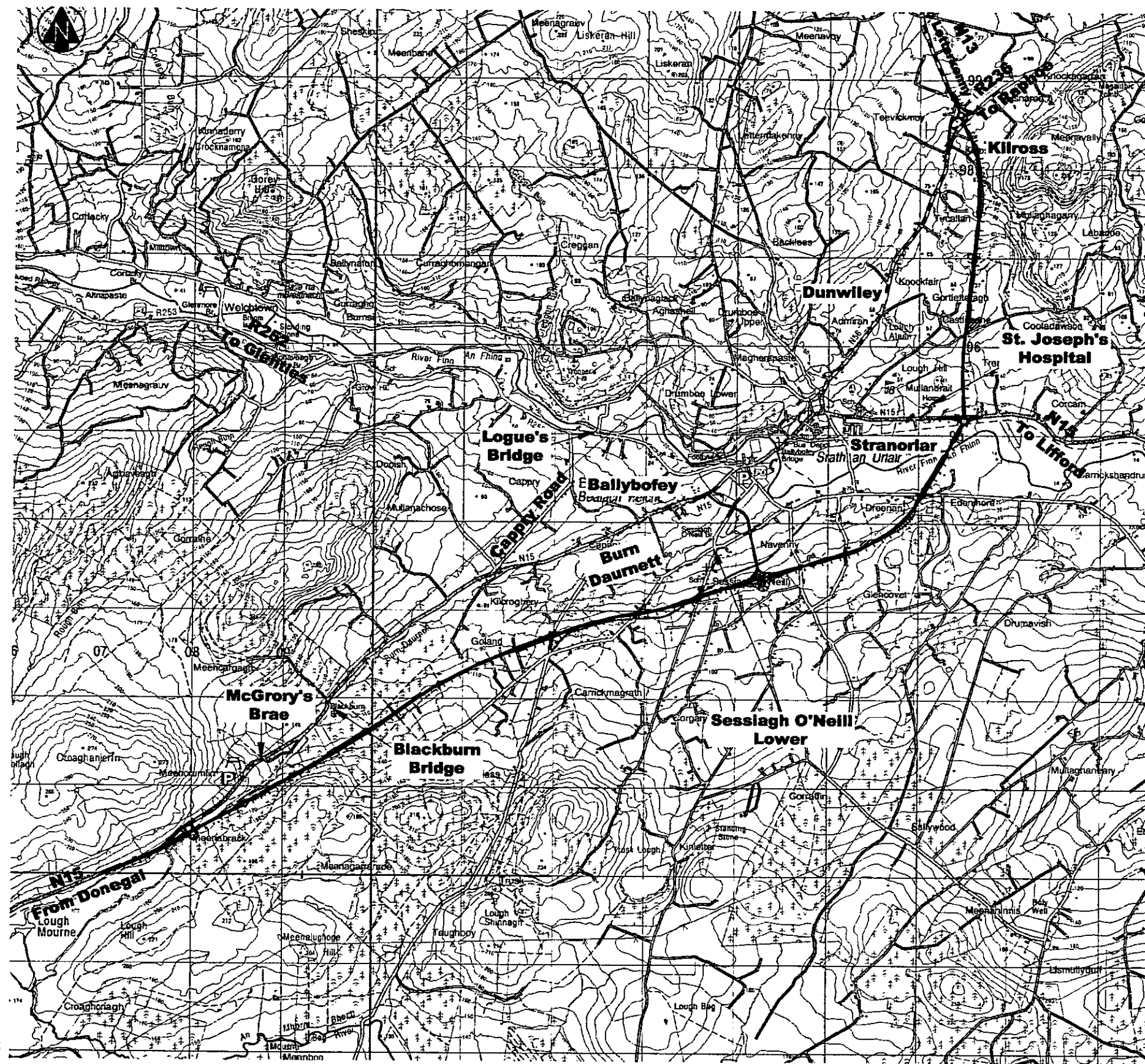


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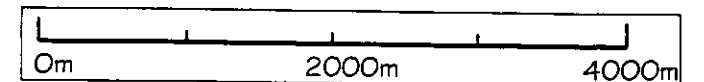


Issue	By	Chk.	App.	Date	Comments
A	ST	MM	LW	00.06.04	FIRST ISSUE
B	G.E.P.	V.P.	H.T.	01.11.06	DATE AMENDED
C	G.E.P.	V.P.	H.T.	01.09.07	DATE AMENDED
D	G.E.P.	V.P.	H.T.	03.10.07	ISSUE DATE AMENDED

Project <b>N13 / N15 BALLYBOFEY STRANORLAR BYPASS</b>		McCarthy Hyder Consultants CONSULTING ENGINEERS SUITE 24, THE MALL, BEACON COURT, BANDYFORD, DUBLIN 18	
Drawing Title <b>LOCATION PLAN</b>		 Drawing no. _____ Issue _____	
Date <b>NOV 2007</b>	Scale <b>N.T.S.</b>	Figure 1.1	



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## LEGEND

— Preliminary Design



**NRA**  
National Roads Authority  
*Ar Udarás na Rí Ríde Meán*



Ceannaird Chaitíon Dhuinn na Ríde  
DONEGAL COUNTY COUNCIL

Rev	By	Chk	App	Date	Comments
A	ST	MM	LW	09.06.04	FIRST ISSUE
B	G.E.P.	V.F.	H.T.	01.11.06	DATE AMENDED
C	G.E.P.	V.F.	H.T.	01.03.07	AUGMENT 4 DATE REVISED
C	G.E.P.	V.F.	H.T.	19.10.07	CPD 4 DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
**N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS**

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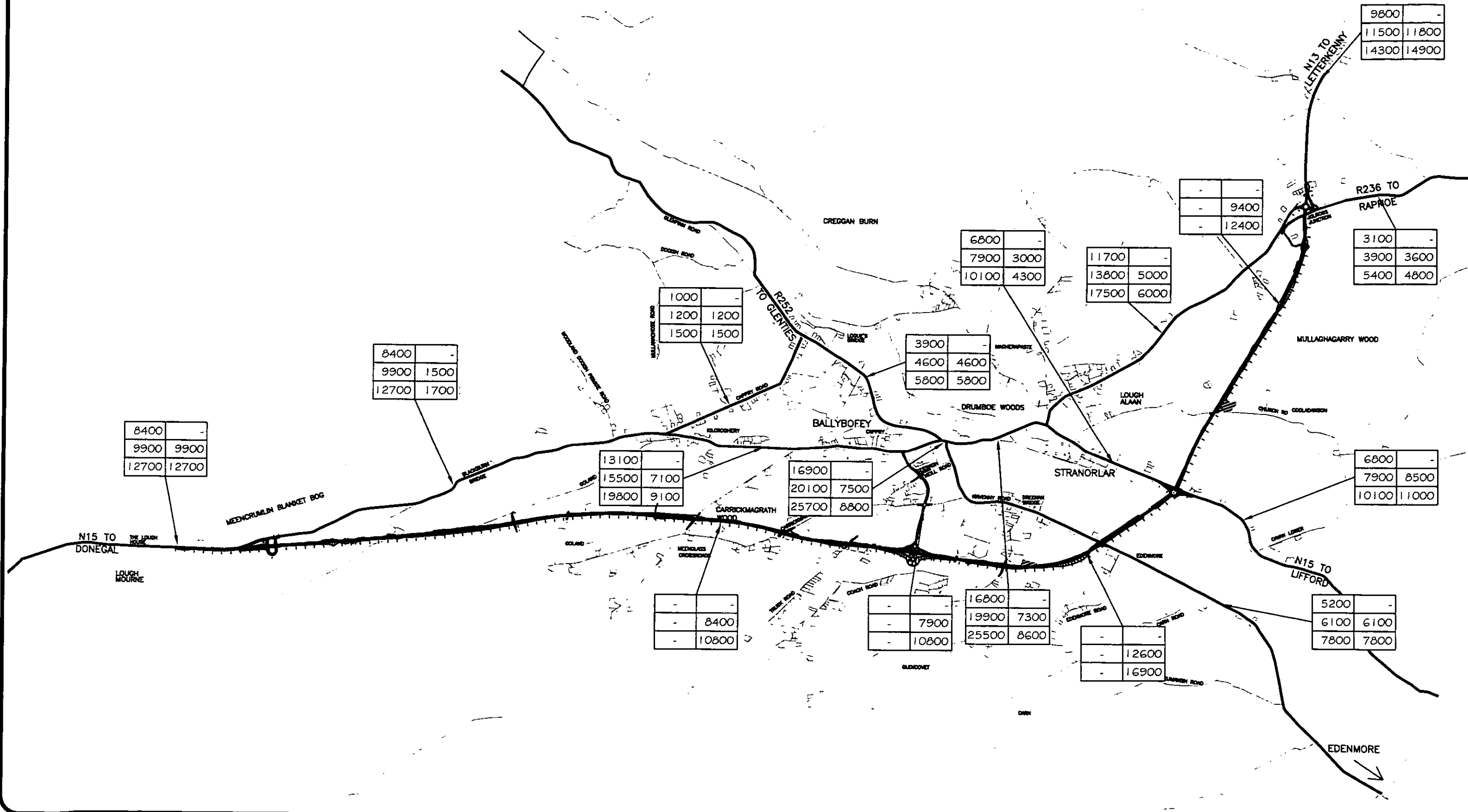
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DUBLIN 18

Drawing no.  
**Figure 1.2**

Issue  
**D**



**LEGEND**

DO NOTHING DO SOMETHING

2006	2006	Year 2006
2011	2011	Year 2011 (Opening Year)
2026	2026	Year 2026 (Design Year)

All flows are AADT in vehicles. (AADT = Annual Average Daily Traffic)

REV	BY	CHK	APP	DATE	COMMENT
A	JOB	T.P.	T.P.	08/02/06	INTERIM TRAFFIC FORECAST REPORT
B	JOB	T.P.	T.P.	18/11/06	INTERIM TRAFFIC REPORT
C	JOB	T.P.	T.P.	01/11/06	FINAL REPORT
D	SEP	H.T.	H.T.	15/04/07	REVISED TRAFFIC FIGURES

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: TRAFFIC FLOWS DIAGRAM (AADT Flows)

Date: NOV 2007

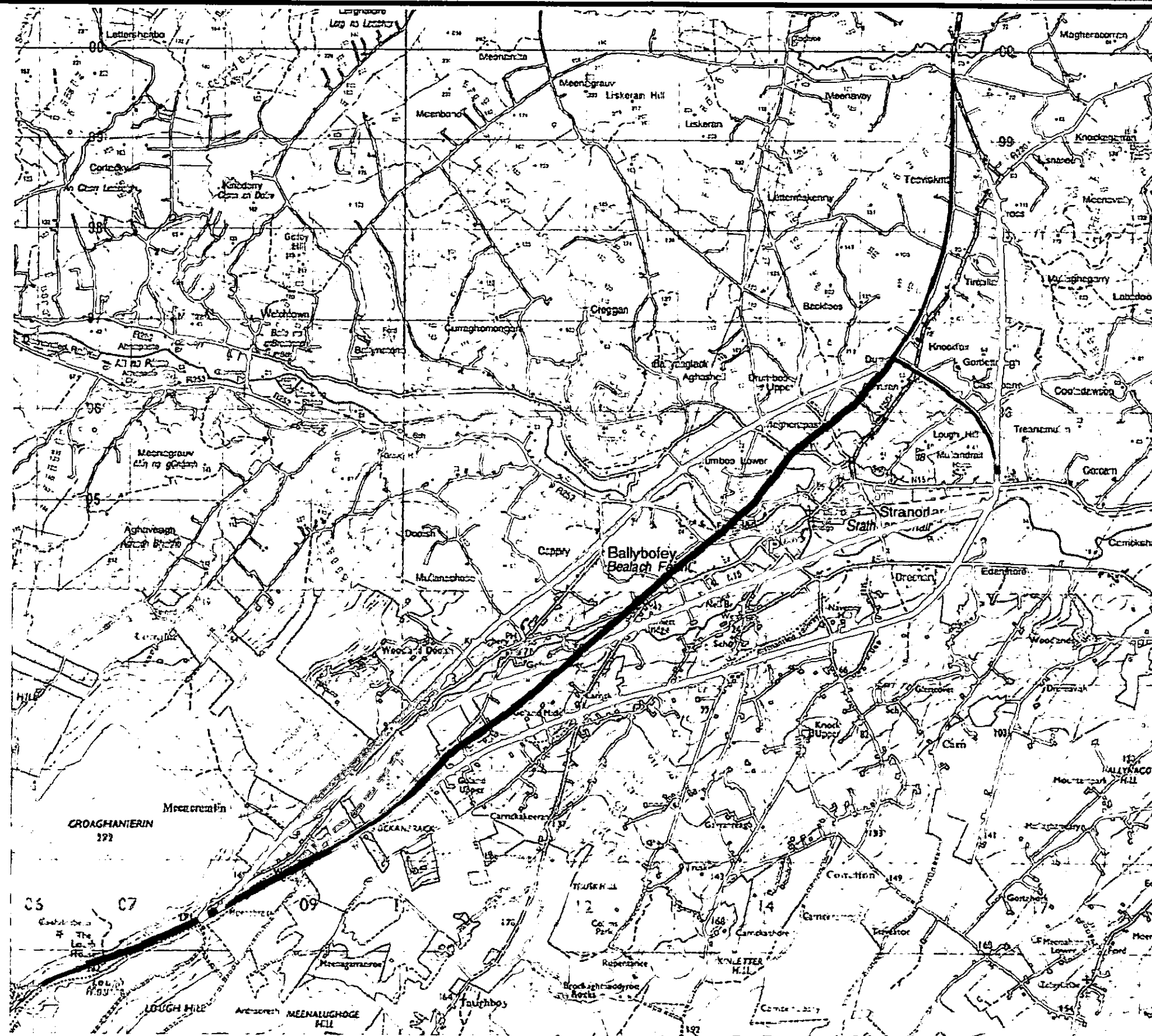
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Drawing no. FIG 2.1

Issue: D



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# LEGEND

- Pink Route
- Blue Route
- Green Route
- Red Route



**NRA**  
National Roads Authority  
An tArdán na h-Éireann



Comhairle Chontae Dún Dealgan  
DUNDEAL COUNTY COUNCIL

Issue	By	Chk.	App.	Date	Comment
A	ST	HW	LW	29/07/08	FIRST ISSUE
B	G.E.P.	V.F.	H.T.	01.11.08	DATE AMENDED
C	G.E.P.	V.F.	H.T.	22.02.07	DATE AMENDED
D	G.E.P.	V.F.	H.T.	05.10.07	ISSUE DATE AMENDED

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STRANORLAR BYPASS**

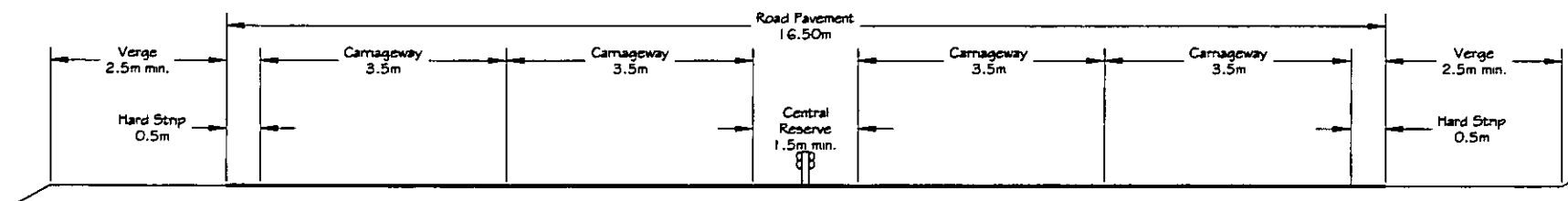
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**ALTERNATIVE ROUTE OPTIONS**

Date: **NOV 2007** Scale: **N.T.S.**

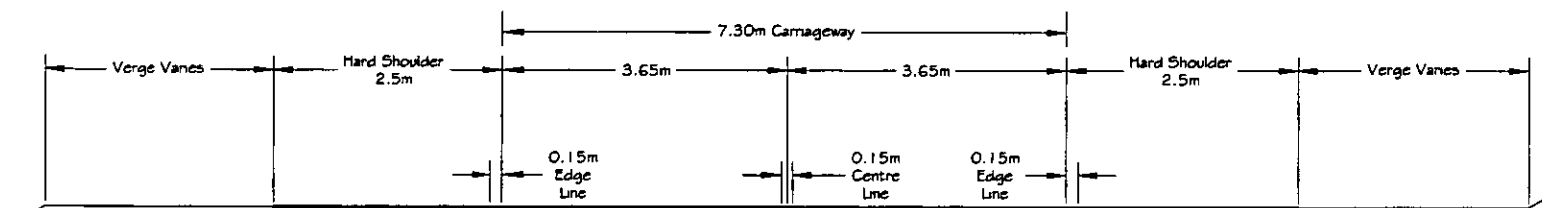
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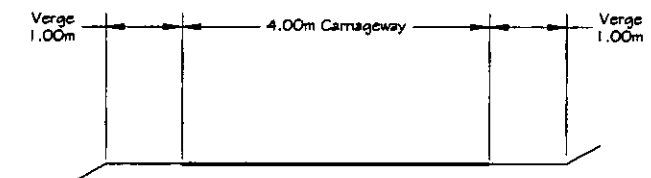
Drawing no. **Figure 2.2** Issue **D**



**Type 2 Dual Carriageway**



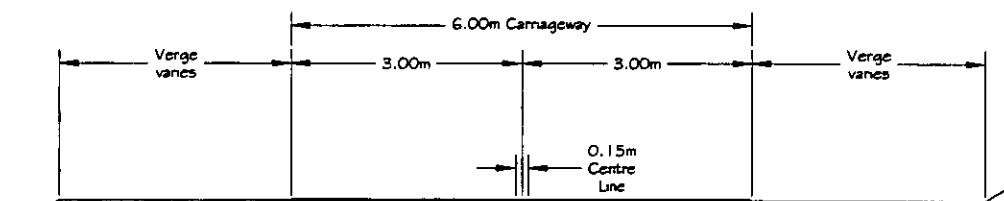
**N13 North of Kilross Roundabout  
(Ch 15,100 - Ch15,500)  
and on the N15 at Meencrumlin  
(Ch -568 - Ch1,200)**



**Accommodation Road**



**Ballybofey Link Road**



**Minor County Road**

**NOTE**

ALL DIMENSIONS ARE IN METRES



Comhairle Chontae Donegal  
DONEGAL COUNTY COUNCIL

Issue	By	CHK	APP	DATE	Comments
A	S.T.	L.W.	L.W.	01.09.05	FIRST ISSUE
B	S.T.	L.W.	L.W.	05.03.04	CROSS SECTION AMENDED
C	S.T.	L.W.	L.W.	10.09.04	GENERAL AMENDMENTS
D	G.E.P.	V.F.	H.T.	01.11.05	WIDE SINGLE CARRIAGEWAY CROSS SECTION DELETED
E	G.E.P.	V.F.	H.T.	01.05.07	REVISED CROSS SECTION & DATE AMENDED
F	G.E.P.	V.F.	H.T.	05.10.07	ISSUE DATE AMENDED

Project  
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STRANORLAR BYPASS**

Drawing Title  
**TYPICAL CROSS SECTIONS**

Date  
NOV 2007

Scale  
N.T.S.

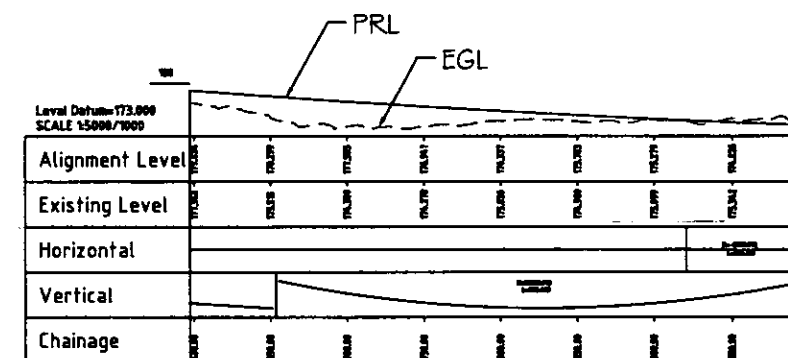
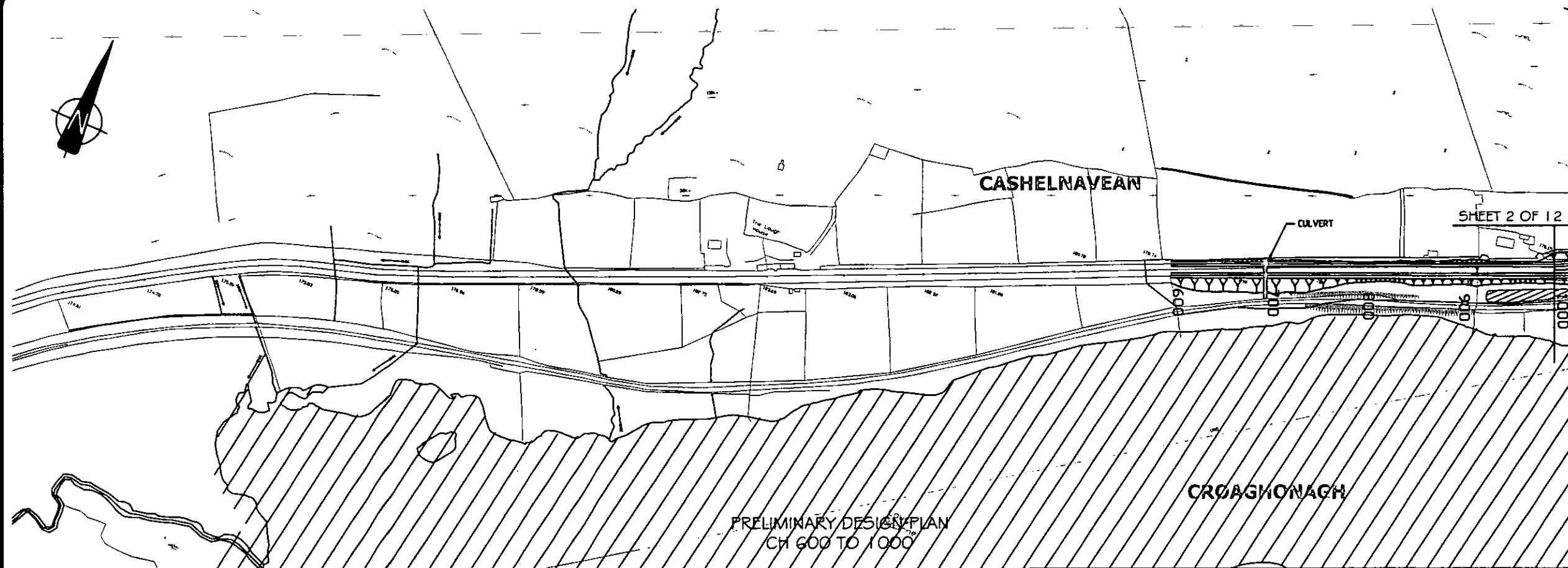
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Drawing no.  
**Figure 3.1**

Issue  
**F**



PRELIMINARY DESIGN PROFILE  
CH 600 TO 1000

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- L - LENGTH
- R - RADIUS
- G - GRADIENT
- VCV - VEHICLE CURVE FACTOR
- o-o - VERTICAL TANGENT POINT

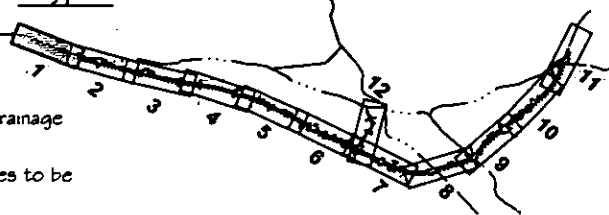
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## LEGEND

SHEET NUMBER  
Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary

- Drainage Ponds
- Culverts
- Watercourse/Land Drainage
- Existing Watercourses to be cleared

## Keyplan



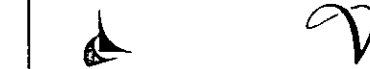
REV	BY	CHK	APP	DATE	COMMENT
1	GPZ	AG	MT	09/06/07	CPO Boundary, Alignment, Profile & Drainage Revised
2	GPZ	MT	MT	09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS

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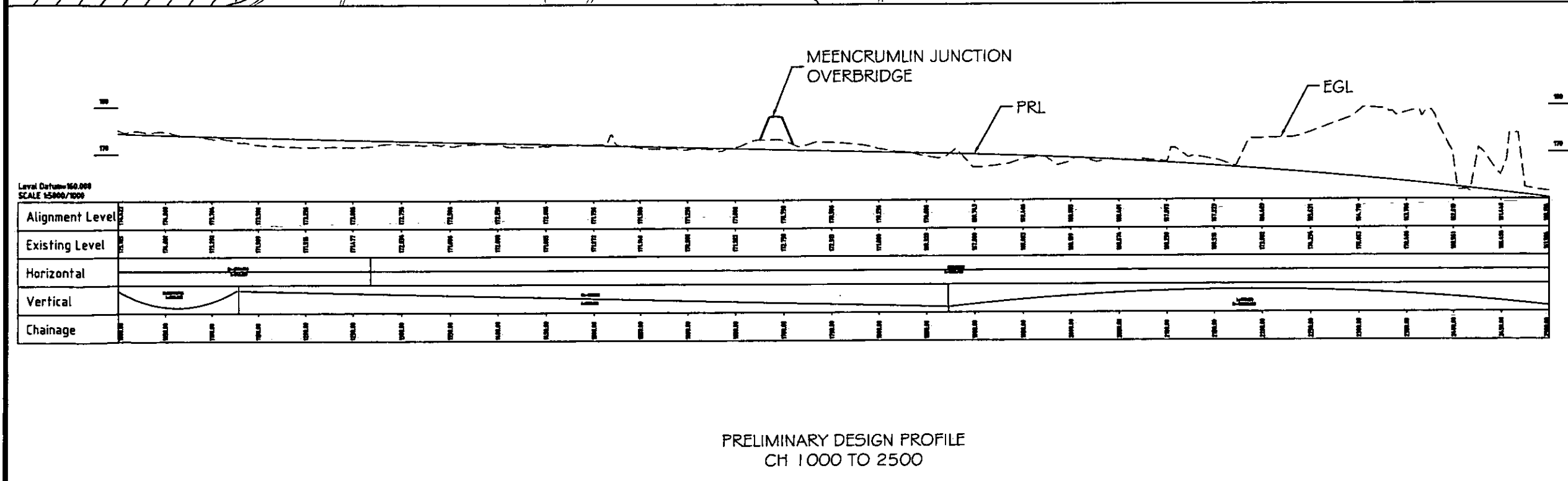
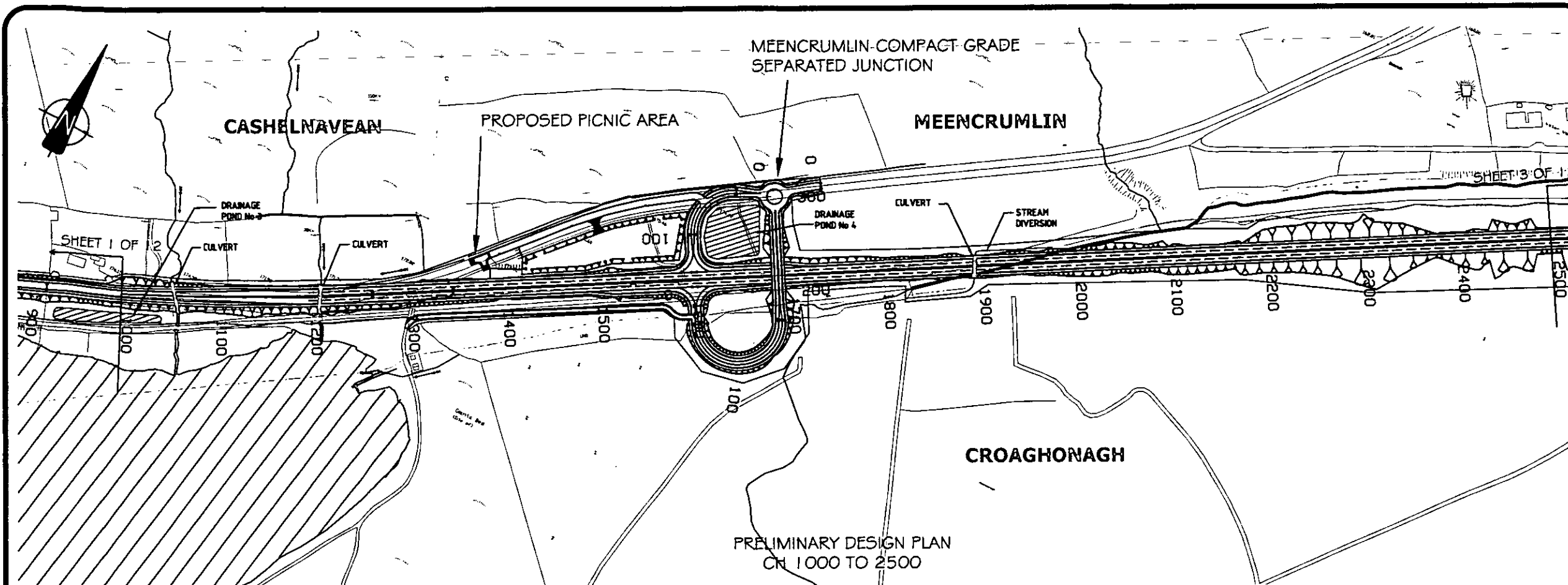
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Drawing no. Figure 3.2 Issue Q





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  - PRL - PROPOSED ROAD LEVEL (CL OF PROPOSED ROAD)
  - L - LENGTH
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**LEGEND**

SHEET NUMBER **2**

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary

Drainage Ponds  
Culverts  
Watercourse/Land Drainage  
Existing Watercourses to be cleared

**Keyplan**

**NDP**  
NATIONAL DEVELOPMENT PLAN  
YOUR PLAN - YOUR FUTURE

**NRA**  
National Roads Authority  
An tArdán um Briche Náisiúnta

**Donegal County Council**  
Comhairle Chontae Donegal

DATE	BY	CHK	APP	DATE	COMMENT
09.10.07	GP	AG	HK	09.10.07	CPO Boundary, Alignment, Profile & Drainage Revised
09.10.07	GP	VI	HT	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project **N13 / N15 BALLYBOFFEY STRANORLAR BYPASS**

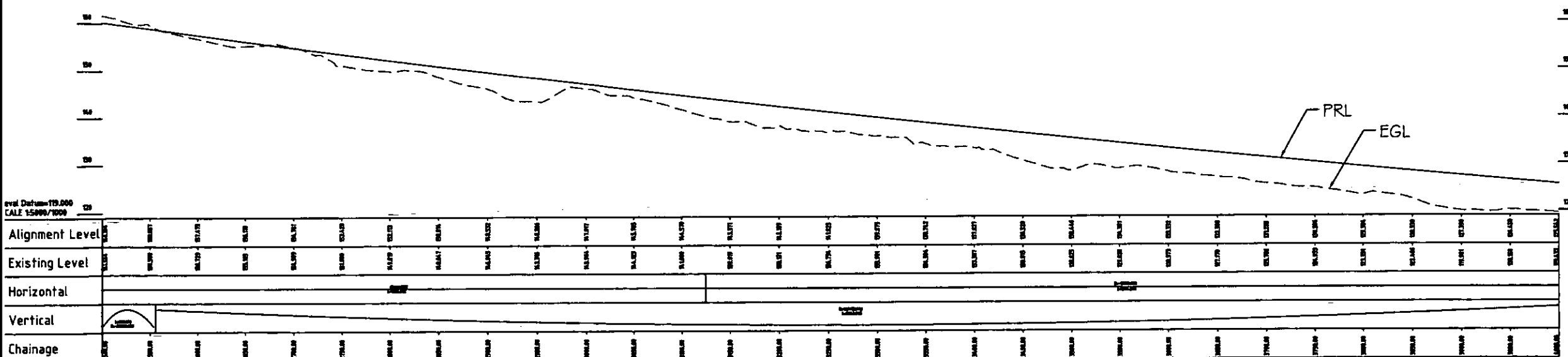
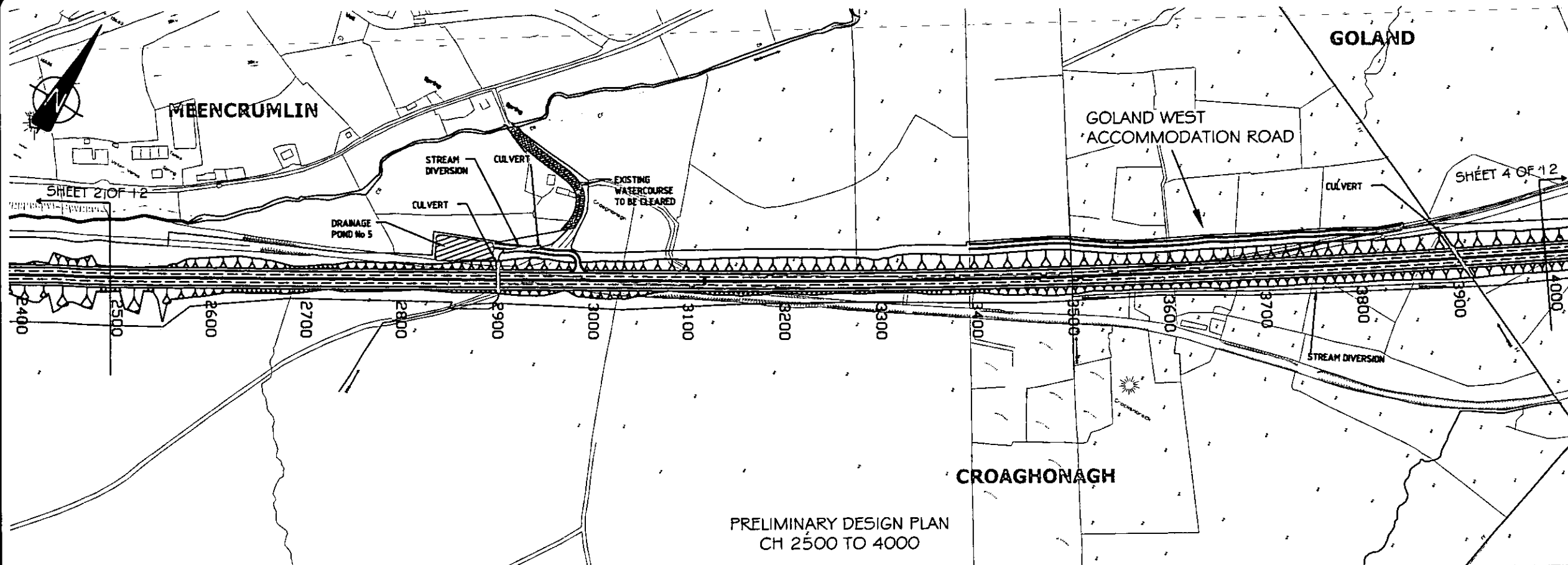
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**FIGURE 3.2**

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## LEGEND

SHEET NUMBER

3

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary



Drainage Ponds



Culverts

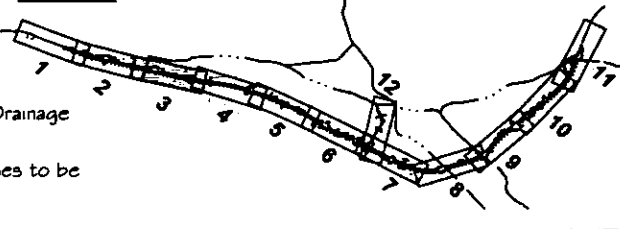


Watercourse/Land Drainage



Existing Watercourses to be cleared

## Keyplan



NO.	BY	CHK.	APP.	DATE	COMMENTS
1	27	SG	NE	02/06/07	CPO Boundary, Alignment, Traffic & Drainage Revised
2	27	VT	HT	02/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

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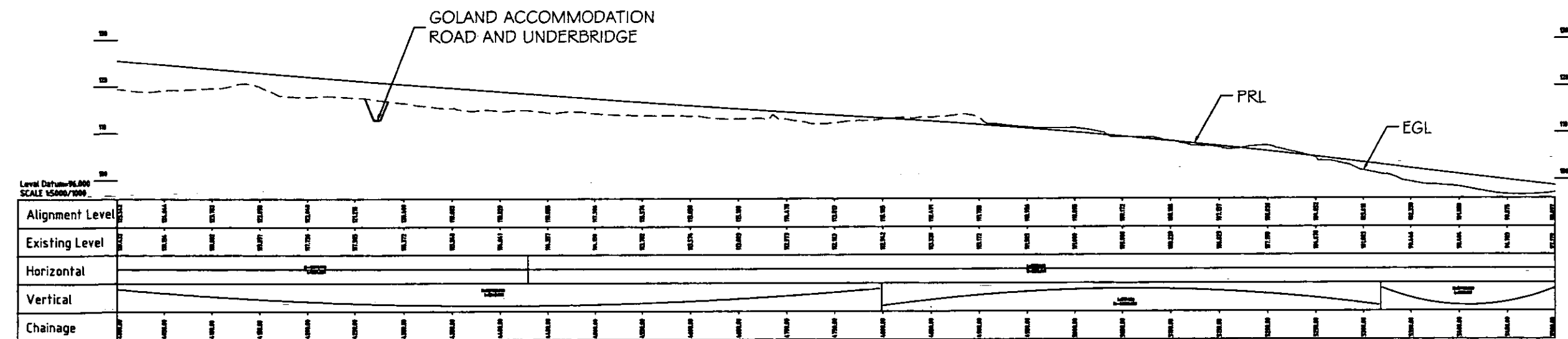
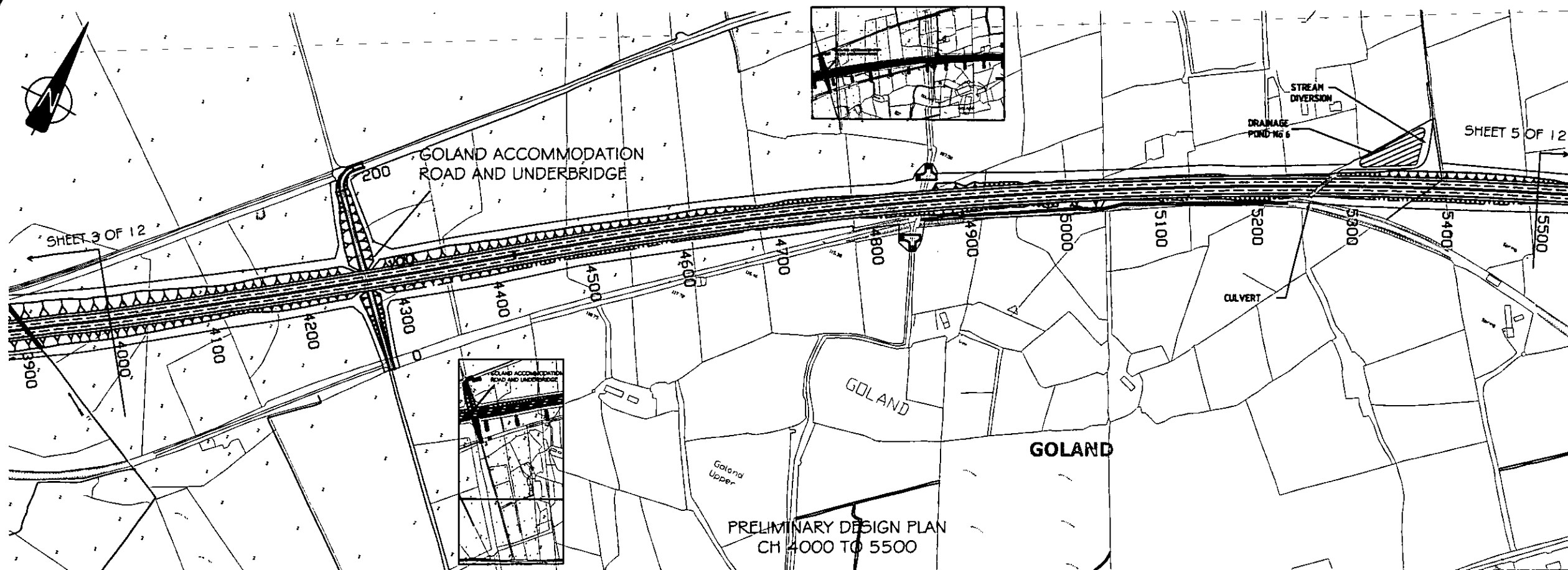
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Figure 3.2

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(CL OF PROPOSED ROAD)

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## LEGEND

SHEET NUMBER

4

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary



Drainage Ponds



Culverts

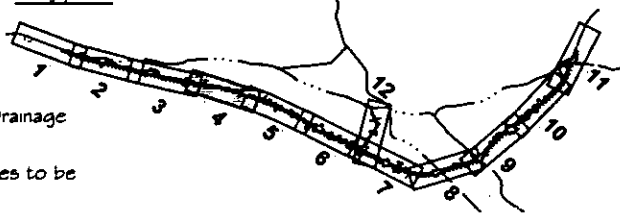


Watercourse/Land Drainage



Existing Watercourses to be cleared

## Keyplan



NRA  
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An tAidise um Bheithre Músaíoch



Drawn by	Chk.	App.	Date	Comments
P	GP	AG	09/09/07	CPO Boundary, Alignment, Traffic & Drainage Revised
Q	GP	VT	09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

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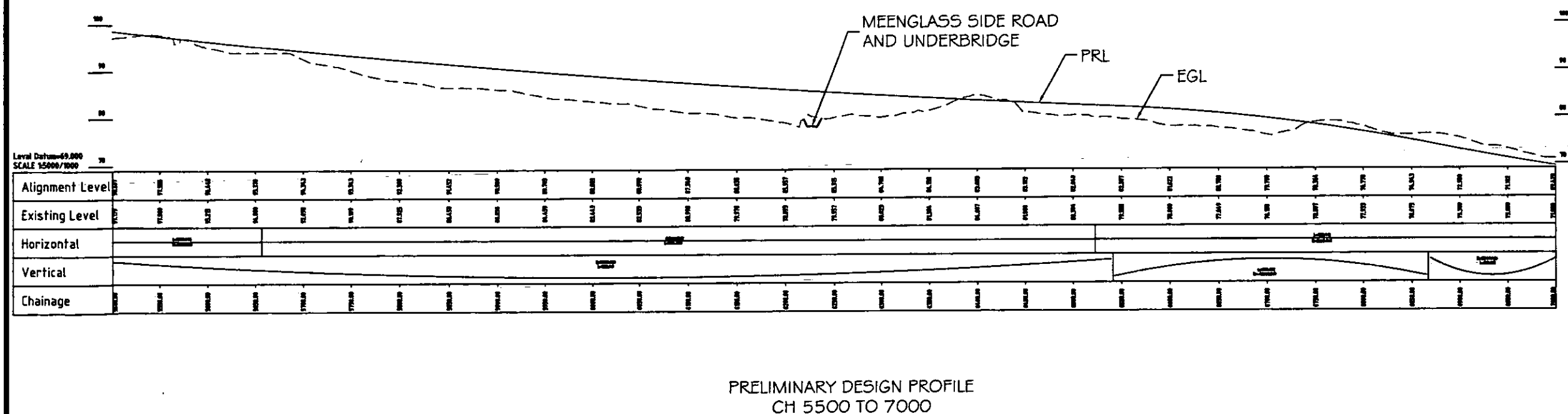
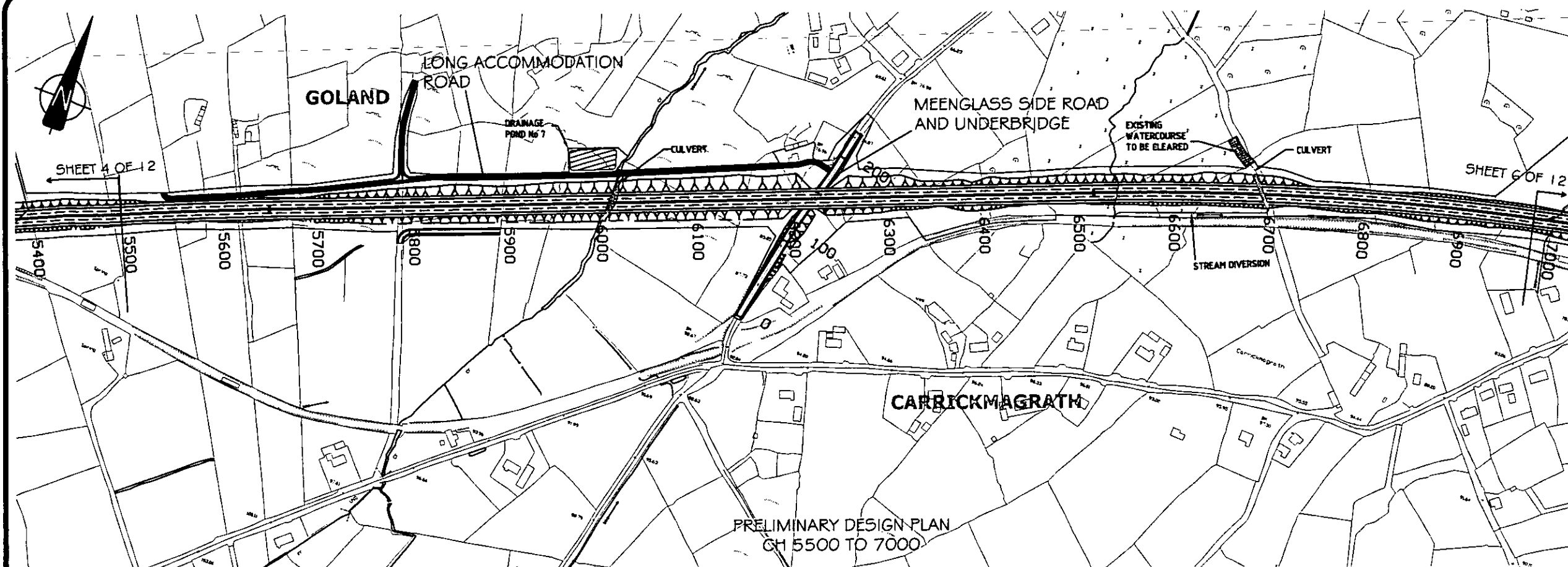


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Figure 3.2

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(CL OF PROPOSED ROAD)

L - LENGTH

R - RADIUS

G - GRADIENT

VCF - VEHICLE CURVE FACTOR

o-o - VERTICAL TANGENT POINT

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## LEGEND

SHEET NUMBER

5

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary

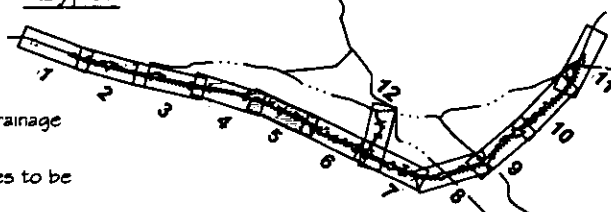
Drainage Ponds

Culverts

Watercourse/Land Drainage

Existing Watercourses to be cleared

## Keyplan



DATE	BY	CHK.	APP.	DATE	COMMENT
03/06/07	AG	NE		03/06/07	CPO Boundary, Alignment, Profile & Drainage Revised
03/10/07	VT	HT		03/10/07	CPO & DRAINAGE REVISED FOLLOWING REVIEW OF GROUND CONDITIONS

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SANDYFORD,  
DUBLIN 18



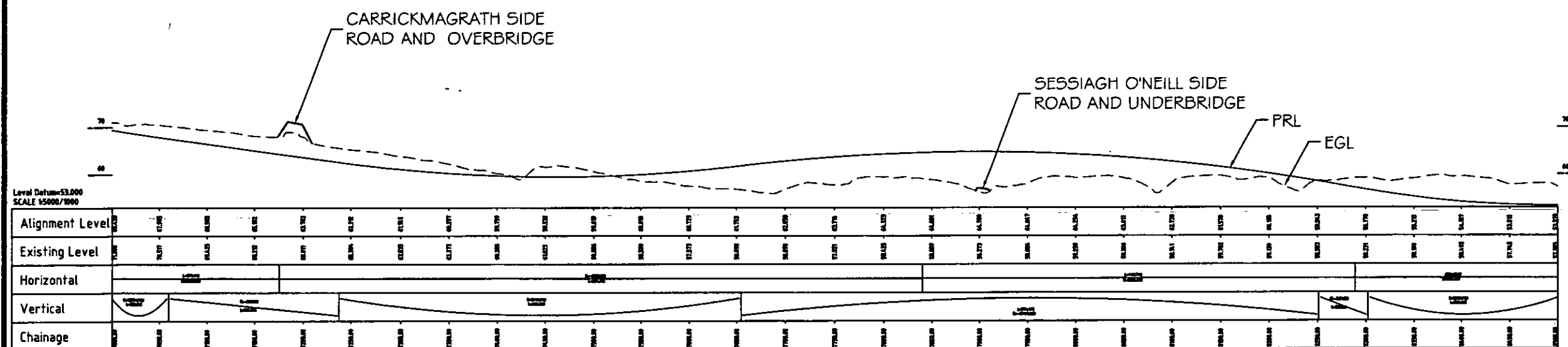
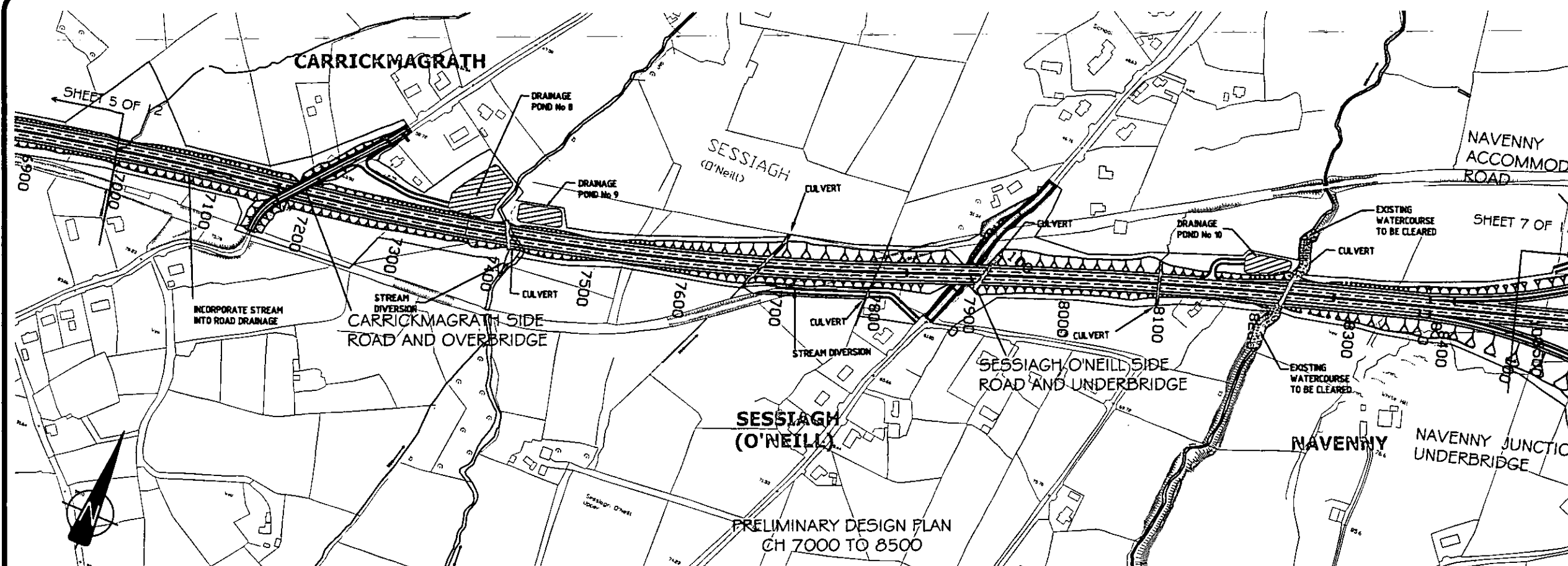
Drawing no.

Figure 3.2



Issue

Q



PRELIMINARY DESIGN PROFILE  
CH 7000 TO 8500

# NOTES

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5. EARTHWORKS AS SHOWN ARE INDICATIVE ONLY.
6. PROPOSED ROAD PROFILE IS PRELIMINARY AND MAY BE REVISED AT DETAILED DESIGN STAGE

## LEGEND - LONG SECTION

- EGL - EXISTING GROUND LEVEL
- PRL - PROPOSED ROAD LEVEL (CL OF PROPOSED ROAD)
- L - LENGTH
- R - RADIUS
- G - GRADIENT
- VCF - VEHICLE CURVE FACTOR
- o-o - VERTICAL TANGENT POINT

OS mapping copyright-Rialtas na hEireann / Government of Ireland 1996

## LEGEND

SHEET NUMBER

6

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary



Drainage Ponds



Culverts

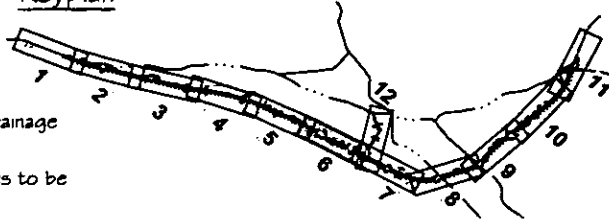


Watercourse/Land Drainage



Existing Watercourses to be cleared

## Keyplan



no.	by	chk.	app.	date	comments
1	SEP	AG	MP	09/09/07	CPO Boundary, Alignment, Profile & Drainage Revised
2	SEP	VT	HT	09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

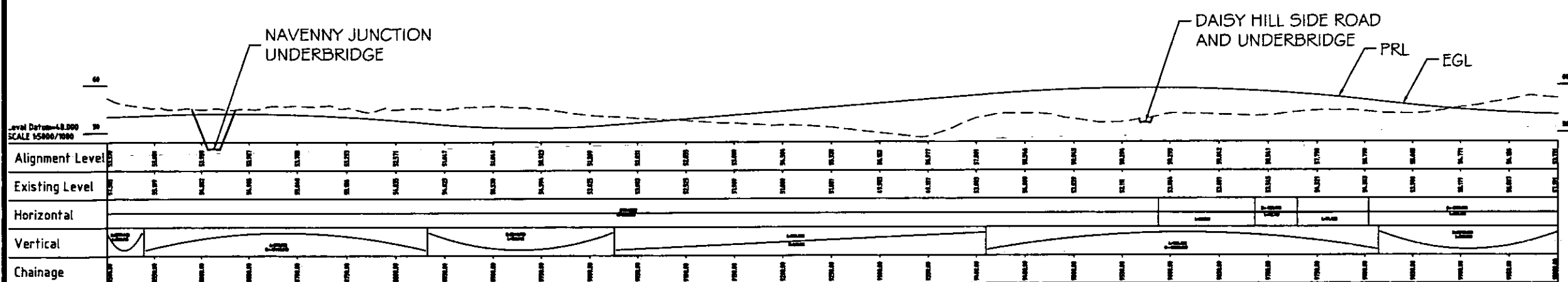
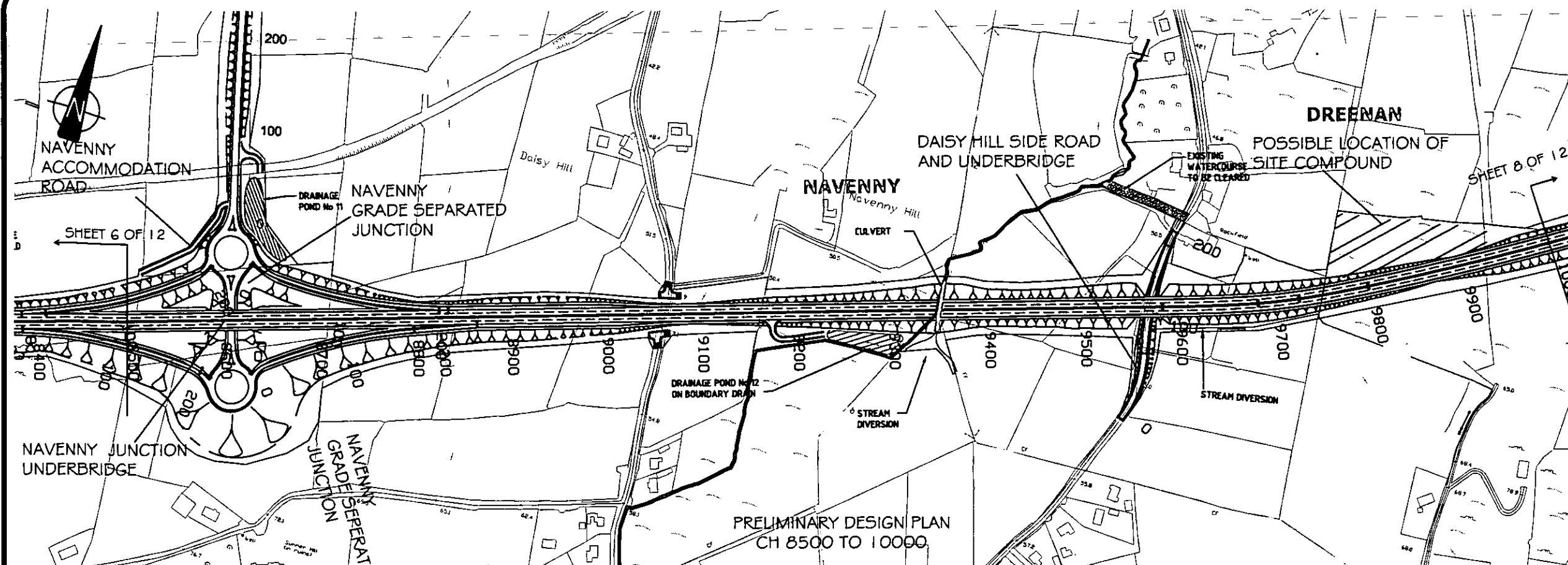
Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title  
PLAN + PROFILE  
(SHEET 6 OF 12)

Date NOV 2007 Scale H1:5000, V1:1000(A3)

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Figure 3.2



PRELIMINARY DESIGN PROFILE  
CH 8500 TO 10000

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4. ALL LEVELS ARE TO MEAN SEA LEVEL AT MALIN HEAD, CO. DONEGAL.

5. EARTHWORKS AS SHOWN ARE INDICATIVE ONLY.

6. PROPOSED ROAD PROFILE IS PRELIMINARY AND MAY BE REVISED AT DETAILED DESIGN STAGE

## LEGEND - LONG SECTION

EGL - EXISTING GROUND LEVEL  
PRL - PROPOSED ROAD LEVEL  
(CL OF PROPOSED ROAD)  
L - LENGTH  
R - RADIUS  
G - GRADIENT  
VCF - VEHICLE CURVE FACTOR  
o-o - VERTICAL TANGENT POINT

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## LEGEND

SHEET NUMBER

7

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary

7

Drainage Ponds

7

Culverts

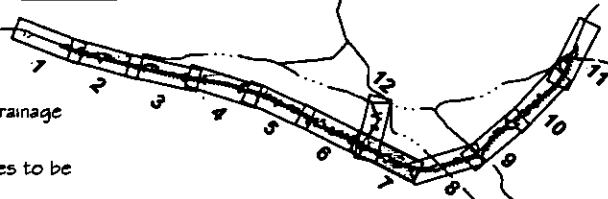
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Watercourse/Land Drainage

7

Existing Watercourses to be cleared

## Keyplan



no.	by	ch.	app.	date	comment
1	GP	AG	HT	09/06/07	CPO Boundary, Alignment, Profile & Drainage Revised
2	GP	VT	HT	09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title  
PLAN + PROFILE  
(SHEET 7 OF 12)

Date NOV 2007

Scale H1:5000, V1:1000(A3)

McCarthy Hyder Consultants  
CONSULTING ENGINEERS

SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18

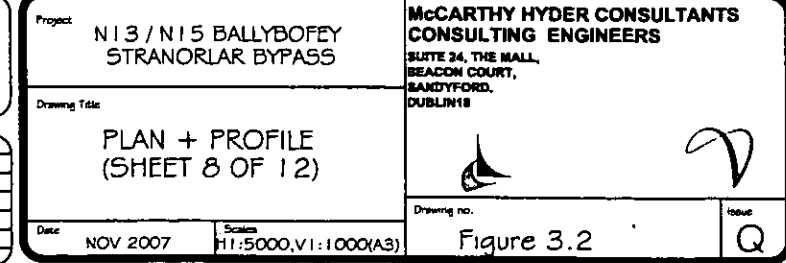
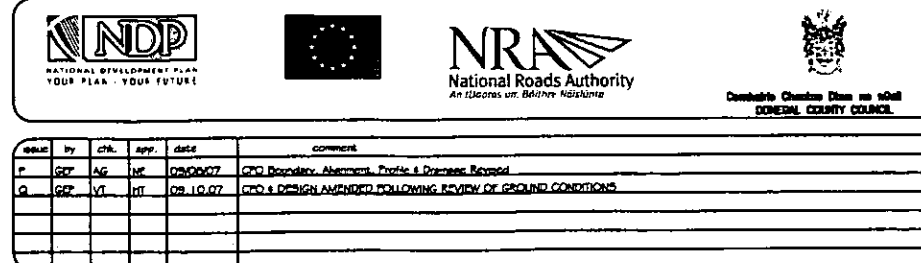
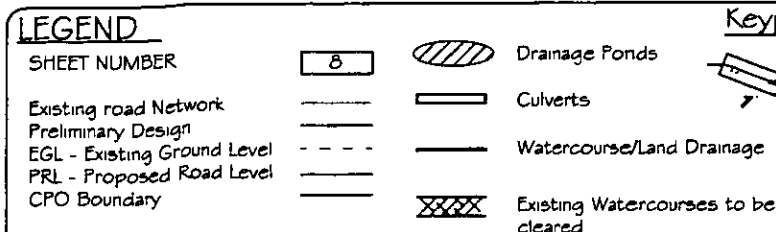
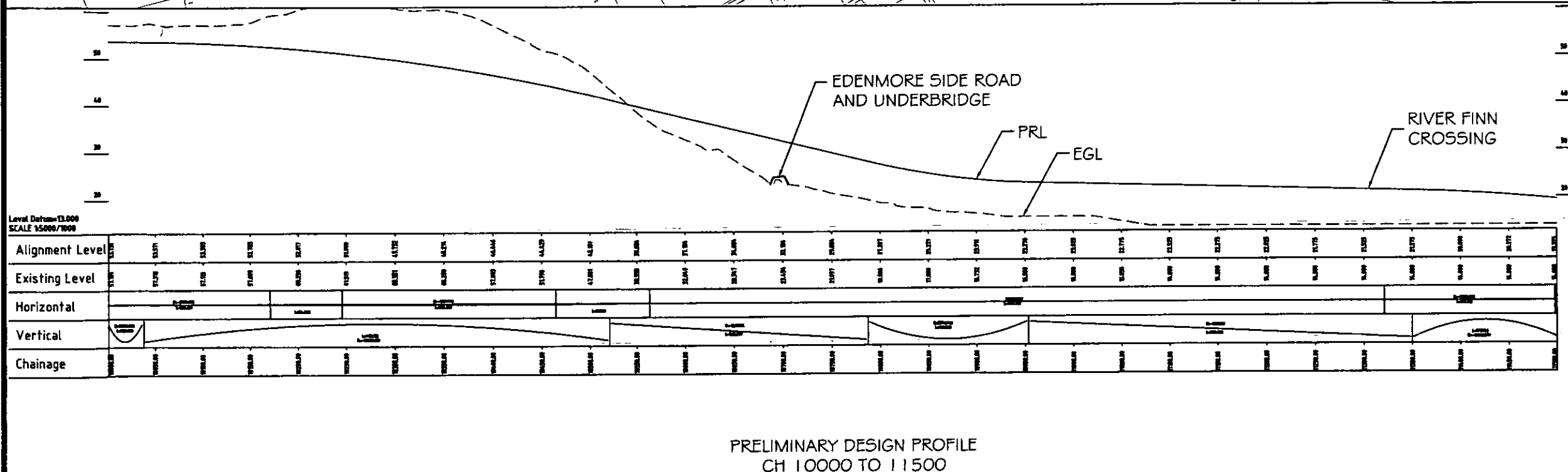
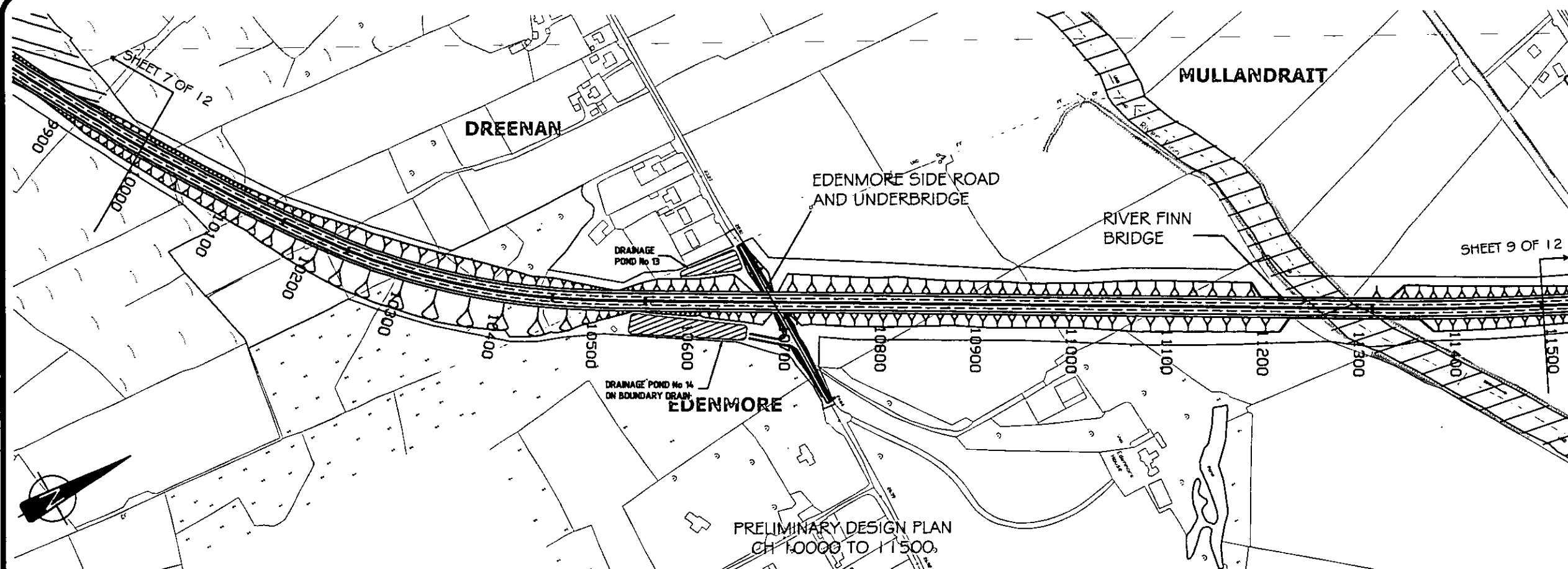


Drawing no.

Figure 3.2

Issue

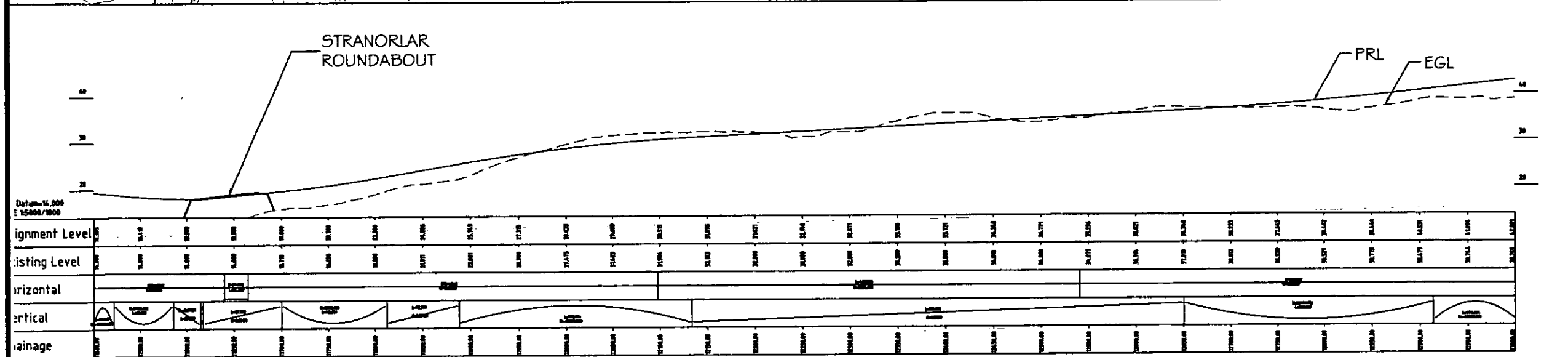
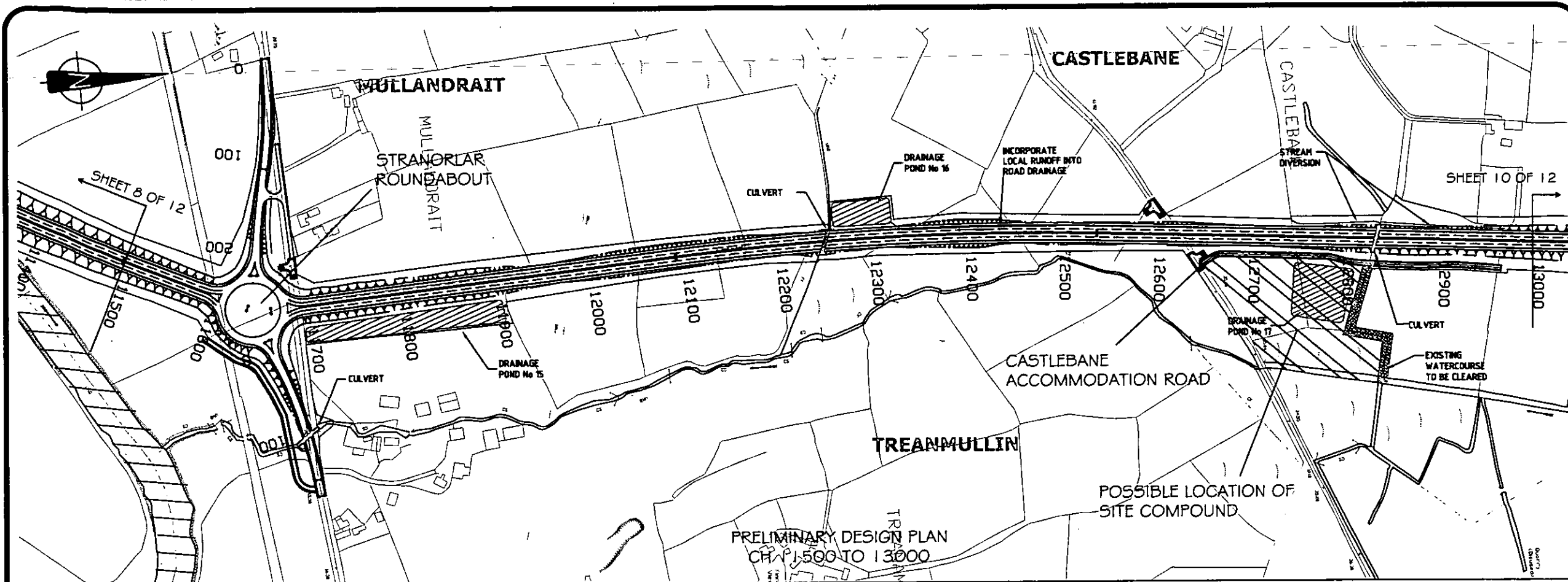
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  - VCF - VEHICLE CURVE FACTOR
  - o-o - VERTICAL TANGENT POINT

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**LEGEND**

SHEET NUMBER: 9

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary

Drainage Ponds  
Culverts  
Watercourse/Land Drainage  
Existing Watercourses to be cleared

**NDP**  
NATIONAL DEVELOPMENT PLAN  
YOUR PLAN - YOUR FUTURE

**NRA**  
National Roads Authority  
An tArdán na Boithre Náisiúnta

**Donaghadee Charter Club na n-Éireann**  
DUBLIN 18

REV	BY	CHK	APP	DATE	COMMENTS
1	GP	AG	NP	09/04/07	CPO Boundary, Alignment, Profile & Drainage Revised
2	GP	VT	HT	09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PLAN + PROFILE (SHEET 9 OF 12)

Date: NOV 2007

Scale: H1:5000, V1:1000 (A3)

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18

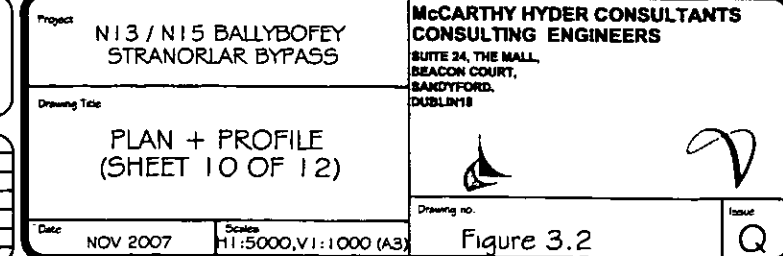
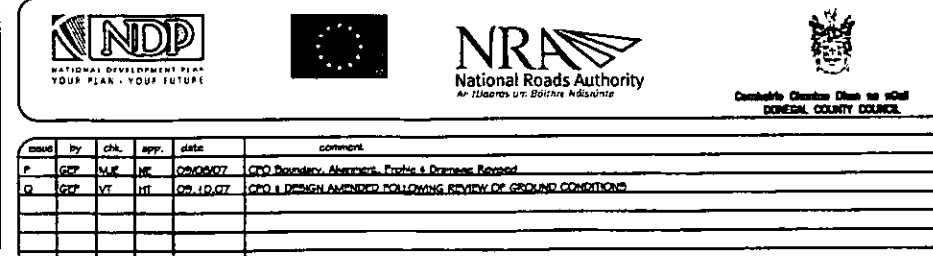
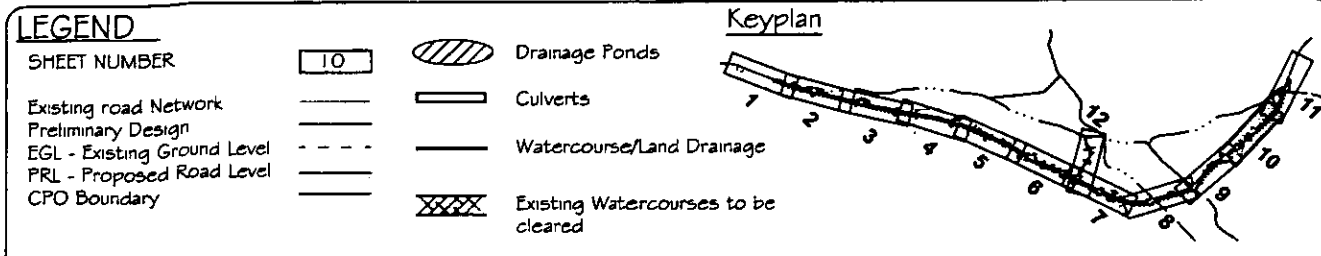
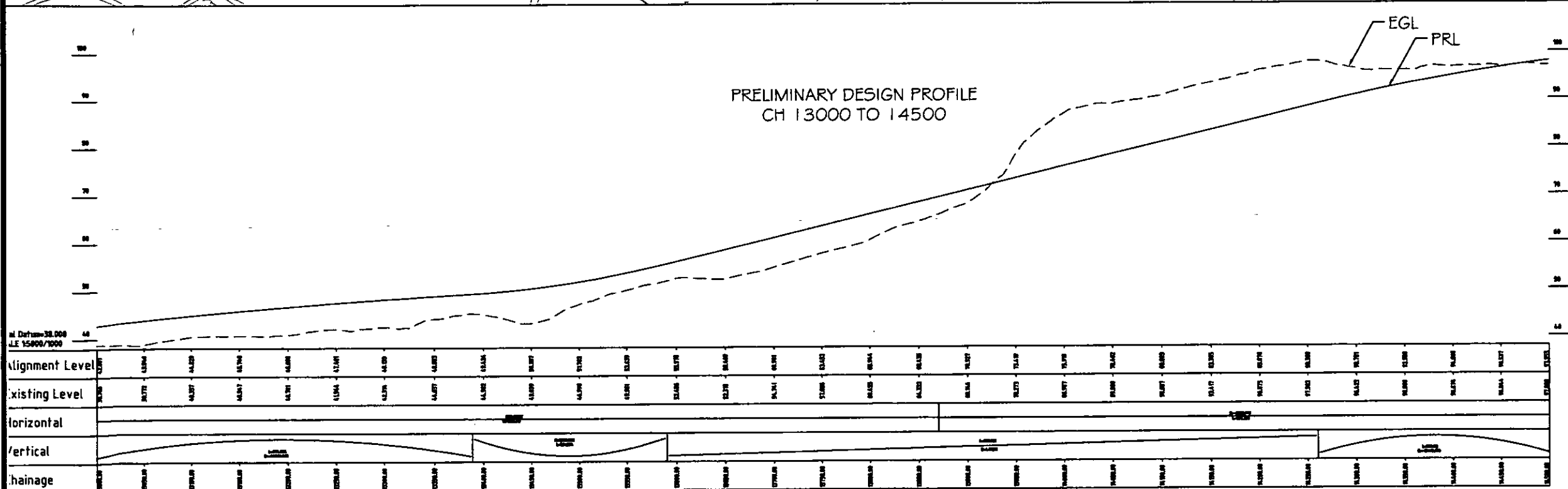
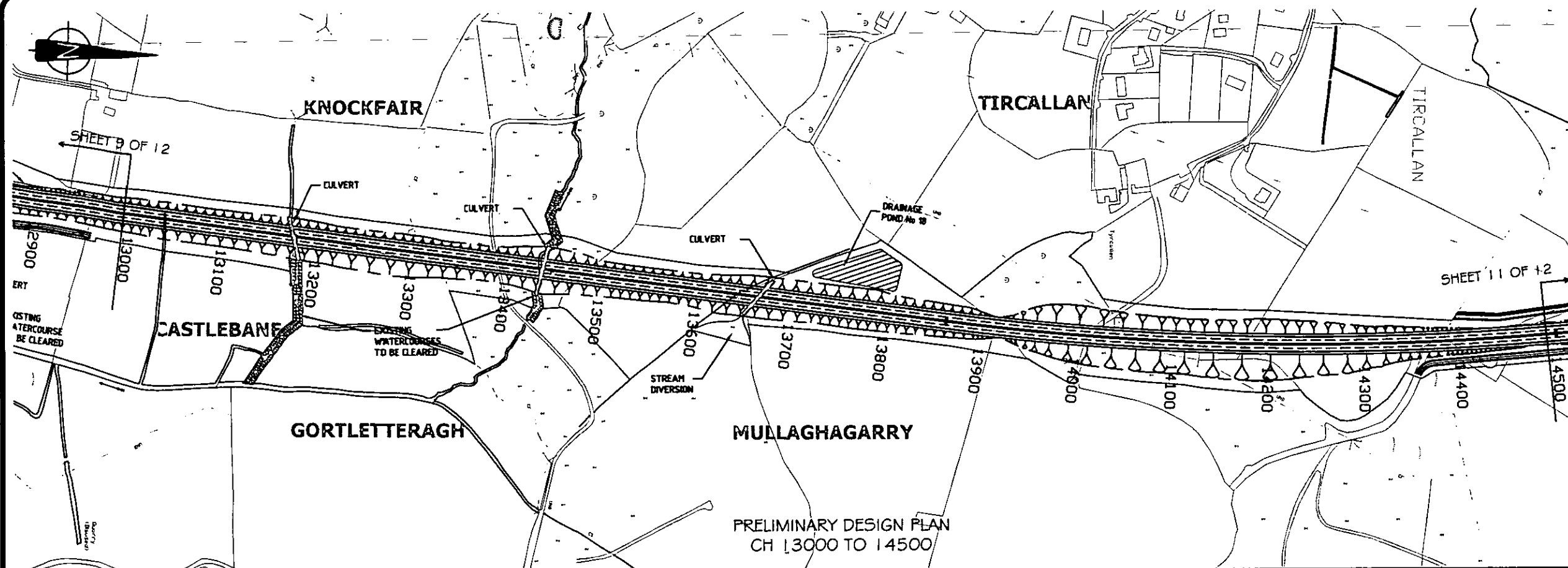
Figure 3.2

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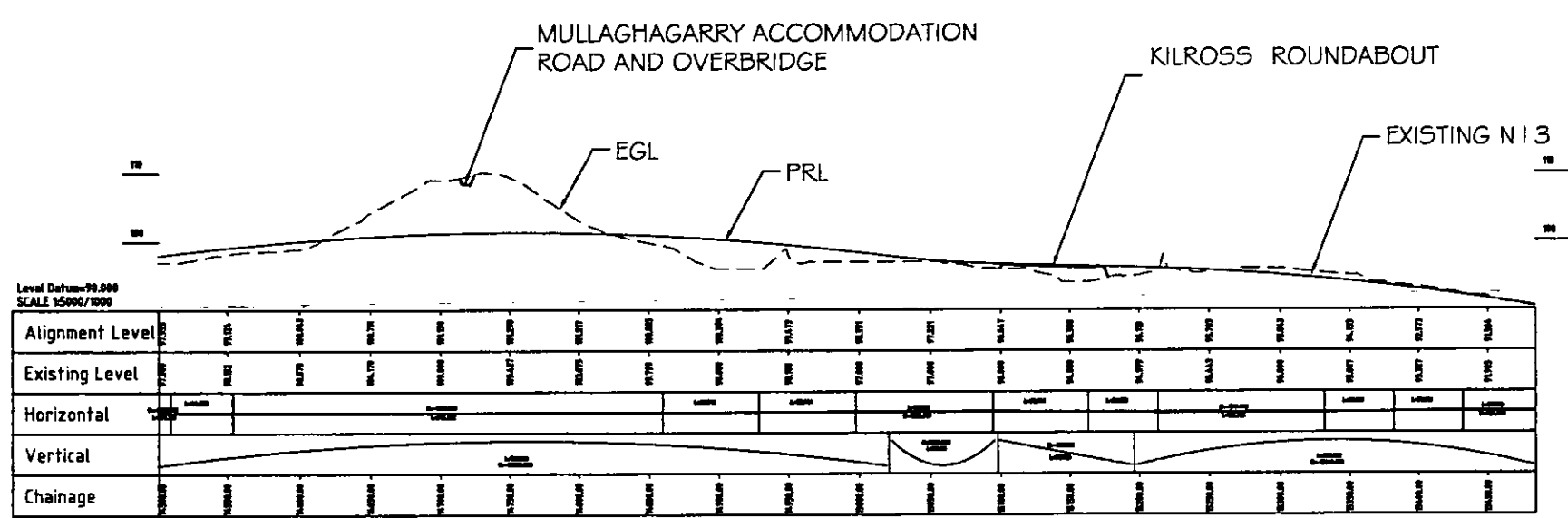
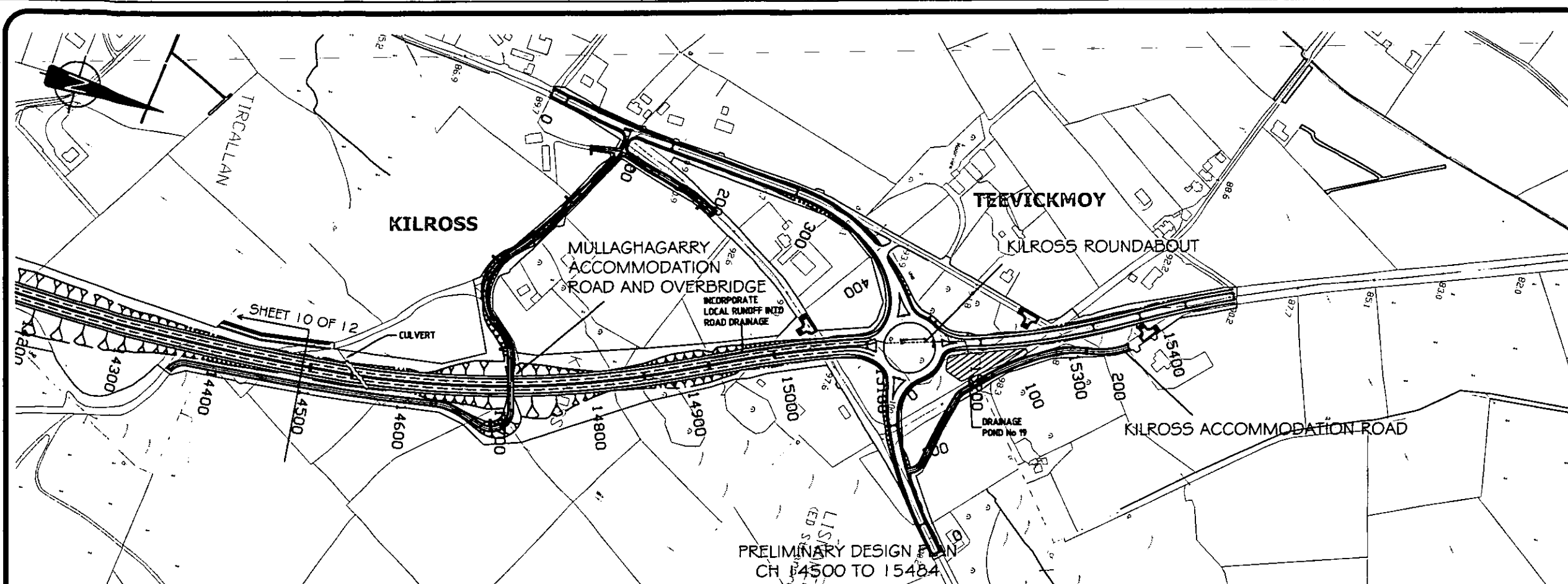
- LEGEND - LONG SECTION**
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PRL - PROPOSED ROAD LEVEL (CL OF PROPOSED ROAD)  
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R - RADIUS  
G - GRADIENT  
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o-o - VERTICAL TANGENT POINT

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o-o - VERTICAL TANGENT POINT
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PRELIMINARY DESIGN PROFILE  
CH 14500 TO 15484

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**LEGEND**

SHEET NUMBER

Existing road Network

Preliminary Design

EGL - Existing Ground Level

PRL - Proposed Road Level

CPO Boundary

Drainage Ponds

Culverts

Watercourse/Land Drainage

Existing Watercourses to be cleared

**Keyplan**

**NDP**  
NATIONAL DEVELOPMENT PLAN  
YOUR PLAN - YOUR FUTURE

**NRA**  
National Roads Authority  
Aic Liardaín na Bóithre Náisiúnta

**Donegal County Council**  
Comhairle Contae Donegal

REV	BY	CHK	APP	DATE	COMMENTS
1	GT	AG	HT	09/06/07	CPO Boundary, Alignment, Profile & Drainage Revised
2	GT	VT	HT	09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PLAN + PROFILE (SHEET 11 OF 12)

Date: NOV 2007

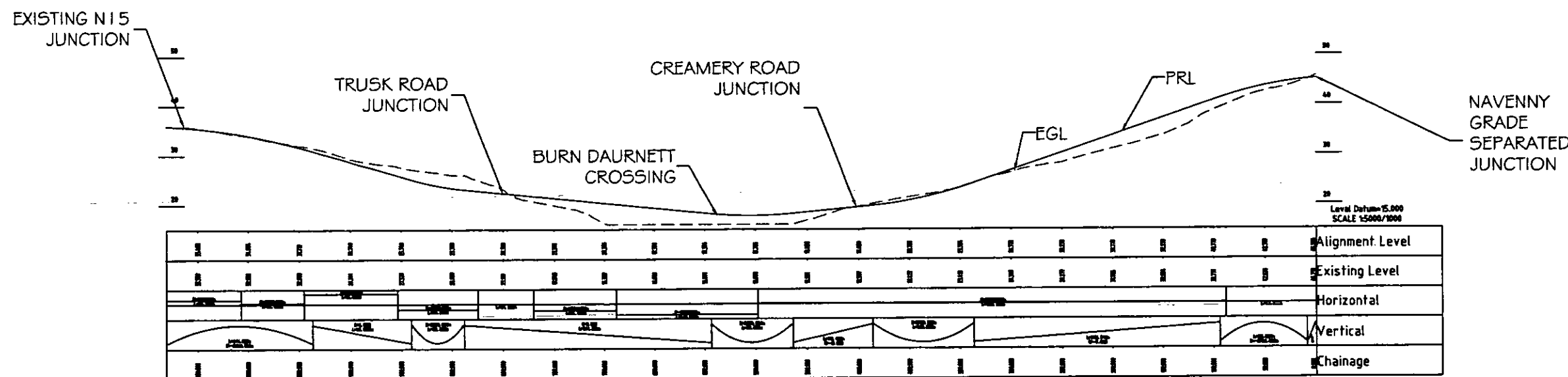
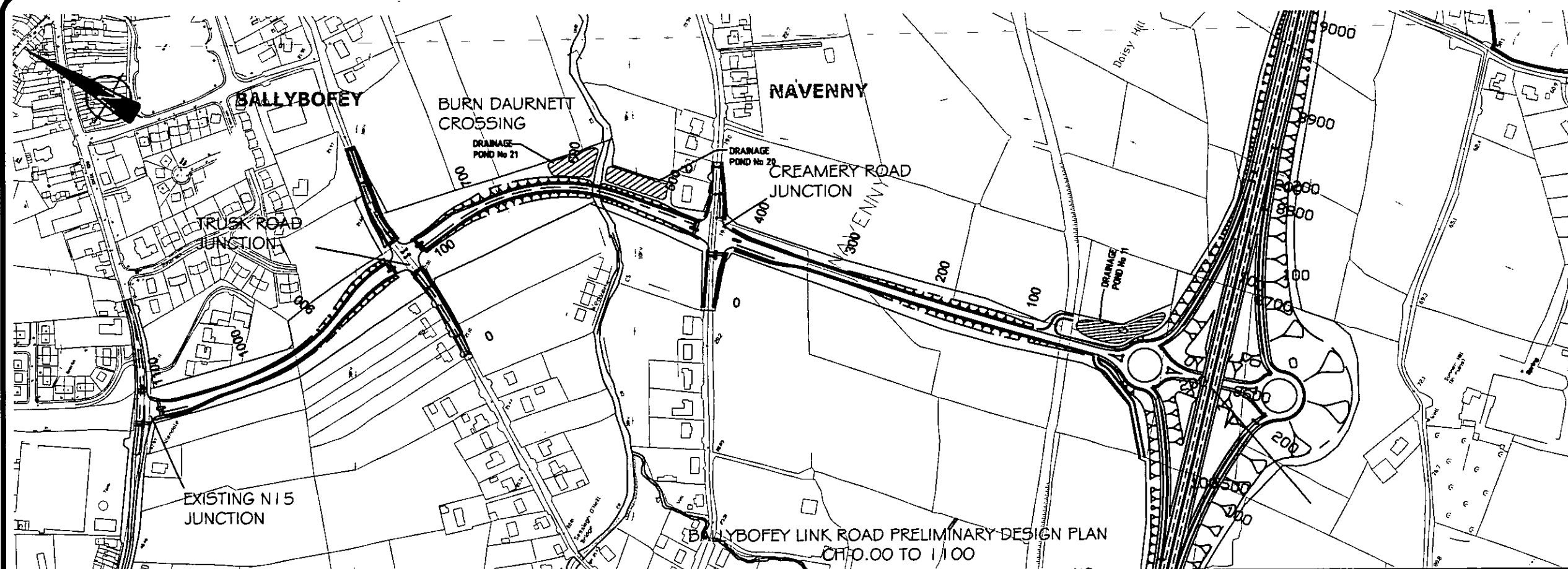
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**MCCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS**  
SUITE 24, THE MALL, SEACON COURT, SANDYFORD, DUBLIN 18

Drawing no. Figure 3.2

Issue Q





BALLYBOFEY LINK ROAD PRELIMINARY DESIGN PROFILE  
CH 0.00 TO 1100

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- L - LENGTH
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## LEGEND

SHEET NUMBER

12

Existing road Network  
Preliminary Design  
EGL - Existing Ground Level  
PRL - Proposed Road Level  
CPO Boundary



Drainage Ponds



Culverts

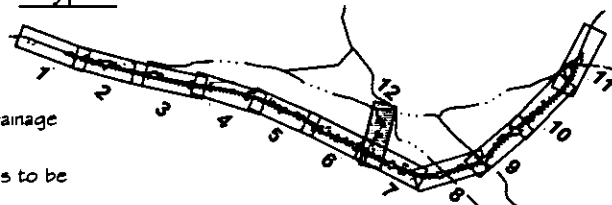


Watercourse/Land Drainage



Existing Watercourses to be cleared

## Keyplan



DATE	BY	CHK	APP	DATE	COMMENT
09/06/07	AG	HT		09/06/07	CPO Boundary, Alignment, Profile & Drainage Revised
09/10/07	VT	HT		09/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title  
PLAN + PROFILE  
(SHEET 12 OF 12)

Date NOV 2007

Scale 1:5000, V1:1000 (A3)

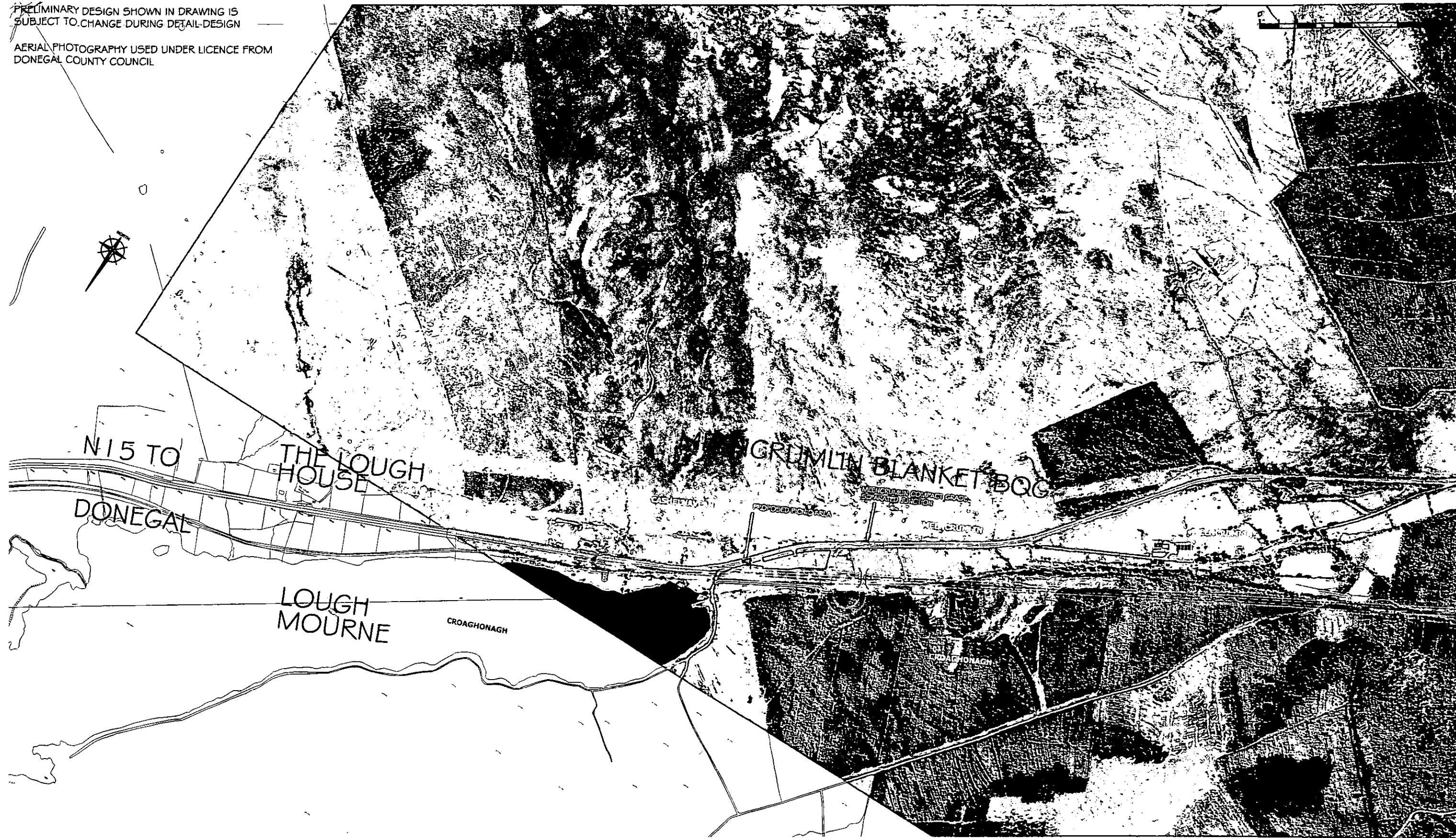
McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
REACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 3.2

Issue  
Q

PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

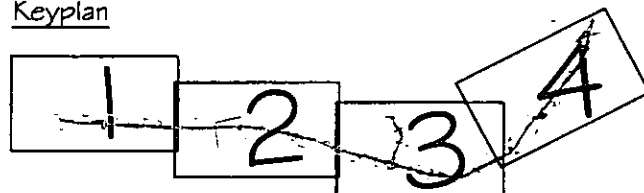
AERIAL PHOTOGRAPHY USED UNDER LICENCE FROM  
DONEGAL COUNTY COUNCIL



# LEGEND

- CPO Boundary
- Road Centreline
- Earthworks
- Road Outline

## Keyplan



date	by	chk.	app.	date	comment
G	G.E.P.	V.F.	H.T.	19.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: AERIAL PHOTOGRAPH OF THE ROUTE OF THE PRELIMINARY DESIGN SHEET 1 OF 4

Date: NOV 2007 Scale: N.T.S.

McCarthy Hyder Consultants Consulting Engineers

SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18

Drawing no. Figure 3.3 Issue G

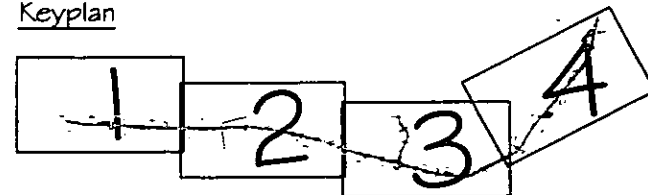




# LEGEND

- CPO Boundary
- Road Centreline
- Earthworks
- Road Outline

## Keyplan



no.	by	chk.	app.	date	comment
1	G.P.P.	V.P.	M.T.	19.10.07	CPO # DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: AERIAL PHOTOGRAPH OF THE ROUTE OF THE PRELIMINARY DESIGN SHEET 2 OF 4

Date: NOV 2007

Scale: N.T.S

McCarthy Hyder Consultants Consulting Engineers

SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18

Drawing no. Figure 3.3

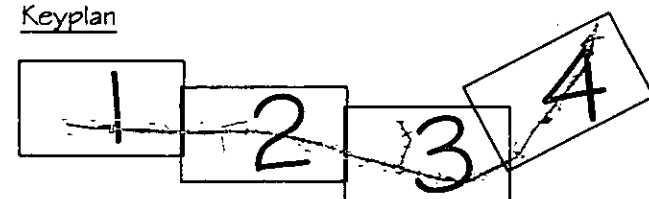
Issue: G



# LEGEND

- CPO Boundary
- Road Centreline
- Earthworks
- Road Outline

## Keyplan



rev	by	chk.	app.	date	comment
1	G.Z.F.	V.P.	H.T.	18.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project <b>N13 / N15 BALLYBOFEY STRANORLAR BYPASS</b>		<b>MCCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS</b> SUITE 24, THE MALL, SANDYFORD, DUBLIN 18	
Drawing Title <b>AERIAL PHOTOGRAPH OF THE ROUTE OF THE PRELIMINARY DESIGN SHEET 3 OF 4</b>			
Date <b>NOV 2007</b>	Scale <b>N.T.S</b>	Drawing no. <b>Figure 3.3</b>	Issue <b>G</b>



PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

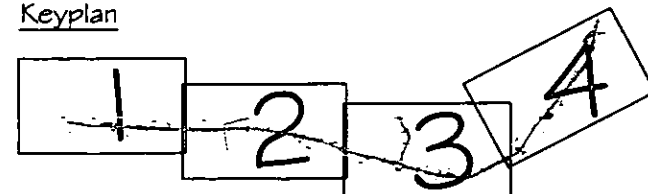
AERIAL PHOTOGRAPHY USED UNDER LICENCE FROM  
DONEGAL COUNTY COUNCIL



# LEGEND

- CPO Boundary
- Road Centreline
- Earthworks
- Road Outline

## Keyplan



**NRA**  
National Roads Authority  
*An tArdán na Bóithr Náisiúnta*



drawn by	chkd.	app.	date	comment
G	G.E.P.	V.P.	19.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

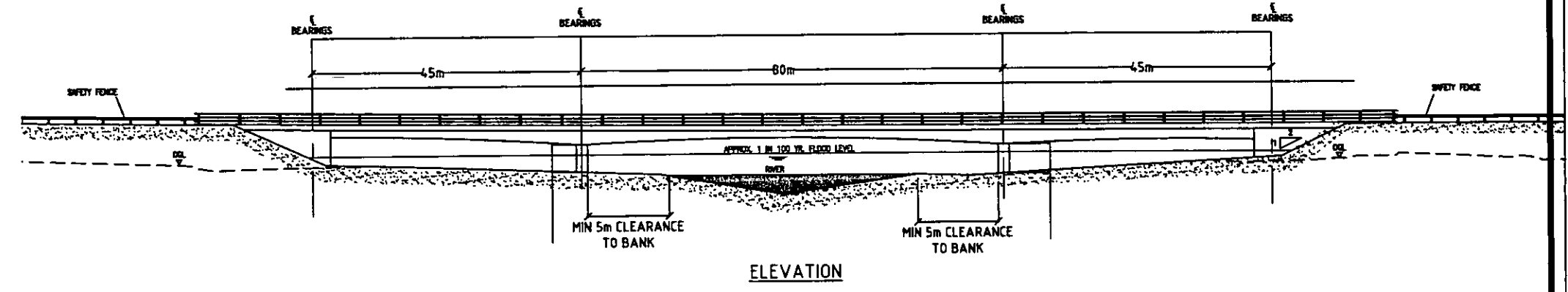
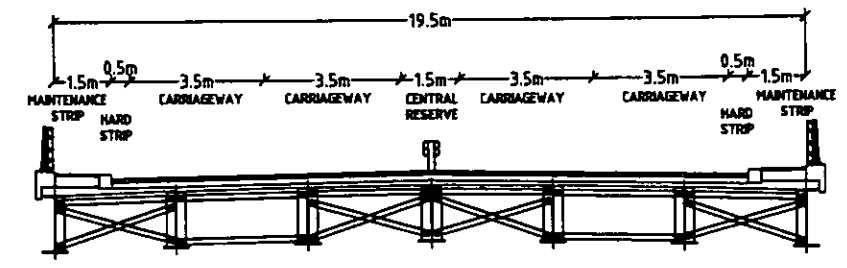
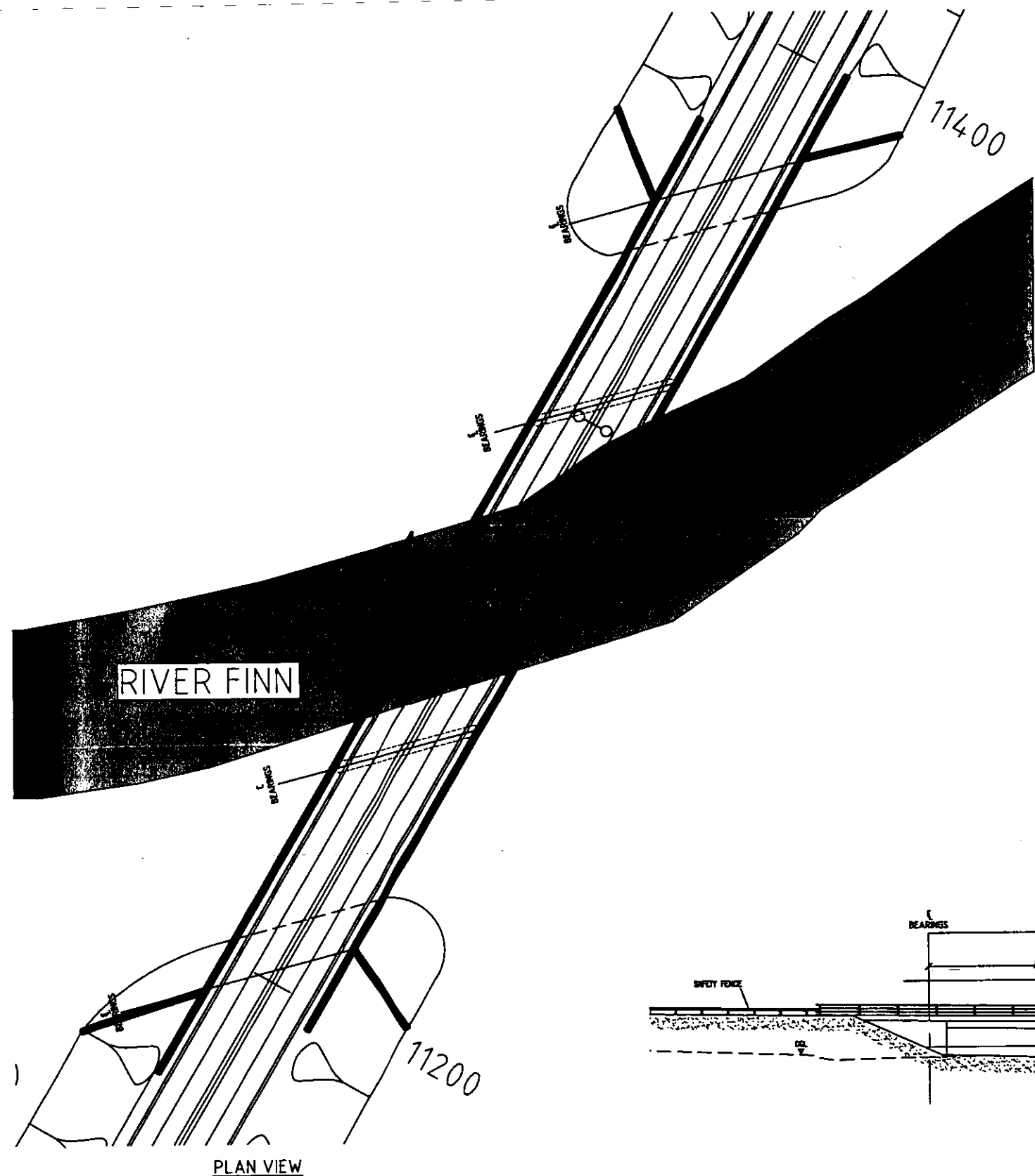
Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
AERIAL PHOTOGRAPH OF THE  
ROUTE OF THE PRELIMINARY  
DESIGN SHEET 4 OF 4

Date: NOV 2007 Scale: N.T.S

**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**  
SUITE 24, THE MALL,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 3.3 Issue G



Issue	By	Chk.	App.	Date	Comment
1	JCD	TP	TP	01/11/06	FINAL ISSUE
2	JCD	TP	TP	15/06/07	FINAL ISSUE

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PRELIMINARY DESIGN STAGE STRUCTURES

General Arrangement of River Finn Bridge

Date: NOV 2007

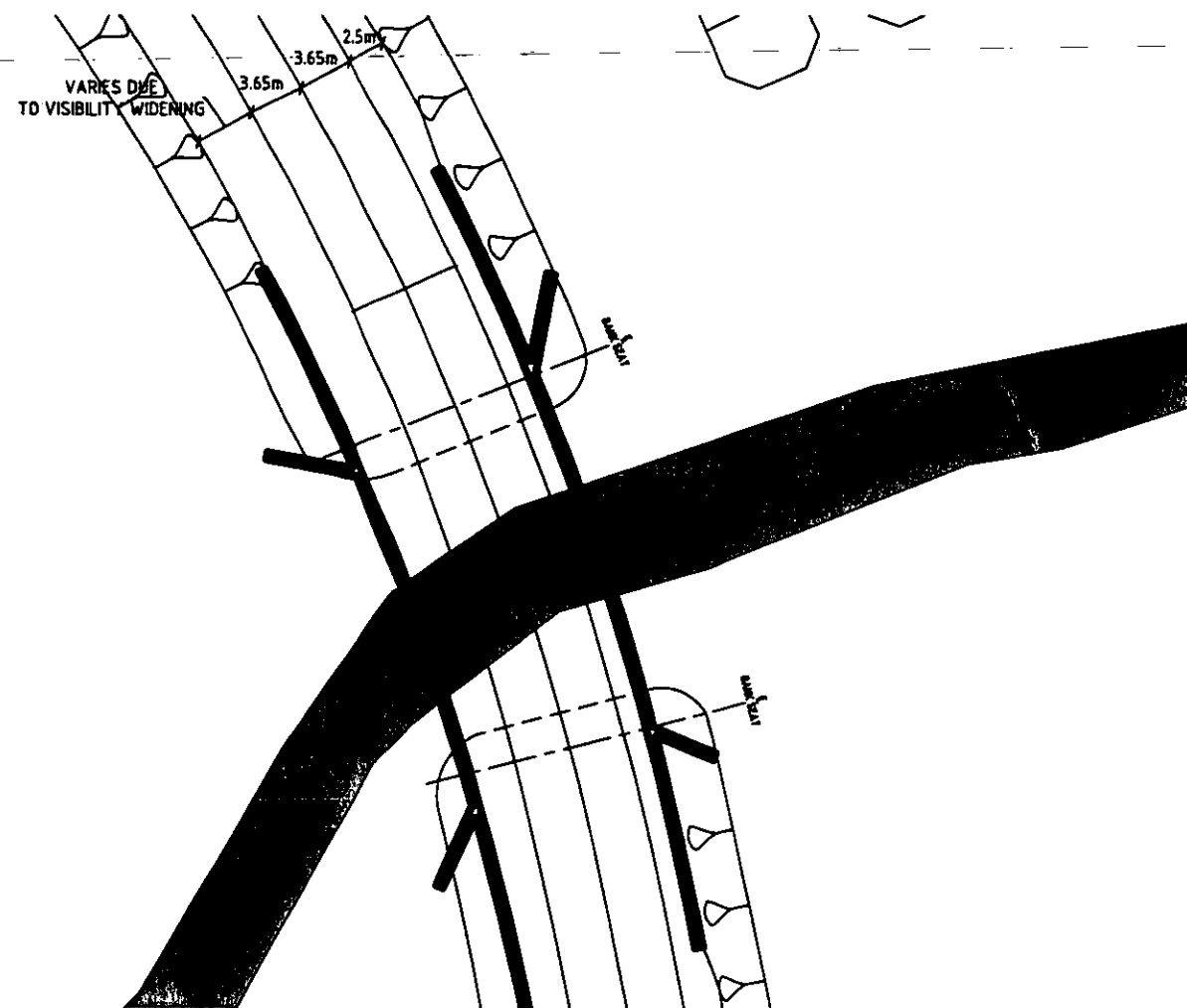
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McCarthy Hyder Consultants Consulting Engineers

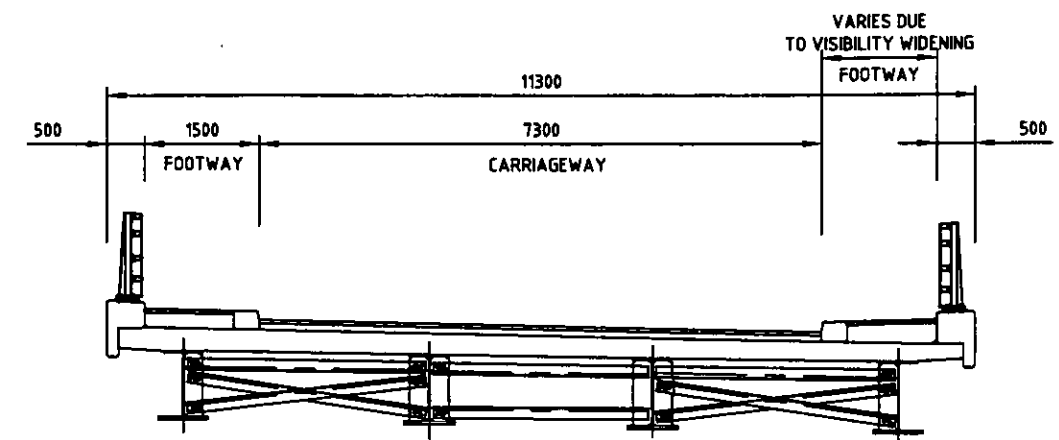
SUITE 24, THE MALL, SANDYFORD, DUBLIN 18

Drawing no. Figure 3.4

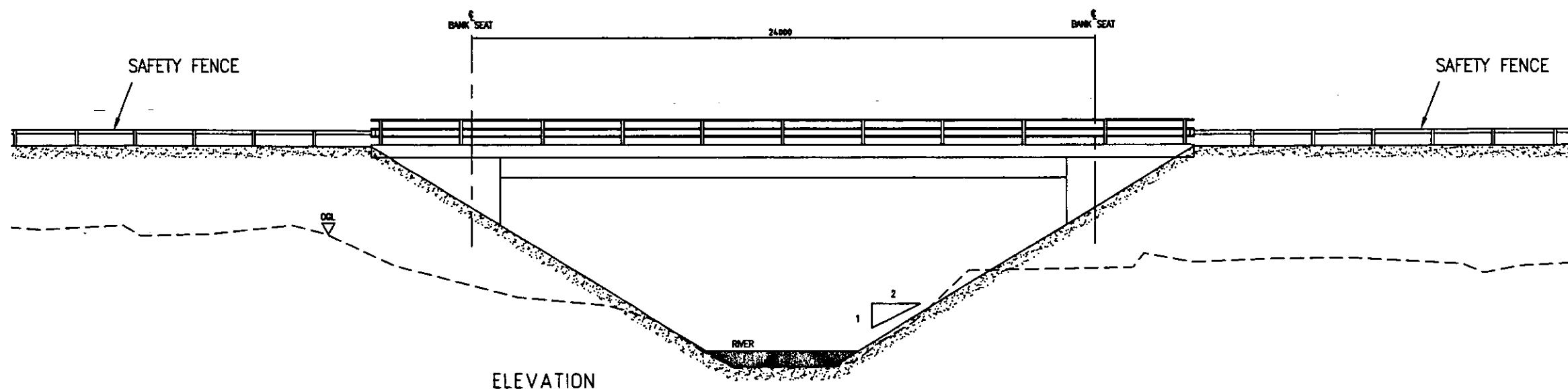
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PLAN VIEW



SECTION A-A



ELEVATION



Rev	By	Chk	App	Date	Comments
A	RD	RD	PC	01/04/05	FOLLOWING DETAILED CONSULTATIONS
B	RD	RD	TP	17/07/05	FOLLOWING DETAILED CONSULTATIONS
C	RD	RD	TP	11/08/04	N15 CROSS SECTION REVISED
D	RD	TP	TP	01/11/06	FINAL ISSUE
E	RD	TP	TP	15/08/07	FINAL ISSUE

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PRELIMINARY DESIGN STAGE STRUCTURES

General Arrangement: Burn Daumett Bridge

Date: NOV 2007

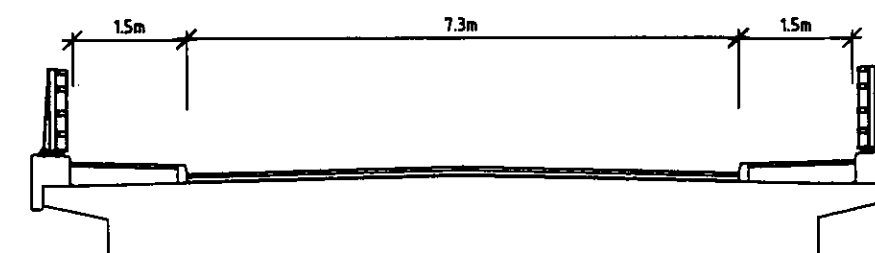
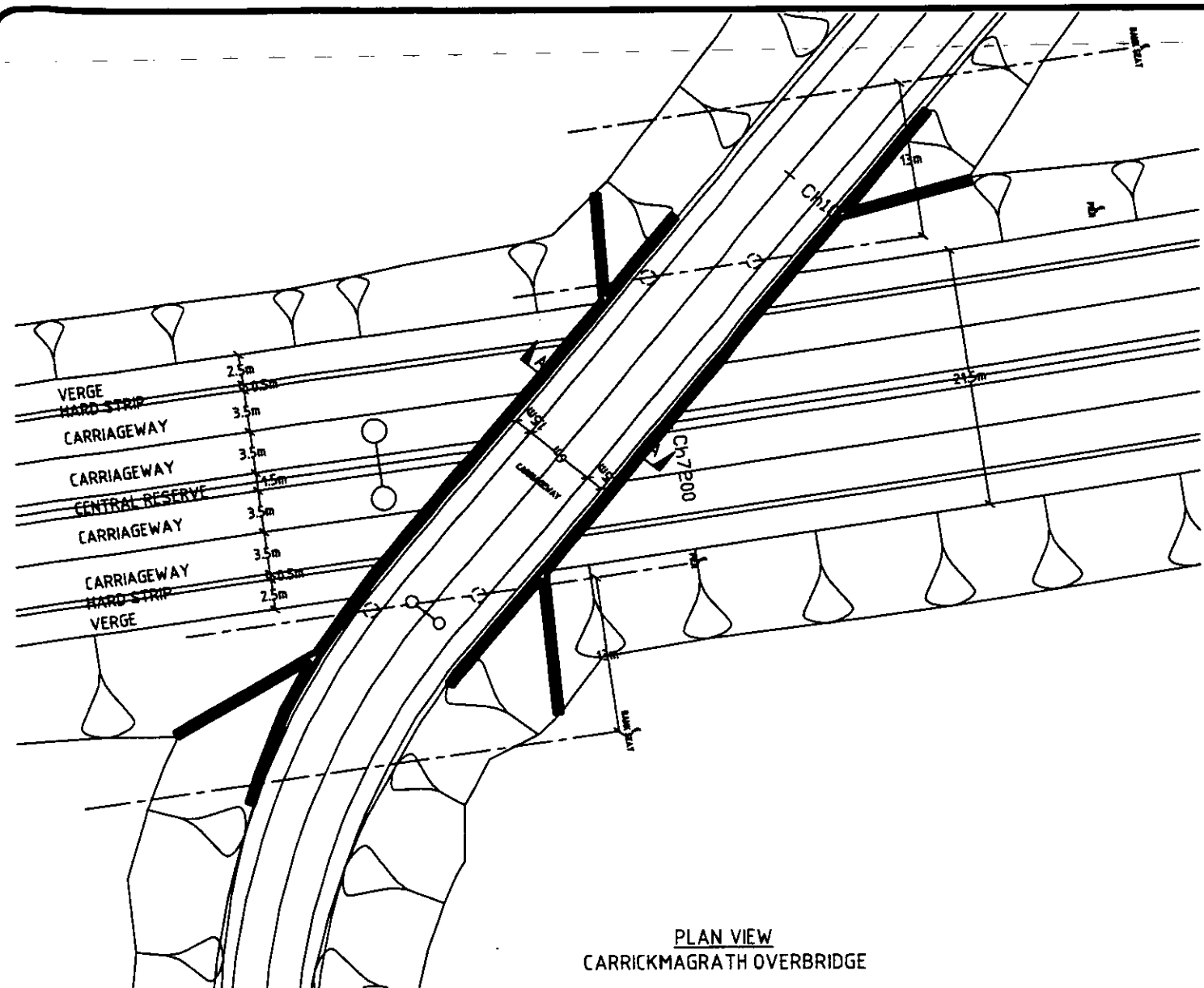
Scale: AS SHOWN

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18

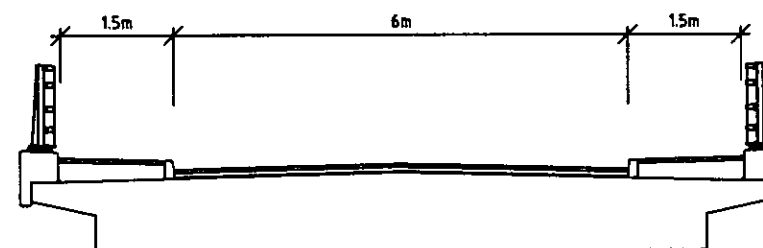


Drawing no. Figure 3.5

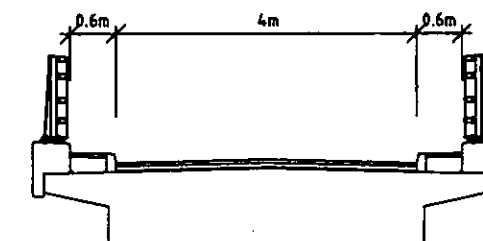
Issue: E



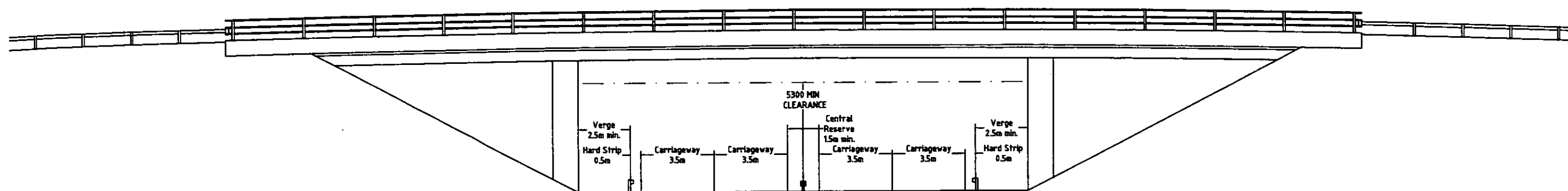
TYPICAL SECTION A-A  
MEENCRLMLIN JUNCTION OVERBRIDGE



TYPICAL SECTION A-A  
CARRICKMAGRATH OVERBRIDGE



TYPICAL SECTION A-A  
MULLAGAHGARRY ACCOMMODATION OVERBRIDGE



TYPICAL ELEVATION  
TYPE 2 CARRIAGEWAY MAINLINE



Rev	By	Chk	App	Date	Comment
A	EW	EW	TP	01/04/03	FOLLOWING DETAIL CONSULTATION
B	BT	EW	TP	17/07/04	FOLLOWING DETAIL CONSULTATION
C	SO	ARW	TP	11/03/04	N.I.S. CROSS SECTION REVISED
D	DB	TP	TP	10/04/04	N.I.S. CROSS SECTION REVISED - NEW N.I.S. GUIDELINES FOR 2+1
E	DB	TP	TP	01/11/05	FINAL ISSUE
F	DB	TP	TP	13/06/07	FINAL ISSUE

Project N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
PRELIMINARY DESIGN STAGE  
STRUCTURES

General Arrangement Overbridges

Date NOV 2007

Scale AS SHOWN

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18



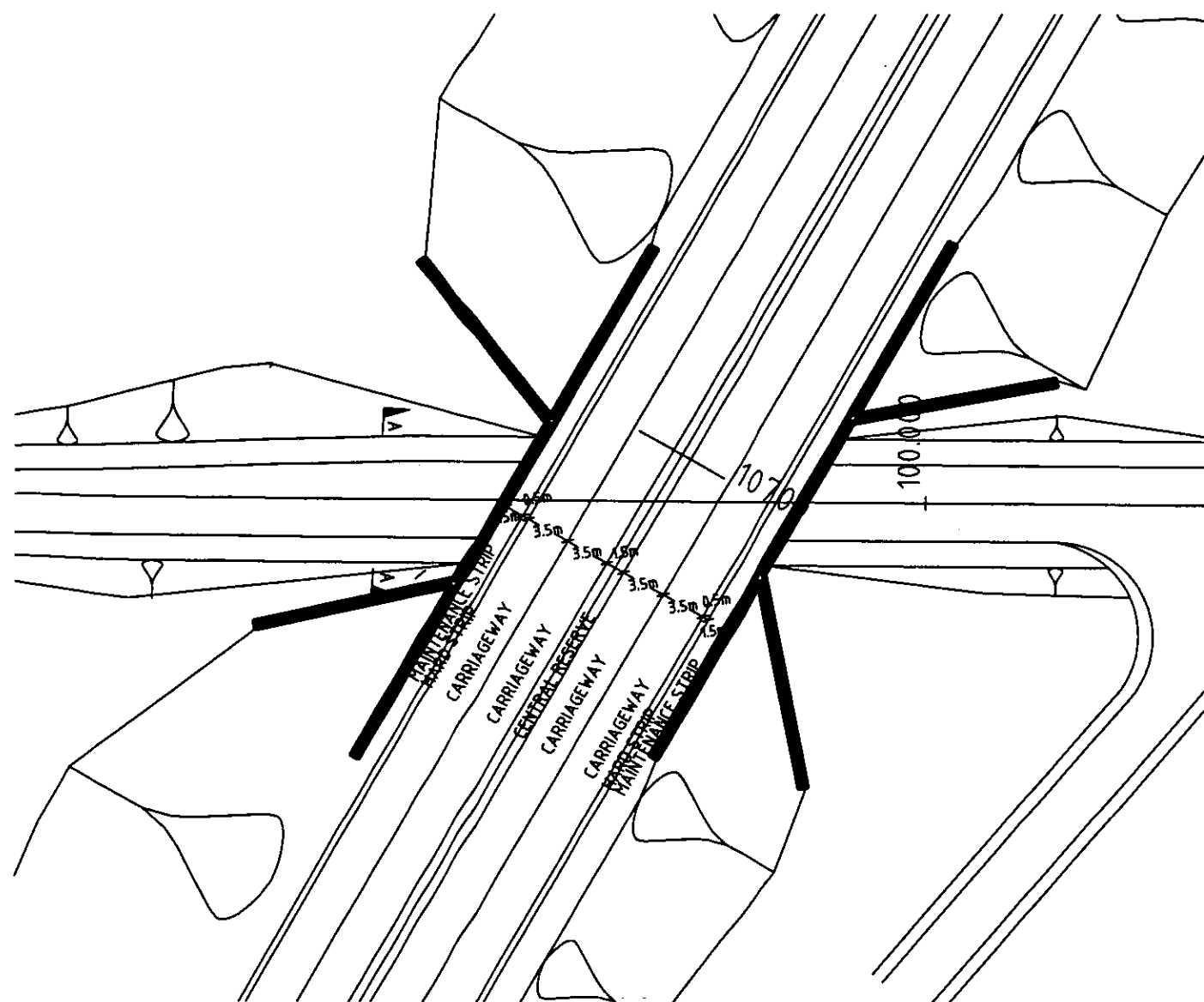
Drawing no.

Figure 3.6

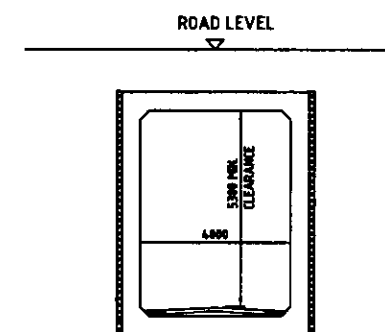
Issue

F

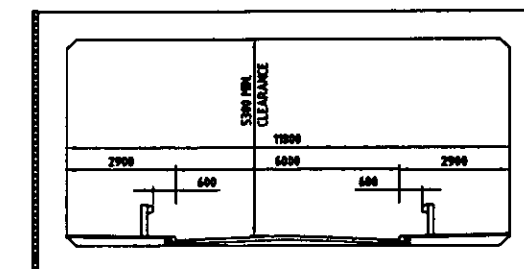




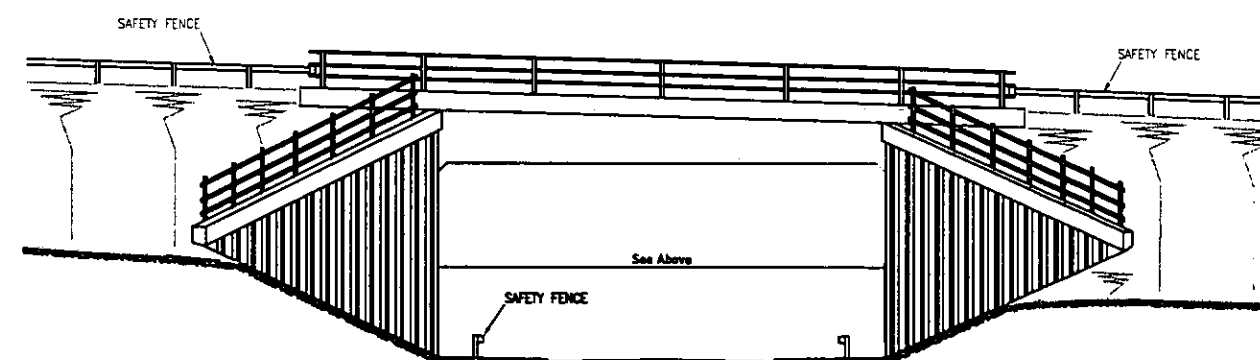
PLAN  
EDENMORE UNDERBRIDGE



TYPICAL SECTION A-A  
GOLAND ACCOMMODATION  
UNDERBRIDGE



TYPICAL SECTION A-A  
MEENGLASS UNDERBRIDGE  
DAISY HILL UNDERBRIDGE  
SESSIAGH O'NEILL UNDERBRIDGE  
EDENMORE UNDERBRIDGE  
NAVENNY JUNCTION UNDERBRIDGE



TYPICAL ELEVATION



REV	BY	CHK	APP	DATE	COMMENT
A	SW	SW	PC	01/04/08	FOLLOWING DETAIL CONSULTATIONS
B	SP	SW	TP	17/07/08	FOLLOWING DETAIL CONSULTATIONS
C	SD	ARM	-	11/03/04	N15 CROSS SECTION REVISED
D	SR	TP	TP	1/06/04	N15 CROSS SECTION REVISED - NEW NRA GUIDELINES FOR 2+1
E	ACB	TP	TP	01/11/06	FINAL ISSUE
F	ACB	TP	TP	12/06/07	FINAL ISSUE

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
PRELIMINARY DESIGN STAGE  
STRUCTURES

General Arrangement Underbridges

Date  
NOV 2007

Scale  
AS SHOWN

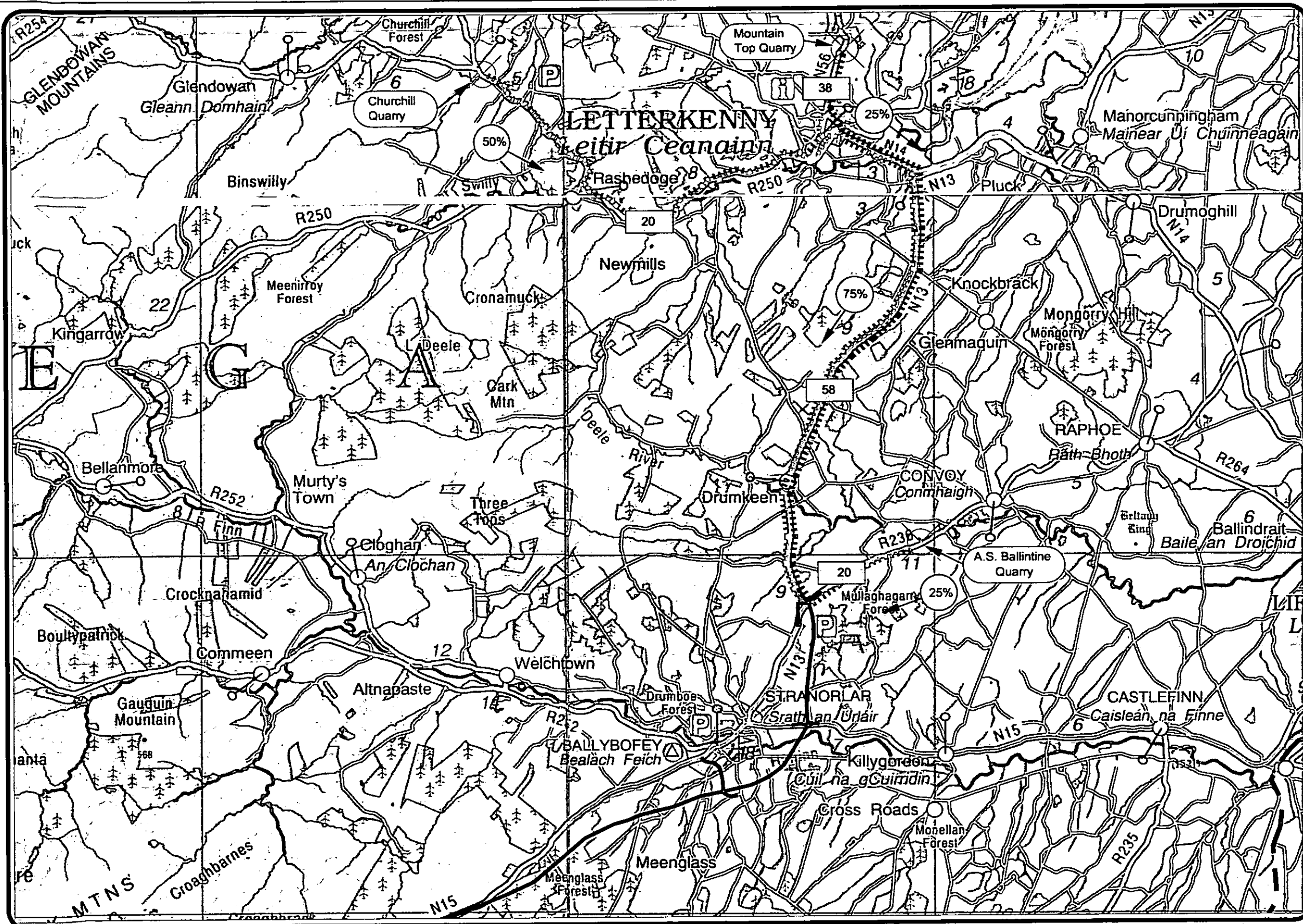
McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18



Drawing no.  
Figure 3.7



Issue  
F



# NOTES:

EARTHWORKS SHOWN IN THIS DRAWING ARE SUBJECT TO CHANGE DURING DETAILED DESIGN.

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## LEGEND

Permissible Access Route Expected to be Used by the Contractor.

Percentage Import of Earthworks and Direction of Arrival.

Daily Lorry Movements Generated by Earthworks on the Permissible Access Routes Expected to be Used by the Contractor



58

Proposed N13 / N15 Ballybofey / Stranorlar Bypass (Preliminary Design)



date	by	ch.	app.	date	comment
05/03/07	CT	TP	TP	05/03/07	ISSUE
05/10/07	G.P.	VI	HI	05/10/07	ISSUE

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: Existing Quarries and Possible Access Routes Forecast Lorry Movements During Construction Phase

Date: NOV2007

Scale: NTS

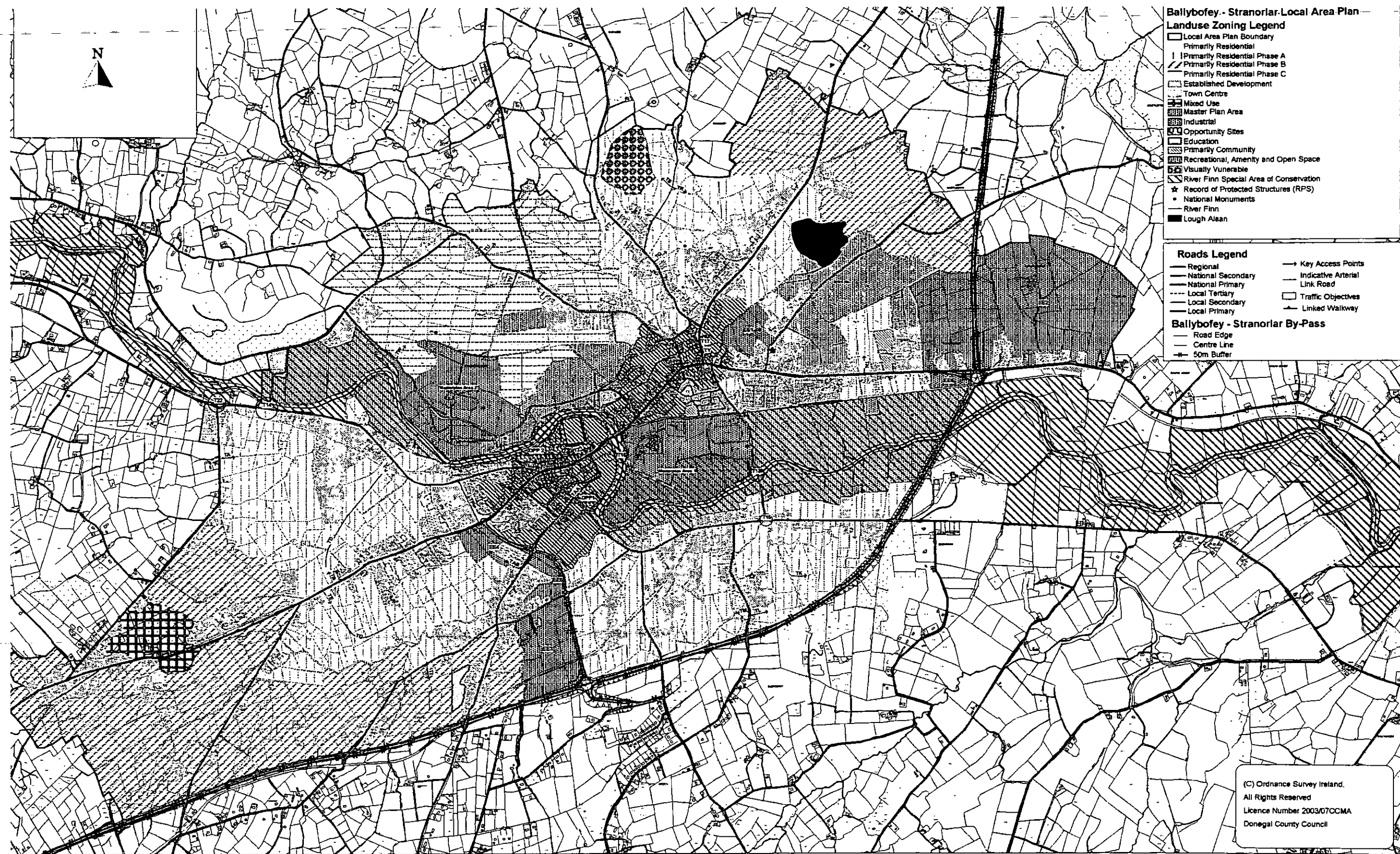
McCarthy Hyder Consultants Consulting Engineers

SUITE 24, THE MALL, SANDYFORD, DUBLIN 18



Drawing no. Figure 3.8

Issue B



#### Notes:

Image derived from the Ballybofey - Stranorlar Local Area Plan 2004 - 2010, with kind permission of Donegal County Council



Rev	By	Chk	App	Date	Comments
A	ST	LW	LW	01.08.03	SECOND ISSUE
B	ST	LW	LW	01.03.04	ROUTE ALIGNMENT / CPO AMENDED
C	G.E.P	V.F	H.T	01.11.06	DATE & TITLE AMENDED ALSO NEW IMAGE USED FOR FIGURE
D	G.E.P	V.F	H.T	01.04.07	DATE & TITLE AMENDED
E	G.E.P	V.T	H.T	09.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PLANNING DESIGNATIONS AS DEFINED BY THE BALLYBOFEY - STRANORLAR LOCAL AREA PLAN 2004 - 2010

Date: NOV 2007 Scale: N.T.S

McCarthy Hyder Consultants Consulting Engineers

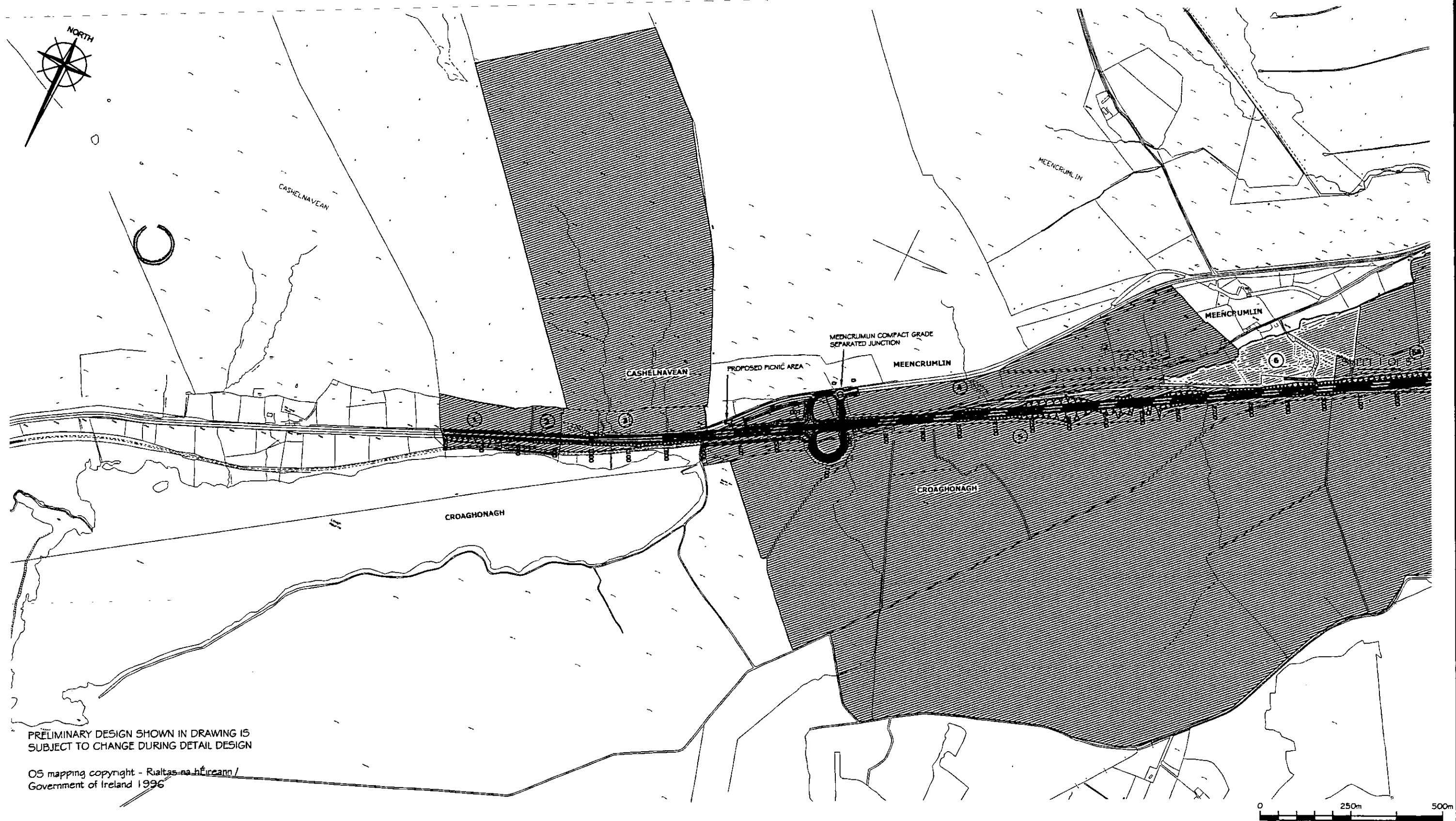
SUITE 24, THE MALL, SEACON COURT, SANDYFORD, DUBLIN 18



Drawing no. Figure 4.1

Issue E

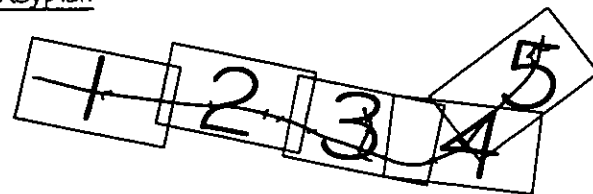




**LEGEND**

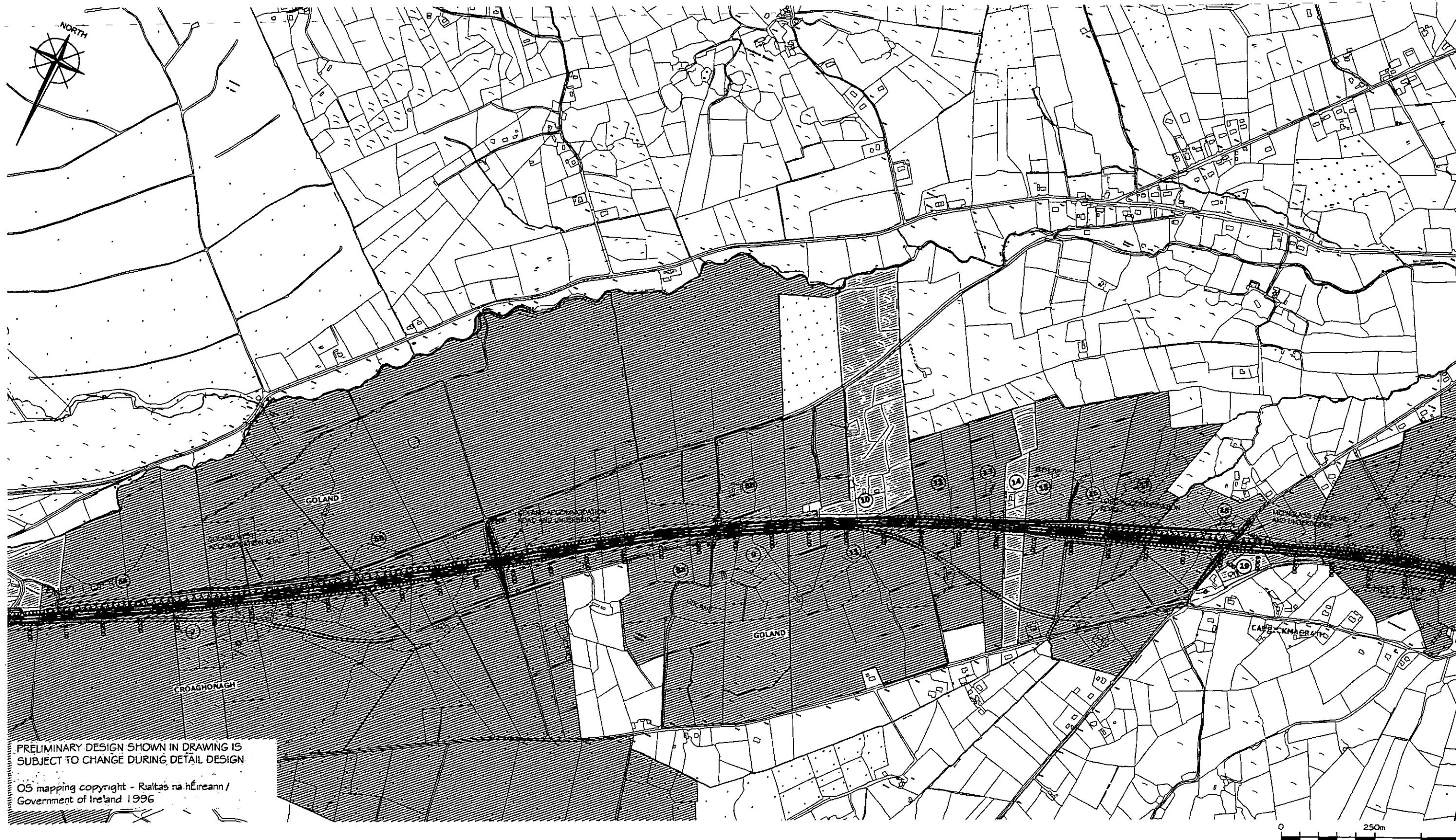
- Preliminary Design
- CPO Boundary
- Farm Boundary
- ⊙ Land Owner Key ( see Appendix G.1 )

**Keyplan**



rev	by	chk.	app.	date	comment
A	G.E.P.	V.P.	H.T.	01.05.07	AUGMENT, CPO BOUNDARY & DATE AMENDED
B	G.E.P.	V.T.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

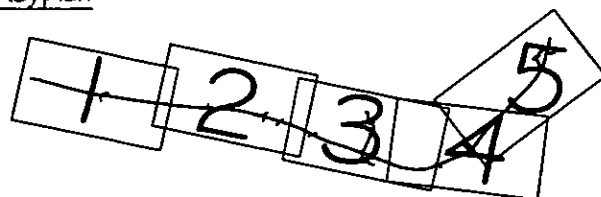
<b>Project</b> N13 / N15 BALLYBOFEY STRANORLAR BYPASS		<b>McCarthy Hyder Consultants Consulting Engineers</b> SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
<b>Drawing Title</b> FARM LANDOWNERSHIP (SHEET 1 OF 5)		Drawing no. Figure 6.1	
<b>Date</b> NOV 2007	<b>Scale</b> N.T.S	<b>Issue</b> B	



# LEGEND

- Preliminary Design
- CPO Boundary
- Farm Boundary
- ⑤ Land Owner Key ( see Appendix G.1 )

## Keyplan



**NRA**  
National Roads Authority  
*An tArdas na hOibre Náisiúnta*



Committee Chaitheas na hOibre  
DONESAL COUNTY COUNCIL

REV	BY	CHK	APP	DATE	COMMENT
A	G.E.T.	V.7	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
B	G.E.T.	V.7	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: **N13 / N15 BALLYBOFEY STRANORLAR BYPASS**

Drawing Title: **FARM LANDOWNERSHIP**  
(SHEET 2 OF 5)

Date: **NOV 2007** Scale: **N.T.S**

**MCCARTHY HYDER CONSULTANTS**  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no. **Figure G.1**

Issue: **B**

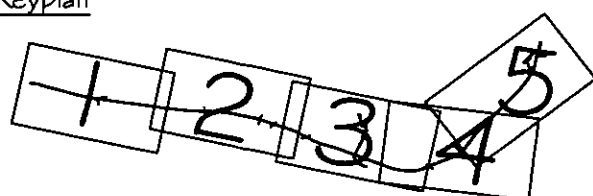




# LEGEND

- Preliminary Design
- CPO Boundary
- Farm Boundary
- ⊙ Land Owner Key ( see Appendix 6.1 )

## Keyplan



REV	BY	CHK	APP	DATE	COMMENTS
A	G.E.P.	V.T.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
B	G.E.P.	V.T.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

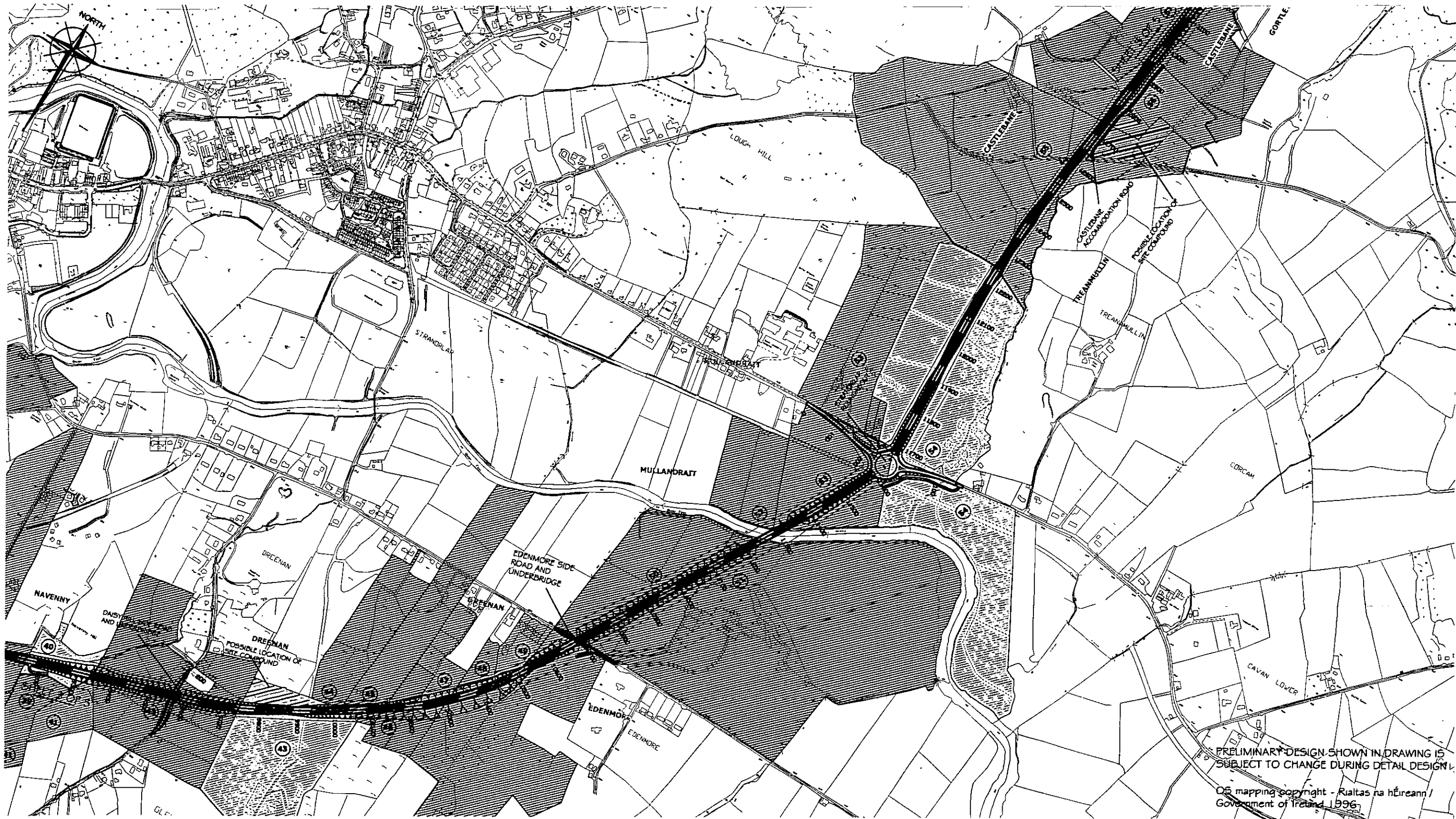
Drawing Title  
FARM LANDOWNERSHIP  
(SHEET 3 OF 5)

Date NOV 2007 Scale N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 6.1

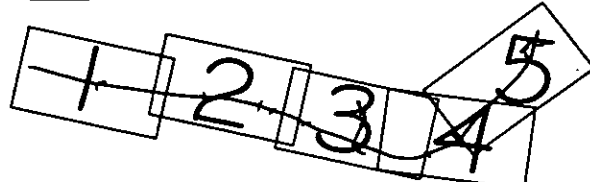
Issue  
B



# LEGEND

- Preliminary Design
- CPO Boundary
- Farm Boundary
- Ⓢ Land Owner Key ( see Appendix G.1 )

## Keyplan



REV	BY	CHK	APP	DATE	COMMENT
A	G.E.P.	V.P.	H.T.	01.08.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
B	G.E.P.	V.T.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFFY STRANORLAR BYPASS

Drawing Title: FARM LANDOWNERSHIP

(SHEET 4 OF 5)

Date: NOV 2007

Scale: N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18



Drawing no.

Figure 6.1

Issue: B

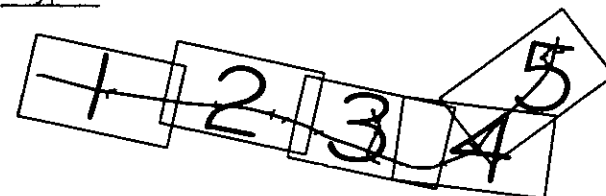




# LEGEND

- Preliminary Design
- CPO Boundary
- Farm Boundary
- Land Owner Key ( see Appendix 6.1 )

## Keyplan



no.	by	chk.	app.	date	comment
A	G.E.P.	V.P.	N.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
B	G.E.P.	V.T.	N.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project	N13 / N15 BALLYBOFEY STRANORLAR BYPASS
Drawing Title	FARM LANDOWNERSHIP (SHEET 5 OF 5)
Date	NOV 2007
Scale	N.T.S

McCarthy Hyder Consultants CONSULTING ENGINEERS SUITE 24, THE MALL, BRADON COURT, SANDYFORD, DUBLIN 18	Issue B
Drawing no. Figure 6.1	





Landscape Type:  
Character Area:  
Key Characteristics:

Afforested Uplands  
Croaghonagh Coniferous Woodlands

- Coniferous plantations at varying stages of maturity but with structured appearance.
- Some areas of open unimproved grassland
- Burn Daurnett watercourse and the former railway line with their adjoining broadleaved vegetation form a linear feature within the character area.
- Coniferous plantations are a discordant feature with a fragmented appearance. Overhead power cables are a detracting feature within the character area.



**NRA**  
National Roads Authority  
An tAidird um Bóithre Náisiúnta



Rev	By	Chk	App	Date	Comments
A	ML	PL	1W	29.07.05	FIRST ISSUE
B	G.E.	V.F.	H.T.	01.11.06	DATE & DRAWING TITLE AMENDED
C	G.E.	V.F.	H.T.	01.08.07	DATE AMENDED
D	G.E.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
LANDSCAPE CHARACTER  
ILLUSTRATIONS:  
CROAGHONAGH CONIFEROUS  
WOODLANDS

Date  
NOV 2007

Scale  
N.T.S

**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**

SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no.  
Figure 7.1

Issue  
D



Landscape Type:  
Character Area:  
Key Characteristics:

Alluvial Floodplain Pasture  
River Finn Floodplain

- Medium sized fields primarily used for cattle grazing.
- Dense hedgerows with mature vegetation form enclosure pattern.
- The former railway line and its associated vegetation contribute to its enclosure.
- The character area is visible within views from elevated ground to the south and from the outskirts of Stranorlar. Within such views the area appears as a pleasantly balanced and verdant landscape.



**NRA**  
National Roads Authority  
An tArdán um Bóthra Náisiúnta





rev	by	chk	app	date	comment
A	ML	FL	W	23.07.05	FIRST ISSUE
B	G.F.F.	V.F.	H.T.	01.11.06	DATE & DRAWING TITLE AMENDED
C	G.F.F.	V.F.	H.T.	01.03.07	DATE AMENDED
D	G.F.F.	V.F.	H.T.	11.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
LANDSCAPE CHARACTER  
ILLUSTRATIONS:  
RIVER FINN FLOODPLAIN

Date: NOV 2007 Scales: N.T.S.

**McCarthy Hyder Consultants**  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.:  Issue:   
Figure 7.2 D



Landscape Type:  
Character Area:  
Key Characteristics:

Enclosed Farmland  
Intensively managed agricultural landscape surrounding Ballybofey/Stranorlar

- Gently undulating landform on the hillsides surrounding Ballybofey/Stranorlar.
- Topography and vegetation combine to form a landscape with a structured appearance that features scattered farm buildings and residential properties.
- Relatively intensively farmed with small to medium sized fields and occasional dense mixed woodlands.
- Enclosure pattern formed by hedgebanks and occasional stone walls.
- Distant views, particularly to the Blue Stack Mountains, from elevated areas although views generally restricted by topography and vegetation. Balanced and pleasant landscape.



rev	by	chk	app	date	comment
A	ML	FL	JW	29.07.05	FIRST ISSUE
B	G.E.H.	V.P.	H.T.	01.11.06	DATE & DRAWING TITLE AMENDED
C	G.E.H.	V.P.	H.T.	01.08.07	PHOTOGRAPH REVISED & DATE AMENDED
D	G.E.H.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: LANDSCAPE CHARACTER ILLUSTRATIONS: INTENSIVELY MANAGED AGRICULTURAL LANDSCAPE

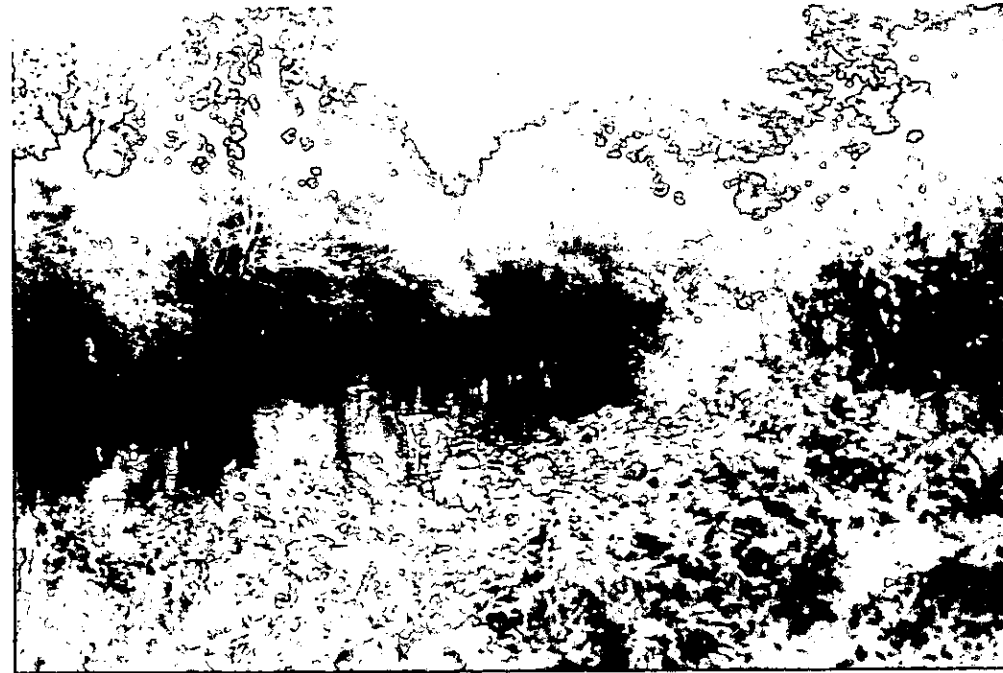
Date: NOV 2007 Scale: N.T.S.

McCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS  
SUITE 34, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 7.3

Issue: D

River Finn near point of proposed bridge crossing.



Within this section the river is defined by mature riverbank vegetation.

Dismantled railway line near Sessiagh O'Neill.



The route of the former railway is defined by hedgebanks planted with Beech. Vegetation on the hedgebanks is characterised by occasional trees with mature understorey shrubs which makes the feature a distinctive linear landscape element within local views.



rev	by	chk	app	date	comment
A	ML	PL	WV	29.07.09	FIRST ISSUE
B	G.E.P.V.F	H.T		01.11.06	DATE & DRAWING TITLE AMENDED
C	G.E.P.V.F	H.T		01.03.07	DATE AMENDED
D	G.E.P.V.F	H.T		11.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: LANDSCAPE CHARACTER ILLUSTRATIONS: RIVER FINN AND DISMANTLED RAILWAY

Date: NOV 2007

Scale: N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
DEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.

Figure 7.4

Issue

D



Landscape Type:  
Character Area:  
Key Characteristics:

Enclosed Farmland  
Less intensively managed agricultural landscape (Type 1)

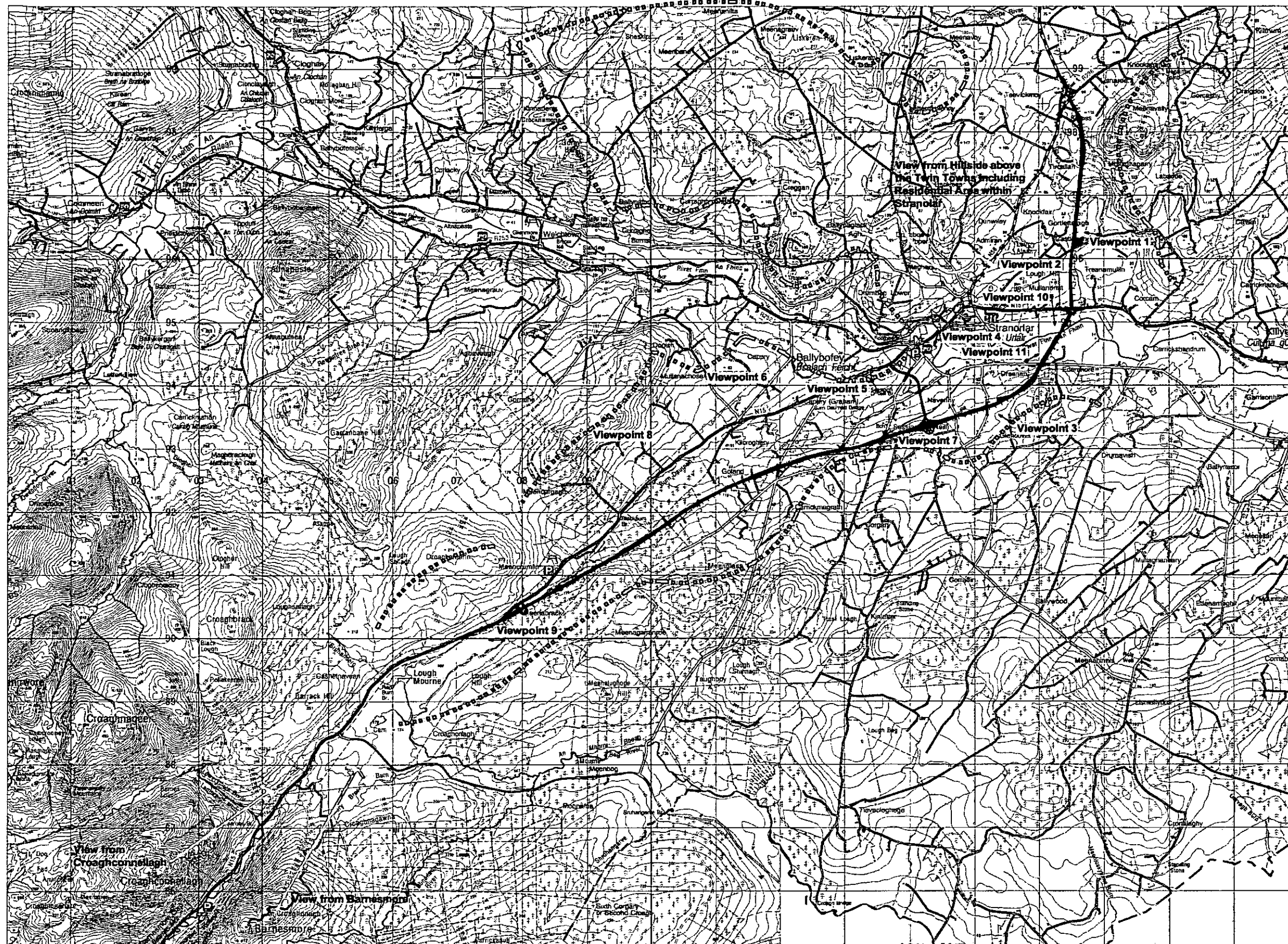
- Rough grasslands, hedgebanks with well established vegetation, some sense of neglect. Variations in texture. Remnant stone walls.
- Enclosure pattern formed by hedgebanks, watercourses.
- Large scale and expansive.



Issue	By	CHK	APP	Date	Comments
A	M.L.	P.	J.W.	29.07.05	FIRST ISSUE
B	G.F.	V.F.	H.T.	01.11.05	DATE & DRAWING TITLE AMENDED
C	G.F.	V.F.	H.T.	01.09.07	DATE AMENDED
D	G.F.	V.F.	H.T.	11.10.07	ISSUE DATE AMENDED

Project	N13 / N15 BALLYBOFEY STRANORLAR BYPASS	McCarthy Hyder Consultants Consulting Engineers
Drawing Title	LANDSCAPE CHARACTER ILLUSTRATIONS: LESS INTENSIVELY MANAGED AGRICULTURAL LANDSCAPE	SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18
Date	NOV 2007	Scale N.T.S.
Drawing no.	Figure 7.5	Issue D





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# LEGEND

- Viewpoint 2 VISUAL IMPACT ASSESSMENT VIEWPOINTS
- INDICATIVE LIMIT OF VIEWS TO PRELIMINARY DESIGN
- GENERAL VIEWS TO PRELIMINARY DESIGN



issue	by	chk.	app.	date	comment
P	G.E.P.	V.P.	H.T.	01.03.07	ALIGNMENT UPDATED
G	G.E.P.	V.T.	H.T.	09.06.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project <b>N13 / N15 BALLYBOFEY STRANORLAR BYPASS</b>		<b>MCCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS</b> SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
Drawing Title <b>ZONE OF VISUAL INFLUENCE OF PRELIMINARY DESIGN</b>			
Date NOV 2007	Scale N.T.S	Drawing no. Figure 7.6	Issue G



Visual Receptors:

Traffic using minor road

Description:

The view shows an area of less intensively farmed landscape to the east of Stranorlar. Its distinctive characteristic is its network of fields that are drained by shallow ditches.

Visual Impact Analysis:

The Preliminary Design would traverse the low-lying area within the central part of the view on shallow embankment. It would cause a noticeable deterioration in the view.

Magnitude of Visual Impact:

Moderate adverse (Winter yr. 1)  
Moderate adverse (Winter yr. 15)  
Moderate adverse (Summer yr. 15)

Rationale:

The road embankments would remain largely open to complement local landscape character and the Preliminary Design would remain a visible and recognisable element within the view.



Ceanncheathrú Chontae Dún Laoghaire  
DUBLIN COUNTY COUNCIL

date	by	chk.	app.	date	comment
A	M.L.	P.L.	L.W.	22.07.03	FIRST ISSUE
B	G.E.F.	V.F.	H.T.	01.11.05	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.F.	V.F.	H.T.	01.03.07	DATE AMENDED
D	G.E.F.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
VISUAL IMPACT  
ASSESSMENT VIEWPOINT 1

Date  
NOV 2007

Scale  
N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
DEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 7.7

Issue  
D

Viewpoint 2: From existing N15 within Mullandrait



Visual Receptors:	Traffic travelling east on the road and occasional settlements adjoining the existing road.
Description:	The view illustrates the highly vegetated character of the River Finn floodplain adjoining the existing N15. The vegetated dismantled railway line forms the linear landscape element within the background of the view.
Visual Impact Analysis:	A new road junction is proposed with the existing N15 at this point (Stranorlar roundabout). It would be on an embankment of up to 3 metres in height above existing ground level and would have lighting. There would be a significant to noticeable deterioration in the existing view. New planting would be proposed upon the road embankments to complement the well vegetated character of the local landscape.
Magnitude of Visual Impact:	Moderate to Substantial adverse (Winter yr. 1) Moderate to Substantial adverse (Winter yr. 15) Moderate adverse (Summer yr. 15)
Rationale:	Linear and well vegetated landscape features are a characteristic of the River Finn floodplain. New planting associated with the Preliminary Design would in time conceal some of the junction within local views although lighting would have a residual visual impact.



Issue	By	On	App.	Date	Comments
A	ML	FL	LW	29.07.03	FIRST ISSUE
B	G.E.F.	V.F.	H.T.	01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.F.	V.F.	H.T.	01.03.07	DATE AMENDED
D	G.E.F.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
VISUAL IMPACT  
ASSESSMENT VIEWPOINT 2

Date  
NOV 2007

Scale  
N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 7.8

Issue  
D





Visual Receptors:

Homeowners

Description:

Elevated viewpoint from which the wider landscape setting of Ballybofey/Stranorlar can be seen. Views would, however, be confined to residents/visitors using a recently built private dwelling.

Visual Impact Analysis:

The Preliminary Design would directly impact upon a number of hedgebanks within the foreground of the view. The Preliminary Design would also be on an embankment of up to 5 meters in height above existing ground levels. There would be a significant deterioration in the view.

Magnitude of Visual Impact:

Substantial adverse (Winter yr. 1)  
Substantial adverse (Winter yr. 15)  
Substantial adverse (Summer yr. 15)

Rationale:

The Preliminary Design would become a significant and immediately apparent element of the view and would affect and change its overall character.



Rev	By	CHK	APP	DATE	COMMENT
A	ML	FL	LW	25.07.03	FIRST ISSUE
B	G.E.P.	V.F.	H.T.	01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.P.	V.F.	H.T.	01.03.07	DATE AMENDED
D	G.E.P.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: VISUAL IMPACT ASSESSMENT VIEWPOINT 3

Date: NOV 2007

Scale: N.T.S

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18

Drawing no. Figure 7.9



Sheet D



Visual Receptors:	Traffic passing over the bridge and pedestrians moving between the Twin Towns.
Description:	Pedestrians tend to stop on the bridge to view the River Finn and the rising land to the south which forms a setting to the towns.
Visual Impact Analysis:	The Preliminary Design would traverse these north facing slopes above the Twin Towns. The proposed new junction (Navenny Grade Separated Junction) would also occupy the centre of the view and would have associated lighting. It would, however, be seen in the context of recent new housing development. There would be a noticeable to barely perceptible deterioration in the view.
Magnitude of Visual Impact:	Slight to Moderate adverse (Winter yr. 1) Slight to Moderate adverse (Winter yr. 15) Slight adverse (Summer yr. 15)
Rationale:	The Preliminary Design would form a visible and recognisable new element within the overall view which would be reduced as new planting matures.







Rev	By	Chk	App	Date	Comments
A	ML	PL	LW	29.07.05	FIRST ISSUE
B	G.E.H.V.F	H.T		01.11.06	VIEWPOINT LOCATION AMENDED
C	G.E.H.V.F	H.T		01.03.07	DATE AMENDED
D	G.E.H.V.T	H.T		11.10.07	ISSUE DATE AMENDED

Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS		McCarthy Hyder Consultants CONSULTING ENGINEERS SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
Drawing Title VISUAL IMPACT ASSESSMENT VIEWPOINT 4		 	
Date NOV 2007	Scale N.T.S	Drawing no. Figure 7.10	Issue D

Viewpoint 5: From the rear of residential properties adjoining the N15 within Ballybofey



Visual Receptors:	Residential properties
Description:	The view shows the hillside to the south of the towns and its pastoral landscape enclosed by hedgebanks.
Visual Impact Analysis:	This is a relatively well-wooded section of the route that would provide some visual concealment to the Preliminary Design within local views. The proposed junction (Navenny Grade Separated Junction) would also be partially visible. New hedgebanks and woodlands are proposed that would provide some visual screening and landscape integration.
Magnitude of Visual Impact:	Slight to Moderate adverse (Winter yr. 1) Slight to Moderate adverse (Winter yr. 15) Slight adverse (Summer yr. 15)
Rationale:	The Preliminary Design would be partially screened by new hedgebanks and woodlands. These would provide additional screening as vegetation matures, however, the Preliminary Design would remain a visible element within the view.



Comhairle Chontae Dún dealgach

DONALD COUNTY COUNCIL

date	by	chk.	app.	date	comment
A	ML	FL	LW	29.07.03	FIRST ISSUE
B	G.E.F.	V.F.	H.T.	01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.F.	V.F.	H.T.	01.03.07	DATE AMENDED
D	G.E.F.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project

N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title

VISUAL IMPACT  
ASSESSMENT VIEWPOINT 5

Date



NOV 2007

Scale

N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS

SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN18



Drawing no.

Figure 7.11

Issue

D

Viewpoint 6: From minor road approaching Kilcroghery







Visual Receptors: Traffic and pedestrians using the road and adjoining settlements.

Description: The view shows the north facing slopes to the immediate south of Ballybofey/Stranorlar that form the landscape setting to the towns within some local views. The major and predominantly broadleaved woodland within the centre of the view is at Carrickmagrath.

Visual Impact Analysis: The Preliminary Design would be visible as it traverses the hillside above the Burn Daurnett between emerging from coniferous forestry at chainage 4800 to approximately chainage. 8500 (the Navenny Grade Seperated Junction). Whilst partly in cutting and in places concealed by existing vegetation visible sections would cause a noticeable deterioration in the existing view.

Magnitude of Visual Impact: Moderate adverse (Winter yr. 1)  
Moderate adverse (Winter yr. 15)  
Slight to Moderate adverse (Summer yr. 15)

Rationale: The Preliminary Design would form a noticeable and recognisable new element within the view. As new hedgebanks/woodlands mature they would conceal parts of the Preliminary Design. However, the Preliminary Design would remain visible.

Issue	By	Chk	App	Date	Comments
A	ML	FL	LW	28.07.05	FIRST ISSUE
B	GEP	VF	HT	01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	GEP	VF	HT	01.09.07	DATE AMENDED
D	G.E.H	V.T	H.T	11.10.07	ISSUE DATE AMENDED

Project

N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title

VISUAL IMPACT ASSESSMENT VIEWPOINT 6

Date

NOV 2007

Scale

N.T.S

Drawing no



Figure 7.12

Issue

D

McCarthy Hyder Consultants Consulting Engineers

SUITE 24, THE MALL, SEACON COURT, SANDYFORD, DUBLIN 18








Visual Receptors:	Residential properties adjoining the minor road.
Description:	Attractive and extensive view from elevated position overlooking part of Ballybofey. Much of the town is however screened from view by an intervening ridge.
Visual Impact Analysis:	The Preliminary Design would be on partial embankment within this view. Whilst views to the far horizon would still be available the Preliminary Design would have a substantial impact upon the foreground of the view.
Magnitude of Visual Impact:	Substantial adverse (Winter yr. 1) Substantial adverse (Winter yr. 15) Substantial adverse (Summer yr. 15)
Rationale:	The Preliminary Design would become the dominant feature within what was previously an attractive and relatively tranquil view.



Rev	By	Chk	App	Date	Comments
A	ML	PL	LW	23.07.05	FIRST ISSUE
B	G.E.F.V.F	H.T		01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.F.V.F	H.T		01.08.07	DATE AMENDED
D	G.E.F.V.T	H.T		11.10.07	ISSUE DATE AMENDED

Project	N13 / N15 BALLYBOFEY STRANORLAR BYPASS		McCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS SUITE 24, THE MALL, SEACON COURT, SANDYFORD, DUBLIN 18	
Drawing Title	VISUAL IMPACT ASSESSMENT VIEWPOINT 7		 	
Date	NOV 2007	Scale	N.T.S	Drawing no. Figure 7.13
				D

Viewpoint 8: From south-facing slopes within Woodland Dooish



Visual Receptors:

Scattered and isolated properties, users of a minor road largely used by occupants of adjoining properties and any recreationists or workers within the adjoining agricultural/afforested landscape.

Description:

The existing N15 is a noticeable yet subordinate linear feature within the foreground of the view. It is seen largely against the backdrop of an extensive belt of coniferous woodland.

Visual Impact Analysis:

The Preliminary Design would be on embankment throughout much of this section. However new mixed woodland plantings are proposed for that section within the existing area of coniferous woodland. As the Preliminary Design emerges from these areas new broadleaved plantings are proposed. This would assist with its landscape and visual integration. The existing N15 is a noticeable element within existing expansive views from this viewpoint. The additional visual impact of the Preliminary Design would be compensated by a reduction in traffic using the existing N15. The Preliminary Design would cause a barely perceptible improvement in the existing view.

Magnitude of Visual Impact:

Slight beneficial (Winter yr. 1)  
Slight beneficial (Winter yr. 15)  
Slight to moderate beneficial (Summer yr. 15)

The Preliminary Design would be visible between areas of cleared planting at Year 1. However, as new plantings mature its visibility would be considerably reduced.

Rationale:



Issue	by	chk.	app.	date	comments
A	ML	FL	LW	22.07.06	FIRST ISSUE
B	G.E.P.V.F	H.T		01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.P.V.F	H.T		01.03.07	DATE AMENDED
D	G.E.P.V.F	H.T		01.10.07	ANNOTATION OF VISUAL IMPACT ANALYSIS & MAGNITUDE OF VISUAL IMPACT REVISED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: VISUAL IMPACT ASSESSMENT VIEWPOINT 8

Date: APRIL 2007

Scale: N.T.S

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 7.14 Issue D



Viewpoint 9: Track adjoining Lough Mourne



Visual Receptors:	Recreationists and workers in the rural landscape.
Description:	The viewpoint reveals Lough Mourne within its unenclosed upland landscape setting. The existing N15 is visible on the hillside above the lough although it is partially concealed by existing vegetation.
Visual Impact Analysis:	The Preliminary Design would be on slight embankment and would follow the course of the existing N15 within the view. Some existing vegetation would be removed. This would cause a barely perceptible change to the existing view. The Meencrumlin junction would also just be visible within the extreme right of the view.
Magnitude of Visual Impact:	Slight adverse (Winter yr. 1) Slight adverse (Winter yr. 15) Slight adverse to No change (Summer yr. 15)
Rationale:	The Preliminary Design would follow the same alignment as the existing N15. There would be little change to the character and nature of the existing view.



issue	by	chk.	app.	date	comment
A	ML	FL	LW	22.07.03	FIRST ISSUE
B	G.E.P	V.F	H.T	01.11.06	VIEWPOINT LOCATION & DATE AMENDED
C	G.E.P	V.F	H.T	01.08.07	DATE AMENDED
D	G.E.P	V.1	H.T	11.10.07	ISSUE DATE AMENDED

Project	N13 / N15 BALLYBOFEY STRANORLAR BYPASS
Drawing Title	VISUAL IMPACT ASSESSMENT VIEWPOINT 9
Date	NOV 2007
Scales	N.T.S

McCarthy Hyder Consultants CONSULTING ENGINEERS SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	Figure 7.15	D
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Visual Receptors: Visitors to and workers within the hospital.

Description: The view includes residential development and overlooks the Finn floodplain, extending to the north-facing slopes above the river valley.

Visual Impact Analysis: The Preliminary Design would be visible in deep cutting as it descends the north-facing slopes above the River Finn. It would also be partially visible above the existing tree-line adjoining the dismantled railway as it starts to cross the Finn floodplain on embankment. There would be a noticeable deterioration in the existing view.

Magnitude of Visual Impact: Moderate adverse (Winter yr. 1)  
Moderate adverse (Winter yr. 15)  
Slight to Moderate adverse (Summer yr. 15)

Rationale: The Preliminary Design would cause a noticeable deterioration in the existing view at Year 1. However, by Year 15 proposed planting would partially disguise and conceal the cutting within the view.



rev	by	chk.	app.	date	comment
A	G.E.F.	V.F.	H.T.	01.11.06	FIRST ISSUE
B	G.E.F.	V.F.	H.T.	01.09.07	DATE AMENDED
C	G.E.F.	V.T.	H.T.	12.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: VISUAL IMPACT ASSESSMENT VIEWPOINT 10

Date: NOV 2007 Scale: N.T.S.

McCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS

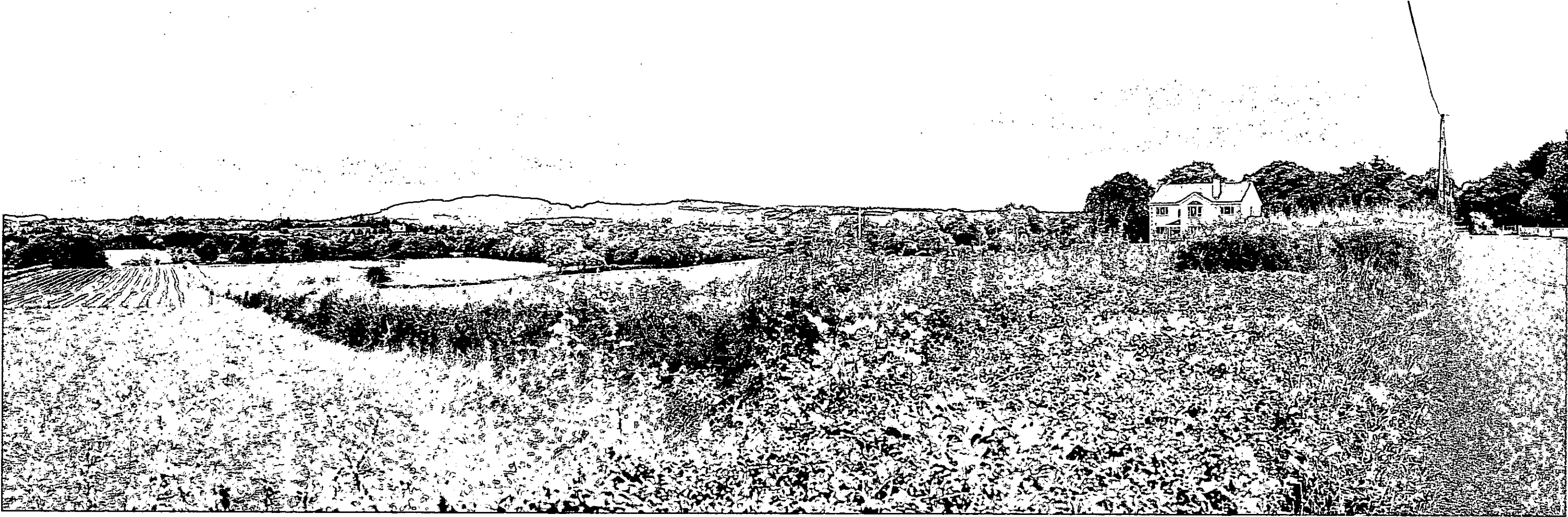
SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18



Drawing no. Figure 7.16

Issue: C





Visual Receptors:	Traffic on the minor road and adjoining residential properties.
Description:	The viewpoint overlooks the Finn floodplain extending to the higher ground to the east of the Twin Towns.
Visual Impact Analysis:	The Preliminary Design would be visible on embankment as it crosses the Finn floodplain. However, summer views would be restricted by the mature tree-line within the mid-ground of the view. The Preliminary Design would cause a significant to noticeable deterioration to the existing view.
Magnitude of Visual Impact:	Moderate to Substantial adverse (Winter yr. 1) Moderate to Substantial adverse (Winter yr. 15) Moderate adverse (Summer yr. 15)
Rationale:	Existing vegetation within the mature tree line would restrict summer views to the Preliminary Design. It would, however, be clearly visible within winter views.



issue	by	chk.	app.	date	comment
A	G.F.F.	V.F.	H.T.	01.11.06	FIRST ISSUE
B	G.F.F.	V.F.	H.T.	01.03.07	DATE AMENDED
C	G.F.F.	V.T.	H.T.	11.10.07	ISSUE DATE AMENDED

Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS	
Drawing Title VISUAL IMPACT ASSESSMENT VIEWPOINT 11	
Date NOV 2007	Scale N.T.S

McCarthy Hyder Consultants CONSULTING ENGINEERS SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
Drawing no. Figure 7.17	Issue C

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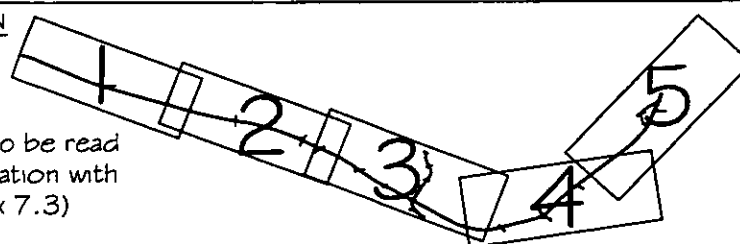


# LEGEND

- CPO Boundary
- Preliminary Design
- P1. Property Locations

## KEYPLAN

(Figure to be read  
in association with  
Appendix 7.3)



A G.E.P. V.P. H.T. April 07 FIRST ISSUE



**NRA**  
National Roads Authority  
An tArdán na Ríomh Náisiúnta



REV	BY	CHK	APP.	DATE	COMMENT
A	G.E.P.	V.P.	H.T.	April 07	FIRST ISSUE
B	G.E.P.	V.P.	H.T.	Nov 07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13/N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
VISUAL RECEPTORS:  
PROPERTIES  
(SHEET 1 OF 5)

Date: NOV 2007

Scale: N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no.

Figure 7.18

Sheet

B





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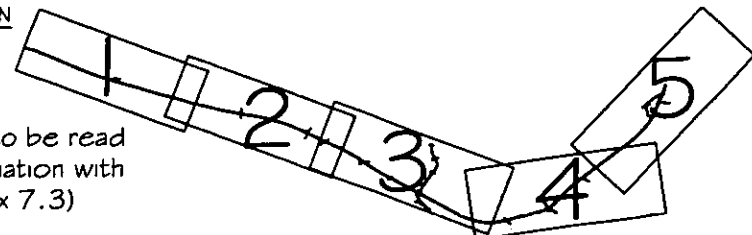
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# LEGEND

- CPO Boundary
- Preliminary Design
- Property Locations

## KEYPLAN

(Figure to be read  
in association with  
Appendix 7.3)



NO.	BY	CHK.	APP.	DATE	COMMENT
A	G.E.P.	V.F.	H.T.	April 07	FIRST ISSUE
B	G.E.P.	V.F.	H.T.	Nov 07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
VISUAL RECEPTORS:  
PROPERTIES  
(SHEET 2 OF 5)

Date: NOV 2007 Scale: N.T.S.

McCarthy Hyder Consultants  
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SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 7.18 Issue B





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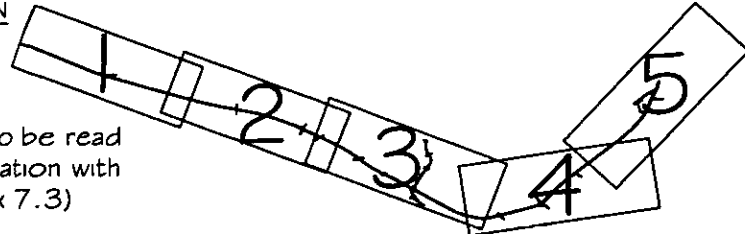


#### LEGEND

- CPO Boundary
- Preliminary Design
- Property Locations

#### KEYPLAN

(Figure to be read  
in association with  
Appendix 7.3)



**NRA**  
National Roads Authority  
*An tArdáire na Bóithre Náisiúnta*



ISSUE	BY	CHK.	APP.	DATE	COMMENTS
A	G.E.P.	V.P.	H.T.	Apr 07	FIRST ISSUE
B	G.E.P.	V.T.	H.T.	Nov 07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
VISUAL RECEPTORS:  
PROPERTIES  
(SHEET 4 OF 5)

Date: NOV 2007

Scale: N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18

Drawing no.:  
Figure 7.18

Issue:  
B

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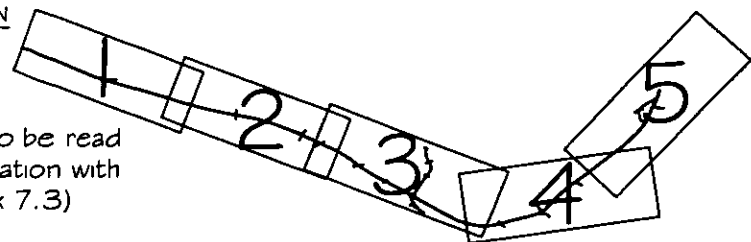


#### LEGEND

- CPO Boundary
- Preliminary Design
- Property Locations

#### KEYPLAN

(Figure to be read  
in association with  
Appendix 7.3)



**NRA**  
National Roads Authority  
*An tAidise um Bólaíochas*



Rev	By	Chk	App	Date	Comments
A	G.E.P.	V.T.	H.T.	April 07	FIRST ISSUE
B	G.E.P.	V.T.	H.T.	Nov 07	CPO 4 DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
VISUAL RECEPTORS:  
PROPERTIES  
(SHEET 5 OF 5)

Date: NOV 2007

Scale: N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS

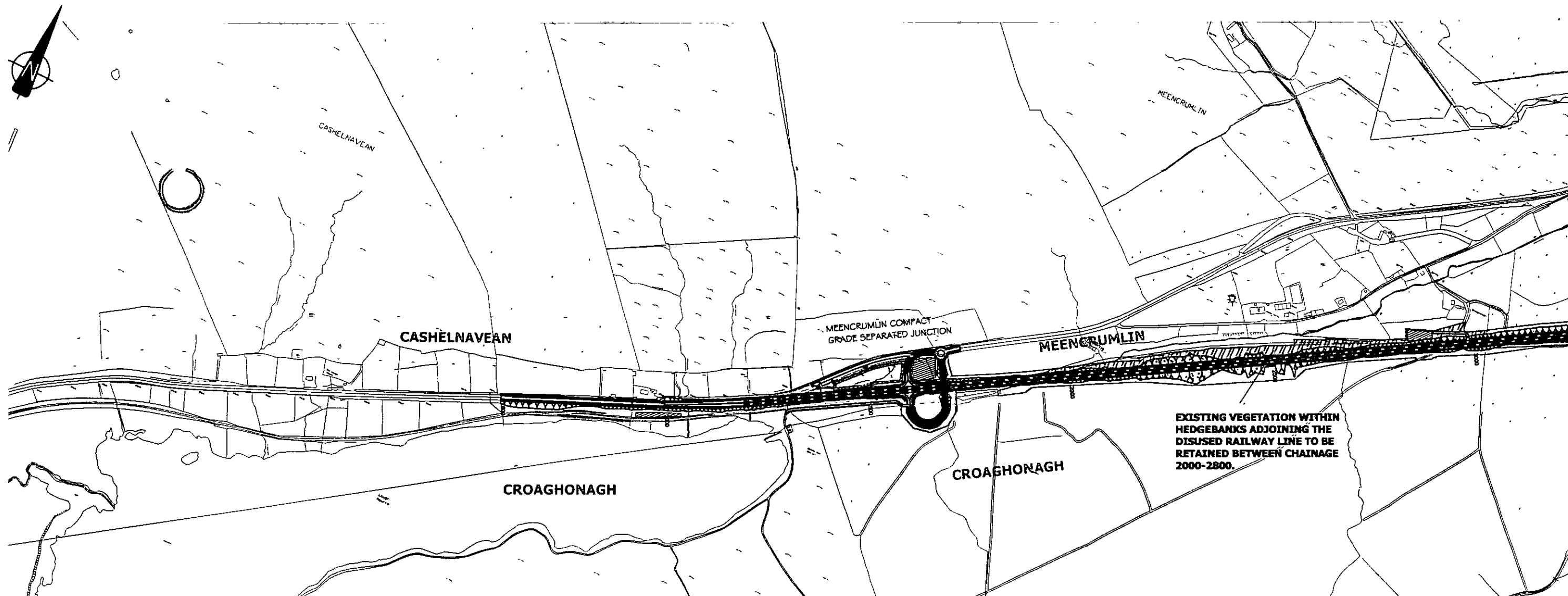
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.

Figure 7.18

Issue

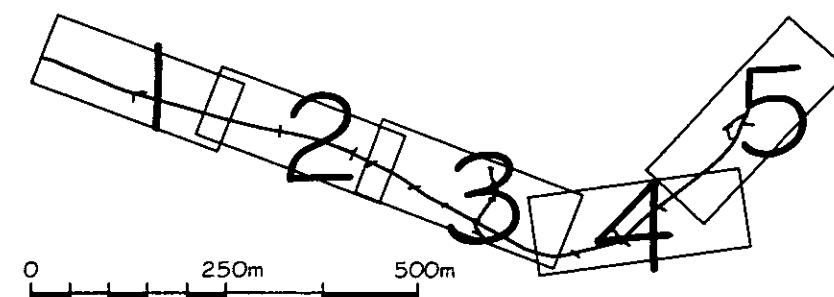
B



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KEYPLAN



**LEGEND**  
 PROPOSED BROADLEAVED WOODLAND  
 PROPOSED MIXED WOODLAND  
 PROPOSED UNIMPROVED GRASSLAND  
 PROPOSED GRASSLAND  
 CPO BOUNDARY

PROPOSED UNIMPROVED GRASSLAND/  
SCRUB  
 PROPOSED GRASSLAND/SCRUB  
 POSSIBLE LOCATION OF  
SITE COMPOUND  
 DRAINAGE PONDS  
 NOISE BARRIER (Refer to Figure 12.2)



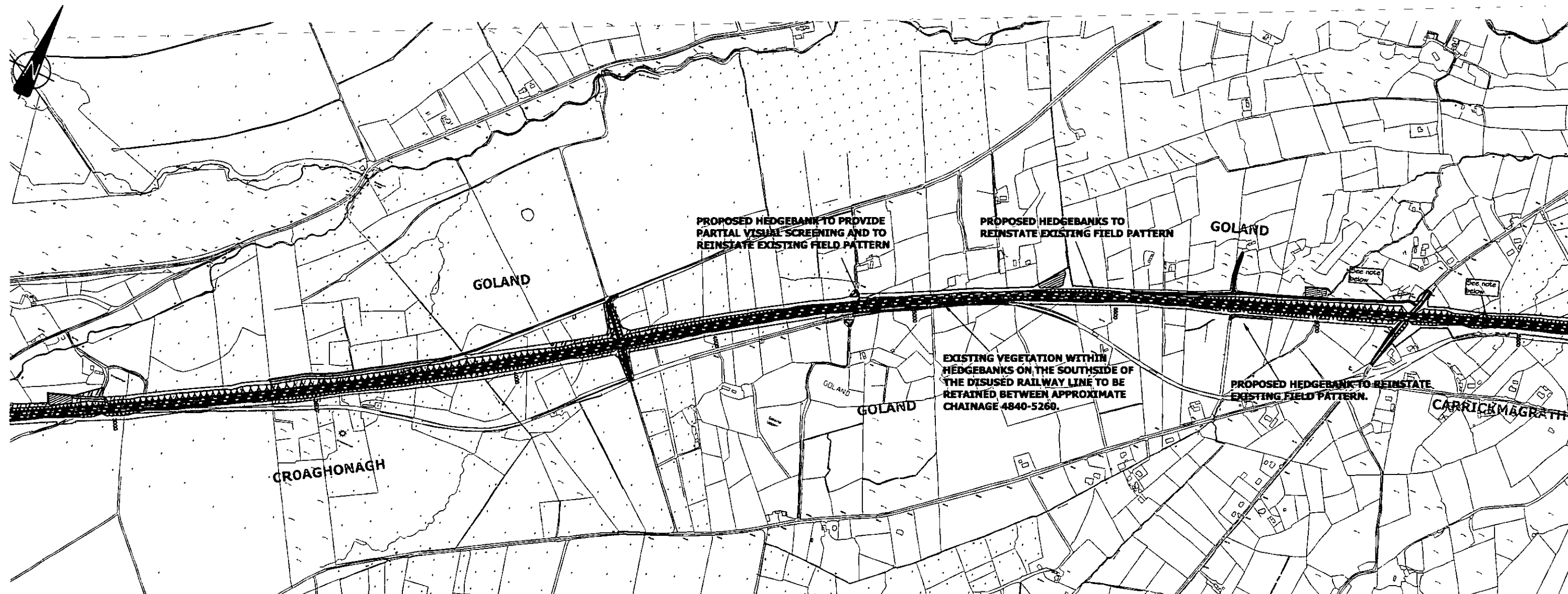
**NRA**  
National Roads Authority  
An tArdánas um Bheithre Náisiúnta

**County Council**  
DUBLIN COUNTY COUNCIL

issue	by	chk.	app.	date	comment
A	G.E.F.	V.P.	H.T.	01.05.07	ALIGNMENT, CPO BOUNDARY REVISED
B	G.E.F.	V.P.	H.T.	05.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS  
 Drawing Title: INDICATIVE LANDSCAPE  
MITIGATION MEASURES  
SHEET 1 OF 5  
 Date: NOV 2007 Scale: AS SHOWN

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DUBLIN 18  
 Drawing no. Figure 7.19 Issue B



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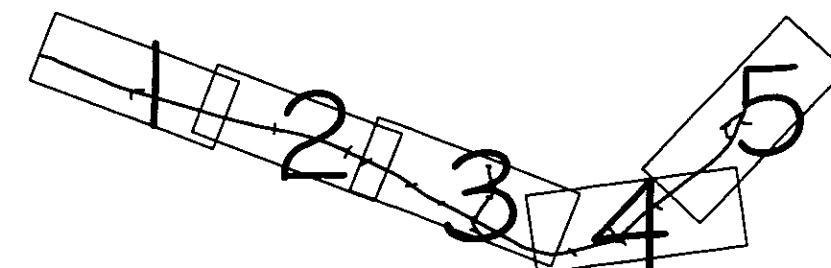
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#### Note:

Between chainage 6150-6200 landtake for road  
construction to be minimised in order to limit direct  
impacts upon existing wet grassland

Between chainage 6400-6500 landtake for road  
construction to be minimised in order to limit direct  
impacts upon existing Oak - Ash - Hazel woodland  
(WN2)

#### KEYPLAN



**LEGEND**  
 PROPOSED BROADLEAVED WOODLAND  
 PROPOSED MIXED WOODLAND  
 PROPOSED UNIMPROVED GRASSLAND  
 PROPOSED GRASSLAND  
 CPO BOUNDARY

PROPOSED UNIMPROVED GRASSLAND/  
SCRUB  
 PROPOSED GRASSLAND/SCRUB  
 POSSIBLE LOCATION OF  
SITE COMPOUND  
 DRAINAGE PONDS  
 NOISE BARRIER (Refer to Figure 12.2)



**NRA**  
National Roads Authority  
An tArdán um Bóthar Náisiúnta

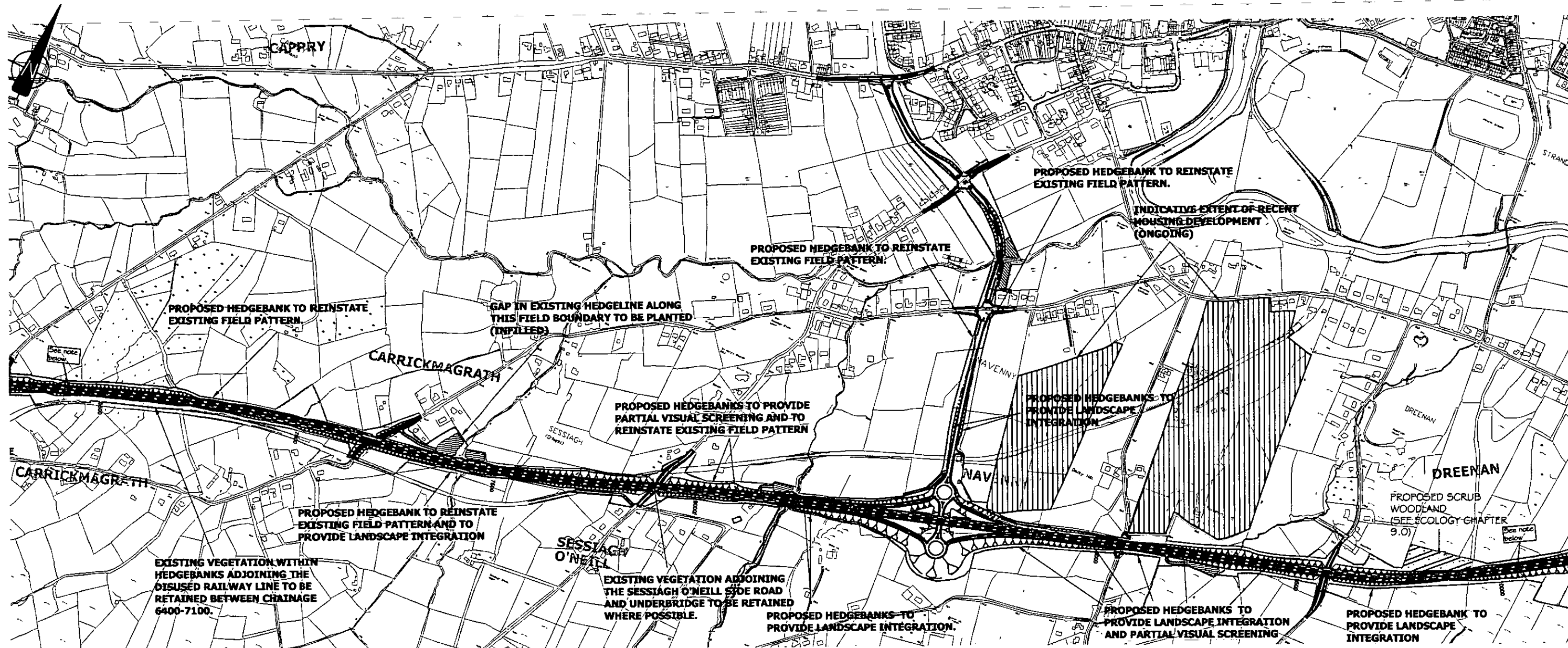


drawn	by	chk.	app.	date	comment
A	G.E.P.	V.F.	H.T.	01.09.07	ALIGNMENT, CPO BOUNDARY REVISED
B	G.E.P.	V.F.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS  
 Drawing Title  
INDICATIVE LANDSCAPE  
MITIGATION MEASURES  
SHEET 2 OF 5  
 Date  
NOV 2007  
 Scale  
AS SHOWN

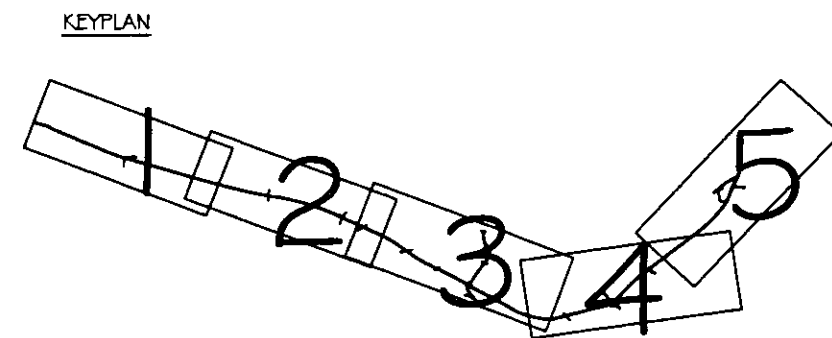
**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**  
 SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18  
 Drawing no.  
Figure 7.19  
 Issue  
B





**Note:**

Between chainage 10000-10140  
 & 12230-12250 landtake for road construction to be minimised in order to limit direct impacts upon existing semi-natural woodland (WN1 & WN6)



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**LEGEND**

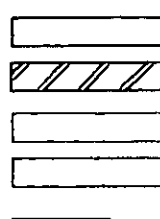
PROPOSED BROADLEAVED WOODLAND

PROPOSED MIXED WOODLAND

PROPOSED UNIMPROVED GRASSLAND

PROPOSED GRASSLAND

CPO BOUNDARY



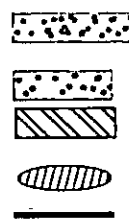
PROPOSED UNIMPROVED GRASSLAND/SCRUB

PROPOSED GRASSLAND/SCRUB

POSSIBLE LOCATION OF SITE COMPOUND

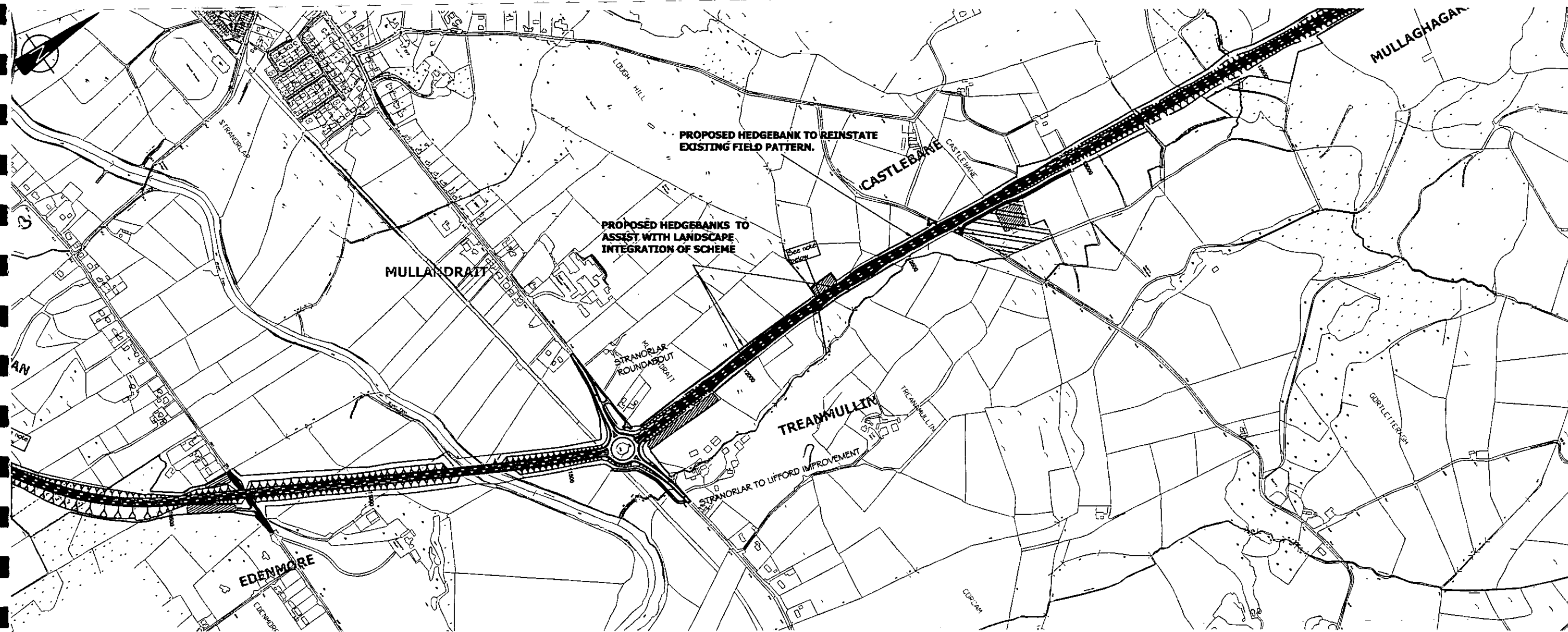
DRAINAGE PONDS

NOISE BARRIER (Refer to Figure 12.2)

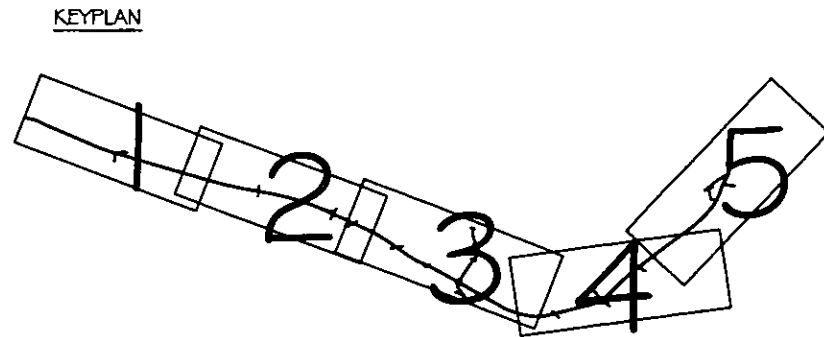


DATE	BY	CHK.	APP.	DATE	COMMENT
A	G.E.P.	V.F.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY REVISED
B	G.E.P.	V.F.	H.T.	03.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

<b>Project</b> N13 / N15 BALLYBOFEY STRANORLAR BYPASS		<b>McCarthy Hyder Consultants Consulting Engineers</b> SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
<b>Drawing Title</b> INDICATIVE LANDSCAPE MITIGATION MEASURES SHEET 3 OF 5			
<b>Date</b> NOV 2007	<b>Scale</b> AS SHOWN	<b>Drawing no.</b> Figure 7.19	<b>Issue</b> B



**Note:**  
 Between chainage 10000-10140  
 & 12230-12250 landtake for road construction to  
 be minimised in order to limit direct impacts upon  
 existing semi-natural woodland (WN1 & WN6)



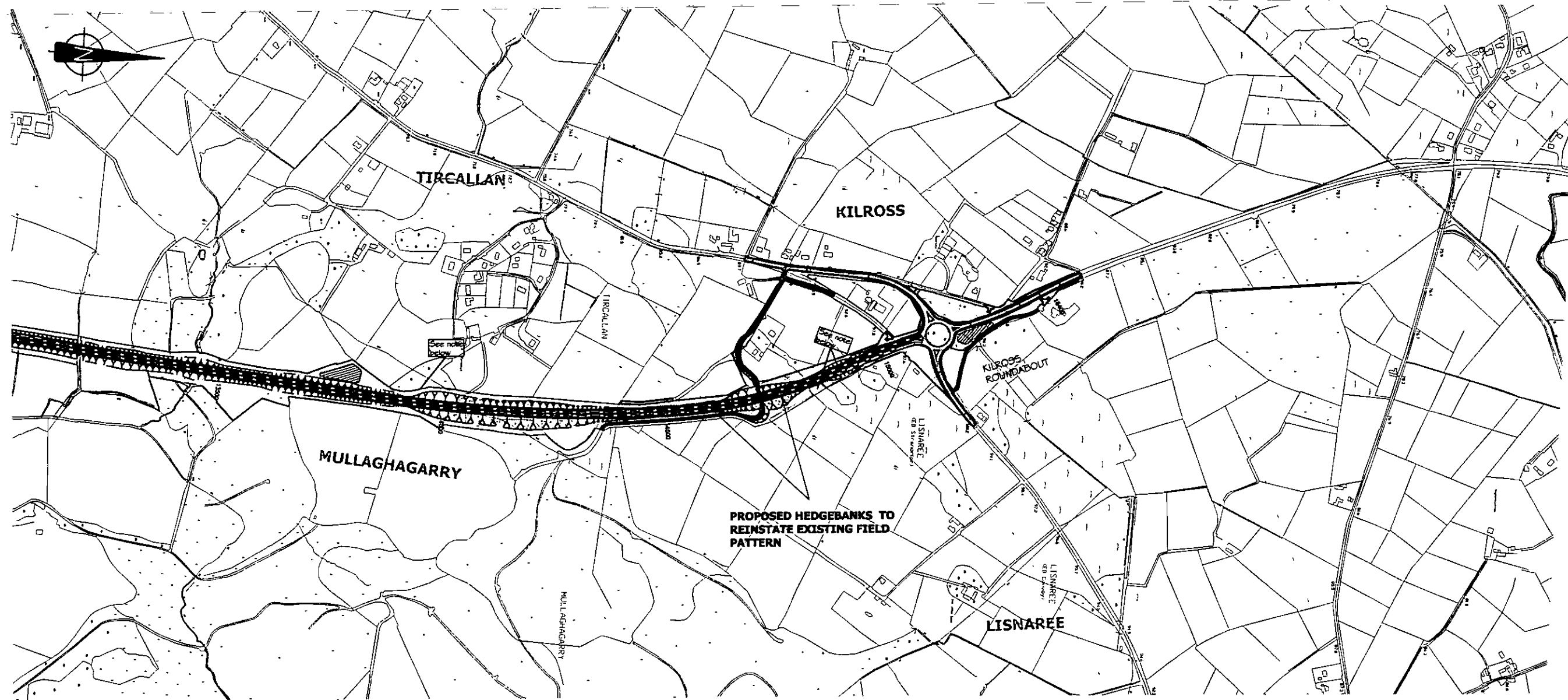
PRELIMINARY DESIGN SHOWN IN DRAWING IS  
 SUBJECT TO CHANGE DURING DETAIL DESIGN

OS mapping copyright - Rialtas  
 na hÉireann / Government of Ireland 1996

LEGEND	
PROPOSED BROADLEAVED WOODLAND	
PROPOSED MIXED WOODLAND	
PROPOSED UNIMPROVED GRASSLAND	
PROPOSED GRASSLAND	
CPO BOUNDARY	
PROPOSED UNIMPROVED GRASSLAND/ SCRUB	
PROPOSED GRASSLAND/SCRUB	
POSSIBLE LOCATION OF SITE COMPOUND	
DRAINAGE PONDS	
NOISE BARRIER (Refer to Figure 12.2)	

 NATIONAL DEVELOPMENT PLAN YOUR PLAN - YOUR FUTURE		 National Roads Authority An tAidís um Beithir Náisiúna		 Donegal County Council	
DATE	BY	CHK.	APP.	DATE	COMMENTS
A	G.E.F.	V.P.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY REVISED
B	G.E.F.	V.P.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project		N13 / N15 BALLYBOFEY STRANORLAR BYPASS		McCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS	
Drawing Title		INDICATIVE LANDSCAPE MITIGATION MEASURES SHEET 4 OF 5		SUITE 24, THE MALL, SEACON COURT, SANDYFORD, DUBLIN18	
Date		NOV 2007		Drawing no.	
Scale		AS SHOWN		Figure 7.19	
				Issue	
				B	



PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

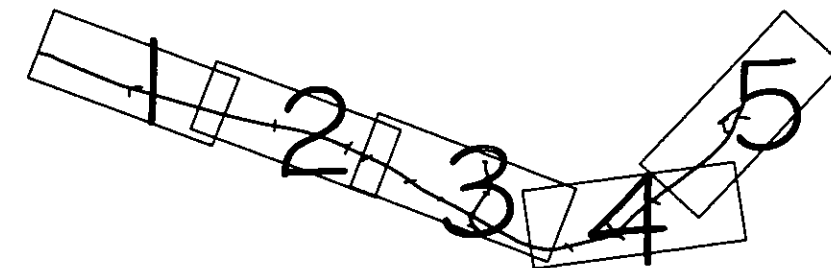
OS mapping copyright - Rialtas  
na hÉireann / Government of Ireland 1996

**Note:**

Between chainage 13900 - 14050 landtake for road construction to be minimised in order to limit direct impacts upon existing scrub (WS1) and mixed broadleaved woodland (WD1).

At chainage 14,900 landtake for road construction to be minimised to limit direct impacts upon existing wet grassland.

**KEYPLAN**



**LEGEND**  
 PROPOSED BROADLEAVED WOODLAND  
 PROPOSED MIXED WOODLAND  
 PROPOSED UNIMPROVED GRASSLAND  
 PROPOSED GRASSLAND  
 CPO BOUNDARY

PROPOSED UNIMPROVED GRASSLAND/SCRUB  
 PROPOSED GRASSLAND/SCRUB  
 POSSIBLE LOCATION OF SITE COMPOUND  
 DRAINAGE PONDS  
 NOISE BARRIER (Refer to Figure 12.2)



**NRA**  
National Roads Authority  
An tArdáil um Bádair Náisiúnta



issue	by	chk.	app.	date	comment
A	G.E.P.	V.P.	H.T.	01.09.07	ALIGNMENT, CPO BOUNDARY REVISED
B	G.E.P.	V.P.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
INDICATIVE LANDSCAPE  
MITIGATION MEASURES  
SHEET 5 OF 5

Date: NOV 2007 Scale: AS SHOWN

**McCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 7.19 Issue B



PRELIMINARY DESIGN SHOWN IN DRAWING IS  
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0 2000m 4000m

## LEGEND

- Preliminary Design
- Watercourse

## NOTES:

1. WATER QUALITY SAMPLES WERE COLLECTED FROM THE SEVEN MAIN WATERCOURSES (EIGHT CROSSING POINTS SAMPLED) CROSSED BY THE PRELIMINARY DESIGN IN JULY 2002 AND MARCH 2003 AS PART OF THE ASSESSMENT PROCESS AND ARE PRESENTED IN APPENDICES 9.1 & 9.2. SAMPLING WAS CARRIED OUT IN APPROPRIATE LOCATIONS DOWNSTREAM OF THE PROPOSED CROSSING POINTS AS SHOWN ON FIGURE 9.2.



issue	by	chk.	app.	date	comment
A	ST	LW	LW	01.08.03	SECOND EDITION
B	ST	LW	LW	01.08.04	ROUTE ALIGNMENT / CPO AMENDED
C	ST	HN	LW	23.06.04	COMMENTS INCORPORATED
D	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT
E	G.E.P.	V.P.	H.T.	01.03.07	ALIGNMENT - DATE REVISED
F	G.E.P.	V.T.	H.T.	18.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
MAIN WATERCOURSES  
IN THE STUDY AREA

Date: NOV 2007

Scale: N.T.S.

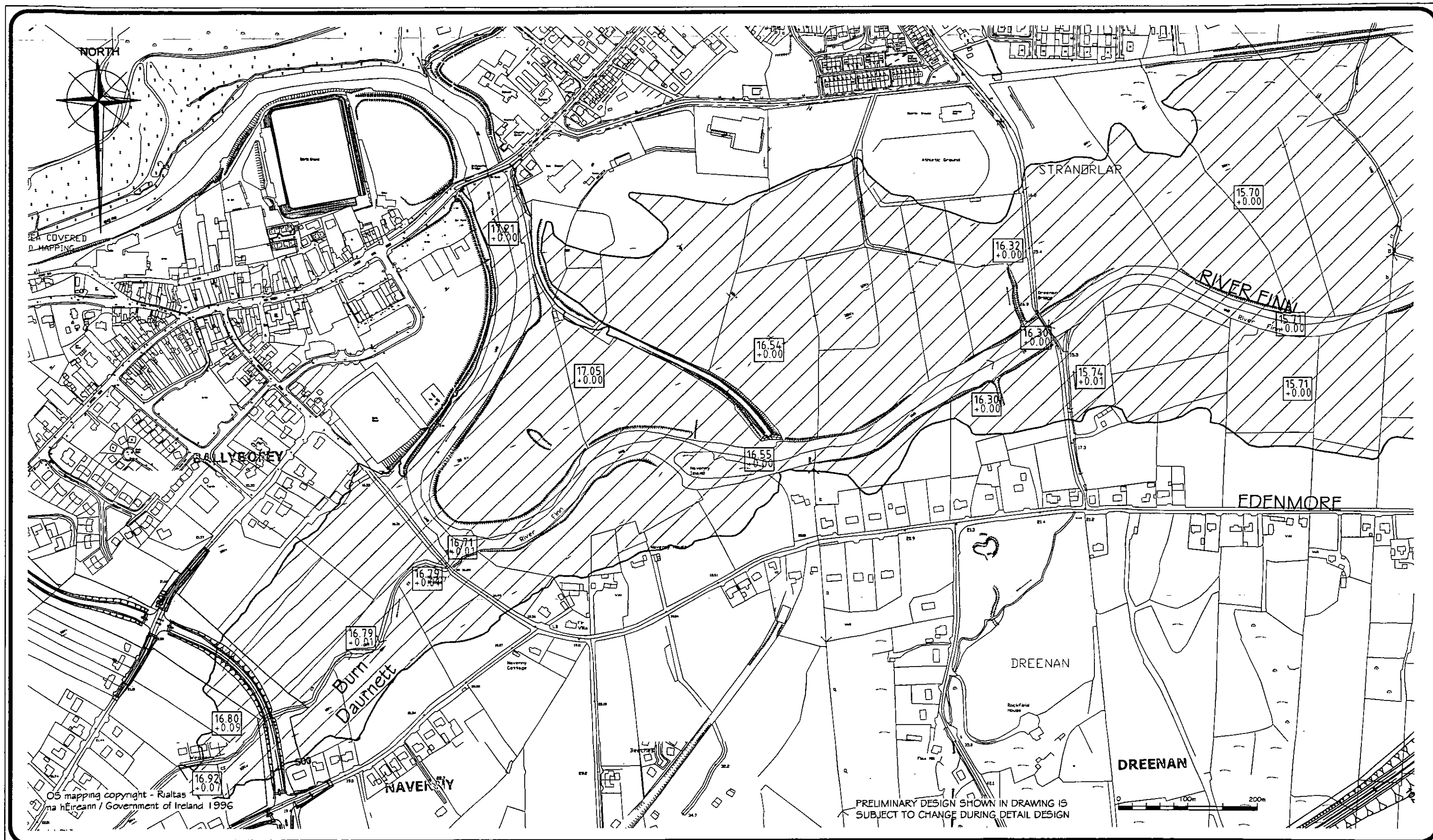
McCarthy Hyder Consultants  
CONSULTING ENGINEERS

SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 11

Drawing no.  
Figure 8.1

Issue  
F





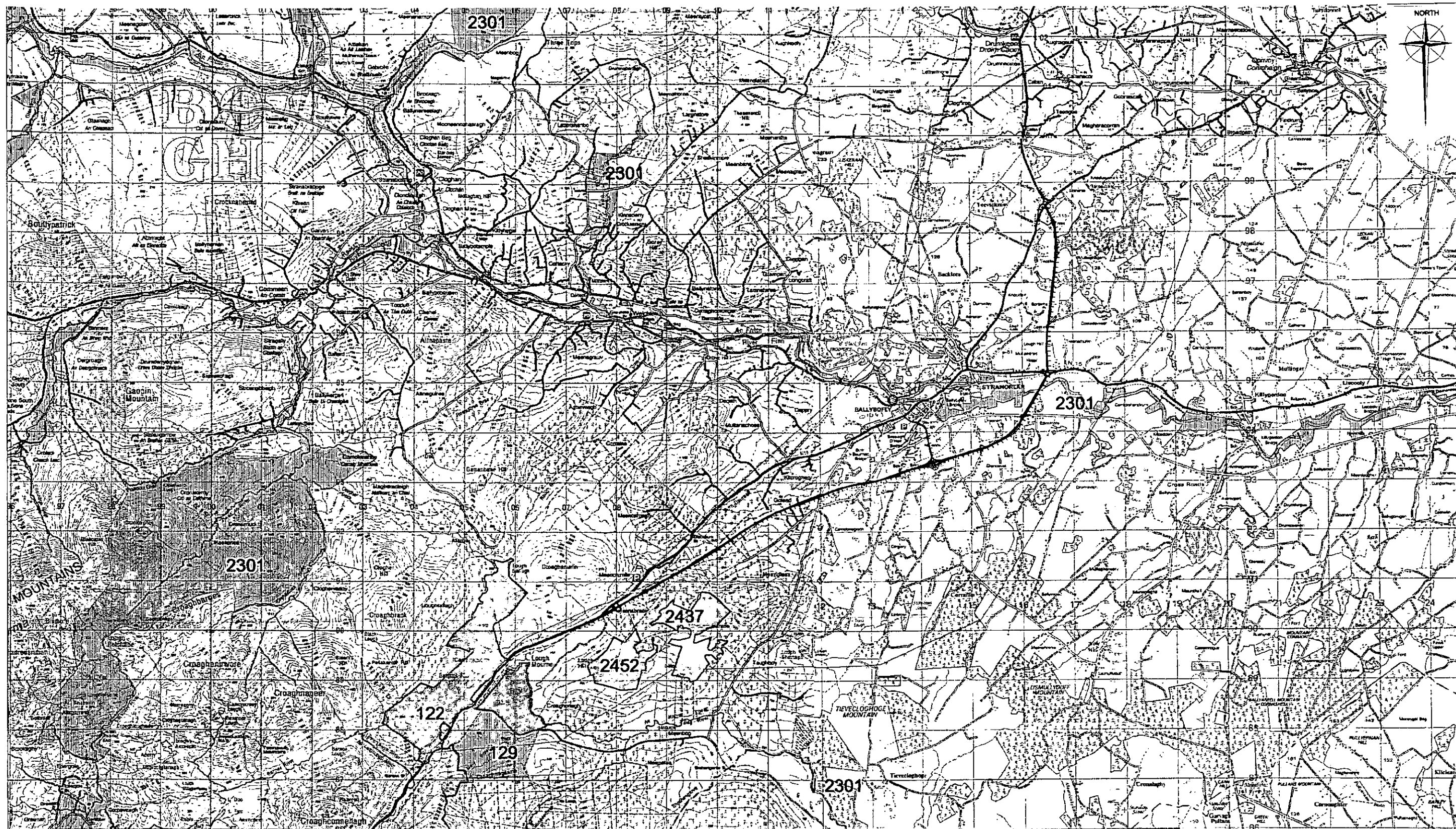
LEGEND	
	CPO BOUNDARY
	PRELIMINARY DESIGN
16.85	BASELINE 1 IN 100 YR FLOOD LEVEL (Metres above Malin Head Datum)
+0.01	PROPOSED CHANGE IN 1 IN 100 YR FLOOD LEVEL (Metres)
	EXTENT OF 1 IN 100 YR FLOOD EVENT (BASELINE INDISTINGUISHABLE FROM PROPOSED)

 <small>NATIONAL DEVELOPMENT PLAN YOUR PLAN - YOUR FUTURE</small>		 <small>National Roads Authority An t-Ardán na Ríomhán agus Tíomh</small>		 <small>Comhairle Chontae Dhún na nDáil DONEGAL COUNTY COUNCIL</small>	
issue	by	chk.	app.	date	comment
1	G.E.P.	V.T.	H.T.	01.03.07	ALIGNMENT & CPO BOUNDARY & DATE REVISED
2	G.E.P.	V.T.	H.T.	19.10.07	CPO & ALIGNMENT AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

<b>Project</b> N13 / N15 BALLYBOFEY STRANORLAR BYPASS		<b>McCarthy Hyder Consultants</b> CONSULTING ENGINEERS SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
<b>Drawing Title</b> RIVER FINN AND FLOODPLAIN INDICATIVE 1 IN 100 YEAR FLOODING (SHEET 1 OF 2)		 Drawing no.	
Date NOV 2007		Scale N.T.S.	
Figure 8.2		Issue G	







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## LEGEND

— PRELIMINARY DESIGN



NATURAL HERITAGE AREAS (NHA)  
SITE CODE  
122 CASHELNAVEAN BOG  
2437 MEENAGARRANROE BOG  
2452 LOUGH HILL BOG



CANDIDATE SPECIAL AREA OF CONSERVATION (cSAC)  
SITE CODE  
129 CROAGHONAGH BOG  
2301 RIVER FINN



**NRA**  
National Roads Authority  
An tArdáil um Bóithr Náisiúnta



Comhairle Contae Donegal  
DONEGAL COUNTY COUNCIL

date	by	chk.	app.	date	comment
A	MJM	HN	LW	10.03.05	FIRST ISSUE
B	G.E.P.	V.F.	H.T.	01.11.06	REVISED ROUTE ALIGNMENT
C	G.E.P.	V.F.	H.T.	01.08.07	ALIGNMENT & DATE REVISED
D	G.E.P.	V.T.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
**N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS**

Drawing Title  
**DESIGNATED CONSERVATION  
AREAS**

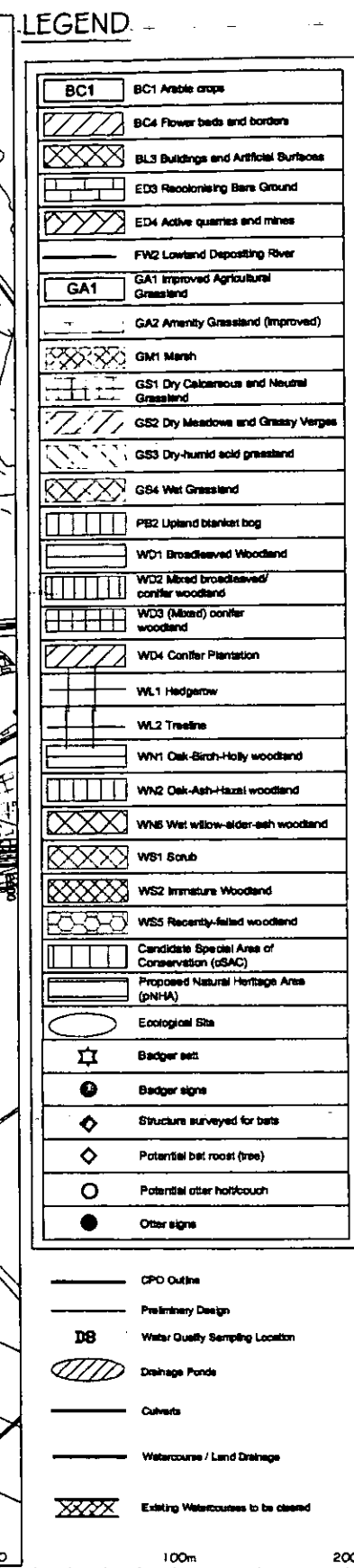
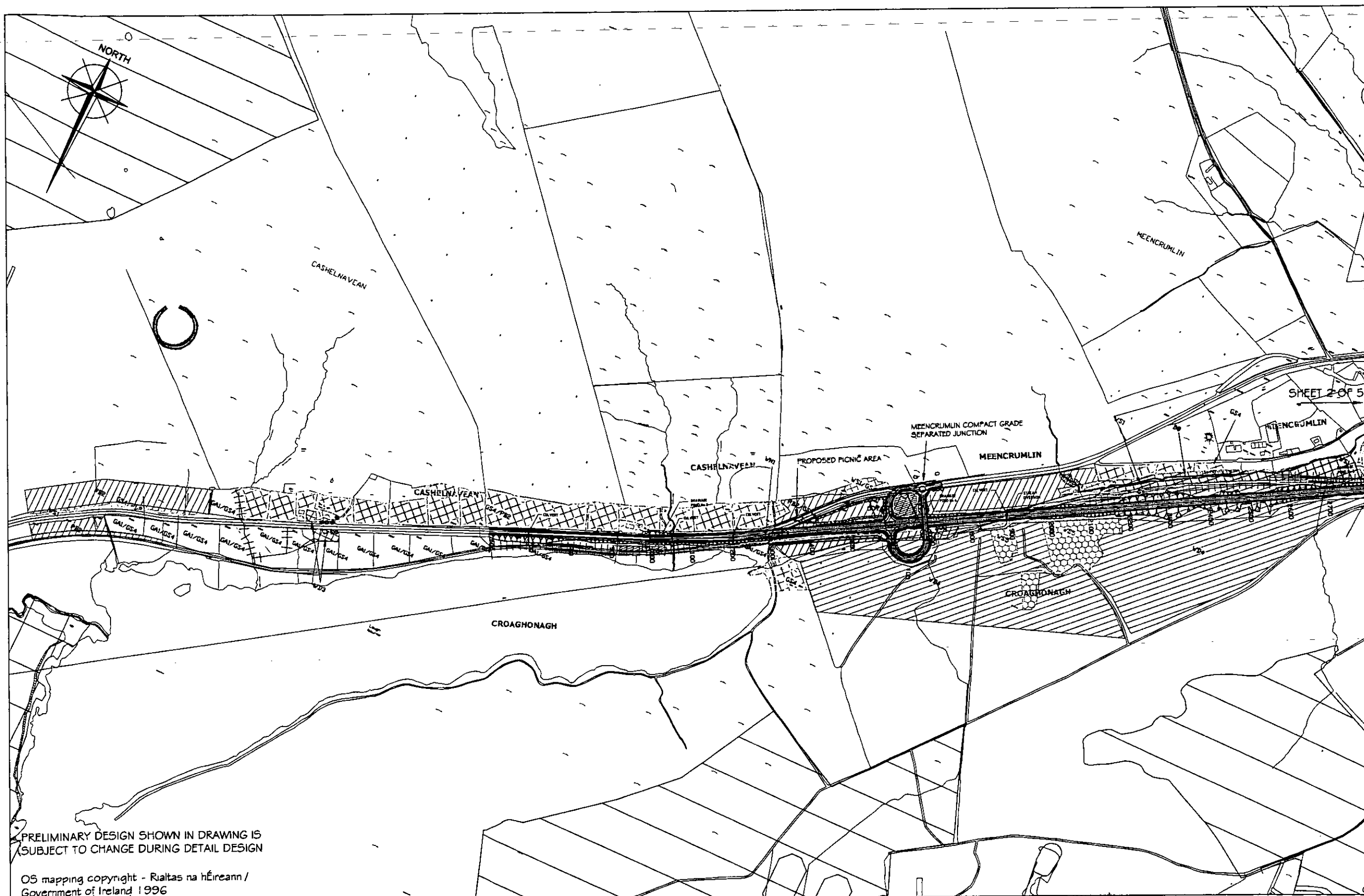
Date **NOV 2007** Scale **N.T.S.**

**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**  
SUITE 24, THE MALL,  
SANDYFORD,  
DUBLIN 18



Drawing no.  
**Figure 9.1**

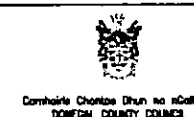
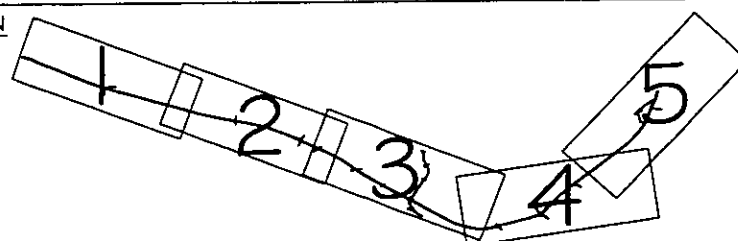
Issue  
**D**



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KEYPLAN



Rev	By	CHK	APP	DATE	COMMENT
A	S.T.	L.W.	L.W.	11.09.03	FIRST ISSUE
B	S.T.	L.W.	L.W.	16.09.04	GENERAL AMENDMENTS
C	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
D	G.E.P.	V.P.	H.T.	19.12.06	HABITAT MAPPING REVISED 14.12.2006
E	G.E.P.	V.P.	H.T.	01.08.07	ALIGNMENT & CPO BOUNDARY UPDATED
F	G.E.P.	V.P.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
HABITAT MAP  
(SHEET 1 OF 5)

Date: NOV 2007 Scale: N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 9.2

Issue: F





# LEGEND

BC1	BC1 Arable crops
	BC4 Flower beds and borders
	BLS Buildings and Artificial Surfaces
	ED3 Recolonising Bare Ground
	ED4 Active quarries and mines
	FA2 Lowland Depositing River
GA1	GA1 Improved Agricultural Grassland
	GA2 Amenity Grassland (improved)
	GM1 Marsh
	GS1 Dry Calcareous and Neutral Grassland
	GS2 Dry Meadows and Grassy Verges
	GS3 Dry-humid acid grassland
	GS4 Wet Grassland
	PS2 Upland blanket bog
	WD1 Broadleaved Woodland
	WD2 Mixed broadleaved/ conifer woodland
	WD3 (Mixed) conifer woodland
	WD4 Conifer Plantation
	WL1 Hedgerow
	WL2 Treeline
	WN1 Oak-Birch-Holly woodland
	WN2 Oak-Ash-Hazel woodland
	WN6 Wet willow-sedge-ash woodland
	WS1 Scrub
	WS2 Immature Woodland
	WS5 Recently-felled woodland
	Candidate Special Area of Conservation (CSAC)
	Proposed Natural Heritage Area (pNHA)
	Ecological Site
	Badger sett
	Badger signs
	Structure surveyed for bats
	Potential bat roost (tree)
	Potential otter hol/vouch
	Other signs

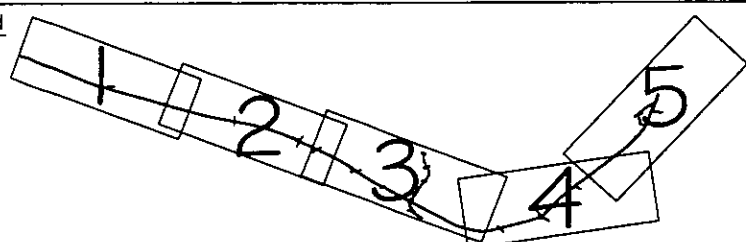
	CPO Outline
	Preliminary Design
D8	Water Quality Sampling Location
	Drainage Ponds
	Culverts
	Watercourse / Land Drainage
	Existing Watercourses to be closed

100m 200m

PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

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Government of Ireland 1996

## KEYPLAN



**NRA**  
National Roads Authority  
An tAidias um Bóthar Náisiúnta



Issue	by	chk.	app.	date	comment
A	S.T.	L.W.	L.W.	11.09.06	FIRST ISSUE
B	S.T.	L.W.	L.W.	16.09.06	GENERAL AMENDMENTS
C	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
D	G.E.P.	V.P.	H.T.	19.12.06	HABITAT MAPPING REVISED 14.12.2006
E	G.E.P.	V.P.	H.T.	01.05.07	ALIGNMENT & CPO BOUNDARY UPDATED
F	G.E.P.	V.T.	H.T.	28.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
**N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS**

Drawing Title  
**HABITAT MAP  
(SHEET 2 OF 5)**

Date  
NOV 2007

Scale  
N.T.S.

**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**  
SUITE 24, THE MALL,  
REACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.  
**Figure 9.2**

Issue  
**F**



# LEGEND

BC1	BC1 Arable crops
BC4	BC4 Flower beds and borders
BL3	BL3 Buildings and Artificial Surfaces
ED3	ED3 Recolonising Bare Ground
ED4	ED4 Active quarries and mines
FW2	FW2 Lowland Depositing River
GA1	GA1 Improved Agricultural Grassland
GA2	GA2 Amenity Grassland (Improved)
GM1	GM1 Marsh
GS1	GS1 Dry Calcareous and Neutral Grassland
GS2	GS2 Dry Meadows and Grassy Verges
GS3	GS3 Dry-humid acid grassland
GS4	GS4 Wet Grassland
PB2	PB2 Upland blanket bog
WD1	WD1 Broadleaved Woodland
WD2	WD2 Mixed broadleaved/conifer woodland
WD3	WD3 (Mixed) conifer woodland
WD4	WD4 Conifer Plantation
WL1	WL1 Hedgerow
WL2	WL2 Treeline
WN1	WN1 Oak-Birch-Holly woodland
WN2	WN2 Oak-Ash-Hazel woodland
WN3	WN3 Wet willow-slder-ash woodland
WS1	WS1 Scrub
WS2	WS2 Immature Woodland
WS3	WS3 Recently-felled woodland
	Candidate Special Area of Conservation (cSAC)
	Proposed Natural Heritage Area (pNHA)
	Ecological Site
	Badger sett
	Badger signs
	Structure surveyed for bats
	Potential bat roost (tree)
	Potential otter holocaust
	Otter signs

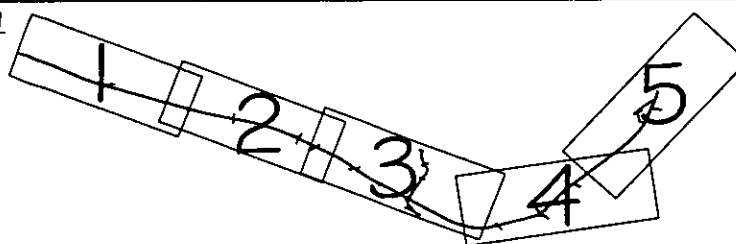
	CPO Outline
	Preliminary Design
D4-D6	Water Quality Sampling Location
	Drainage Ponds
	Culverts
	Watercourse / Land Drainage
	Existing Watercourses to be cleared

100m 200m

PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

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## KEYPLAN



Issue	By	Chk.	App.	Date	Comments
A	S.T.	L.W.	L.W.	11.09.03	FIRST ISSUE
B	S.T.	L.W.	L.W.	16.06.04	GENERAL AMENDMENTS
C	G.Z.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
D	G.Z.P.	V.P.	H.T.	18.12.06	HABITAT MAPPING REVISED 14.12.2006
E	G.Z.P.	V.P.	H.T.	01.03.07	ALIGNMENT & CPO BOUNDARY UPDATED
F	G.Z.P.	V.T.	H.T.	02.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
HABITAT MAP  
(SHEET 3 OF 5)

Date  
NOV 2007

Scale  
N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 11

Drawing no.  
Figure 9.2

Issue  
F



# LEGEND

BC1	BC1 Arable crops
BC4	BC4 Flower beds and borders
BL3	BL3 Buildings and Artificial Surfaces
ED3	ED3 Recolonising Bare Ground
ED4	ED4 Active quarries and mines
FV2	FV2 Lowland Depositing River
GA1	GA1 Improved Agricultural Grassland
GA2	GA2 Amenity Grassland (Improved)
GM1	GM1 Marsh
GS1	GS1 Dry Calcareous and Neutral Grassland
GS2	GS2 Dry Meadows and Grassy Verges
GS3	GS3 Dry-humid acid grassland
GS4	GS4 Wet Grassland
PS2	PS2 Upland blanket bog
WD1	WD1 Broadleaved Woodland
WD2	WD2 Mixed broadleaved/conifer woodland
WD3	WD3 (Mixed) conifer woodland
WD4	WD4 Conifer Plantation
WL1	WL1 Hedgerow
WL2	WL2 Treeline
WN1	WN1 Oak-Birch-Holly woodland
WN2	WN2 Oak-Ash-Hazel woodland
WN6	WN6 Wet willow-alder-ash woodland
WS1	WS1 Scrub
WS2	WS2 Immature Woodland
WS5	WS5 Recently-felled woodland
	Candidate Special Area of Conservation (SAC)
	Proposed Natural Heritage Area (pNHA)
	Ecological Site
☆	Badger sett
●	Badger signs
◇	Structure surveyed for bats
◇	Potential bat roost (tree)
○	Potential otter holloough
●	Other signs

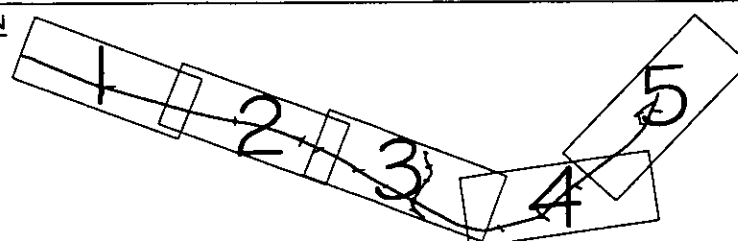
—	CPO Outline
—	Preliminary Design
D3	Water Quality Sampling Location
▨	Drainage Ponds
—	Culverts
—	Watercourse / Land Drainage
▨	Existing Watercourses to be closed

100m 200m

PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

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Government of Ireland 1996

## KEYPLAN



REVISED	BY	CHK.	APP.	DATE	COMMENT
A	S.T.	L.W.	L.W.	11.09.00	FIRST ISSUE
B	S.T.	L.W.	L.W.	16.06.04	GENERAL AMENDMENTS
C	G.E.P.	V.F.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
D	G.E.P.	V.F.	H.T.	18.12.06	HABITAT MAPPING REVISED 14.12.2006
E	G.E.P.	V.F.	H.T.	01.09.07	ALIGNMENT & CPO BOUNDARY UPDATED
F	G.E.P.	V.F.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project N13 / N15 BALLYBOFFY  
STRANORLAR BYPASS

Drawing Title  
HABITAT MAP  
(SHEET 4 OF 5)

Date NOV 2007

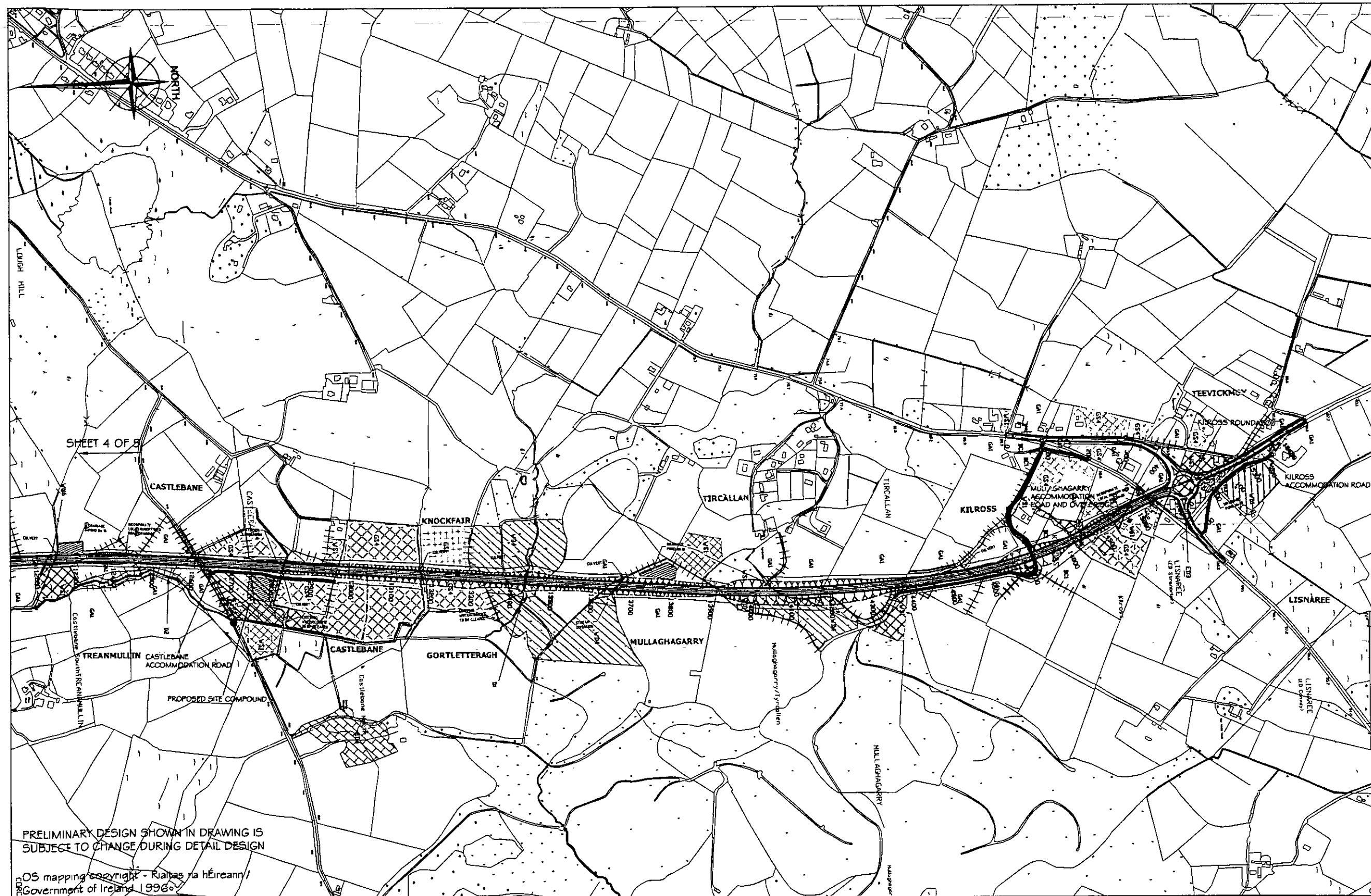
Scale N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 9.2

Issue F



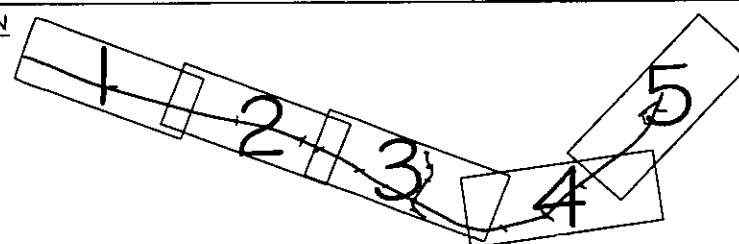


# LEGEND

BC1	BC1 Arable crops
BC4	BC4 Flower beds and borders
BL3	BL3 Buildings and Artificial Surfaces
ED3	ED3 Recolonising Bare Ground
ED4	ED4 Active quarries and mines
FA2	FA2 Lowland Depositing River
GA1	GA1 Improved Agricultural Grassland
GA2	GA2 Amenity Grassland (improved)
GM1	GM1 Marsh
GB1	GB1 Dry Calcareous and Neutral Grassland
GS2	GS2 Dry Meadows and Grassy Verges
GS3	GS3 Dry-humid acid grassland
GS4	GS4 Wet Grassland
PB2	PB2 Upland blanket bog
WD1	WD1 Broadleaved Woodland
WD2	WD2 Mixed broadleaved/ conifer woodland
WD3	WD3 (Mixed) conifer woodland
WD4	WD4 Conifer Plantation
WL1	WL1 Hedgerow
WL2	WL2 Treeline
WN1	WN1 Oak-Birch-Holly woodland
WN2	WN2 Oak-Ash-Hazel woodland
WN6	WN6 Wet willow-alder-ash woodland
WS1	WS1 Scrub
WS2	WS2 Immature Woodland
WS5	WS5 Recently-felled woodland
	Candidate Special Area of Conservation (SAC)
	Proposed Natural Heritage Area (PNHA)
	Ecological Site
☆	Badger sett
○	Badger signs
◇	Structure surveyed for bats
◇	Potential bat roost (tree)
○	Potential otter holch/ouch
●	Other signs

—	CPO Outline
—	Preliminary Design
M-D2	Water Quality Sampling Location
○	Drainage Ponds
—	Culverts
—	Watercourse / Land Drainage
---	Existing Watercourses to be closed

## KEYPLAN



Rev	by	chk.	app.	date	comment
A	S.T.	L.W.	L.W.	11.09.05	FIRST ISSUE
B	S.T.	L.W.	L.W.	16.06.04	GENERAL AMENDMENTS
C	G.E.P.	V.F.	H.T.	21.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
D	G.E.P.	V.F.	H.T.	12.12.06	HABITAT MAPPING REVISED 14.12.2006
E	G.E.P.	V.F.	H.T.	01.08.07	ALIGNMENT & CPO BOUNDARY UPDATED
F	G.E.P.	V.F.	H.T.	05.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title  
HABITAT MAP  
(SHEET 5 OF 5)

Date  
NOV 2007

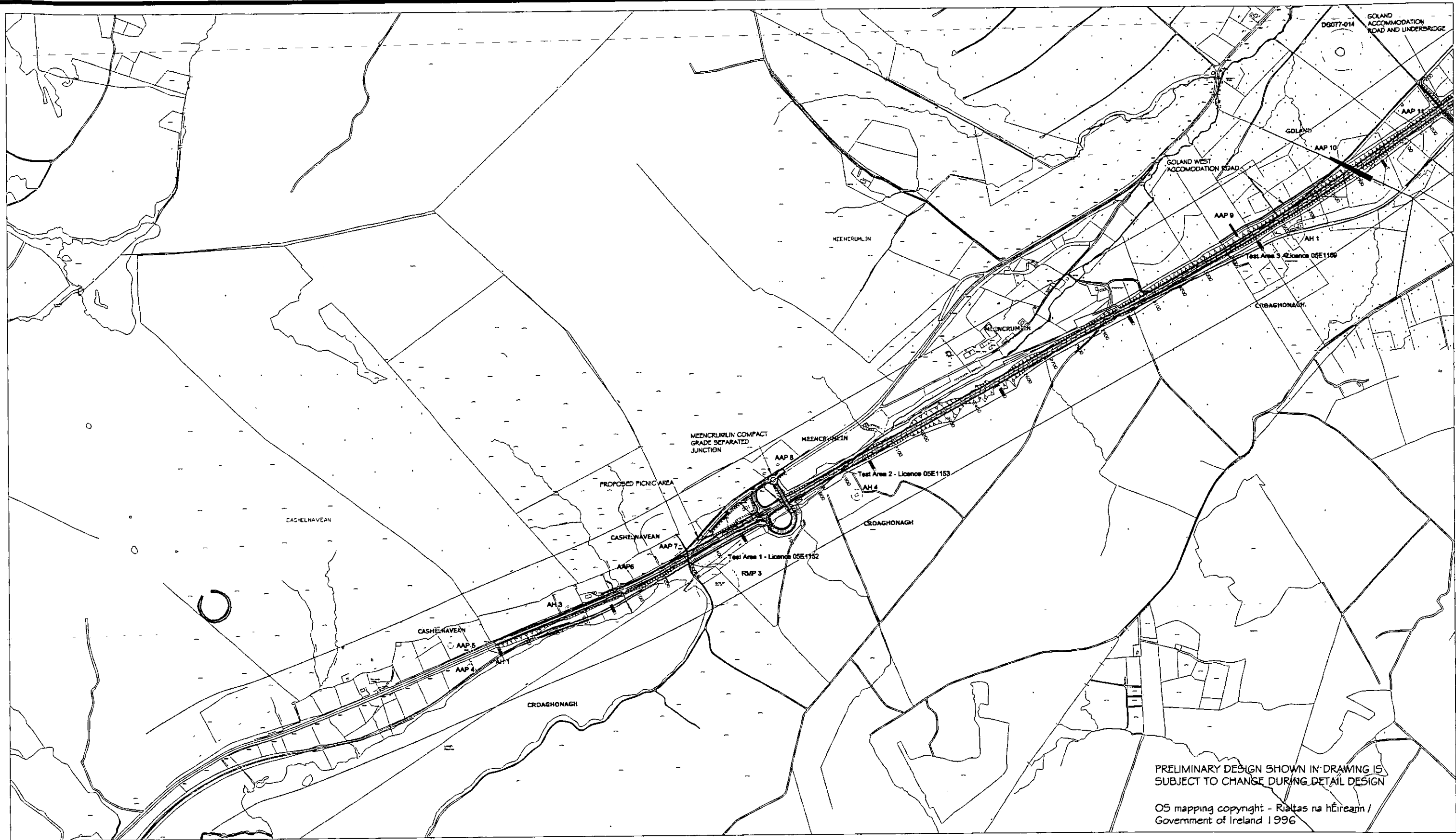
Scale  
N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN18



Drawing no.  
Figure 9.2

Issue  
F



#### LEGEND

- CPO BOUNDARY
- RMP ARCHAEOLOGICAL HERITAGE
- AH ARCHITECTURAL HERITAGE
- AAP AREA OF ARCHAEOLOGICAL POTENTIAL
- DG— RECORD OF MONUMENT# PLACES OUTSIDE STUDY AREA
- EXTENT OF ARCHAEOLOGICAL FEATURE
- STUDY AREA

#### KEYPLAN



Comhairle Chontae Donegal  
DONEGAL COUNTY COUNCIL

issue	by	chk.	app.	date	comment
1	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
2	G.E.P.	V.P.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE REVISED
3	G.E.P.	V.T.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
**N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS**

Drawing Title  
**OS MAP SHOWING LINE OF  
PRELIMINARY DESIGN, FIELD  
NUMBERS AND POSSIBLE  
ARCHAEOLOGICAL FEATURES  
(SHEET 1 OF 5)**

Date  
NOV 2007

Scales  
NTS

**McCarthy Hyder Consultants  
CONSULTING ENGINEERS**

SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no

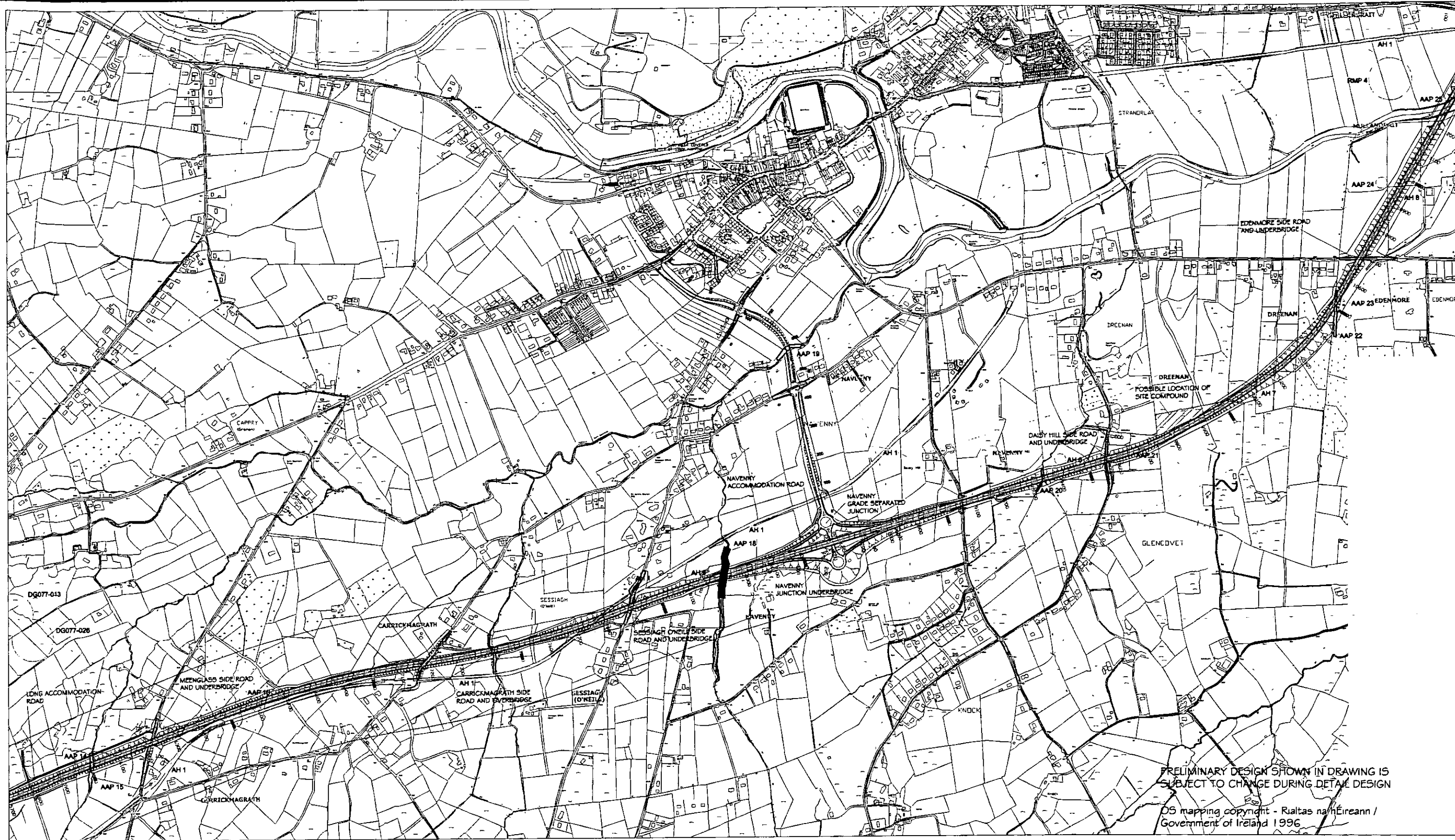
Figure 10.1

Issue

G







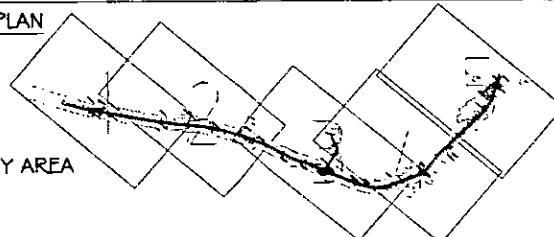
PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

OS mapping copyright - Rialtas na hÉireann /  
Government of Ireland 1996

#### LEGEND

- CPO BOUNDARY
- RMP ARCHAEOLOGICAL HERITAGE
- AH ARCHITECTURAL HERITAGE
- AAP AREA OF ARCHAEOLOGICAL POTENTIAL
- RECORD OF MONUMENT & PLACES OUTSIDE STUDY AREA
- EXTENT OF ARCHAEOLOGICAL FEATURE
- STUDY AREA

#### KEYPLAN



DATE	BY	CHK.	APP.	DATE	COMMENT
01.11.06	G.E.P.	V.F.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
01.08.07	G.E.P.	V.F.	H.T.	01.08.07	ALIGNMENT, CPO BOUNDARY & DATE REVISED
08.10.07	G.E.P.	V.T.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
OS MAP SHOWING LINE OF  
PRELIMINARY DESIGN, FIELD  
NUMBERS AND POSSIBLE  
ARCHAEOLOGICAL FEATURES  
(SHEET 3 OF 5)

Date NOV 2007

Scale N T S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no. Figure 10.1

Issue  
G

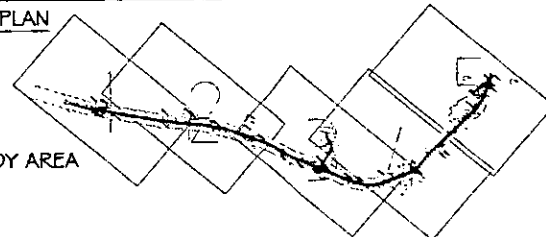


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#### LEGEND

- CPO BOUNDARY
- RMP ARCHAEOLOGICAL HERITAGE
- AH ARCHITECTURAL HERITAGE
- AAP AREA OF ARCHAEOLOGICAL POTENTIAL
- RECORD OF MONUMENT & PLACES OUTSIDE STUDY AREA
- EXTENT OF ARCHAEOLOGICAL FEATURE
- STUDY AREA

#### KEYPLAN



no.	by	chk.	app.	date	comment
E	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
F	G.E.P.	V.P.	H.T.	01.08.07	ALIGNMENT, CPO BOUNDARY & DATE REVISED
G	G.E.P.	V.P.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
OS MAP SHOWING LINE OF  
PRELIMINARY DESIGN, FIELD  
NUMBERS AND POSSIBLE  
ARCHAEOLOGICAL FEATURES  
(SHEET 4 OF 5)

Date  
NOV 2007

Scale  
N T S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 10.1

Index  
G

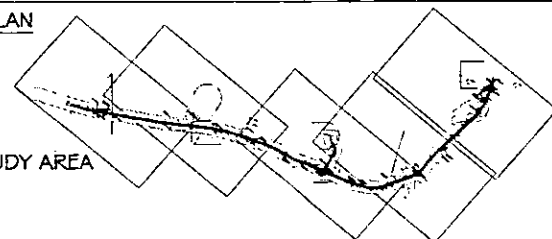




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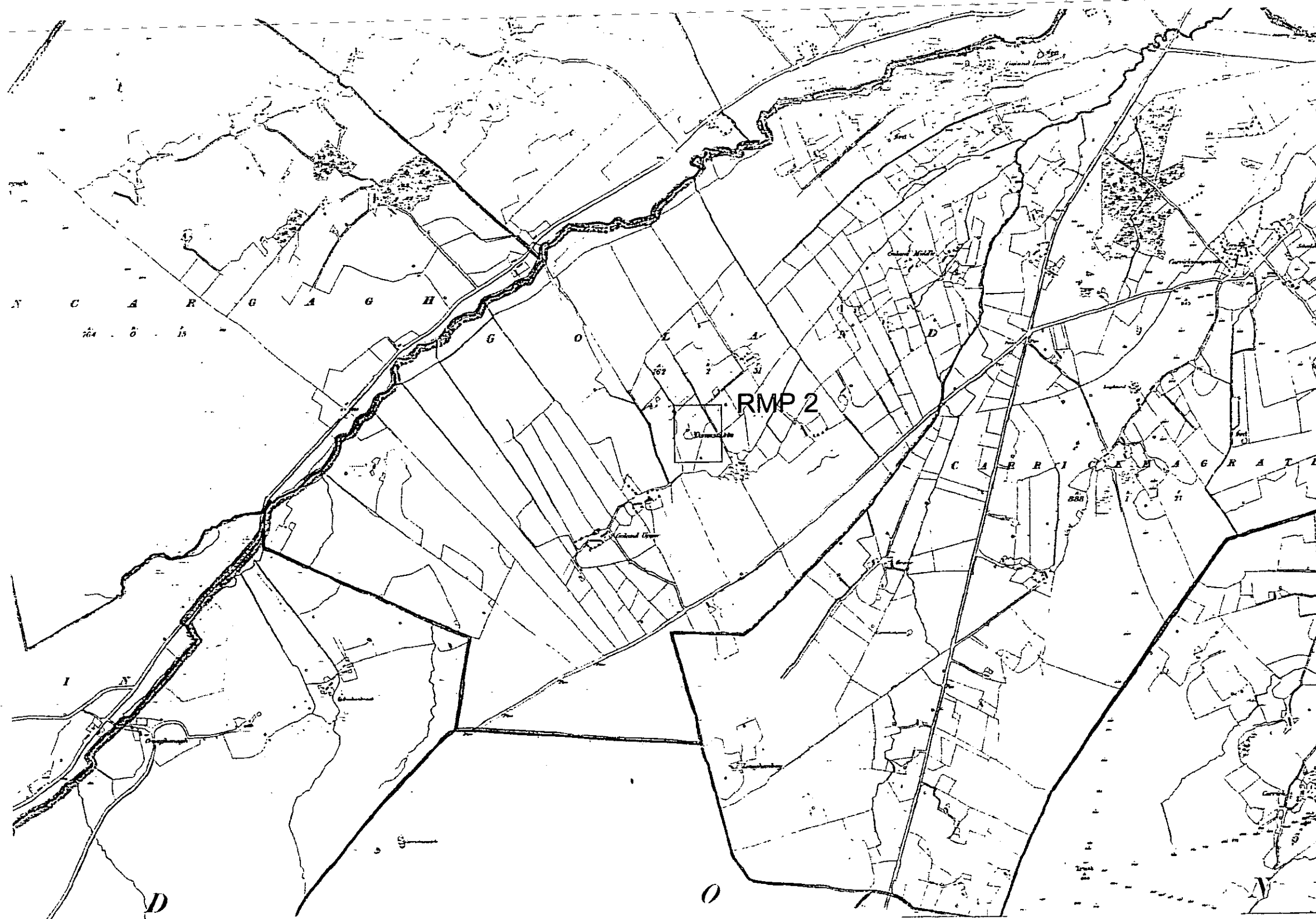
- CPO BOUNDARY
- RMP ARCHAEOLOGICAL HERITAGE
- AH ARCHITECTURAL HERITAGE
- AAP AREA OF ARCHAEOLOGICAL POTENTIAL
- RECORD OF MONUMENT & PLACES OUTSIDE STUDY AREA
- EXTENT OF ARCHAEOLOGICAL FEATURE
- STUDY AREA

# KEYPLAN



no.	by	chk.	app.	date	comment
1	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
2	G.E.P.	V.P.	H.T.	01.08.07	ALIGNMENT, CPO BOUNDARY & DATE REVISED
3	G.E.P.	V.T.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

<b>Project</b> N13 / N15 BALLYBOFEY STRANORLAR BYPASS		<b>McCarthy Hyder Consultants</b> CONSULTING ENGINEERS SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN18	
<b>Drawing Title</b> OS MAP SHOWING LINE OF PRELIMINARY DESIGN, FIELD NUMBERS AND POSSIBLE ARCHAEOLOGICAL FEATURES (SHEET 5 OF 5)			
<b>Date</b> NOV 2007	<b>Scale</b> NTS	<b>Drawing no.</b> Figure 10.1	<b>Sheet</b> G



# LEGEND

- RMP RECORD OF MONUMENTS AND PLACES
- EXTENT OF ARCHAEOLOGICAL FEATURE



rev	by	chk	app	date	comment
A	JFM	PL	LW	29.07.03	FIRST ISSUE
B	G.E.P.V.F	H.T		01.11.06	DATE AMENDED
C	G.E.P.V.F	H.T		01.09.07	DATE AMENDED
D	G.E.P.V.T	H.T		05.10.07	ISSUE DATE AMENDED

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
1st EDITION OS 6" MAP  
(1836, SH77) SHOWING  
RMP2

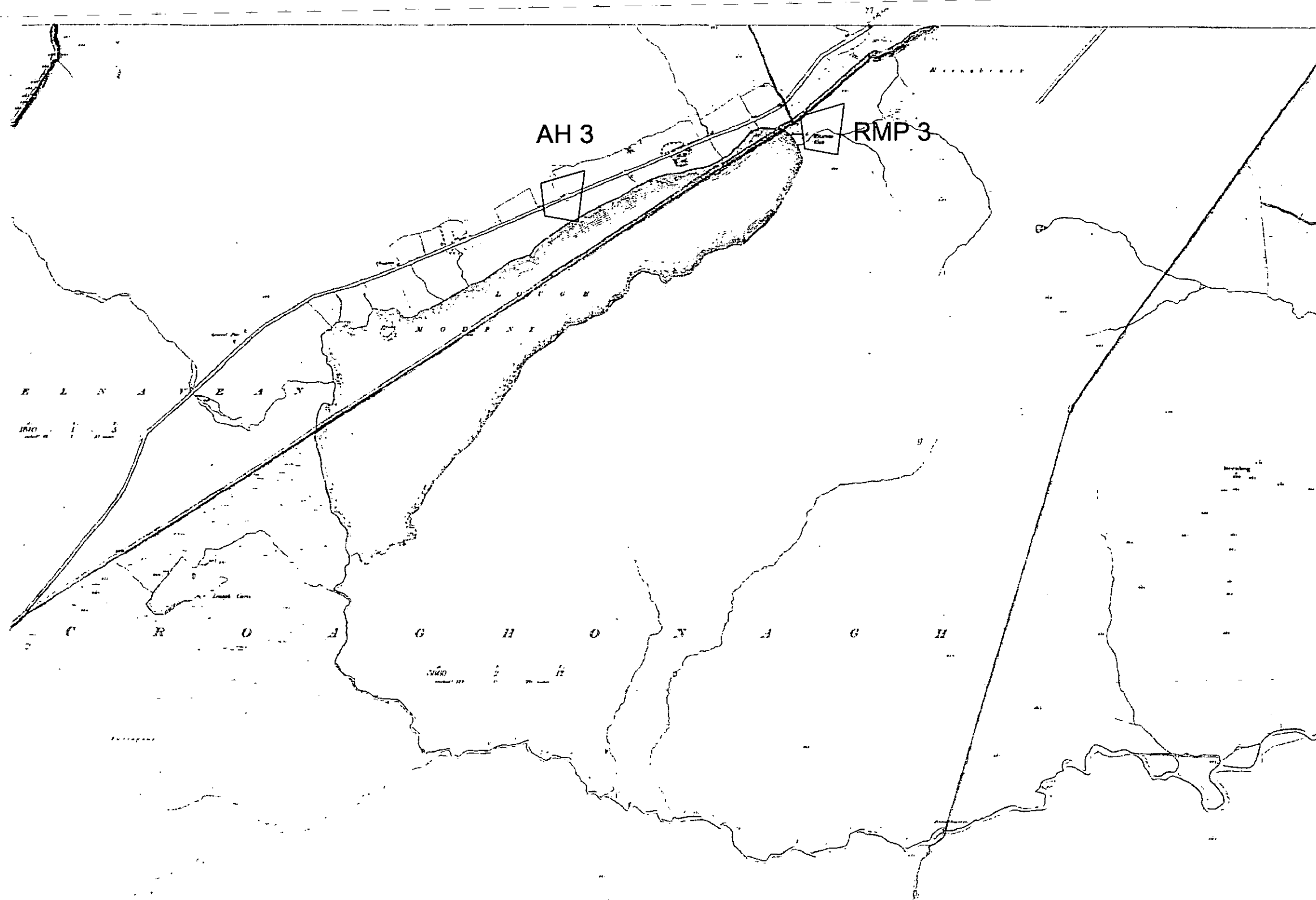
Date  
NOV 2007

Scale  
1:10000 (A3)

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN11

Drawing no.  
Figure 10.2

Issue  
D



#### LEGEND

- RMP RECORD OF MONUMENTS AND PLACES  
AH ARCHITECTURAL HERITAGE  
— EXTENT OF ARCHAEOLOGICAL FEATURE



date	by	chk.	app.	date	comment
A	ST	EC	LW	29/07/03	FIRST ISSUE
B	G.E.P.	V.F.	H.T.	01.11.05	DATE AMENDED
C	G.E.P.	V.F.	H.T.	01.03.07	DATE AMENDED
D	G.E.P.	V.T.	H.T.	05.10.07	ISSUE DATE AMENDED

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: 1st EDITION OS 6" MAP 1836 SH86 SHOWING AH3 AND RMP 3

Date: NOV 2007 Scale: 1:10000 (A3)

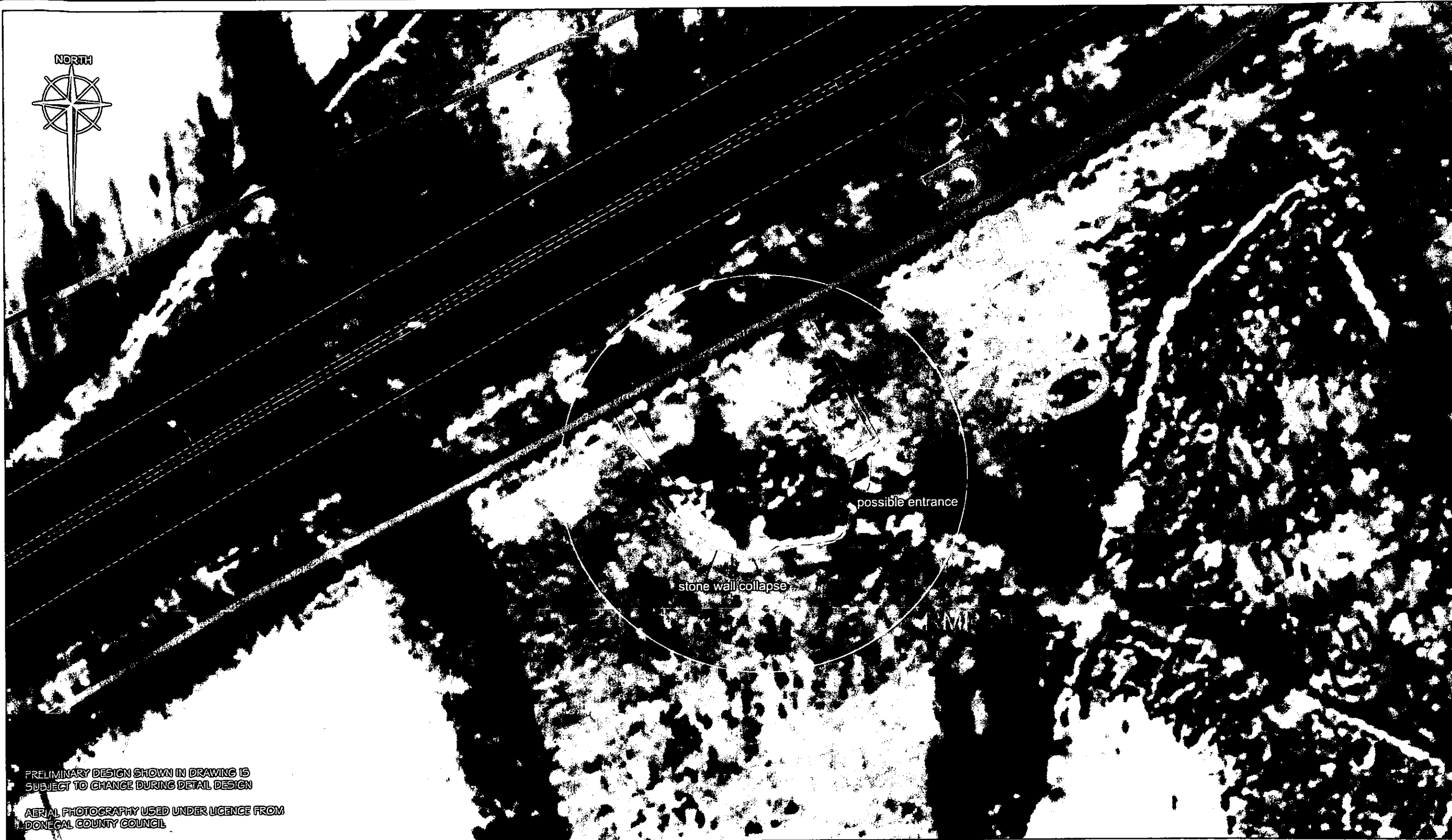
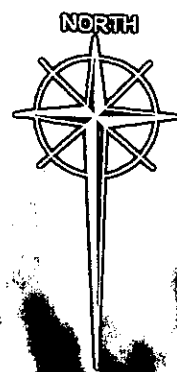
McCarthy Hyder Consultants Consulting Engineers

SUITE 24, THE MALL, SEACON COURT, SANDYFORD, DUBLIN 18



Drawing no. Figure 10.3

Issue: D



PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

AERIAL PHOTOGRAPHY USED UNDER LICENCE FROM  
DONEGAL COUNTY COUNCIL

#### LEGEND

- RMP RECORD OF MONUMENTS AND PLACES
- EXTENT OF ARCHAEOLOGICAL FEATURE
- ARCHAEOLOGICAL STUDY AREA
- PRELIMINARY DESIGN ROUTE CENTRE LINE
- CPO BOUNDARY



issue	by	chk.	app.	date	comment
A	ST	EC	LW	25/07/05	FIRST ISSUE
B	G.E.M.V.F	H.T		01.11.06	REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
C	G.E.M.V.F	H.T		01.03.07	ALIGNMENT / CPO BOUNDARY UPDATED
D	G.E.M.V.T	H.T		09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

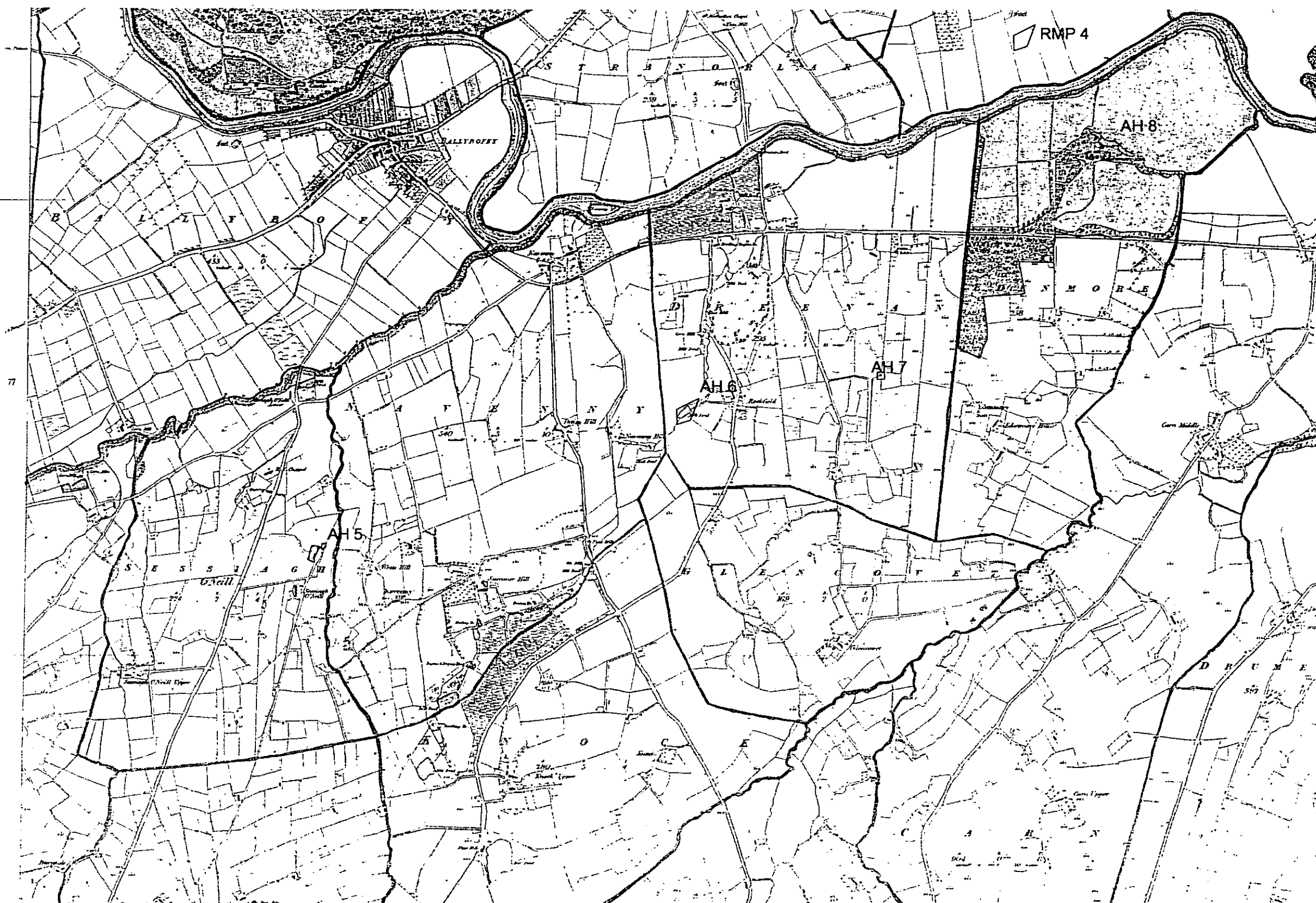
Project: N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title:  
ANNOTATED AERIAL  
PHOTOGRAPH OF RMP2

Date: NOV 2007 Scale: 1:500 (A3)

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN15

Drawing no. Figure 10.4 Issue: D



## LEGEND

- RMP RECORD OF MONUMENTS AND PLACES  
AH ARCHITECTURAL HERITAGE  
— EXTENT OF ARCHAEOLOGICAL FEATURE



no.	by	ch.	app.	date	comment
A	ST	EC	LW	29/07/05	FIRST ISSUE
B	G.E.P.V.F	M.T		01/11/06	DATE AMENDED
C	G.E.P.V.F	M.T		01/03/07	DATE AMENDED
C	G.E.P.V.T	M.T		09/10/07	ISSUE DATE AMENDED

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
1st EDITION OF 6" MAP (1836,  
SH78) SHOWING AH5, AH6,  
AH7, ORIGINAL EXTENT OF AH8  
AND RMP4

Date  
NOV 2007

Scale  
1:10000 (A3)

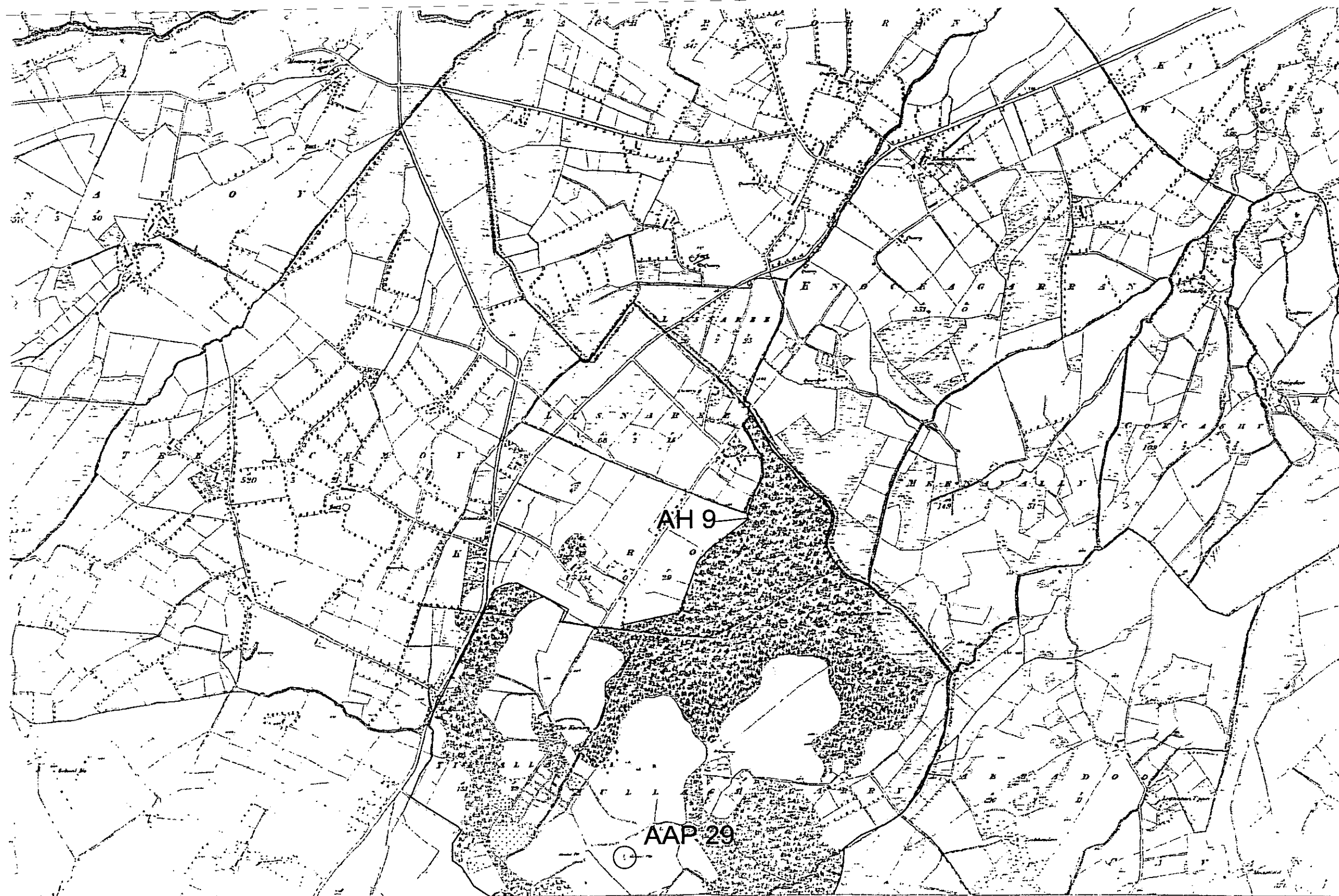
McCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no.  
Figure 10.5

Issue  
D





AH	ARCHITECTURAL HERITAGE
AAP	AREA OF ARCHAEOLOGICAL POTENTIAL
—	EXTENT OF ARCHAEOLOGICAL FEATURE



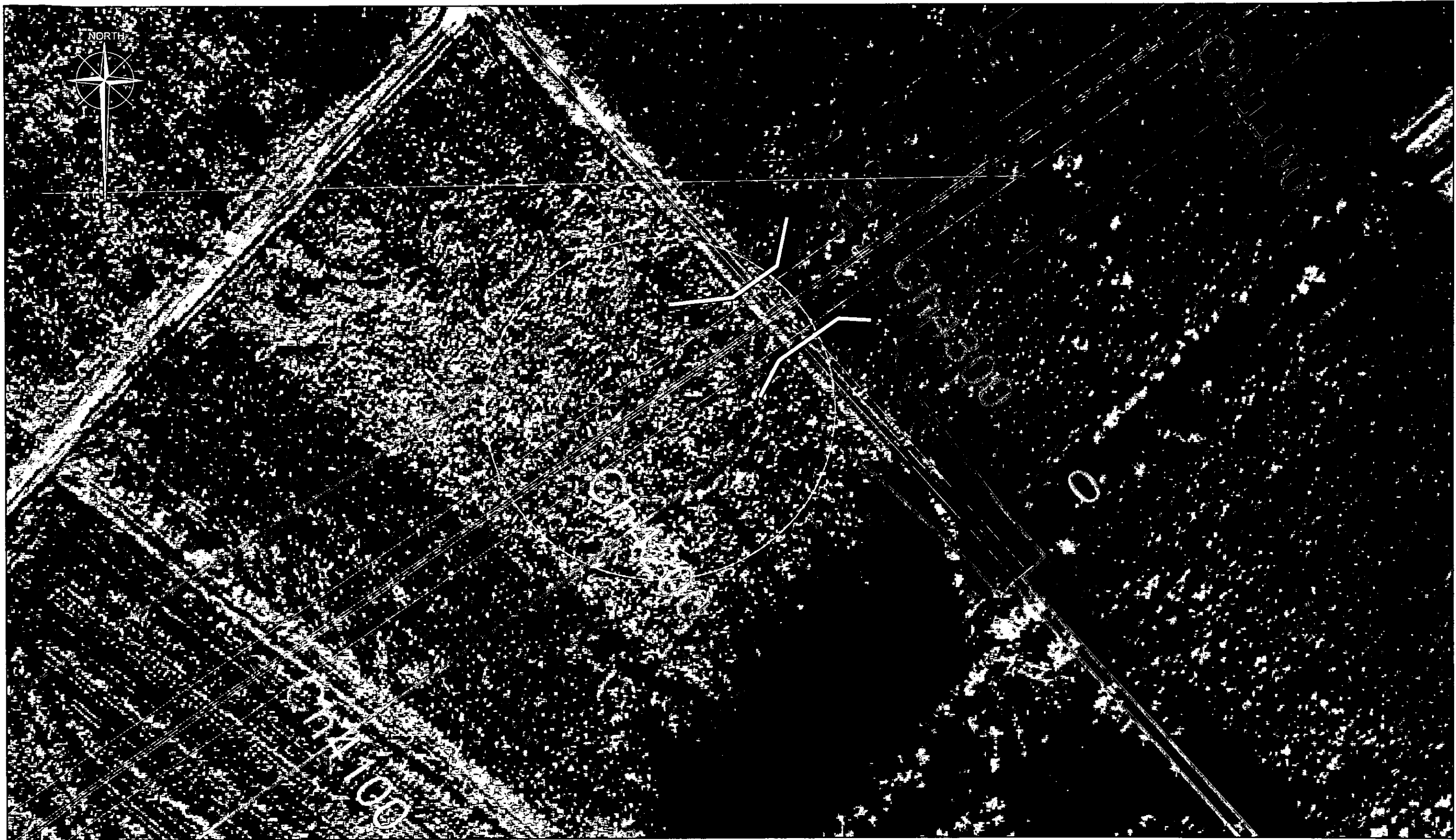
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A	ST	EC	LW	25/07/03	FIRST ISSUE
B	G.E.P.V.F	N.T		01/11/06	DATE AMENDED
C	G.E.P.V.F	N.T		01/03/07	DATE AMENDED
D	G.E.P.V.T	N.T		12/10/07	ISSUE DATE AMENDED



Drawing no.

Figure 10.6

Drawing no. Figure 10.6



# LEGEND

- AAP AREA OF ARCHAEOLOGICAL POTENTIAL
- EXTENT OF ARCHAEOLOGICAL FEATURE
- STUDY AREA
- PRELIMINARY DESIGN ROUTE CENTRE LINE
- CPO BOUNDARY



issue	by	chk.	app.	date	comment
A	ST	EC	LW	29/07/05	FIRST ISSUE
B	G.E.P	V.P	H.T	01/11/06	REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED / DATE AMENDED
C	G.E.P	V.P	H.T	01/05/07	ALIGNMENT & CPO BOUNDARY DATE UPDATED
D	G.E.P	V.T	H.T	29/10/07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title  
AERIAL PHOTOGRAPH OF AAP 11  
CIRCULAR CROPMARK IN AN  
AREA OF FORESTRY

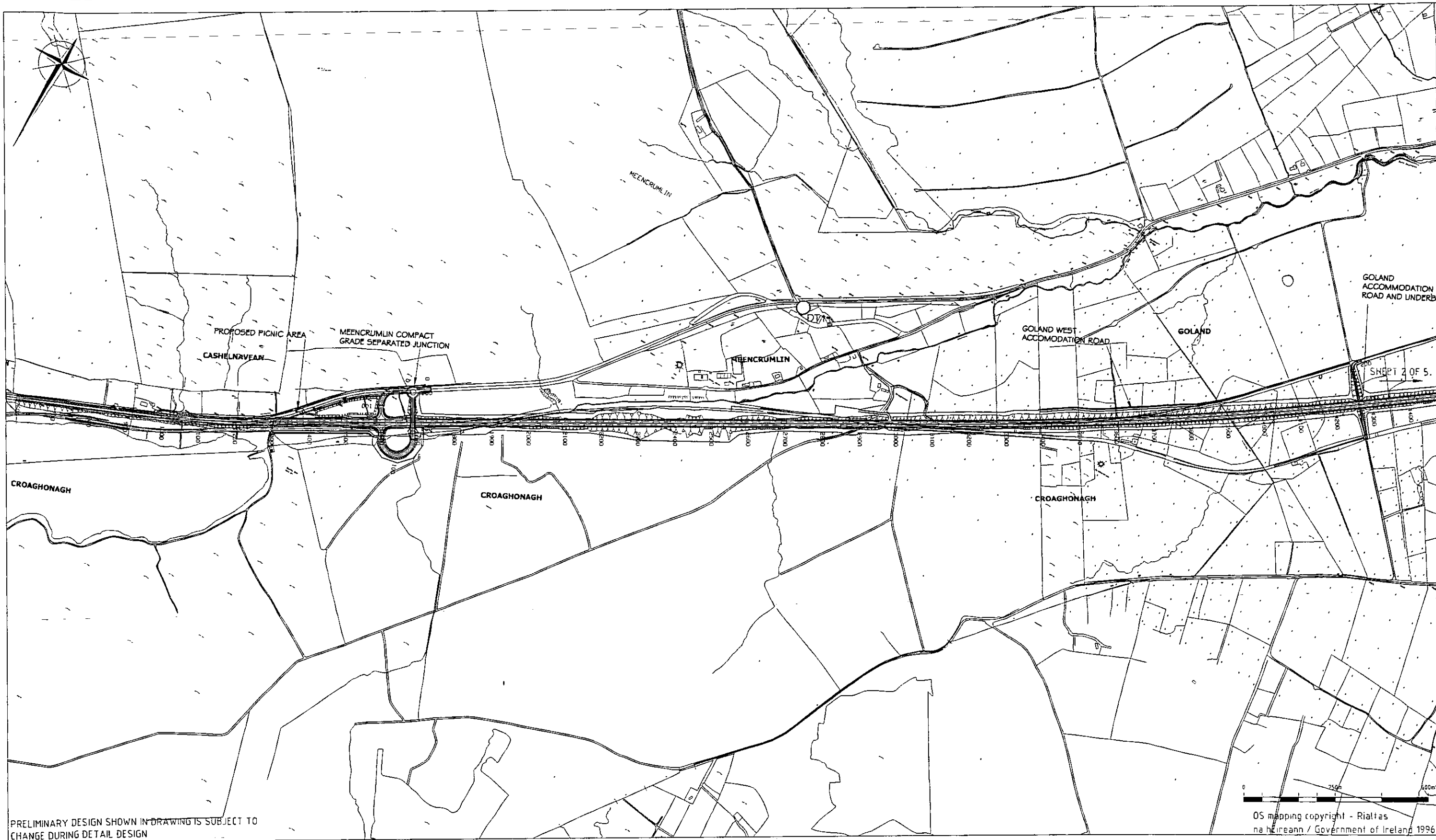
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McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 10.7

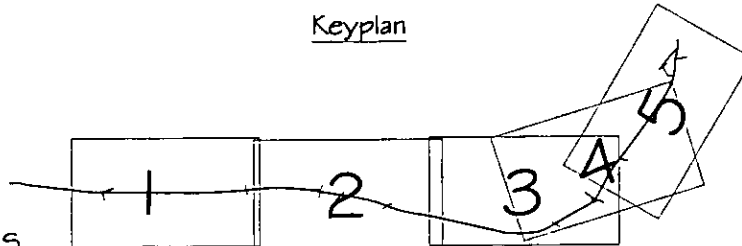
Issue C



# LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- RI ○ AIR QUALITY RECEPTORS
- DTI ○ DIFFUSION TUBE LOCATIONS
- DMLI □ DUST (PM<sub>10</sub>) MONITORING LOCATIONS

## Keyplan



date	by	chk.	app.	date	comment
F	G.E.P.	V.P.	M.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
G	G.E.P.	V.T.	M.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
AIR QUALITY RECEPTORS &  
MONITORING LOCATIONS  
(SHEET 1 OF 5)

Date  
NOV 2007

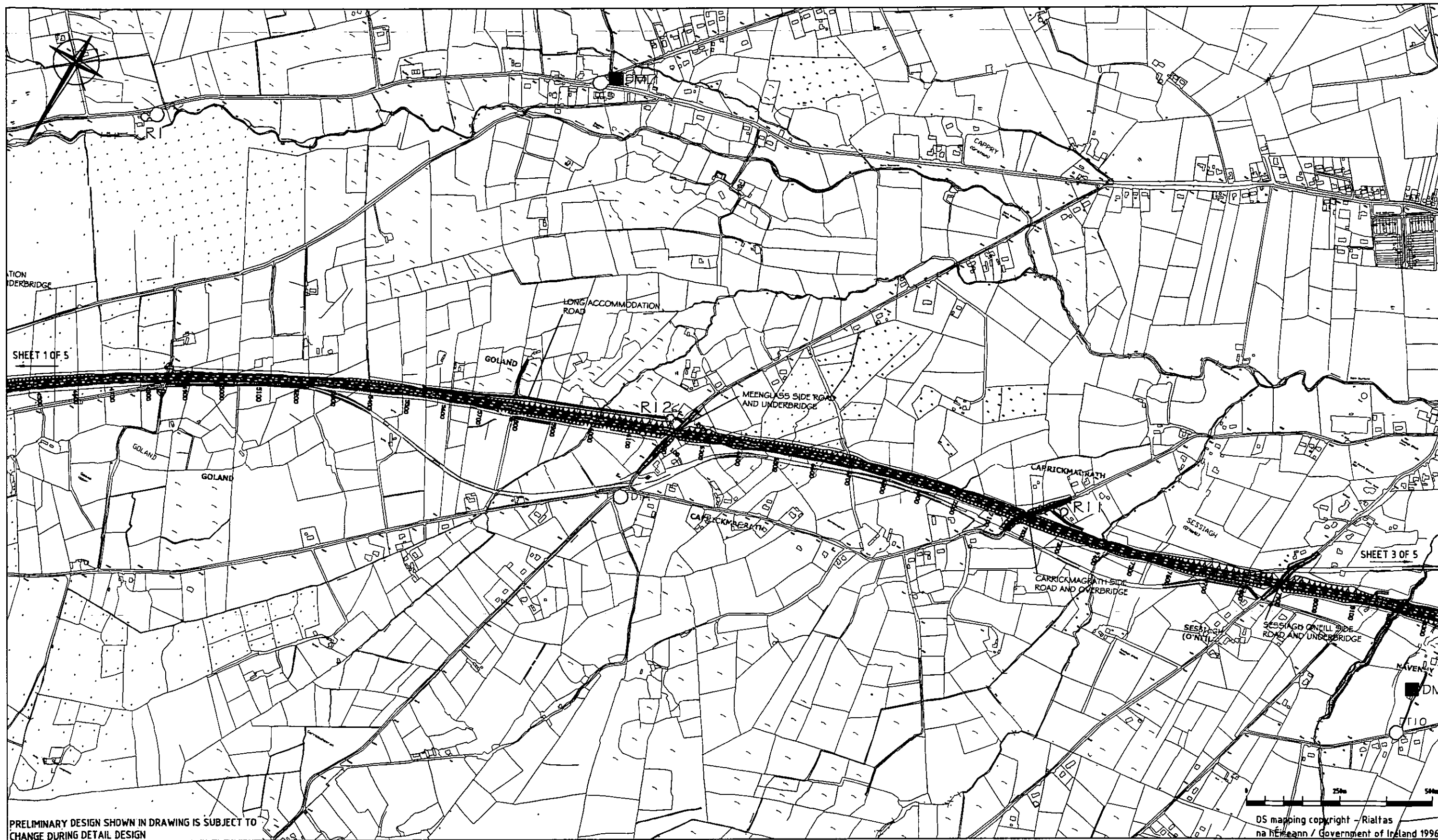
Scale  
N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 11.1

Issue  
G

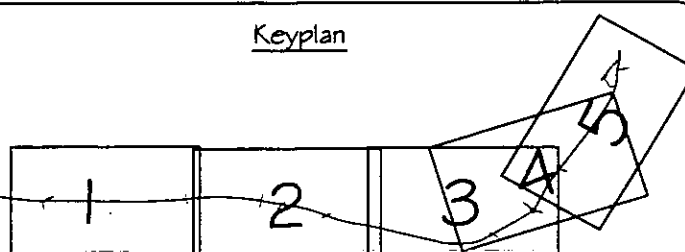




# LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- RI ○ AIR QUALITY RECEPTORS
- DT ○ DIFFUSION TUBE LOCATIONS
- DMLI DUST (PM<sub>10</sub>) MONITORING LOCATIONS

## Keyplan



Issue	By	CHK	APP	DATE	COMMENT
1	G.E.P.	V.F.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
2	G.E.P.	V.T.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

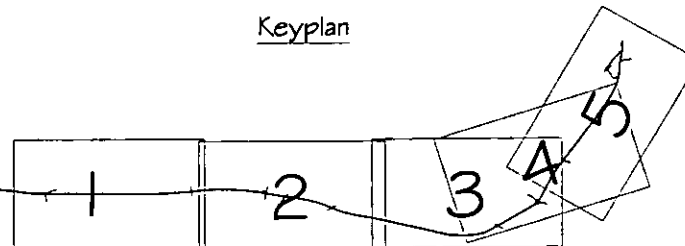
<b>Project</b> N13 / N15 BALLYBOFEY STRANORLAR BYPASS		<b>McCarthy Hyder Consultants Consulting Engineers</b> SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
<b>Drawing Title</b> AIR QUALITY RECEPTORS & MONITORING LOCATIONS (SHEET 2 OF 5)		Drawing no.	
<b>Date</b> NOV 2007	<b>Scale</b> N.T.S.	<b>Issue</b> Figure 11.1 G	



# LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- R1 ○ AIR QUALITY RECEPTORS
- DT1 ○ DIFFUSION TUBE LOCATIONS
- DML1 □ DUST (PM<sub>10</sub>) MONITORING LOCATIONS

## Keyplan



Rev	By	Chk	App	Date	Comments
1	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
2	G.E.P.	V.T.	H.T.	05.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
AIR QUALITY RECEPTORS &  
MONITORING LOCATIONS  
(SHEET 3 OF 5)

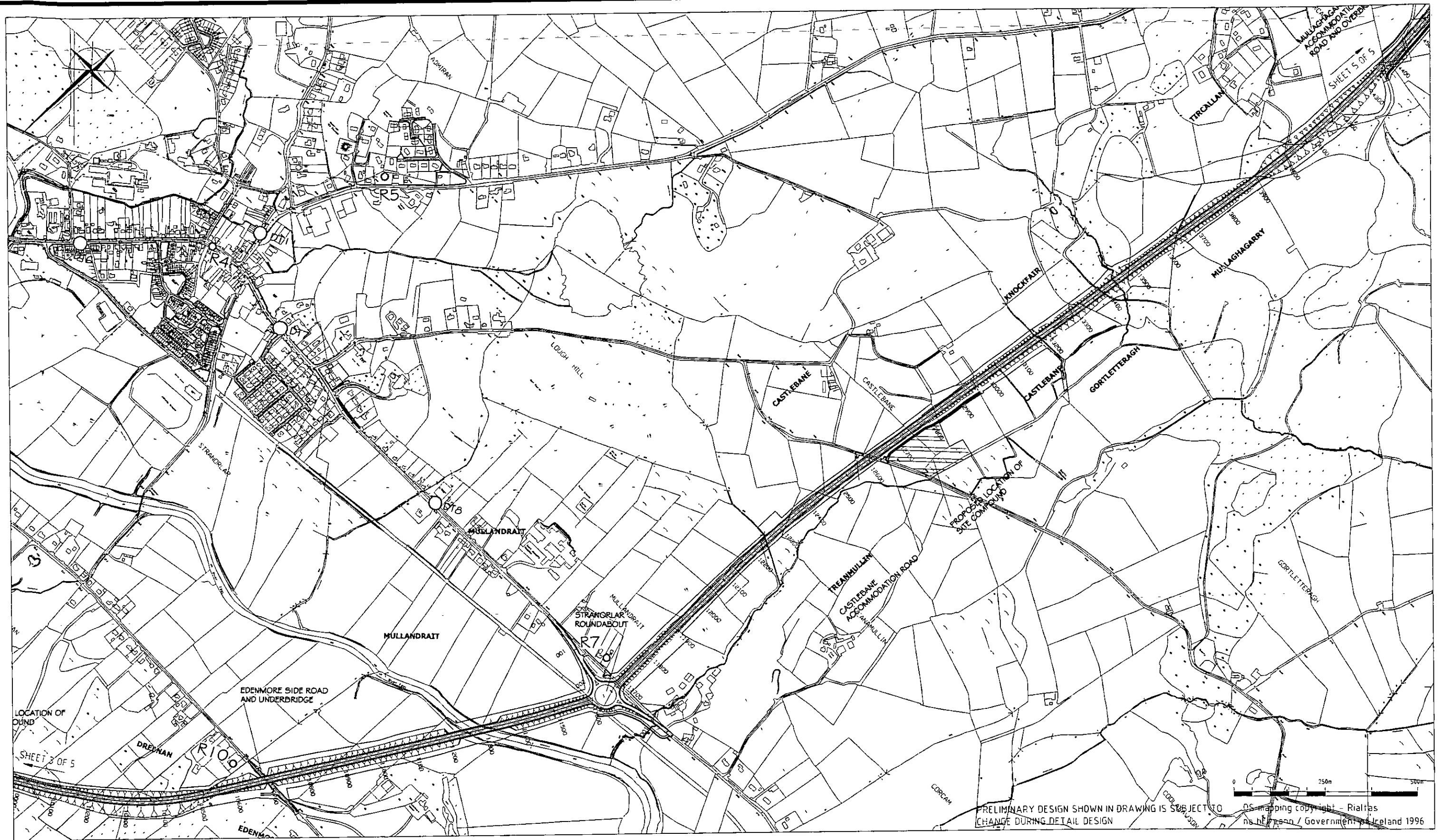
Date  
NOV 2007

Scale  
N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no.  
Figure 11.1

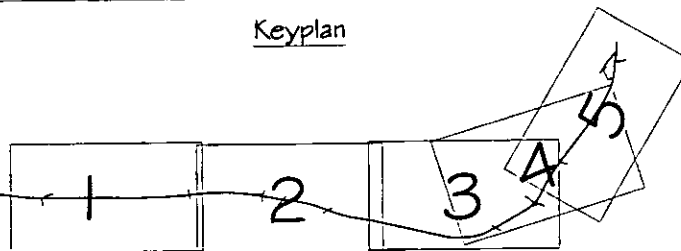
Issue  
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## LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- R1 ○ AIR QUALITY RECEPTORS
- DT1 ○ DIFFUSION TUBE LOCATIONS
- DML1 ■ DUST (PM<sub>10</sub>) MONITORING LOCATIONS

## Keyplan



Comhairle Contae Donegal  
DONEGAL COUNTY COUNCIL

date	by	chk.	app.	date	comment
01.11.06	F.G.E.P. V.F.	H.T.			OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
09.10.07	G.G.E.P. V.T.	H.T.			CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
AIR QUALITY RECEPTORS &  
MONITORING LOCATIONS  
(SHEET 4 OF 5)

Date  
NOV 2007

Scale  
N.T.S.

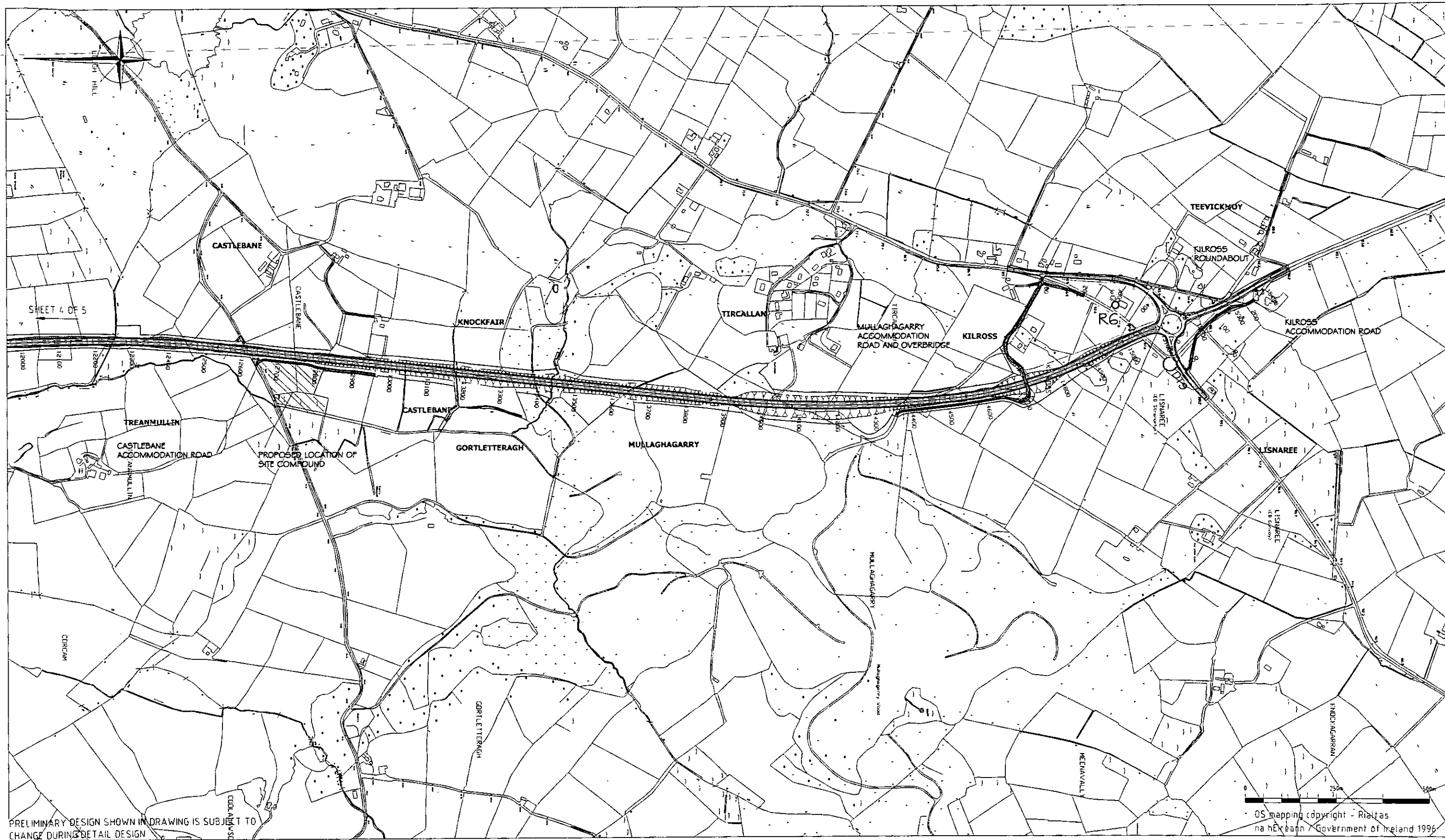
McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18



Drawing no.  
Figure 11.1

Issue  
G

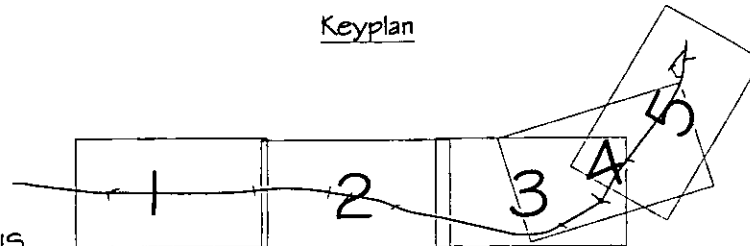




# LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- R1 ○ AIR QUALITY RECEPTORS
- DTI ○ DIFFUSION TUBE LOCATIONS
- DMLI ■ DUST (PM<sub>10</sub>) MONITORING LOCATIONS

## Keyplan



Issue	By	Chk.	App.	Date	Comment
1	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
2	G.E.P.	V.T.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

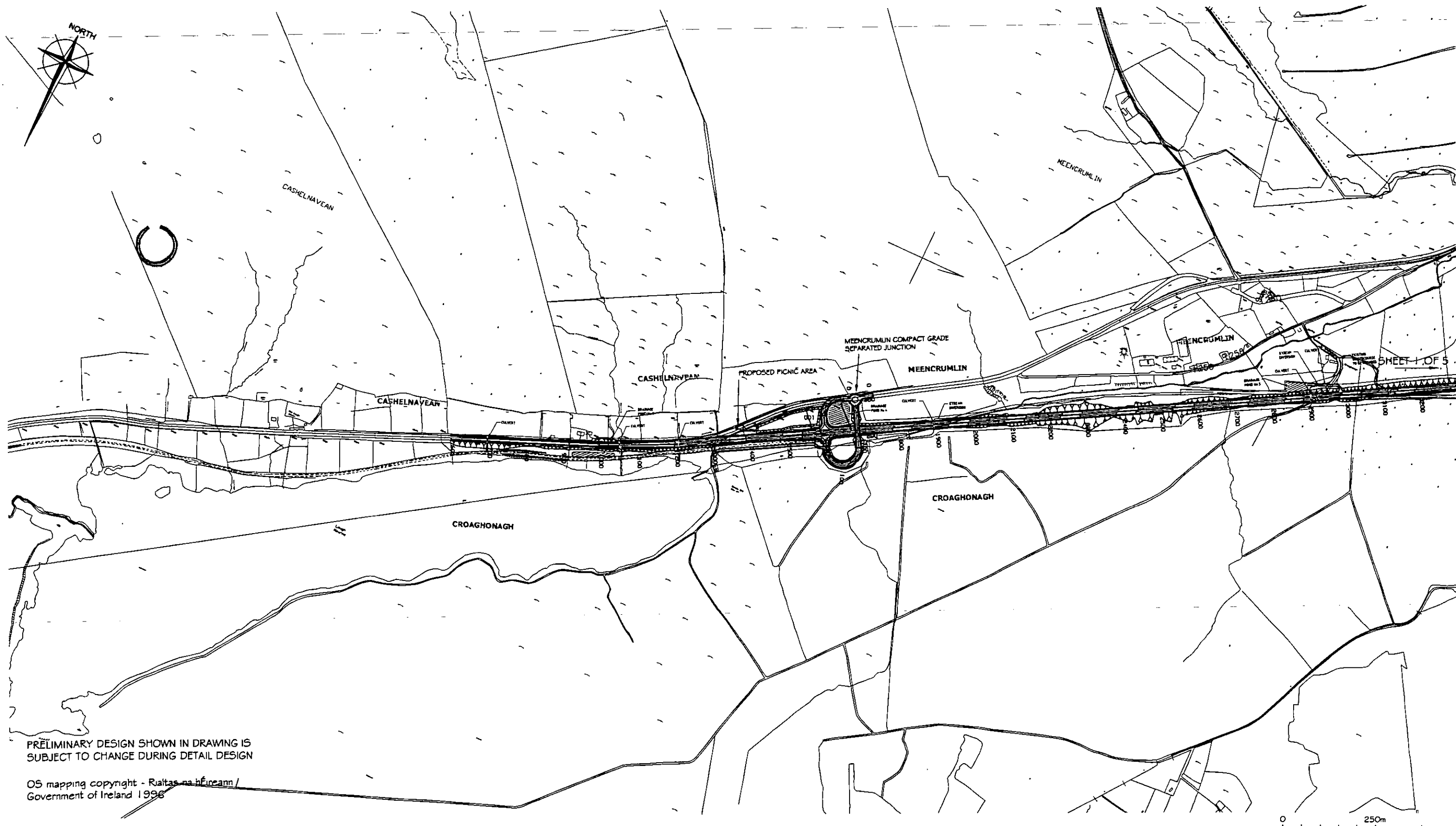
Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: AIR QUALITY RECEPTORS & MONITORING LOCATIONS (SHEET 5 OF 5)

Date: NOV 2007 Scale: N.T.S.

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18

Drawing no. Figure 11.1 Issue G



PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

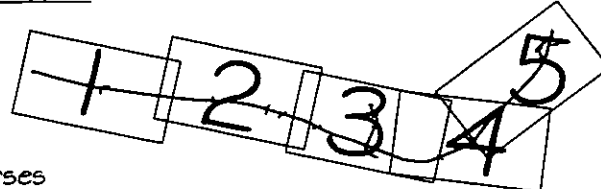
OS mapping copyright - Raitas na hÉireann /  
Government of Ireland 1998

# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Survey Locations
- T261 Modelled Noise Receivers

- Drainage Ponds
- Culverts
- Watercourse / Land Drainage
- Existing Watercourses to be cleared

## Keyplan



date	by	chk.	app.	date	comment
01.03.07	G.P.P.	V.P.	M.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
08.10.07	G.P.P.	V.P.	M.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project N13/N15 BALLYBOFEY  
STRANORLAR BYPASS

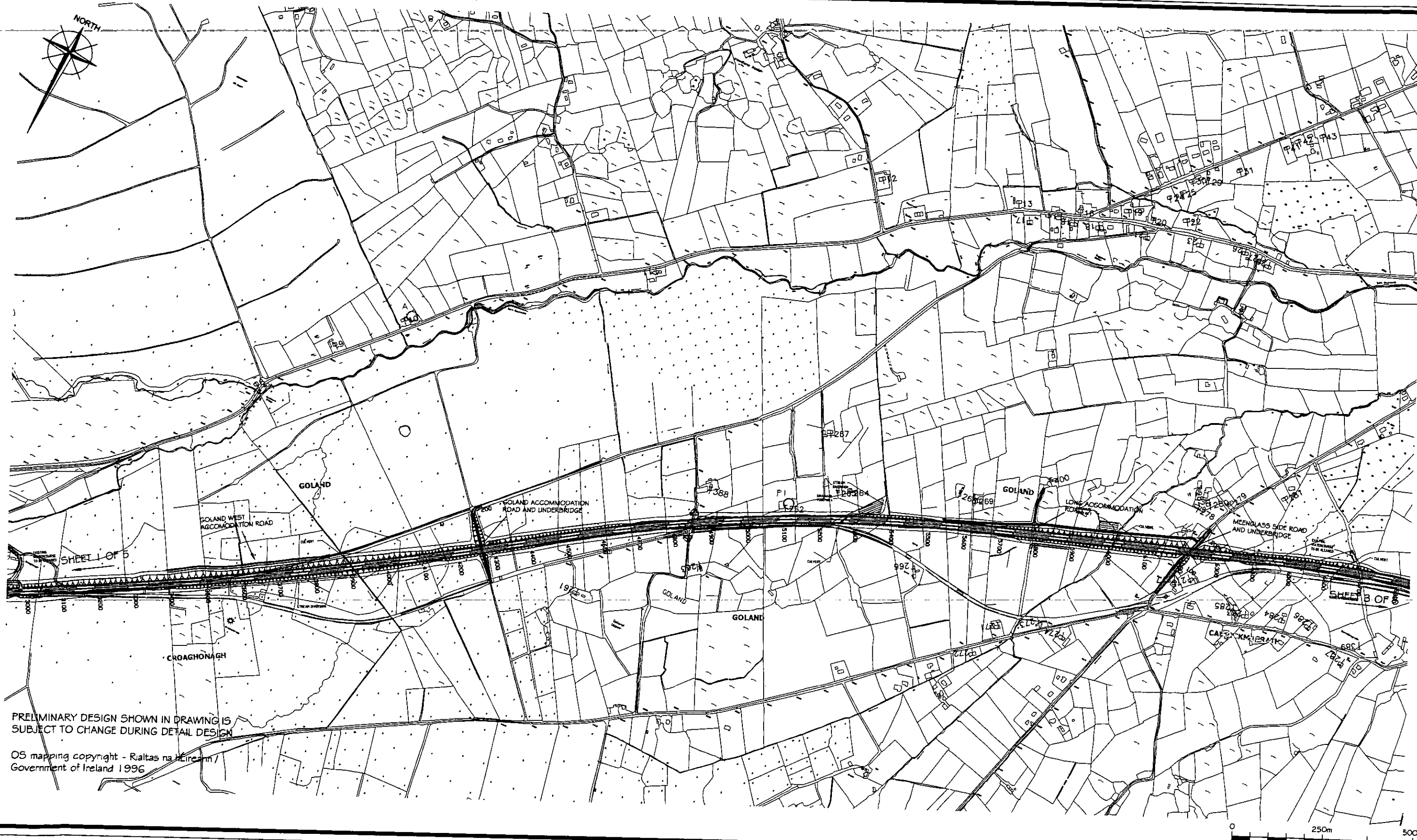
Drawing Title  
NOISE SURVEY LOCATIONS  
MODELLED NOISE RECEIVERS  
(SHEET 1 OF 5)

Date NOV 2007 Scale N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN18

Drawing no. Issue

Figure 12.1



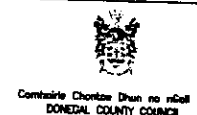
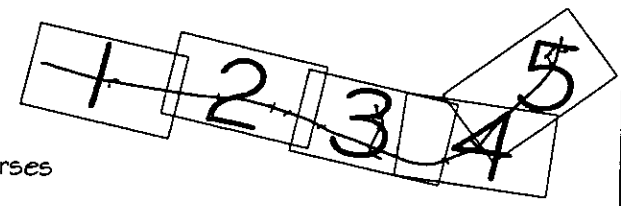
PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

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**LEGEND**

- Preliminary Design
- CPO Boundary
- Noise Survey Locations
- T261 Modelled Noise Receivers
- Drainage Ponds
- Culverts
- Watercourse / Land Drainage
- Existing Watercourses to be cleared

**Keyplan**



DATE	BY	CHK.	APP.	DATE	COMMENT
01.03.07	G.E.P.	V.P.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
08.10.07	G.E.P.	V.T.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: **N13/N15 BALLYBOFEY STRANORLAR BYPASS**

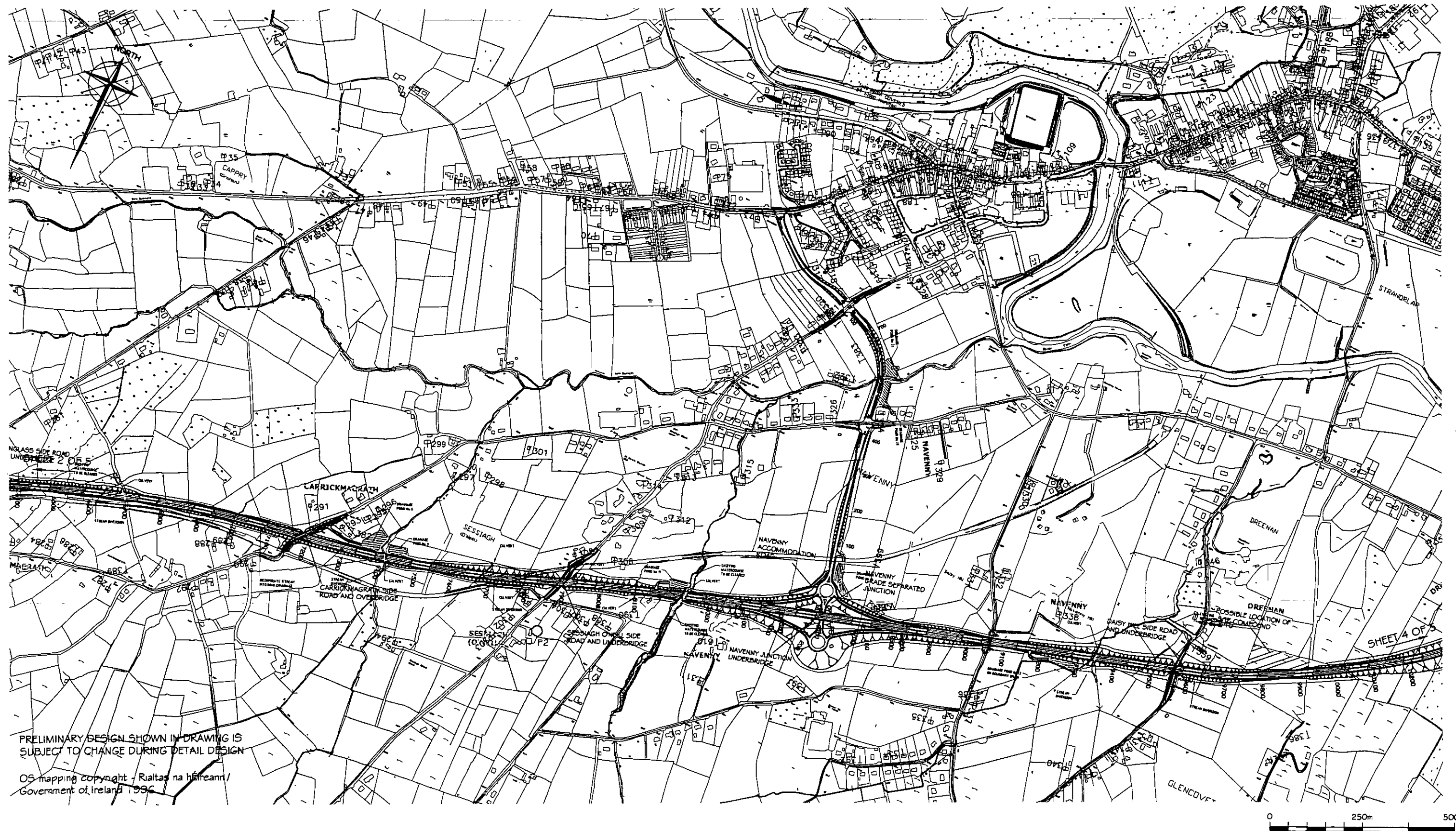
Drawing Title: **NOISE SURVEY LOCATIONS  
MODELLED NOISE RECEIVERS  
(SHEET 2 OF 5)**

Date: **NOV 2007** Scale: **N.T.S**

**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**

SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 18

Drawing no. **Figure 12.1** Issue **H**

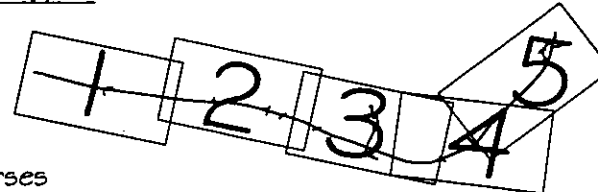


## LEGEND

- Preliminary Design
- CPO Boundary
- P1 Noise Survey Locations
- T261 Modelled Noise Receivers

- Drainage Ponds
- Culverts
- Watercourse / Land Drainage
- XXXX Existing Watercourses to be cleared

## Keyplan



**NRA**  
National Roads Authority  
An tArdáil na Bóithí Náisiúnta



date	by	chk.	app.	date	comment
01.08.07	G.E.P.	V.T.	H.T.	01.08.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
08.10.07	H.	G.E.P.	V.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: **N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS**

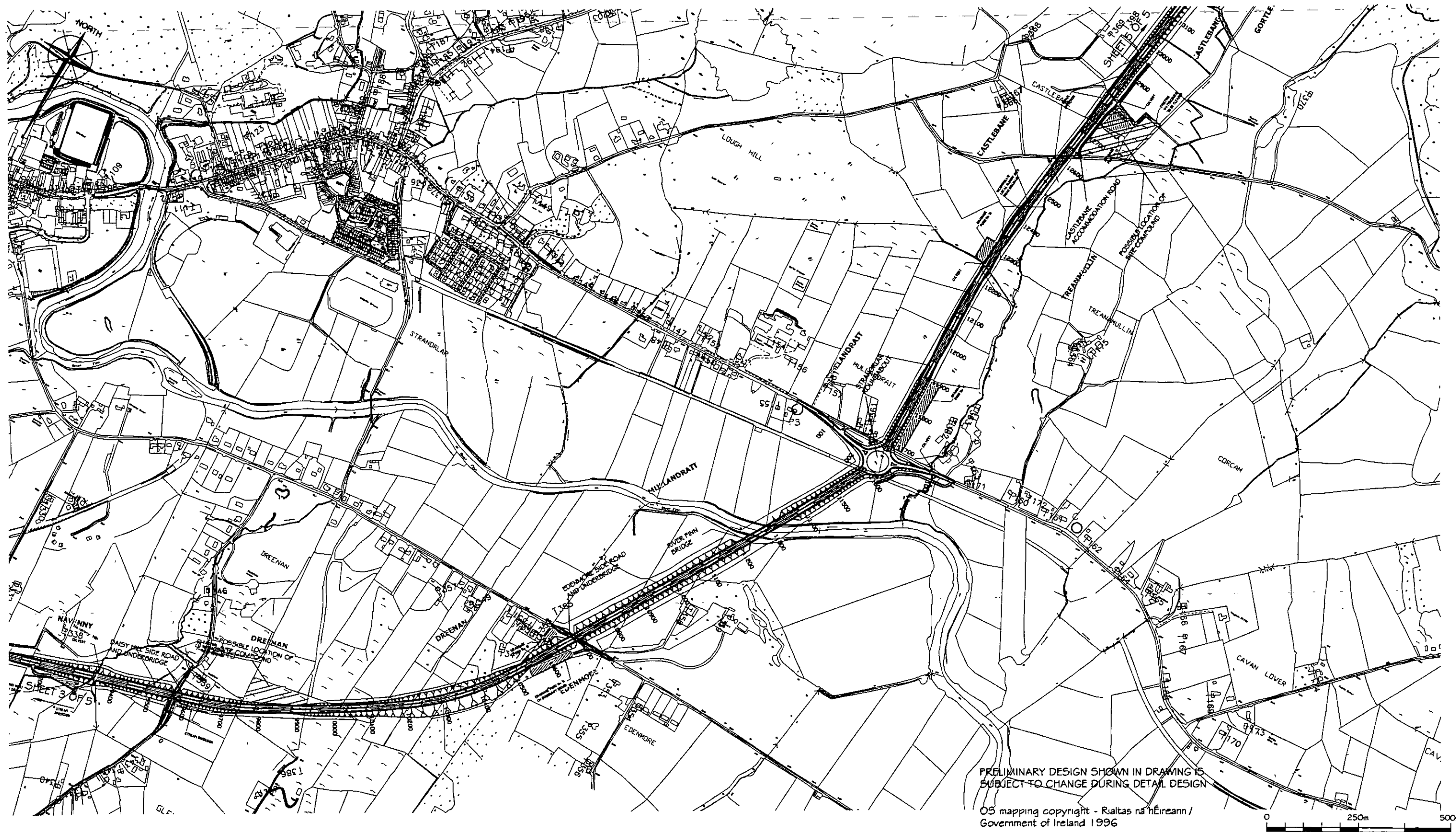
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MODELLED NOISE RECEIVERS  
(SHEET 3 OF 5)**

Date: **NOV 2007** Scale: **N.T.S**

**MCCARTHY HYDER CONSULTANTS  
CONSULTING ENGINEERS**  
SUITE 24, THE MALL,  
BEACON COURT,  
BANDYFORD,  
DUBLIN 15

Drawing no. **Figure 12.1** Issue **H**

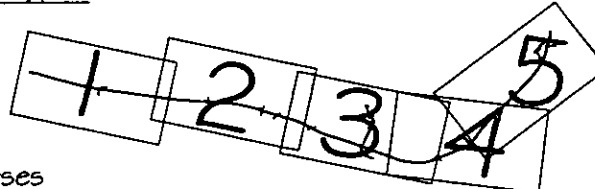




# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Survey Locations
- T261 Modelled Noise Receivers
- ▨ Drainage Ponds
- Culverts
- Watercourse / Land Drainage
- ▨ Existing Watercourses to be cleared

## Keyplan



Rev	By	Chk	App	Date	Comments
1	G.E.P.	V.P.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
2	G.E.P.	V.P.	H.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
NOISE SURVEY LOCATIONS  
MODELLED NOISE RECEIVERS  
(SHEET 4 OF 5)

Date  
NOV 2007

Scale  
N.T.S

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no.  
Figure 12.1

Issue  
H

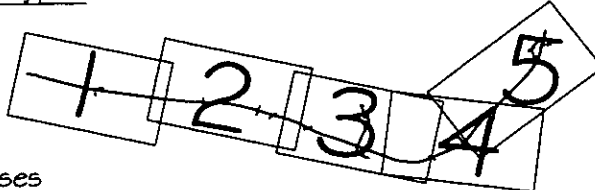




# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Survey Locations
- Modelled Noise Receivers
- Drainage Ponds
- Culverts
- Watercourse / Land Drainage
- Existing Watercourses to be cleared

## Keyplan



Comhairle Chontae Dhún na nGall  
DONAL COUNTY COUNCIL

Rev	By	chk	app	date	comment
1	G.B.T.	V.P.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE AMENDED
2	G.B.T.	V.P.	H.T.	08.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFFY  
STRANORLAR BYPASS

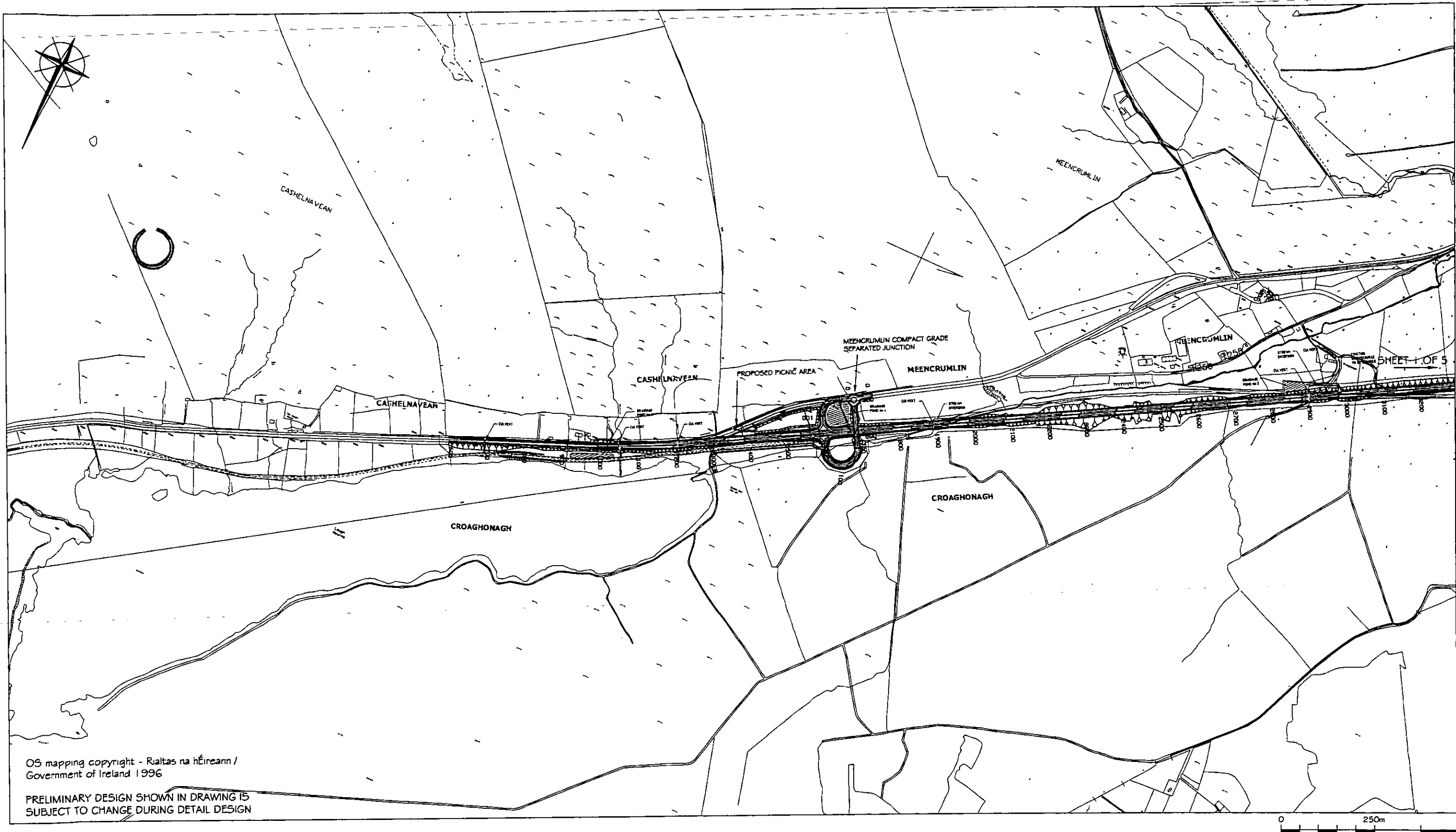
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(SHEET 5 OF 5)

Date NOV 2007 Scale N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no. Figure 12.1 Issue H



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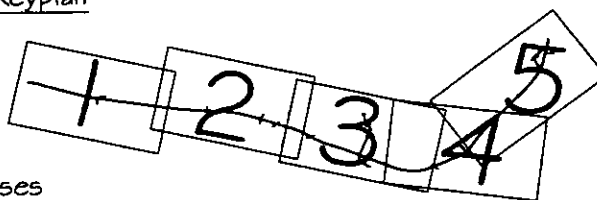
PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Barrier
- T261 Modelled Noise Receivers

- ▨ Drainage Ponds
- Culverts
- Watercourses / Land Drainage
- XXX Existing Watercourses to be cleared

## Keyplan



rev	by	chk	app	date	comment
1	G.E.P.	V.L.	P.T.	25.04.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS & NOISE BARRIERS
2	G.E.P.	V.L.	P.T.	25.10.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS & NOISE BARRIERS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

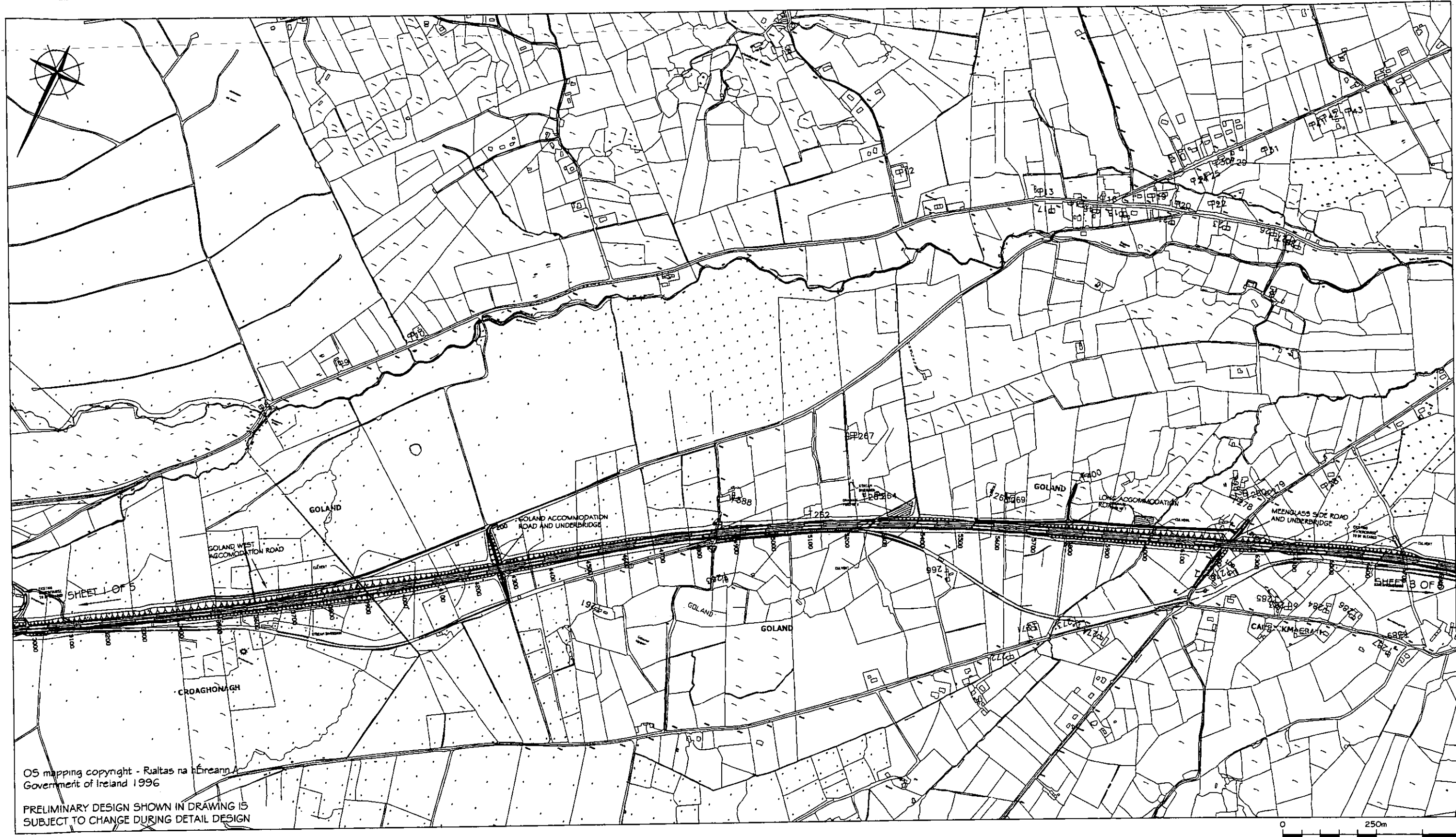
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Date: NOV 2007 Scale: N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 12.2

Issue H



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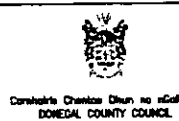
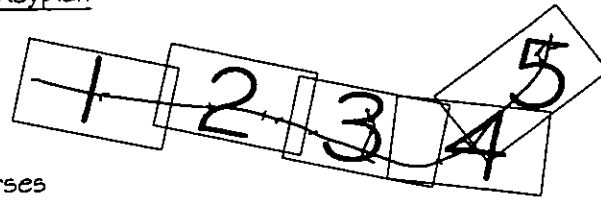
PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Barrier
- T261 Modelled Noise Receivers

- Drainage Ponds
- Culverts
- Watercourses / Land Drainage
- Existing Watercourses to be cleared

## Keyplan



Rev	By	CHK	APP	DATE	COMMENTS
0	G.E.P.	V.T.	H.T.	05.04.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS + NOISE BARRIERS
1	G.E.P.	V.T.	H.T.	29.10.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS + NOISE BARRIERS

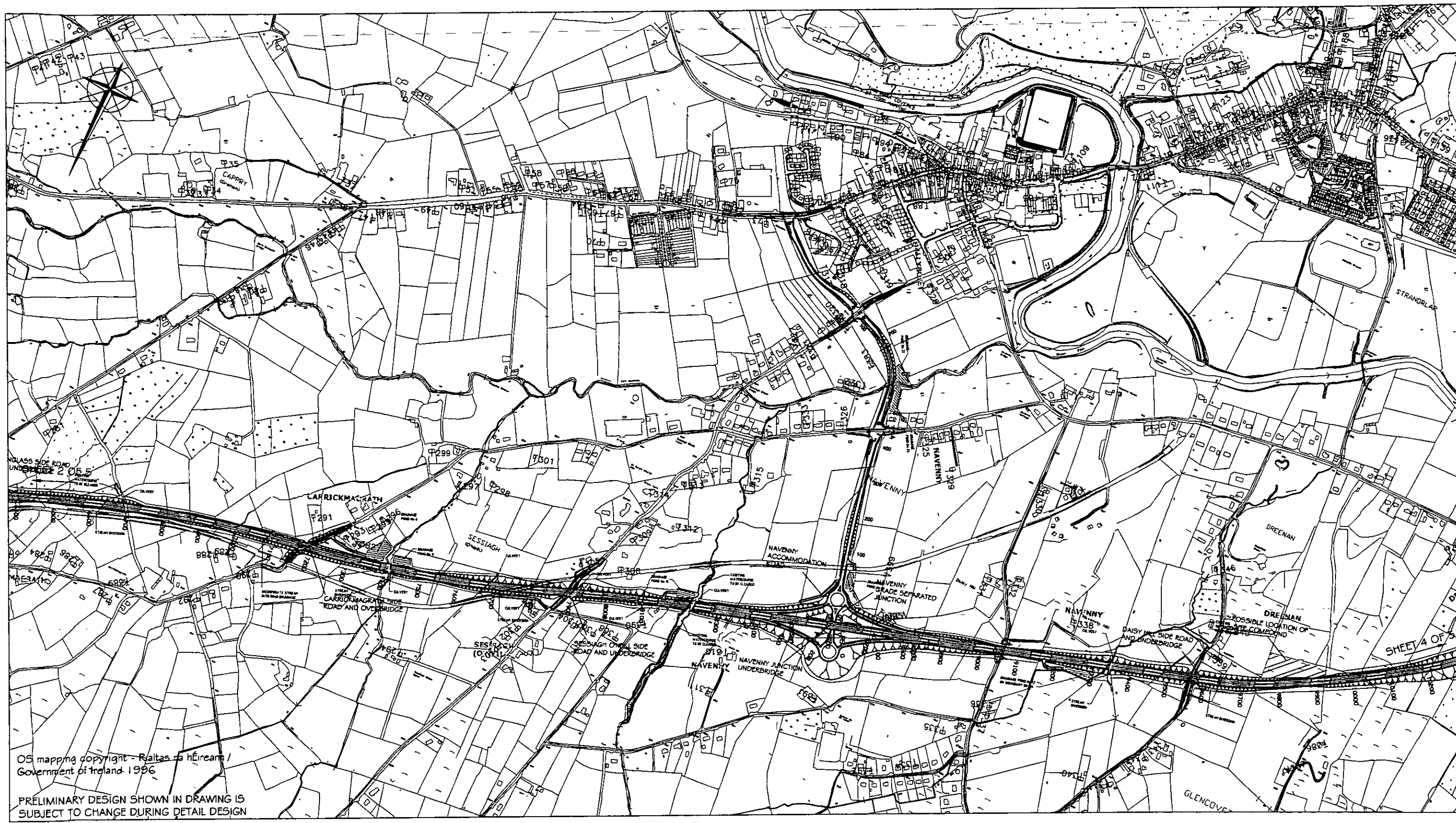
Project: N13 / N15 BALLYBOFFEY STRANORLAR BYPASS

Drawing Title: PROPOSED NOISE MITIGATION SHEET 2 OF 5

Date: NOV 2007 Scale: N.T.S.

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18

Drawing no. Figure 12.2 Issue H

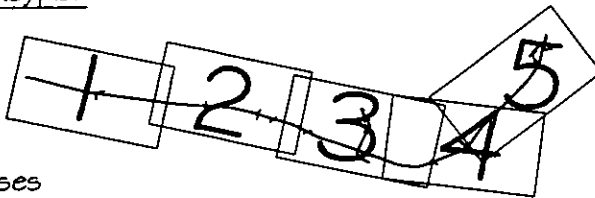


# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Barrier
- T261 Modelled Noise Receivers

- ▨ Drainage Ponds
- Culverts
- Watercourses / Land Drainage
- ▨ Existing Watercourses to be cleared

## Keyplan



**NRA**  
National Roads Authority  
An tAidise um Bheith Náisiúnta



Rev	By	Chk	App	Date	Comment
6	G.E.T.	V.T.	H.T.	25.04.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS & NOISE BARRIERS
5	G.E.T.	V.T.	H.T.	25.10.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS & NOISE BARRIERS
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3					
2					
1					

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PROPOSED NOISE MITIGATION SHEET 3 OF 5

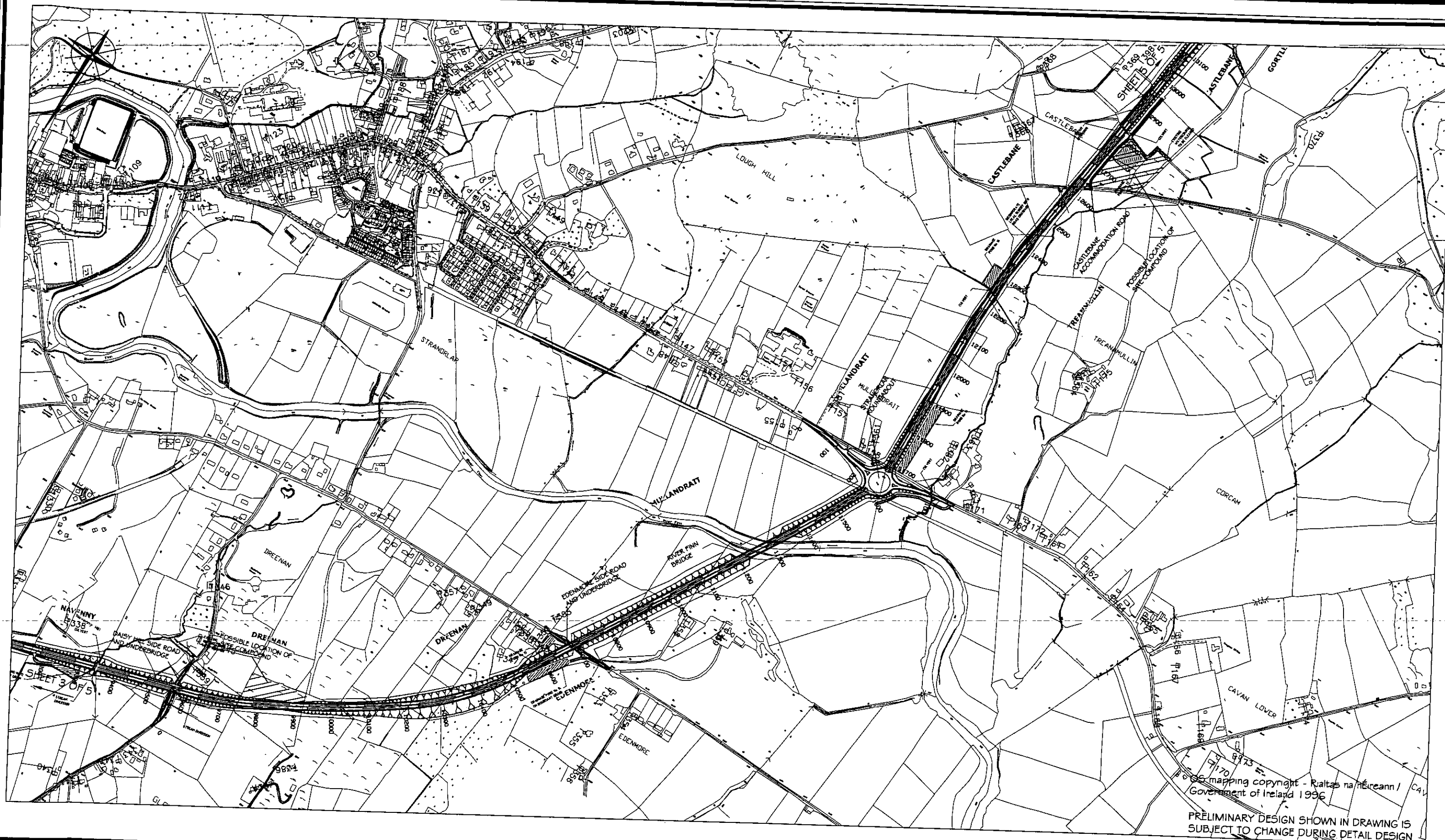
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CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 12.2

Issue: H



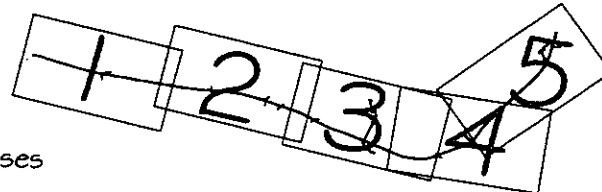


# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Barrier
- T261 Modelled Noise Receivers

- Drainage Ponds
- Culverts
- Watercourses / Land Drainage
- Existing Watercourses to be cleared

## Keyplan



Rev	By	Chk	App	Date	Comments
1	G.E.P.	V.P.	M.T.	05.04.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS & NOISE BARRIERS
2	G.E.P.	V.P.	M.T.	09.10.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEPTORS & NOISE BARRIERS
3					
4					
5					

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

Drawing Title: PROPOSED NOISE MITIGATION SHEET 4 OF 5

Date: NOV 2007

Scale: N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
SEACON COURT,  
SANDYFORD,  
DUBLIN 18

Drawing no. Figure 12.2

Issue H

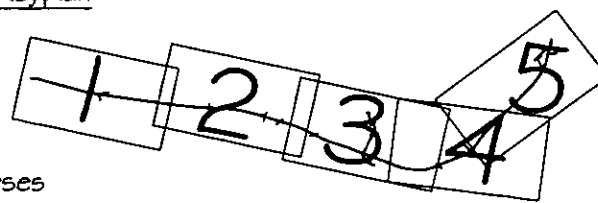


# LEGEND

- Preliminary Design
- CPO Boundary
- Noise Barrier
- T261 Modelled Noise Receivers

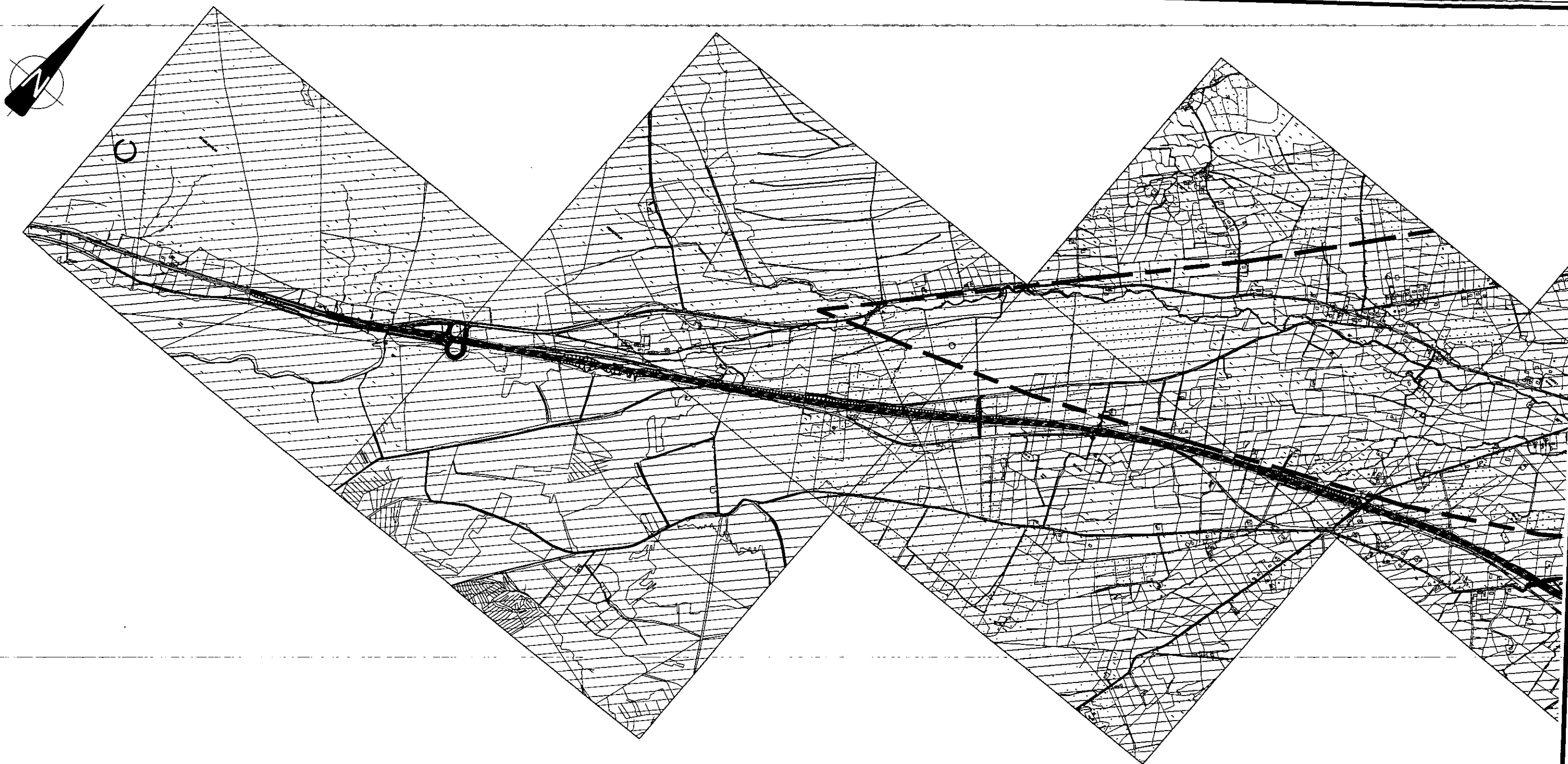
- Drainage Ponds
- Culverts
- Watercourses / Land Drainage
- Existing Watercourses to be cleared

## Keyplan



drawn by	chkd.	app.	date	comment
G.E.P.	V.T.	H.T.	05.04.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEIVERS & NOISE BARRIERS
H.	G.E.P.	V.T.	05.10.07	REVISED ALIGNMENT, CPO BOUNDARY, NOISE RECEIVERS & NOISE BARRIERS

Project N13/N15 BALLYBOFEY STRANORLAR BYPASS		McCarthy Hyder Consultants CONSULTING ENGINEERS SUITE 24, THE MALL, REACON COURT, BANDYFORD, DUBLIN 15	
Drawing Title PROPOSED NOISE MITIGATION SHEET 5 OF 5		Drawing no. NOV 2007	
Scale N.T.S.		Figure 12.2	
		Issue H	



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NA HÉIREANN / GOVERNMENT OF IRELAND 1996

EXTRACT FROM '1:100,000 SCALE BEDROCK MAP SERIES - SHEET 3 AND PART OF 4 GEOLOGY OF SOUTH DONEGAL'  
GEOLOGICAL SURVEY OF IRELAND 1999

PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

# LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- LOUGH ESKE PSAMMITE FORMATION
- LOUGH MOURNE FORMATION
- KILLETER QUARTZITE FORMATION
- AGHYARAN & KILLYGORDAN LIMESTONE FORMATIONS
- - - FAULT



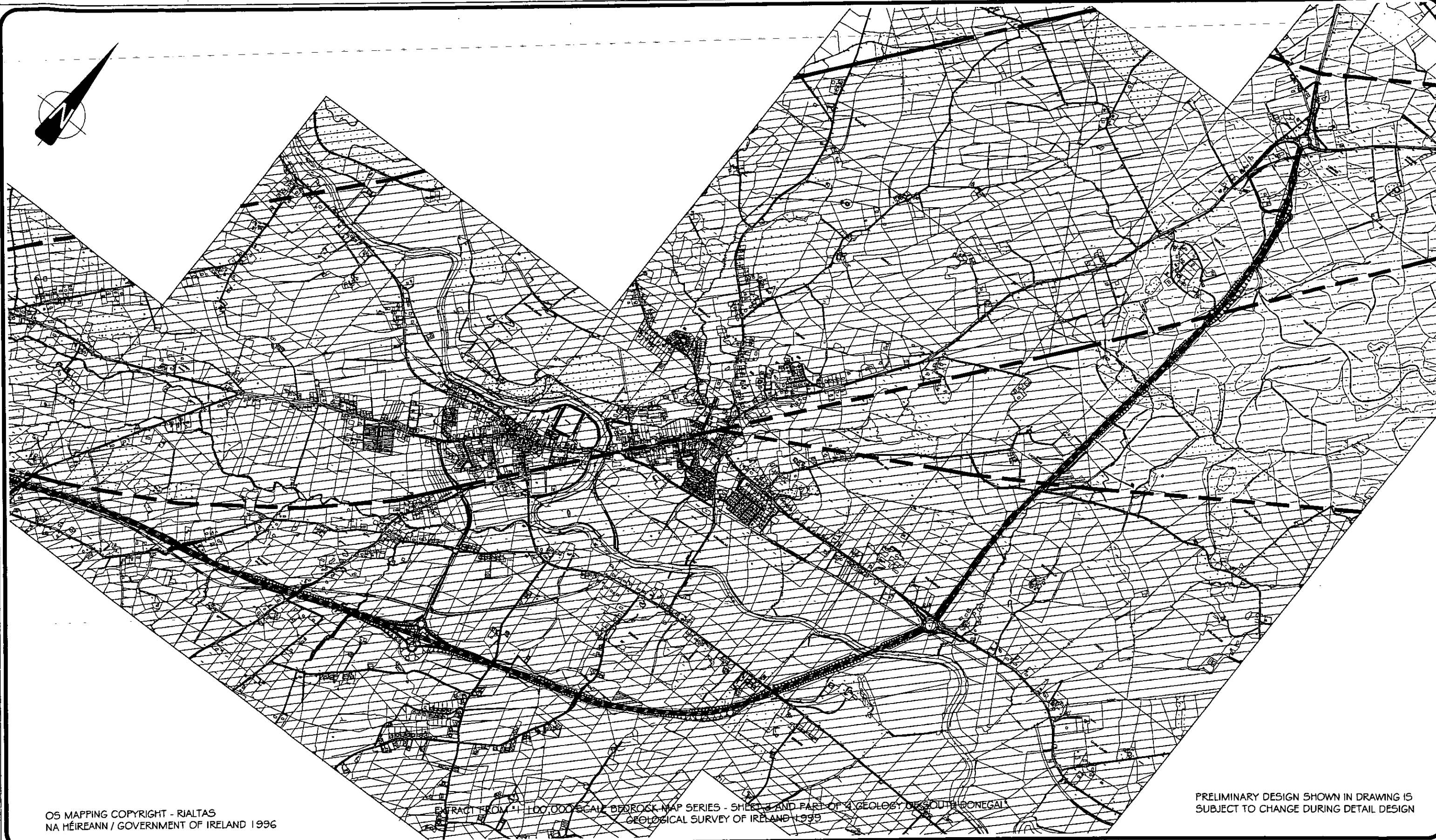
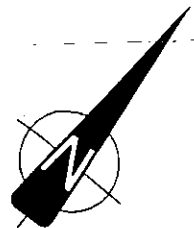
**NRA**  
National Roads Authority  
An tArdán na Bóithé Náisiúnta



rev	by	chk	app	date	comment
F	PR	PT	PT	06.03.07	NEW ROAD ALIGNMENT (Alignment 280207) & SPLIT INTO TWO PARTS
G	PR	PT	PT	15.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project <b>N13/N15 BALLYBOFEY STRANORLAR BYPASS</b>		<b>MCCARTHY HYDER CONSULTANTS CONSULTING ENGINEERS</b> SUITE 24, THE MALL, BEACON COURT, SANDYFORD, DUBLIN 18	
Drawing Title <b>GEOLOGY WITHIN THE STUDY AREA (PLAN VIEW)</b> (SHEET 1 OF 2)			
Date NOV 2007	Scale N.T.S.	Drawing no. Figure 14.1	Issue G





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EXTRACT FROM 1:100,000 SCALE BEDROCK MAP SERIES - SHEET 4 AND PART OF 3 GEOLOGY OF SOUTH DONEGAL  
GEOLOGICAL SURVEY OF IRELAND 1999

PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

# LEGEND

- PRELIMINARY DESIGN
- CPO BOUNDARY
- LOUGH ESKE PSAMMITE FORMATION
- LOUGH MOURNE FORMATION
- KILLETER QUARTZITE FORMATION
- AGHYARAN & KILLYGORDAN LIMESTONE FORMATIONS
- FAULT



REV	BY	CHK	APP	DATE	COMMENT
1	FR	FT	FT	21.12.06	NEW ROAD ALIGNMENT (Alignment 230207) & SPLIT INTO TWO PARTS
2	FR	FT	FT	19.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
GEOLOGY WITHIN THE STUDY AREA  
(PLAN VIEW)  
SHEET 2 OF 2

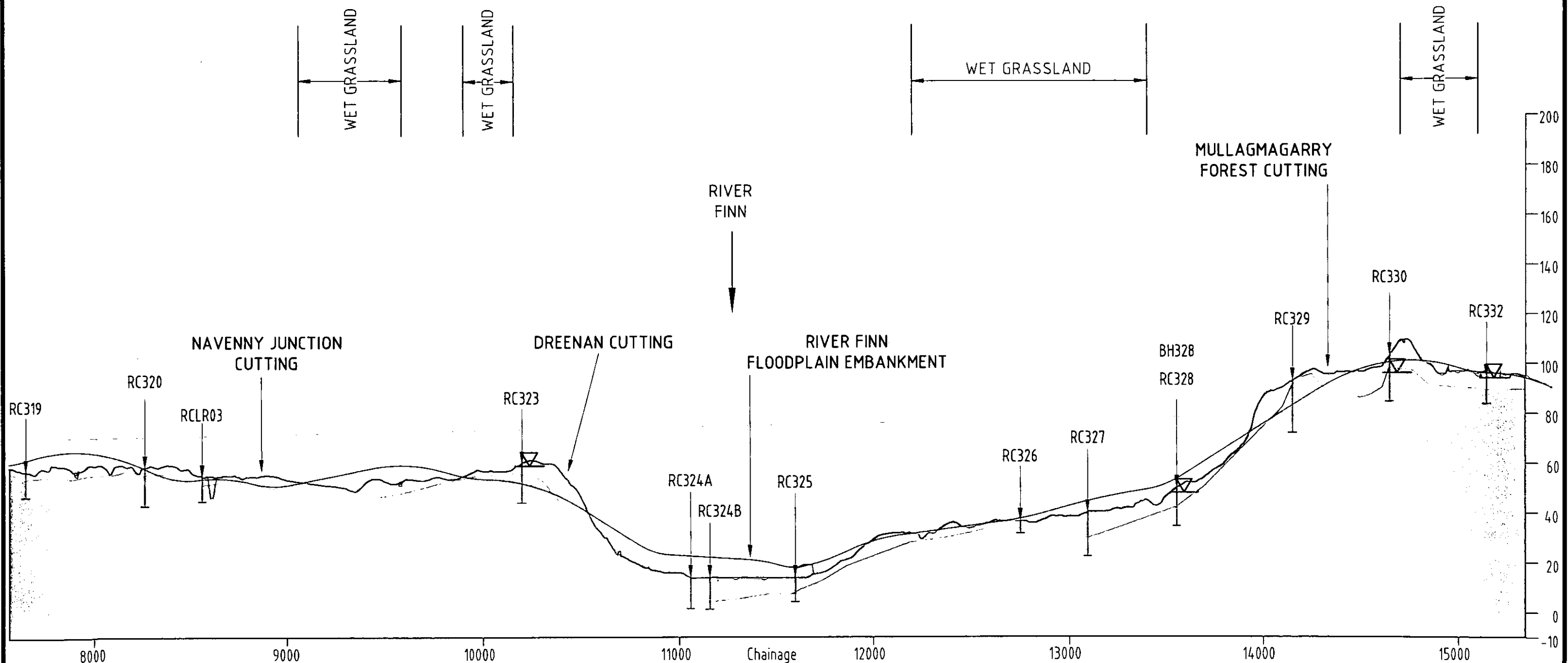
Date NOV 2007 Scale NTS

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18

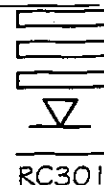
Drawing no. Figure 14.1 Issue G







#### LEGEND



PEAT  
SUPERFICIAL DRIFT DEPOSITS  
SOLID GEOLOGY  
HIGHEST RECORDED GROUNDWATER LEVELS  
PRELIMINARY DESIGN  
ROTARY CORE BOREHOLE

#### NOTES:

PRELIMINARY DESIGN SUBJECT TO CHANGE

OS DATUM - MALIN HEAD



date	by	chk.	app.	date	comment
11.12.06	P.R.	P.T.	P.T.	11.12.06	FIRST ISSUE (14.2 RD NOW FIG 14.3 RD)
04.03.07	F.P.R.	P.T.	P.T.	04.03.07	NEW ROAD ALIGNMENT (Alignment 200207)
19.10.07	G.P.R.	P.T.	P.T.	19.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS

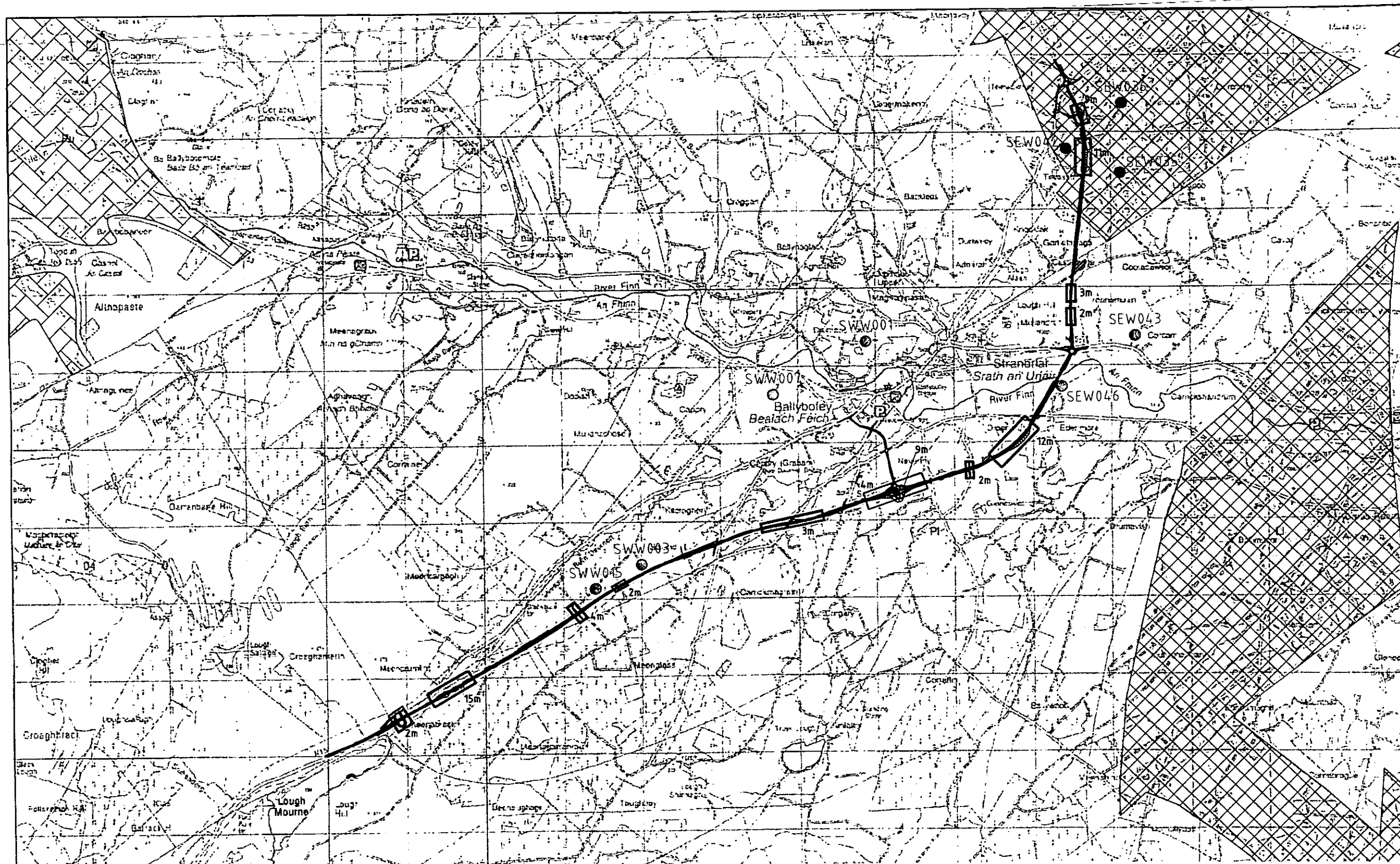
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Date: NOV 2007

Scale: 1:500 (N)  
1:20000 (H)

McCarthy Hyder Consultants Consulting Engineers  
SUITE 24, THE MALL, SANDYFORD, DUBLIN 18

Drawing no. Figure 14.2  
Issue G



PRELIMINARY DESIGN SHOWN IN DRAWING IS  
SUBJECT TO CHANGE DURING DETAIL DESIGN

EXTRACT FROM "DRAFT NATIONAL BEDROCK AQUIFER MAP" MARCH 2004, GEOLOGICAL SURVEY OF IRELAND

# LEGEND

## PROVISIONAL AQUIFER CLASSIFICATIONS

- LI - LOCALLY IMPORTANT AQUIFER - BEDROCK WHICH IS MODERATELY PRODUCTIVE ONLY IN LOCAL ZONES
- PI - POOR AQUIFER - BEDROCK WHICH IS GENERALLY UNPRODUCTIVE EXCEPT FOR LOCAL ZONES
- PU - POOR AQUIFER - BEDROCK WHICH IS GENERALLY UNPRODUCTIVE
- GSI WELL DATABASE
- AREAS OF SIGNIFICANT CUTTING WITH APPROXIMATE MAXIMUM DEPTH
- PRELIMINARY DESIGN



REV	BY	CHK	APP	DATE	COMMENT
1	P.R.	P.T.	P.T.	06.03.07	NEW ROAD ALIGNMENT
2	P.R.	P.T.	P.T.	09.10.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project  
N13 / N15 BALLYBOFEY  
STRANORLAR BYPASS

Drawing Title  
DRAFT GSI NATIONAL  
BEDROCK AQUIFER MAP

Date  
NOV 2007

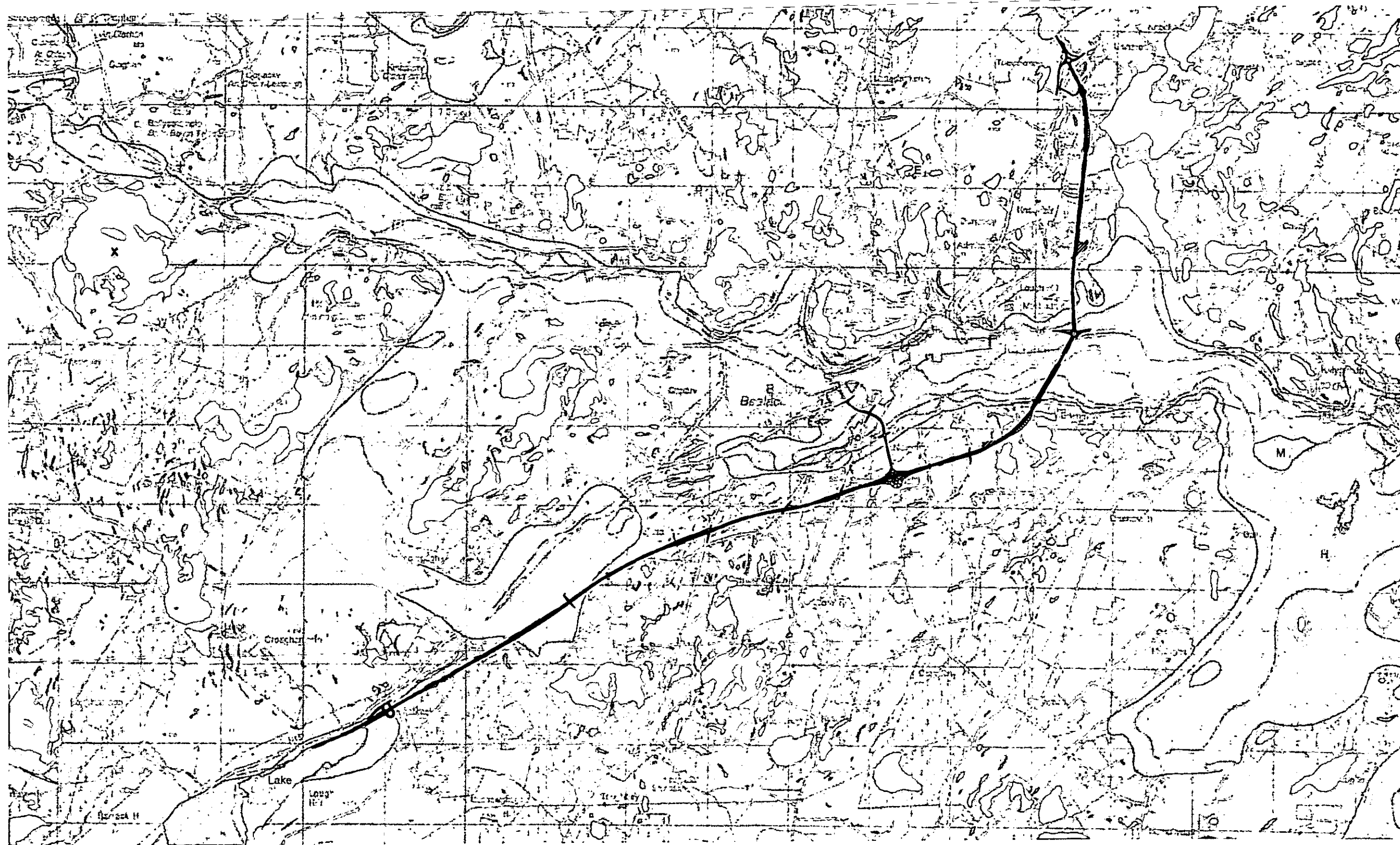
Scale  
N.T.S.

McCarthy Hyder Consultants  
CONSULTING ENGINEERS  
SUITE 24, THE MALL,  
BEACON COURT,  
SANDYFORD,  
DUBLIN 18



Drawing no.  
Figure 14.3

Issue  
F



EXTRACT FROM "DRAFT GROUNDWATER VULNERABILITY MAP FOR STRANORLAR / BALLYBOFEY TO DONEGAL 2002" GEOLOGICAL SURVEY OF IRELAND

PRELIMINARY DESIGN SHOWN IN DRAWING IS SUBJECT TO CHANGE DURING DETAIL DESIGN

# LEGEND

- E - EXTREME
- X - EXTREME (KARST / ROCK NEAR SURFACE)
- H - HIGH
- L - LOW
- M - MODERATE
- PRELIMINARY DESIGN



REVISED	BY	CHK.	APP.	DATE	COMMENT
A	D.T.	L.W.	L.W.	23.06.04	FIRST ISSUE
B	M.J.H.	L.W.	L.W.	10.03.05	MINOR AMENDMENTS
C	G.E.P.	V.P.	H.T.	01.11.06	OS MAP UPDATED / REVISED ROUTE ALIGNMENT / CPO BOUNDARY REVISED
D	G.E.P.	V.P.	H.T.	01.03.07	ALIGNMENT, CPO BOUNDARY & DATE REVISED
E	G.E.P.	V.T.	H.T.	19.06.07	CPO & DESIGN AMENDED FOLLOWING REVIEW OF GROUND CONDITIONS

Project: N13 / N15 BALLYBOFEY STRANORLAR BYPASS		McCarthy Hyder Consultants Consulting Engineers Suite 24, The Mall, Sandycroft, Dublin 15	
Drawing Title: DRAFT GSI VULNERABILITY MAP		Drawing no.: Figure 14.4	
Date: NOV 2007	Scale: N.T.S.	Issue: E	

213/15

BRADLEY  
STRAVINSKY



# N13/N15 Ballybofey/Stranorlar Bypass

## Environmental Impact Statement

### Volume 3: Appendices



November 2007



**MCCARTHY HYDER**  
CONSULTANTS  
CONSULTING ENGINEERS



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Appendix 1.1 Consultation Responses

**Chapter 2.0 Background to the Project**

Appendix 2.1 Traffic Accident Data

Appendix 2.2 Constraints Study Area

Appendix 2.3 Route Selection Report Summary and Conclusions

**Chapter 3.0 Description of The Proposed Bypass**

Appendix 3.1 Affected Services

**Chapter 5.0 Socio-Economics**

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Appendix 5.2 Businesses Surveyed 2002

**Chapter 6.0 Agricultural Land**

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**APPENDIX 1.1**

**CONSULTATION RESPONSES**

N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Organisation	Contact	Address	Response
Duchas	Regional Manager Regional Ecologist	Glenveagh National Park Churchill Letterkenny Co. Donegal	Response
Duchas	Local Ranger Archaeologist Architectural Heritage Specialist Underwater Specialist Hon. Secretary	Dun Sceline Harcourt Land Dublin 2	Response
Ballybofey and Stranorlar Anglers Association		Admiral Stranorlar Co. Donegal	Response
Environment Protection Agency (flooding, water quality, ecology)	Dublin Regional Inspectorate	St Martins House Waterloo Road Dublin 4	No response received
The Heritage Council	Planning Officer	Kilkenny Ireland	No response received
Loughs Agency	Inspector/	22 Victoria Road Londonderry	Response
Office of Public Works	Principal Officer Engineering Services	Head Office 51 St Stephen's Green Dublin 2	Response
Office of Public Works	Regional Engineer	Engineering Branch 17-19 Lower Hatch Street Dublin 2 Tel: 01 - 647 6000	Response
Office of Public Works	Regional Engineer	Headford Galway	Response
Arts Council, Archaeology Section		70 Merrion Square Dublin 2	No response received
BirdWatch Ireland		Rutledge House 8 Longford Place Monkstown Co. Dublin Ireland	No response received

N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Organisation	Contact	Address	Response
Bord na Mona		Main Street Newbridge Co. Kildare Ireland	No response received
Central Fisheries Board		Balnagowan Mobhi Boreen Glasnevin Dublin 9	No response received
Northern Regional Fisheries Board		Station Road Ballyshannon Co. Donegal	Response
Coillte Teoranta		River View House Carlow Road Kilkenny	Response
Department of Agriculture, Food and Rural Development		Bishop Street Dublin 8	Response
Irish Wildlife Trust	National Co-ordinator	107 Lower Baggot Street Dublin 2 6768601	No response received
Irish Peatland Conservation Council	Chairman	119 Capel Street Dublin 1	Response
An Taisce	National Planning Officer	The Tailors' Hall, Back Lane, Dublin 8	No response received
An Taisce	Chairperson	Glendoeen New Mills Letterkenny Co. Donegal	No response received
Teagasc	Chief Agricultural Officer	Cavan Lower Ballybofey Co Donegal	Response
Department of Marine and Natural Resources		Corporate Management Division Leeson Lane Dublin 2	Response
Voice of Irish Concern for the Environment		14 Pembroke Street Dublin 12	No response received
Tree Council of Ireland		Cabinteeley House The Park Cabinteeley Dublin 18	No response received

N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Organisation	Contact	Address	Response
Earthwatch		Head Office 20 Grove Road Rathmines Dublin 6	No response received
Royal Irish Academy		19 Dawson Street Dublin 2	No response received
ENFO		The Environmental Information Service St Andrew Street Dublin 2	Response
Bord failte		Baggot Street Bridge Dublin 2	No response received
Tourism Ireland		Aras Redden Temple Street Sligo	No response received
Crann Woodland Trust		Crank House Banagher Co. Offaly	No response received
Donegal Historical Society		Hon. Secretary 61 Cluain Barron Ballyshannon Co. Donegal	Response
Twin Towns Environmental Group		Twin Towns Environmental Group Ballybofey Co. Donegal	Response
Woodlands of Ireland		The Farm Centre Mill Park Road Enniscorthy Co. Wexford	No response received
Crossroads & Killygordon Enterprise Ltd (CAKE)		Chairperson Crossroads & Killygordon Enterprise Ltd Old Creamery Office Crossroads Killygordon Lifford	No response received
North-Western Health Board	Head of Environmental Health	Co. Donegal Community Services Ballybofey Co. Donegal	No response received

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Organisation	Contact	Address	Response
Department of the Marine & Natural Resources	Forestry Inspector	Mill Road Genties Co. Donegal	Response
Health & Safety Authority		Infotel 10 Hogan Place Dublin 2 Ireland	Response
Irish Aviation Authority	Corporate Policy & Planning	Aviation House Hawkins Street Dublin 2	Response
Loughs Agency (formerly Foyle Fisheries Commission)		22 Victoria Road Londonderry BT47 2AB	Response
Dúchas, The Heritage Service		Ecology Section 7 Ely Place Dublin 2	No response received
Dúchas, The Heritage Service		Dúchas NPWS Dun Sceine Harcourt Place Dublin 2	No response received
Loughs Agency (formerly Foyle Fisheries Commission)	Inspector	Foyle Carlingford and Irish Lights Commission 22 Victoria Road Londonderry BT47 2AB	Response

**APPENDIX 2.1**  
**TRAFFIC ACCIDENT DATA**

## Accident Statistics

### Year 1996

Accident Location	Fatal	Serious	Slight Injury
Node 200-307 Existing N15 in towns			1
Node 140 N15 at R252 Junction		1	
Node 147 N15 to Lifford, east of Towns		1	
Node 150 Junction of N13 & N15			1
Node 250-303 N13 north of towns			1
<b>Total</b>	0	2	3

### Year 1997

Accident Location	Fatal	Serious	Slight Injury
Node 120 N15 west of towns		1	
Node 138 N15 in towns		1	
Node 140-141 R252 north of N15		1	1
Node 147 N15 to Lifford, East of towns		1	
Node 149 N15 to Lifford, East of towns			1
Node 150 Junction of N15 N13			1
Node 150-159 N13 north of towns			1
Node 307 Existing N15 in towns	2	1	
<b>Total</b>	2	5	4

### Year 1998

Accident Location	Fatal	Serious	Slight Injury
Node 120 N15 west of towns			1
Node 136-140 N15 west of R252 junction			1
Node 140 N15 at R252 Junction			1
Node 149 N15 to Lifford, East of towns			1
Node 159 N13 north of towns			1
Node 200-307 Existing N15 in towns		2	
Node 201 Existing N15 in towns			1
Node 250-303 N13 north of towns			2
Node 250 Junction N13 and R236			1
<b>Total</b>	0	2	9

### Year 1999

Accident Location	Fatal	Serious	Slight Injury
Node 120 N15 west of towns	1		
Node 136-140 N15 west of R252 junction			1
Node 137 Existing N15 in towns		1	
Node 140-141 R252 north of N15		1	1
Node 147-149 N15 to Lifford, East of towns	1		1
Node 151 N13 north of towns			2
Node 152 N13 north of towns			1
Node 245-250 N13 north of towns at Kilross			1
<b>Total</b>	2	2	7

### Year 2000

Accident Location	Fatal	Serious	Slight Injury
Node 120 N15 west of towns			1
Node 130-136 N15 west of R252 Junction			1
Node 147 N15 to Lifford, East of towns			1
Node 201 Existing N15 in towns			2
Node 149-150 N15 to Lifford, East of towns		1	1
<b>Total</b>	0	1	6

**Year 2001**

**Accident Location**

Node 130-135 N15 west of R252 Junction  
Node 130-131 N15 west of R252 Junction  
Node 138 Existing N15 in towns  
Node 141 Existing N15 in towns  
Node 149 N15 to Lifford. East of towns  
Node 201 Existing N15 in towns  
Node 200-307 Existing N15 in towns  
Node 151-250 N13 north of towns  
Node 307 Existing N15 in towns

<b>Fatal</b>	<b>Serious</b>	<b>Slight Injury</b>
	1	
		2
		1
		1
	1	1
		1
	1	
		7
	1	
0	4	13

**Total**

**Year 2002**

**Accident Location**

Node 120-132 N15 west of towns  
Node 130-135 N15 west of towns  
Node 131-132 N15 west of towns  
Node 140 N15 at R252 Junction  
Node 140-141 N15 west of towns  
Node 147 N15 to Lifford. East of towns  
Node 150-307 Existing N15 in towns  
Node 201-307 Existing N15 in towns  
Node 245-250 N13 north of towns at Kilross  
Node 250-303 N13 north of towns at Kilross

<b>Fatal</b>	<b>Serious</b>	<b>Slight Injury</b>
		1
	1	
		1
		1
	1	
		2
		1
		2
		1
	1	3
0	3	12

**Total**

**Totals for period 1996 - 2002**

<b>Fatal</b>	<b>Serious</b>	<b>Slight Injury</b>
4	19	54



**APPENDIX 2.2**

**CONSTRAINTS STUDY AREA**

# N13/N15 Ballybofey / Stranorlar Bypass Constraints Study Area



**APPENDIX 2.3**

**ROUTE SELECTION REPORT**  
**SUMMARY AND CONCLUSIONS**

This Appendix is taken from Chapter 19 of the Ballybofey / Stranorlar Bypass Route Selection Report Volume 1 – Main Text (May 2001) (McCarthy Hyder Consultants). It presents the process of selection used to arrive at the Preferred Route.

### **Route Options**

Following the initial study work carried out in the Constraints Study Phase four route options were defined for the scheme. The Green and Blue routes were based on the reserved lines outlined in the Ballybofey and Stranorlar Development Plan 1996. The Pink and Red routes formed alternative outer northern and southern bypass options respectively. The route options are described in Chapter 2.0 Background to the Project.

### **Environmental Impact Tables**

An assessment of the environmental impact of each route option was undertaken. An overall assessment was presented based on a seven-point scale:

Moderate Beneficial  
Minor Beneficial  
No Change  
Minor Adverse  
Moderate Adverse  
Major Adverse  
Severe Adverse

The Do Minimum Situation and beneficial impacts were also considered within the initial assessment stage and presented within impact evaluation tables within the Route Selection Report. The information presented in the impact evaluation tables was examined together with the engineering and traffic needs of each route option to determine an overall preferred route option for the N15 Ballybofey / Stranorlar Bypass.

With mitigation measures taken into consideration, the route options were then ranked into order of preference as follows:

- 1 Most Preferred
- 2
- 3
- 4 Least Preferred

A summary table of the key issues considered was presented in the Route Selection Report (Figure 1). For many of the environmental subject areas however, the differences between route options were not considered significant.

### **The Preferred Route**

As the route selection study progressed it became apparent that no one route being examined was going to be superior in all aspects to the others.

Based on the ranking 'with mitigation' of each option (Figure 1), the Red Route was associated with the highest number of 'most preferred' ratings and although 'least preferred' with respect to landscape, it was identified that all of the route options would have at least a 'moderate adverse' impact on the landscape of the area.

Furthermore following examination of route options it was felt that the Red Route offered a number of other significant advantages over the other options as outlined below.

### *Engineering*

The Red Route follows a significant length of the old disused railway line and accordingly the terrain through which the route passes is eminently suitable for allowing the design of a high quality single carriageway road as is proposed. Both of the routes that run north of the town would require sections of substantial gradient either side of the crossing of the River Finn. This is undesirable with respect to both the quality of the proposed road alignment and the substantial earthwork cuttings that would be required.

### *Strategic Road Network*

The existing road network of the N15 and N13, as they run through the twin towns, form the intersection from three points of a geographical triangle consisting of Donegal Town, Letterkenny and Lifford. The results of the traffic survey work, undertaken by Babbie Pettit, indicate that whilst there are higher traffic flows to and from Letterkenny in comparison to Lifford they are not significantly higher. Whereas the routes that run north of the town offer some benefit to Letterkenny area trips, the substantial increase in journey distance imposed on Lifford traffic more than offset those benefits. This was illustrated by the 'Link Transit' benefits identified in the cost benefit analysis (COBA). Furthermore the junction location on the old N15, which would intersect, with the proposed N15 Lifford to Stranorlar Improvement works would ensure that the bypass, if the Red Route was chosen, would serve the needs of both the N13 and N15 equally and maintains the 'three points of the triangle'.

### *Planning*

As shown in the impact evaluation tables all of the route options were in accordance with the various local and national needs studies and development plans.

Evaluation of the route options however, highlighted the fact that although the inner route options (Blue and Green) were based on corridors identified previously, the towns have changed substantially in the intervening years. The two inner routes run close to the towns and accordingly it could be said that they failed to bypass the towns.

Accordingly it was recommended that the Red Route be confirmed as the Preferred Route for the N15 Ballybofey / Stranorlar Bypass.

FIGURE 1 SUMMARY OF KEY ISSUES

ISSUE	ALL ROUTES BENEFICIAL IMPACTS	PINK ROUTE	BLUE ROUTE	GREEN ROUTE	RED ROUTE	DO MINIMUM
Length	-	16,635m	16,630m	15,410m	15,530m	-
Land Costs	-	IR £1,273,210	IR £2,286,520	IR £646,508	IR £764,484	-
Construction Costs	-	IR £22,693,683	IR £18,807,736	IR £27,833,884	IR £20,808,547	-
NPV	-	IR £-5,580,000	IR £740,000	IR £4,592,000	IR £24,000	-
Traffic	★	★	★	★	★	△
No. structures	-	8	8	6	7	-
Planning	★	△	△	△	△	△
Land Use and Amenities	★	△	△	△	△	△
Socio-Economics	★	△	△	△	△	△

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ISSUE	ALL ROUTES BENEFICIAL IMPACTS	PINK ROUTE	BLUE ROUTE	GREEN ROUTE	RED ROUTE	DO MINIMUM
Agricultural Land	★	△	△	△	△	△
Landscape and Aesthetics	★	△, △	△	△	△, △	△
Surface Water Quality/ Drainage	★	△	△	△	△	△
Ecology	○	△	△, △	△	△	○
Cultural Heritage	★	△	△	△	△	△
Air Quality	★	△	△	△	△	△
Noise and Vibration	★	△	△	△	△	△

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ISSUE	ALL ROUTES BENEFICIAL IMPACTS	PINK ROUTE	BLUE ROUTE	GREEN ROUTE	RED ROUTE	DO MINIMUM
Geology and Hydrogeology	★	△	△	△	△	△
Construction Impacts	★	△	△	△	△	○
Ranking		2	3	3	1	

Major Negative	△
Moderate Negative	△
Minor Negative	△
No Impact	○
Minor Beneficial	★
Moderate Beneficial	★

Note: This summary is indicative of the possible impacts of the scheme but all of the groups cannot be compared in simple relative terms. Each subject area should be considered on an individual basis only.



**APPENDIX 3.1**  
**AFFECTED SERVICES**

## Affected Services

### Electricity Supply Board (ESB)

Item	Location	Chainage	Description	Length of Diversion
E1	Existing N15, west of Lough House.	900	Existing 10kv overhead cable.	(35m)
E2	Goland	5150	Existing 10kv overhead cable.	(35m)
E3	North of proposed Edenmore underbridge.	10,730	Existing 10kv overhead cable.	(50m)
E4	Mullandrait.	11,985	Existing 10kv overhead cable.	(20m)
E5	Kilross.	14,635	Existing 10kv overhead cable.	(60m)
E6	Proposed Link Road (LR), Navenny.	LR 600	Existing 10kv overhead cable.	(25m)
E7	Proposed Link Road (LR), Ballybofey.	LR 250	Existing 38kv overhead cable.	(20m) Proposed link road is at-grade in this location.

### Eircom

Item	Location	Chainage	Description	Length of Diversion
T1	Existing N15, The Lough House.	-568 to 1300	Existing overhead line.	(180m)
T2	Carrickmagrath	6,200	Existing overhead line.	(60m)
T3	Carrickmagrath	7,070	Existing overhead line.	(60m)
T4	Sessiagh O'Neill	7,900	Existing overhead line.	(60m)
T5	Navenny	9,060	Existing overhead line.	(30m)
T6	Edenmore, (proposed underbridge)	10,700	Existing overhead line.	(60m)
T7	Existing N15, Proposed Stranorlar Roundabout.	11,700	Existing overhead line.	(500m)
T8	Proposed junction at Kilross.	15,050 15,300	Existing overhead line.	(250m)
T9	Kilross.	15,300	Existing overhead line.	(30m)
T10	Ballybofey Link Road LR, Navenny, Trusk Road.	LR 680	Existing overhead line.	(100m)
T11	Ballybofey Link Road LR, Ballybofey, Carrickmagrath Road.	LR 330	Existing overhead line.	(150m)
T12	Ballybofey Link Road, existing N15.	LR 0	Existing overhead line.	(120m)

**Water Supply (Donegal County Council)**

Item	Location	Chainage	Description	Length of Diversion
W1	Croaghonagh, to the east of Lough Mourne.	1,400 – 2,000	Mains water pipe from pumping station adjacent Lough Mourne to Lough Mourne Head works.	(600m)
W2	Croaghonagh.	3,300	Mains water pipe from Lough Mourne Head works to Ballybofey.	(70m)
W3	Goland	4,300	Mains water crossed proposed side road realignment	(30m)
W4	Goland.	4,800 – 5,200	Mains water pipe from Lough Mourne Head works to Ballybofey.	(400m)
W5	Carrickmagrath.	7,160	Mains water pipe from Lough Mourne Head works to Ballybofey.	(60m)
W6	Sessiagh O' Neill.	7,900	Mains water pipe from Lough Mourne Head works to Ballybofey.	(70m)
W7	Navenney.	9,050	Mains water pipe.	(25m)
W8	Dreenan.	9,550	Mains water pipe.	(50m)
W9	Edenmore Underbridge.	10,690	Mains water pipe.	(60m)
W10	Edenmore.	10,720	Mains water pipe.	(60m)
W11	Mullandrait, Proposed Link Road Roundabout.	11,700	Mains water pipe.	(500m)
W12	Castlebane.	12,630	Mains water pipe.	(40m)
W13	Kilross.	15,050	Mains water pipe.	(150m)
W14	Kilross	15,250 15,500	Mains water pipe.	(250m)
W15	Navenney, Ballybofey Link Road, Trusk Road junction.	LR 680	Mains water pipe.	(120m)
W16	Navenney, Ballybofey Link Road.	LR 580	Foul Sewer.	(30m)
W17	Ballybofey Link Road.	LR 330	Foul Sewer and Mains water pipe.	(150m)
W18	Ballybofey Link Road	LR 170	Foul Sewer.	(25m)
W19	Ballybofey Link Road	LR 70	Foul Sewer.	(25m)
W20	Ballybofey Link Road, at existing N15 junction.	LR 0	Mains Water.	(120m)

**APPENDIX 5.1**  
**SURVEY QUESTIONNAIRE 2002**

## Survey Questionnaire 2002

Business Name: \_\_\_\_\_

Nature of business: \_\_\_\_\_

Interview Number: \_\_\_\_\_ Surveyor: \_\_\_\_\_

### Part 1: Business Details

1.1 What type of customers use your business, please select from the list below.

Local	<input type="checkbox"/>	_____ %
Passing (not including tourists)	<input type="checkbox"/>	_____ %
Tourist	<input type="checkbox"/>	_____ %
Other (please describe)		
_____		_____ %

1.2 Has trading changed over the last 3 years?

Improved	<input type="checkbox"/>	_____ %
No change	<input type="checkbox"/>	_____ %
Declined	<input type="checkbox"/>	_____ %
Reasons:		
_____		

1.3 How many staff does the business employ, not including seasonal staff?

Full-Time \_\_\_\_\_ Part-Time \_\_\_\_\_

1.4 If you employ staff on a seasonal basis, please indicate how many?

\_\_\_\_\_

1.5 Which of the following figures relate to the annual turnover of the business?

Less than €50,000	<input type="checkbox"/>
€50,000 - €100,000	<input type="checkbox"/>
€100,000 - €500,000	<input type="checkbox"/>
€500,000 - €1,000,000	<input type="checkbox"/>
€1m - €2million	<input type="checkbox"/>
More than €2million (please state an indicative amount):	
_____	

**Part 2: N15 Ballybofey / Stranorlar Bypass.**

- 2.1 What impact do you believe the proposed bypass have on your business turnover? If your answer is no impact, please skip to question 2.4.

Negative impact ☐ Positive impact ☐ No impact ☐

- 2.2 If you believe that the bypass will have an impact, please indicate the extent of this on your annual turnover.

**Impact**

Less than one quarter ☐  
Less than one half ☐  
More than a half ☐  
More than three quarters ☐

- 2.3 Reasons for this impact on business:

Reduced passing trade ☐  
Reduced delivery costs ☐  
Reduced drive times to the area ☐  
Increased catchment area ☐  
Increased volume of tourists ☐  
Reduced volume of tourists ☐  
Other: \_\_\_\_\_

- 2.3 What would be the consequences of this impact?

\_\_\_\_\_

- 2.4 Possible steps to encourage a positive impact upon your business?

Traffic Management ☐  
Upgrade parking facilities ☐  
Landscaping ☐  
Improved signage ☐  
Other \_\_\_\_\_

- 2.5 Do you believe that the recent bypass schemes at Donegal Town and Mountcharles have had a positive or negative impact on these towns?

Positive ☐ Negative ☐ No change ☐ Don't know ☐

- 2.6 What, in your opinion, would be the future potential of Ballybofey and Stranorlar, once the bypass has been put in place?

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- 2.7 Do you have any other comments relating to the proposed N15 bypass?

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**APPENDIX 5.2**  
**BUSINESSES SURVEYED IN 2002**



## Businesses Surveyed in 2002

<i>Accommodation</i>	<i>Retail Convenience</i>
Dergfield House	Spar Express
Stranorlar house	O'Connors
Blackrock House	Galabake
Rockville House	Supervalu
Warrenbank	Andies
Jacksons Hotel	
	<i>Petrol Filling Stations</i>
<i>Retail Comparison</i>	Gallaghers Garage
Raitt WH & Sons	Esso - Dunnions Garage
The Flower Shop	Shell Garage
Ballybofey Hardware	EMO garage and Mace
Blackburn Electrical shop	
Book Centre	<i>Wholesale Outlets</i>
Variety Basket	Ulster Tyre Co. Ltd
Foys Interiors	K Whelan and Sons
McElhinneys	
Beechwood Kitchens	<i>Manufacturing</i>
Suite and Pine Furniture	Cherrymore Furniture
Shaun Lafferty	JMP Furniture
G Brown Tool Hire	Nenagh Models Ltd
TSA Tyres	

**APPENDIX 6.1**

**SUMMARY OF INDIVIDUAL FARM  
ASSESSMENTS**

Notes:

- Affected farms on the N13/N15 Ballybofey / Stranorlar Bypass are entered in the following summary table. Details of farmed area, farm enterprise and the overall farm impact are included in columns 1-3.
- The land subplot number in column 4 identifies the affected agricultural lands on the mapping of Agricultural Properties.
- Details of the nature of impact such as landtake, level of severance and mitigation relating to severance on each affected land plot are included in columns 5-7. In certain cases a farm may be affected by the scheme on more than one land plot. Where this is the case detail of the landtake, level of severance and mitigation relating to severance is given specific to each land plot.
- In a small number of cases the land subplot column also consists of A, B, C, etc. referring to two or more land plots, which are assumed to be farmed as one unit.

Table 6.8 Summary Table - N13/N15 Ballybofey / Stranorlar Bypass

Total farmed area (Ha)	Farm Enterprise Impacted	Level of Overall Impact	Land Subplot No.	Nature of Impact			Level of Residual Overall Impact
				Take (Ha)	Severance	Mitigation Relating to Severance	
76.1	Forestry & Ponies	Minor	1	1.656	None	Provide access to affected area	Minor
1.2	Leased	Minor	2	0.153	None	Provide access to affected area	Minor
76.9	Sheep	Minor	3	1.887	None	Provide access to affected area	Minor
60.7	Mixed Livestock - Sheep & Cattle	Moderate	4	4.581	Moderate	Provide access to severed area	Minor
404.7	Forestry	Moderate	5A	9.451	Moderate	Provide access to severed areas	Moderate
			5B	8.889		Restore access points / gates to affected area	
			48	3.281	None	Restore access points / gates to affected area	
			58	1.269	None		
46.5	Beef	Moderate	62	1.534	None		Moderate
			6	1.255	None		
			55	3.589	Moderate	Restore access points / gates to affected area	
17.0	Mixed Livestock - Cows & Cattle, Sheep	Moderate	7	0.721	Major	Provide access to severed area	Moderate
17.8	Sheep	Moderate	8A	0.030	Major	Restore access points / gates to affected area	Moderate
			8B	0.027			
33.2	Beef	Moderate	9	1.048	Major	Provide access to severed area	Moderate
13.0	Beef	Minor	10	0.392	None		Minor
38.0	Sheep	Moderate	11	0.875	None		Moderate
			13	0.306	Major	Provide access to severed area	
8.5	Beef	Major	12	0.697	Major	Provide access to severed area	Moderate
4.0	Leased	Moderate	14	0.246	Major	Provide access to severed area	Moderate
18.2	Beef	Moderate	15	1.060	Major	Provide access to severed area	Moderate
20.2	Sheep	Major	16	1.228	Major	Provide access to severed area	Moderate
40.5	Forestry, Sheep & Horses	Major	17	0.791	Major	Provide access to severed area	Moderate
			34	1.170	None		

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Total farmed area (Ha)	Farm Enterprise Impacted	Level of Overall Impact	Land Subplot No.	Nature of Impact			Level of Residual Overall Impact
				Take (Ha)	Severance	Mitigation Relating to Severance	
12.1	Beef	Major	18	2.948	Moderate	Restore access points / gates to affected area	Major
36.4	Sheep	Minor	19	0.119	None		Minor
36.4	Beef	Moderate	20	2.001	Moderate		Moderate
21.9	Leased	Minor	21	0.151	None		Minor
			39	0.506	None		
23.7	Beef	Major	22	0.151	None		Moderate
			24	0.572	Major	Provide access to severed area	
			26	1.001	None		
14.2	Mixed Livestock - Cows & Cattle, Sheep	Moderate	23	1.086	None		Moderate
1.0	Leased	Severe	25	1.182	None		Severe
18.2	Beef	Moderate	27	1.774	Moderate	Provide access to severed area	Moderate
22.3	Leased	Minor	28	0.196	None		Minor
9.3	Beef	Moderate	29A 29B	0.05 2.129	Moderate	Provide access to severed area Restore access points / gates to affected area	Moderate
18.2	Beef	Major	30	1.802	Major	Provide access to severed area	Moderate
17.0	Mixed Livestock - Sheep & Cattle	Moderate	31	4.112	None		Moderate
36.8	Beef	Major	32	2.379	Moderate	Restore access points / gates to affected area	Major
			38	3.850	Major	Restore access points / gates to affected area	
			41	0.139	None		
2.4	Beef	Moderate	33	0.582	Moderate	Provide access to severed area Restore access points / gates to affected area	Minor
0.4	Leased	Severe	35	0.360	None		Severe
29.1	Beef	Major	36	0.909	None	Restore access points / gates to affected area	Major

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Total farmed area (Ha)	Farm Enterprise Impacted	Level of Overall Impact	Land Subplot No.	Nature of Impact		Mitigation Relating to Severance	Level of Residual Overall Impact
				Take (Ha)	Severance		
			54	3.689	Moderate	Restore access points / gates to affected area(s)	
25.3	Mixed Livestock - Cows & Cattle, Sheep	Moderate	37	0.597	None	Restore access points / gates to affected area	Moderate
1.6	Unused	Moderate	40	1.216	None		Moderate
16.2	Leased	Moderate	42	2.669	Major	Provide access to severed area Restore access points / gates to affected area	Moderate
11.5	Beef	Moderate	43	2.042	None		Moderate
10.1	Beef	Not Significant	44	0.053	None		Not Significant
8.5	Mixed Livestock - Sheep & Cattle	Minor	45	0.557	None		Minor
80.9	Mixed Livestock - Cows & Cattle, Sheep	Moderate	46	1.825	None		Moderate
57.5	Mixed Livestock - Cows & Cattle, Sheep	Moderate	47	0.568	None		Moderate
			49	0.381	None		
17.0	Mixed Livestock - Sheep & Cattle	Major	50	3.334	Major	Provide access to severed area Restore access points / gates to affected area	Major
32.4	Leased	Minor	51	1.257	None		Minor
56.7	Beef	Not Significant	52	0.064	None		Not Significant
22.3	Beef	Major	53	2.820	Major	Provide access to severed area Restore access points / gates to affected area	Moderate
29.1	Silage Production	Major	56	1.676	Major	Provide access to severed area	Moderate
24.3	Silage Production	Major	57	3.625	Major	Provide access to severed area	Moderate
17.8	Sheep	Moderate	59	1.531	None		Moderate
11.3	Leased	Moderate	60	1.880	None		Moderate
5.7	Leased	Not Significant	61	0.030	None		Not Significant
24.7	Sheep	Minor	63	0.658	None		Minor
37.2	Beef	Moderate	64	1.520	Major	Provide access to severed area	Moderate

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Total farmed area (Ha)	Farm/Enterprise Impacted	Level of Overall Impact	Land Subplot No.	Nature of Impact		Mitigation Relating to Severance	Level of Residual Overall Impact
				Take (Ha)	Severance		
12.1	Leased	Moderate	65	2.059	Major	Provide access to severed area Restore access points / gates to affected area	Moderate
16.2	Beef	Major	66A 66B	1.802 1.360	Major	Provide access to severed area	Moderate
24.3	Leased	Minor	67	0.203	None	Restore access points / gates to affected area	Minor
2.4	Unused	Moderate	68A 68B 68C	0.253 0.766 0.074	None	Restore access points / gates to affected area	Moderate

## **APPENDIX 7.1**

### **SUMMARY OF LANDSCAPE EVALUATION**



## Summary of Landscape Evaluation

Landscape Type	Character Area	Landscape Receptor	Landscape Quality
Chainage 600-1900: Unenclosed uplands	Lough Mourne	<ul style="list-style-type: none"> <li>Glacial upland landscape with Lough Mourne as major landscape feature and adjoining high hills forming a landscape setting to the Lough.</li> <li>Sense of wildness, dramatic scenery/sometimes hostile.</li> <li>Extensive areas of unimproved grassland with occasional patches of gorse and Juncus.</li> <li>Rock outcrops.</li> <li>Large-scale and exposed landscape offering dramatic views of the Blue Stack mountains to the south west.</li> </ul>	Highest Quality
Chainage 1900-4850: Afforested Uplands	Croaghonagh Coniferous Woodlands	<ul style="list-style-type: none"> <li>Coniferous plantations at varying stages of maturity but with structured appearance.</li> <li>Some areas of open unimproved grassland.</li> <li>Burn Daurnett watercourse and the former railway line with their adjoining broadleaved vegetation form a linear feature within the character area.</li> <li>Coniferous plantations are a discordant feature with a fragmented appearance. Overhead power cables are a detracting feature within the character area.</li> </ul>	Ordinary
Chainage 4850-6700: Enclosed Farmland	Type 1: Less intensively managed agricultural landscape surrounding Ballybofey / Stranorlar (Ch 4850-6700)	<ul style="list-style-type: none"> <li>Rough grasslands, hedgebanks with well established vegetation; some sense of neglect. Variations in colour and texture. Remnant stone walls.</li> <li>Enclosure pattern formed by hedgebanks, watercourses.</li> <li>Large-scale and expansive.</li> </ul>	Very Attractive
Chainage 7300-7900 / 9050-10700 and 12200-13500: Enclosed Farmland	Type 2: Less intensively managed agricultural landscape surrounding Ballybofey / Stranorlar (Ch 7300-7900 / 9050-10700 and 12200-13500)	<ul style="list-style-type: none"> <li>Small-scale, more intimate and enclosed.</li> <li>Well established hedgebanks with mature vegetation giving areas a strong sense of enclosure.</li> <li>Rough grasslands (some areas completely choked by rushes <i>Juncus</i>)</li> </ul>	Very Attractive
Chainage 6700-7300 and 13500-15480: Enclosed Farmland	Intensively managed agricultural landscape surrounding Ballybofey / Stranorlar	<ul style="list-style-type: none"> <li>Gently undulating landform on the hillsides surrounding Stranorlar/ Ballybofey.</li> <li>Topography and vegetation combine to form a landscape with a structured appearance that</li> </ul>	Good (However, that section between Chainage 7900-9050, including the Ballybofey Link Road, is assessed as Ordinary,

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		<p>features scattered farm buildings and residential properties.</p> <ul style="list-style-type: none"> <li>• Relatively intensively farmed with small to medium sized fields and occasional dense mixed woodlands.</li> <li>• Enclosure pattern formed by hedgebanks and occasional stonewalls.</li> <li>• Distant views, particularly to the Blue Stack Mountains, from elevated areas although views generally restricted by topography and vegetation.</li> <li>• Balanced and pleasant landscape.</li> </ul>	see below)
Chainage 7900-9050 (including link road to Ballybofey 0-1100) Enclosed Farmland	Intensively managed agricultural landscape surrounding Ballybofey / Stranorlar	<p>As above except:</p> <ul style="list-style-type: none"> <li>• Extensive and recent residential development introducing an urban landscape character.</li> </ul>	Ordinary
Chainage 10700-12200: Alluvial Floodplain Pasture	River Finn Floodplain	<ul style="list-style-type: none"> <li>• Medium sized fields primarily used for cattle grazing.</li> <li>• Dense hedgebanks with mature vegetation form enclosure pattern.</li> <li>• The former railway line and its associated vegetation contribute to its enclosure.</li> <li>• The character area is visible within views from elevated ground to the south and from the outskirts of Stranorlar. Within such views the area appears as a pleasantly balanced and verdant landscape.</li> </ul>	Good
Urban Areas	Ballybofey / Stranorlar	<ul style="list-style-type: none"> <li>• River Finn. Mix of built forms along High Street.</li> </ul>	Not Applicable

## **APPENDIX 7.2**

### **SUMMARY OF LANDSCAPE IMPACT ASSESSMENT**

## Summary of Landscape Impact Assessment

Chainage	Description of Impact	Nature of Impact	Duration	Magnitude of Impact at Year 1 and 15, including Rationale
600 – 1900	Loss of relatively small areas of existing acid grasslands, hedgebanks associated with disused railway line.	Direct	Permanent (Temporary for acid grasslands)	<b>Moderate Adverse</b>  The Preliminary Design would require widening of the existing road. Whilst it adopts an on-line alignment between Ch 600-1300 it would require new cuttings/ embankments. The Preliminary Design proceeds off-line at approximately Ch 1300. It would also require the addition of the Meencrumlin grade separated junction and it's associated lighting. This and other earthworks would result in further adverse impacts upon a landscape of the Highest Quality, which is extremely sensitive to change. New acid grasslands would assist with the landscape integration of the Preliminary Design, whilst new woodlands to enclose the Meencrumlin junction would connect this feature of the Preliminary Design with the adjoining coniferous woodland.
	Impact upon setting of Lough Mourne and character area of Highest landscape Quality.	Direct	Permanent	
	Culverting of existing watercourses.	Direct	Permanent	
	Introduction of Meencrumlin grade separated junction (including lighting) within the visual setting to the Lough.	Direct	Permanent	
	Introduction of more extensive embankments and cuttings at abrupt slope angles.	Direct	Permanent	
1900 – 4850	Loss of existing established coniferous woodlands.	Direct	Permanent	<b>Slight Adverse</b>  This is a landscape that is considered to be of Ordinary Quality. The Preliminary Design would introduce new embankments and cuttings that would not fit the landform and scale of the local landscape. New mixed woodland plantings would assist with its landscape integration.
	Loss of sections of existing dismantled railway line hedgebanks.	Direct	Permanent	
	Loss of rough pasture and areas of cleared forestry.	Direct	Permanent	
	Earthworks including cuttings/embankments; consequential impact upon landscape of Ordinary quality.	Direct	Permanent	

Chainage	Description of Impact	Nature of Impact	Duration	Magnitude of Impact at Year 1 and 15, including Rationale
4850 – 6700	Direct impact upon Very Attractive area of less intensively farmed agricultural landscape including substantial embankments within a relatively flat, low-lying landscape.	Direct	Permanent	<b>MODERATE ADVERSE</b>  New woodlands and hedgebanks would provide further landscape integration within this Very Attractive landscape area. The landscape character area would, however, be directly impacted by earthworks and the loss of some characteristic landscape features such as rock outcrops, hedgelines and trees.
	Loss of characteristic features associated with this landscape character area such as enclosure pattern, hedgebanks, mixed woodlands, green lanes and streams.	Direct	Permanent	
	Local impact upon settings of scattered settlements.	Direct	Permanent	
6700 – 7900	Direct impact upon a transition zone between areas of Very Attractive and Good landscape quality (Very Attractive landscape between Ch 7300 – 7900).	Direct	Permanent	<b>MODERATE ADVERSE</b>  The scheme would pass through a Very Attractive pocket of local landscape quality between Ch 7300–7900. New hedgebanks and woodlands would partially offset this loss. The Preliminary Design and its embankments would not fit the local landscape pattern and topography.
	Loss of sections of hedgerbank with mature vegetation, green lanes, improved/semi-improved pasture.	Direct	Permanent	
7900 – 9050	Direct impact upon a landscape type of Ordinary quality. Major cutting proposed at the Navenny grade separated junction with the link road (Ch 8400–8800 approximately).	Direct	Permanent	<b>MODERATE ADVERSE</b>  Due to the depth of cuttings proposed the Preliminary Design would be at considerable variance to the local pattern and landform resulting in some local degradation of landscape value with an area of Ordinary landscape quality. Its impact would also be increased due to the effects of lighting at the junction.
	Loss of improved pasture, severance of enclosure pattern and loss of relict hedgebanks.	Direct	Permanent	
	New lighting at Navenny junction would introduce an urban landscape element within this hitherto rural landscape character area.	Operational	Permanent	

Chainage	Description of Impact	Nature of Impact	Duration	Magnitude of Impact at Year 1 and 15, including Rationale
9050 – 10100	Direct impacts upon a Very Attractive local landscape of hedgebanks with well established vegetation and neglected pasture. Definitive sense of enclosure.	Direct	Permanent	<b>MODERATE ADVERSE</b>  Whilst the scheme would be out of scale with the existing landform new woodlands/hedgebanks would assist with its integration within an area of Very Attractive landscape quality.
	Loss of hedgebanks, pasture dominated by rushes.	Direct	Permanent	
10100 – 10700	Direct impact upon north facing slopes, which descend into the Finn Valley. Substantial cutting proposed of up to 12 metres depth at Ch 10350.	Direct	Permanent	<b>LARGE ADVERSE</b>  The Preliminary Design would introduce a major cutting, which would be out of scale with the local landform and landscape pattern. Over time new plantings would assist with the landscape integration of the Preliminary Design but the landscape impacts of the proposed earthworks would be considerable.
	Loss of some established mixed woodlands.	Direct	Permanent	
10700 - 12200	Direct impact upon the alluvial floodplain landscape of the River Finn, including earthworks and Stranorlar roundabout.	Direct	Permanent	<b>LARGE ADVERSE</b>  The Preliminary Design would cross the level expanse of the Finn floodplain on major embankment. Its junction with the existing N15 at Stranorlar would also have associated lighting that would increase its landscape impact.
	Loss of some 100 metres of hedgebanks associated with the disused railway line at Ch 11600. Loss of sections of relict hedgebanks in floodplain although these are relatively poor quality.	Direct	Permanent	
	Lighting on the Stranorlar roundabout.	Operational	Permanent	
12200-13500	Direct impact upon relatively compact area of less intensively farmed landscape of Very Attractive quality. Open drainage ditches.	Direct	Permanent	<b>MODERATE ADVERSE</b>  The Preliminary Design traverses a Very Attractive area of local landscape on slight embankment or in cutting. It would be out of scale with the local pattern and landform.
	Loss of areas dominated by rushes, hedgebanks and mature vegetation.	Direct	Permanent	

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Chainage	Description of Impact	Nature of Impact	Duration	Magnitude of Impact at Year 1 and 15, including Rationale
13500 – 15480	Direct impact upon an intensively farmed landscape of Good quality. Major earthworks between Ch 13900–14400 approximately.	Direct	Permanent	<b>LARGE ADVERSE</b>  Whilst this is a landscape of Good Quality the Preliminary Design would introduce substantial new earthworks that would be out of scale with the local landscape pattern.
	Loss of existing woodlands and some hedgerbanks (majority of hedgerbanks degraded/gappy). Improved pasture.	Direct	Permanent	
0-1100 (Link Road)	Direct impact upon north-facing slopes, which descend to the Burn Durnett.	Direct	Permanent	<b>MODERATE ADVERSE</b>  The Preliminary Design would impact upon the shallow valley of the Burn Durnett and would have a direct impact upon extant hedgerbanks and a short section of the disused railway line. New junctions and earthworks are also proposed.
	Loss of sections of existing hedgerbanks and parts of the disused railway line.	Direct	Permanent	

**APPENDIX 7.3**  
**VISIBILITY SCHEDULES**



Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
P1	Ti Locha Single storey property.	28m  28m	Front elevation views from x3 windows from very slightly elevated location overlooking Lough Mourne and wild land to the south of the waterbody. Direct open views over existing N15.	Slightly more of waterbody visible in Winter views due to lack of foliage on deciduous vegetation along disused railway line.	Start of Preliminary Design potentially visible within extreme oblique front elevation views from property. There would be no discernible deterioration in the existing view.  No Change	As for Year 1
P2	Unknown property name Single storey property.	19m  19m	Direct open views as for P1 from x4 front elevation windows. Property slightly more elevated than P1 with more open views over Lough Mourne. Existing N15 plus x2 emergency lanes in close proximity to property.	As for P1	Preliminary Design would bring a new cutting slope closer to the property. Existing N15 visible within direct open front elevation views. There would be a noticeable to barely perceptible deterioration in the existing view.  Slight to Moderate adverse visual effect	As for Year 1
P3	Unknown property name. Single storey property.	148m  354m	Property well enclosed by existing broadleaved and coniferous vegetation and occupies south facing slopes just above the Burn Daurnett. Views from building and its curtilages to existing N15 severely curtailed by existing vegetation. Oblique front and rear elevation views to a wooded hillside largely curtailed by intervening vegetation. Similarly, views from end elevation (south-facing façade) and building curtilage largely curtailed by existing vegetation in close proximity to property.	Views to south much more open due to lack of foliage on deciduous vegetation immediately adjoining property and upon vegetation adjoining the Burn Daurnett and hillsides above.	Preliminary Design would pass property on embankment on rising ground to south within a heavily wooded setting. Traffic and open embankments would be visible between Ch 2800-3000 upon what was previously wooded hillside. Earthworks to accommodate drainage pond (no. 5) would also be noticeable. There would be a significant deterioration in the existing view.  Substantial adverse visual effect	At Summer Year 15, planting on the embankments to the Preliminary Design would reinstate the heavily wooded character of the existing view. There would be a barely perceptible deterioration in the existing view.  Slight adverse  (Winter: Moderate adverse visual effect, new woodland planting would,

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
						due to its density, have some screening effect)
P4	Unknown property name. Believed to be a Single storey property.	41m  278m	To the north views to the existing N15 are part restricted by existing broadleaved trees, which almost enclose property. However, there is at least one view to the existing N15 through a gap in the tree screen. South facing elevation of building orientated towards wooded hillside. Views of a similar character to P3.	As for P3	As for P3, however views to the same section of carriageway would be oblique views from the front elevation and at slightly greater distance. Within views to the south from this property there would be a noticeable to significant deterioration in the existing view.  Moderate to Substantial adverse effect  Within views to existing N15 from the north facing elevation, there would be a barely perceptible improvement in the view due to a potential reduction in traffic using the route.  Slight beneficial effect	For views from south facing elevation: As for P3      For views from north facing elevation: As for Year 1
P5	Unknown property name. Single storey property.	200m  127m	Views from x3 front elevation windows, which face south to lane and wooded hillside. Severely restricted views to existing N15 from rear elevation.	North- facing valley sides above Burn Daurnett more visible due to lack of foliage on existing vegetation (including hedgeline on opposite side of track).	Preliminary Design on embankment would be visible through existing broadleaved vegetation, including hedgeline on opposite side of track. The vegetative screen currently afforded by vegetation adjoining the disused railway line would be removed between Ch 2800 to 3000. Within views to the south from this property there would be a substantial deterioration in the existing view.  Substantial adverse effect	At Year 15, new woodland planting implemented as part of the scheme would reinstate the woodland edge currently visible within views. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: Moderate adverse visual effect)

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Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
P6	Unknown property name. Two storey property.	206m  105m	As for P5. (Number of windows not noted). Property appears to be used for storage rather than residential.	As for P5	As for P5	As for P5
P7	Unknown property name. Single storey property.	565m  885m	Views from x4 front elevation windows (including door) from elevated position relative to existing N15. Extensive coniferous woodland character to views. (Note: coniferous woodland block to south-west of this property recently clear felled)	No significant change	Preliminary Design would be visible from where it deviates from existing N15 near Lough Mourne (including the Meencrumlin junction and lighting) to where it enters coniferous forestry at Ch 1900 approx, especially those sections on embankment. The Preliminary Design would take traffic further away from the property. There would be a barely perceptible improvement to no discernible change in the existing view.  Slight beneficial effect to No Change	Summer views to the Preliminary Design would be partly curtailed by existing and proposed woodland implemented as part of the scheme. There would be a barely perceptible improvement in the existing view.  Slight beneficial effect  (Winter: As for Year 1)
P8	x2 Single storey properties.	20m  674m	Existing N15 visible in close proximity views from front elevation of building. Views from rear elevation curtailed by existing, dense, coniferous woodland.	No significant change	No views to Preliminary Design from rear elevation. Reduced traffic flows on the existing N15 would result in a noticeable improvement in the existing view from the front elevation.  Front elevation views: Moderate beneficial effect.	As for Year 1.  (Winter: As for Year 1)
P9	Upper Road, Woodland Dooish.	425m  1126m	Approximately 10 number predominantly single storey properties on hillside above Burn Daurnett. Majority of properties orientated to south to exploit the view over the Valley of the Burn Daurnett and to the hilltops below Tieveclaghoge Mountain. Views over valley including fields, extensive coniferous woodlands and hilltops. Very attractive views. Existing N15 visible on valley	Views over valley of Burn Daurnett generally more open due to lack of foliage on existing deciduous vegetation.	Views to sections of Preliminary Design would be available especially to those sections emerging on embankment between breaks in coniferous woodland and sections within pasture. There would also be a reduction in traffic on the existing N15, which would compensate	During Summer Year15 new planting would partially obscure views to the Preliminary Design. There would be a barely perceptible to noticeable improvement in the

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
			floor.		for the additional visual impact of the Preliminary Design. There would be a barely perceptible improvement in the existing view.  Slight beneficial effect	existing view.  Slight to Moderate beneficial effect  (Winter: As for Year 1)
P10	Properties on mid-slopes of hillside within Woodland Dooish.	410m approx.  1125m	Similar views and orientations of properties to those within upper Woodland Dooish (P9). However, slight reduction in elevation relative to valley. More restricted views to existing N15 compared to P9. However, extensive views of coniferous forestry, pasture and woodland.	As for P9.	Preliminary Design would be at a similar elevation to the properties. There would be slightly more restricted views than for P9. However, there would also be a reduction in traffic on the existing N15, which would compensate for the additional visual impact of the Preliminary Design. There would be a barely perceptible improvement in the existing view.  Slight beneficial effect	As for P9, except that the lower elevation of properties means that proposed and existing vegetation would have a greater screening effect upon Preliminary Design. There would be a barely perceptible to noticeable improvement in the existing view.  Slight to Moderate beneficial effect  (Winter: As for Year 1)
P11	Unknown property name. Single storey property.	249m  973m	Open and extensive views over valley of Burn Daumett and to existing N15. Similar characteristics to P9 and P10. However, elevation of property less in comparison to P9 and P10. Views from x5 front elevation windows and x1 side elevation window.	No significant change	Preliminary Design would be concealed from view by existing, largely coniferous, woodland. A reduction in traffic volumes on the existing N15 would result in a noticeable to barely perceptible improvement in the existing view.  Moderate to Slight beneficial effect.	As for Year 1
P12	Unknown property name. Single storey property.	209m  933m	Property at a slightly lower elevation than adjoining P11 otherwise existing views as for P11. Property is orientated east- west. Views from x1 end elevation window and x3 extreme oblique views from front elevation, which is orientated to the east over valley of	No significant change	As for P11  Moderate to Slight beneficial effect.	As for Year 1  (Winter: As for Year 1)

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
			Burn Durnett.			
P13	Unknown property name. Single storey property.	162m  884m	As for P12 except views from 5 no. windows to the south over the valley of the Burn Durnett.	No significant change	As for P11  Moderate to Slight beneficial effect.	As for P11  (Winter: As for Year 1)
P14	Unknown property name. Two-storey property.	10m  704m	Direct views towards existing N15 from front elevation. However, views from rear elevation curtailed by existing dense coniferous woodland.	No significant change	No views to Preliminary Design from rear elevation.  From front elevation: Property would benefit from a potential reduction in traffic on existing N15. There would be a noticeable improvement in the existing view.  Moderate beneficial effect.	As for Year 1.
P15	Group of mainly single storey properties.	400-900m approx.  1200-1700m approx.	The general character of views from these properties is more rural containing pasture, woodland, and treelines rather than wilder land. Existing N15 is also an element within views.	Views slightly more extensive due to reduction in foliage upon vegetation within gardens to properties.	Properties generally orientated with their front elevations facing towards Preliminary Design. Preliminary Design would be visible on emerging from extensive coniferous woodland at Ch 4850. Goland accommodation road and underbridge would also be visible. The visual impact of the Preliminary Design would be partly compensated by a reduction in traffic on the existing N15. There would be a barely perceptible improvement in existing views.  Slight beneficial effect.	Preliminary Design would be rendered less visible due to new planting, especially at Goland accommodation road and underbridge. There would be a barely perceptible to noticeable improvement in the existing view.  Slight to Moderate beneficial effect  (Winter: As for Year 1)
P16	Unknown property name. Single storey property.	275m  1100m approx.	As for P15, views are more agricultural in character. Existing N15 is also an element within views although adjoining properties P18 to 20 do restrict views.	No significant change	Property orientated towards Preliminary Design. Views are distant but would include much of that section on approach to the Meenglass side road and overbridge from the west. This would be partly compensated by a	In summer, existing and proposed vegetation would partially curtail views to the Preliminary Design. There would be a barely perceptible to

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
					reduction in traffic on the existing N15. There would be a barely perceptible improvement in existing views.  Slight beneficial effect.	noticeable improvement in the existing view. Slight to Moderate beneficial effect  (Winter: As for Year 1)
P17	Number not used					
P18	Unknown property name. Single storey property.	213m  1006m	Front elevation of property orientated to east and towards hillside of Woodland Doolish and Twin Towns rather than towards route of Preliminary Design. Hedgeline on boundary and adjoining building curtail views over valley of the Burn Daurnett.	In Winter, there would be views through the Summer screen formed by the hedgeline on the boundary to the property.	Potential restricted views to Preliminary Design through existing hedgeline on boundary to property from x2 end elevation windows and building cutlidge. This would be partly compensated by a reduction in traffic on the existing N15. There would be a barely perceptible improvement in the existing view.  Slight beneficial effect	Summer views effectively curtailed by the existing hedgeline on the boundary to the property.  No Change  (Winter: As for Year 1)
P19	x3 detached single storey properties.	137m  953m	Properties orientated towards Burn Daurnett. Properties at similar elevation to existing N15, which forms a visible element within the foreground of the view. Views extend to hill-top (partly afforested) to the southwest of Lough Trusk, and include fields and woodlands.	No significant change	Preliminary Design would be visible on embankment upon emerging from its coniferous screen at Ch 4850. Views to Goland accommodation road and underbridge and parts of Preliminary Design further to the east. This would be partly compensated by a reduction in traffic on the existing N15. There would be a barely perceptible improvement in existing views.  Slight beneficial effect	New planting would partially reduce the visibility of the Preliminary Design within views. There would be a barely perceptible to noticeable improvement in the existing view due to the reduction in traffic on the existing N15.  Slight to Moderate beneficial effect  (Winter: As for Year 1)

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
P20	Unknown property name. Two storey property.	23m  881m	Views from x5 front elevation windows and x4 west elevation windows, including conservatory. Front elevation views as for P19. However, views from lower floor windows part restricted by existing hedgelines adjoining Burn Daurnett and on opposite side of existing N15 which passes in close proximity to front of building.	No significant change to views to existing N15. However, more extensive views to opposite side of valley due to reduction in foliage on existing vegetation.	Potential upper floor windows as for P19. Lower floor views part restricted by intervening vegetation. However, property would benefit from a reduction in traffic on the existing N15. There would be a barely perceptible to noticeable improvement in the existing view.  Moderate to Slight beneficial effect	Existing vegetation would restrict views to Preliminary Design during Summer. The property would continue to benefit from a reduction in traffic volumes on the existing N15. There would be a noticeable improvement in the existing view.  Moderate beneficial effect  (Winter: As for Year 1)
P21	Unknown property name. Single storey property.	21m  922m	Views from front elevation over existing N15 which passes directly in front of property and adjoining hedgeline forming roadside boundary to distant hill-top as for P20. Property sited on rising ground above Burn Daurnett.	Lack of foliage on vegetation adjoining Burn Daurnett reveals more of existing landform and the watercourse.	As for P20	As for P20  (Winter: As for Year 1)
P22	Unknown property name. Single storey property.	25m  868m	Rear elevation views as for P21 from some 5no. windows. Front elevation views directly over existing N15.	As for P21	Views to Preliminary Design over and through intervening vegetation. There would be a barely perceptible to noticeable deterioration in existing views from the rear elevation.  Slight to Moderate adverse effect.  Views from the front elevation would potentially benefit from a reduction in traffic on the existing N15. There would be a noticeable improvement in the existing view.  Moderate beneficial effect.	New planting on the embankments to the Preliminary Design would partially reduce the visibility of the scheme within views. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)  Views from front elevation: As for Year 1.

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
P22A	Unknown property name. Single storey property.	220m  675m	Views to valley sides of Woodland Dooish and south to hillside forming north facing valley sides to Burn Daurnett, over pasture enclosed by hedgelines. Also views to Cappry. Property sited on a low ridge above Burn Daurnett.	Slightly more open views due to lack of foliage on vegetation.	Potential but restricted views to Preliminary Design on low embankment over intervening fields. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect	At Summer (Year 15) new planting implemented as part of the scheme together with existing intervening vegetation would partially conceal the Preliminary Design. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)
P23	Unknown property name. Two storey property.	729m  30m	Views to south of property curtailed by existing hedgebanks adjoining the disused railway line.	More extensive views to south due to loss of foliage on vegetation along disused railway line.	Preliminary Design would introduce a major new element within close proximity views from the property. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views to the south. Those to the north would be unaffected.  Substantial adverse effect.	As for Year 1.
P23A	Unknown property names. x2 Two storey property	500m approx.  240m approx.	Properties front north towards hillside of Woodland Dooish. Rear elevation views to disused railway line on rising ground to P23.	Filtered views through and less visual obstruction afforded by existing vegetation adjoining disused railway line during Winter.	Rear elevation views as for P24/25.	Rear elevation views as for P24/25.
P24	Unknown property name. Two storey	695m  80m	Rear elevation views to south as for P23. Property also at a similar elevation to P23.	As for P23	Preliminary Design passes to rear of property on slight embankment. As for P23, a noise barrier would provide some	At Summer Year 15 planting implemented as part of the scheme would



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	property				visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	partially reduce the visual impact of the Preliminary Design. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect.  (Winter: As for Year 1)
P25	Unknown property name. Single storey property.	527m  242m	Rear elevation views from property partly restricted by adjoining P24 and existing hedgelines. Existing views have a short depth of field due to vegetation along the disused railway line, rising landform and intervening hedgelines (part coniferous).	Lack of foliage within intervening hedgelines results in less visual obstruction to views.	As for P24 except that slightly further distance from the Preliminary Design would partly reduce its potential visual impact. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	As for P24 new planting (implemented as part of the scheme) in association with existing vegetation within hedgelines would potentially partly reduce the visual impact of the Preliminary Design. There would be a noticeable deterioration in views.  Moderate adverse effect.  (Winter: As for Year 1)
P26	Unknown property name. Two storey property.	454m  310m	Existing views as for nearby properties P24 and P25. Also property at a slightly lower elevation to P25.	As for P25	Views to Preliminary Design would largely be confined to those from upper floor windows. Views as for P24 and P25. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	As for P24 and P25.  Moderate adverse effect.  (Winter: As for Year 1)
P27	Unknown property name. Single storey property (with	389m  395m	Views from front elevation to the west and from the side elevation to the north. A line of coniferous trees and intervening hedge lines curtail some views to the south.	Views to south only partly more extensive due to lack of foliage on deciduous	Views to the Preliminary Design would potentially be available in winter particularly towards the embankment section of the scheme. There would be a	New planting (implemented as part of the scheme) would partly reduce the visual impact of

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	rooflights).			vegetation within hedgeline, however mainly coniferous.	noticeable deterioration in views.  Moderate adverse effect.	the Preliminary Design.  Slight to Moderate adverse effect  (Winter: As for Year 1)
P28	Unknown property name. Single storey property.	239m  532m	Views from x3 front elevation windows of property to south over existing pastoral fields with treelines.	Lack of foliage on intervening vegetation increases depth of field of view.	Preliminary Design would be partially concealed within views due to rising landform and existing hedgelines. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	As for P27, new planting implemented as part of the scheme in association with existing vegetation within hedgelines would partially conceal the Preliminary Design within views. There would be a barely perceptible to no discernible change in the existing view.  Slight adverse effect to No Change  (Winter: As for Year 1)
P29	Unknown property name. Two storey property.	200m  624m	Existing front elevation views as for adjoining property P28. However, a hedge line on the opposita side of the track to the property would screen views from the lower floor windows during summer. Potential upper floor views from the roof lights (x2) over intervening hedge lines.	Views from lower floor windows remain largely screened by vegetation and rising landform immediately in front of property.	There would be a noticeable deterioration in views from the upper floor windows.  Moderate adverse effect.  Lower floor windows: There would be a barely perceptible deterioration in existing views.  Slight adverse effect.	Upper floor: New planting would partially conceal the Preliminary Design within views.  Slight to Moderate adverse effect  (Winter: As for Year 1)  Lower floor: The hedge line would partly screen the Preliminary Design

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						within Summer views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change
Properties in Cappry: adjoining minor road en-route to Hostel.	Variety of property styles.	Approx 200-700m  Approx 1200-1700m	Generally properties front in alternative directions. Views are some 360 degrees in the round but generally front elevations to properties are orientated east to west. Existing N15 almost entirely concealed from view.	Reduction in visual obstruction afforded by existing vegetation within hedgelines and woodland on the north-facing valley sides above the Burn Daurnett.	Properties front away from the Preliminary Design. However, they are at a similar elevation to that of the Preliminary Design. Views would be available to the Preliminary Design and it would be partially visible within views. There would be a barely perceptible to noticeable deterioration in views.  Slight to Moderate adverse effect.	New planting implemented as part of the scheme would reduce the visibility of the Preliminary Design. There would be a barely perceptible deterioration in views.  Slight adverse effect (Winter: as for Year 1)
Properties in Cappry: adjoining minor road through settlement between existing N15 and R252.	Variety of property styles.	Approx. 500-1100m  Approx. 1650m-2250m	Properties generally front north/ south depending on which side of the minor road through the settlement they are located. Properties are sited on a low ridgeline above the Burn Daurnett. Views extend to the hillside and hilltops above the Burn Daurnett. Character of views is rural with a quite extensive settlement pattern. The existing N15 is largely concealed from view.	Reduction in visual obstruction afforded by existing vegetation within hedgelines and woodland on the north-facing valley sides above the Burn Daurnett.	Preliminary Design would be visible within views. There would be a noticeable deterioration in views especially where sections of the Preliminary Design are generally open in response to local landscape character and are on embankment.  Moderate adverse effect.	As for other properties in Cappry at this distance from the Preliminary Design new planting, in association with existing vegetation would effectively conceal parts of the Preliminary Design within external views. There would be a noticeable to barely perceptible deterioration within views.  Moderate to Slight

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						adverse effect.  (Winter: as for Year 1)
P30	Mix of single and two storey properties adjoining crossroads within Cappry.	Approx. 20-30m  Approx 920-930m	Generally properties at a lower elevation to those on the ridgeline on approach to the Hostel (see above). Existing views from both front and rear elevations to hillsides above Woodland Dooish and to lower slopes to Tievecloghoge Mountain respectively. Front elevation views directly over existing N15 and partially obstructed by properties on opposite side of the existing N15 (P30a).	Some reduction in visual obstruction afforded by existing vegetation on hillside to south.	Views to Preliminary Design would be restricted by adjoining buildings and landform. Properties would also benefit from a reduction in traffic on the existing N15. There would be a noticeable to barely perceptible improvement in the view.  Slight to Moderate beneficial effect.	New planting implemented as part of the scheme in association with existing vegetation would partially conceal the Preliminary Design within views from these properties. There would be a noticeable improvement in the view.  Moderate beneficial effect  (Winter: As for Year 1)
P30A	Mix of single and two storey properties adjoining properties within Cappry.	Approx. 20-30m  Approx 850-875m	As for P30, except views from front elevations directly over existing N15. Rear elevation views to lower slopes below Tievecloghoge Mountain.	As for P30	Rear elevation views: Views to Preliminary Design over and through intervening vegetation. There would be a barely perceptible to noticeable deterioration in existing views from the rear elevation.  Slight to Moderate adverse effect.  Front elevation views: Views from the front elevation would potentially benefit from a reduction in traffic on the existing N15. There would be a noticeable improvement in the existing view.  Moderate beneficial effect.	New planting on the embankments to the Preliminary Design would partially reduce the visibility of the scheme within views. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)  Views from Front elevation: As for Year 1.
P31	Unknown group of x2	18m	Views from the rear elevation would be largely curtailed by intervening vegetation. The properties are at a	Intervening hedgelines to immediate rear of	Rear elevation: Potential restricted views to the Preliminary Design on	Rear elevation: New planting and existing

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	single storey properties.	816m	slightly lower elevation to that of the adjoining P32 above the Burn Daurnett.	properties and upon adjoining ridge (P38) afford little visual obstruction.	embankment between approximate Ch 5250 to 6750 approximately. There would be a barely perceptible deterioration in the view.  Slight adverse effect  Front elevation: Views from the front elevation would potentially benefit from a reduction in traffic on the existing N15. There would be a noticeable improvement in the existing view.  Moderate beneficial effect.	vegetation to the rear of the property would potentially reduce the visibility of the Preliminary Design within views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)  Views from front elevation: As for Year 1
P32	Unknown property name. Single storey property.	12m  850m	Existing vegetation curtails views to the immediate south. There are more open views to the north although these are compromised by the existing N15. An adjoining garage also partially restricts views to the south.	As for P31	As for P31 for both front and rear elevation views.	As for P31 for both front and rear elevation views.
P33	Unknown property name. Two storey property.	42m  836m	Rear elevation views to the lower slopes below Tievecloghoge Mountain including woodlands and pasture interspersed with hedgelines. Views from slightly elevated position over Burn Daurnett. Front elevation views over minor road and to existing N15 on slightly rising ground. Oblique front elevation views to junction with existing N15.	Reduction in visual obstruction afforded by existing hedgelines and woodland on lower slopes below Tievecloghoge Mountain.	Rear elevation: Views to Preliminary Design on embankment between approximate Ch 5250 to 6750 would be available, including the Meenglass side road and underbridge. There would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect.  Front elevation: There would be a barely perceptible to noticeable improvement in the view due to a reduction in traffic	Rear elevation: At Summer (Year 15) new planting implemented as part of the scheme together with existing intervening vegetation would partially conceal the Preliminary Design. There would be a barely perceptible deterioration in the view.  Slight adverse effect

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					using the existing N15. Traffic would still use the minor road to access the retail premises adjoining the property to the immediate west.  Slight to Moderate beneficial effect	(Winter: As for Year 1)  Front elevation: As for Year 1
P34	Unknown property name. Single storey property.	30m  861m	Views as for P33	Lack of foliage on hedgerow to rear of property would reduce visual obstruction afforded by this feature.	Rear elevation: Whilst views would be part restricted by the intervening hedgerow the lower slopes of the hillside beneath Tievecloghoge Mountain which carry the Preliminary Design would be visible. There would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect  Front elevation: As for P33	At Summer Year 15 the potential visual impact of the Preliminary Design would be reduced. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  Winter: As for Year 1.  Front elevation: As for P33
P35	Unknown property name. Two storey property.	25m  865m	Rear elevation views as for P33, except views from lower floor windows obstructed by intervening hedgerows. Front elevation views directly over existing N15.	Little visual obstruction afforded by intervening hedgerows	Rear elevation: Views to Preliminary Design on embankment between approximate Ch 5250 to 6750 would be available, including the Meenglass side road and underbridge. There would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect.  Front elevation: Property would benefit from a reduction in traffic using the existing N15. There would be a noticeable improvement in the view.  Moderate beneficial effect	Rear elevation: As for other properties new planting in association with existing vegetation would partly conceal the Preliminary Design within external views. There would be a barely perceptible deterioration in the view.  Slight adverse effect  Front elevation: as for Year 1

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P36	Unknown property names. Group of x2 two storey properties (x1 still to be completed).	26m  923m	Existing views from the front elevation of the properties over the existing N15 towards the lower slopes of the Tievcloghoge Mountain and over woodland/treelines. Summer views are severely restricted by existing vegetation. Properties P35 and 37 also restrict views from the front elevation.	No significant change except less visual obstruction from existing hedgelines on hillside to south.	Front elevation: A reduction in traffic volumes on the existing N15 would have a noticeable beneficial effect upon views.  Moderate beneficial effect	As for Year 1
P37	Unknown property name. Single storey property.	22m  856m	Summer views from the rear of the property severely restricted by existing deciduous vegetation to immediate back of property. Front elevation views directly over existing N15.	Vegetation to rear of property affords reduced visual obstruction.	Rear elevation: Views partially obstructed by vegetation at the rear of the property. There would be a barely perceptible deterioration in the view.  Slight adverse effect  Front elevation: Moderate beneficial effect.	The intervening hedgeline at the rear of the property would severely restrict views. In association with new planting there would be a barely perceptible to no discernible change in the view.  Slight adverse effect to No Change  Front elevation: As for Year 1
P38	Unknown property names. Group of five properties. Largely single storey.	157m  651m	Properties sited on rising ground above the Burn Daumett and are enclosed by woodland and existing treelines. Summer views are severely restricted and, for a number of the group, curtailed by existing vegetation, which virtually encloses the properties.	Enclosing vegetation does not afford the same level of visual obstruction as it does during Summer.	Despite a reduction in visual obstruction afforded by existing vegetation views to the Preliminary Design would be restricted during Winter. However, there would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect	Existing vegetation would largely curtail views from the properties towards the Preliminary Design at Summer Year 15. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P39	Unknown property name.	303m	Property enclosed by broadleaved vegetation, which severely restricts Summer views.	Enclosing vegetation does not provide full	Potential filtered winter view towards the Preliminary Design through existing	Views would be severely restricted by existing

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	Single storey property.	533m		visual obstruction in Winter.	vegetation. There would be a barely perceptible deterioration in existing views.  Slight adverse effect	vegetation in Summer. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P40	Unknown property name. Two storey property.	388m  470m	Potential front elevation views towards the hillside to the south. Property occupies a relatively open ridge-top position above the Burn Daurnett and a shallow valley, which is drained by a stream that flows into the Burn Daurnett.	Some reduction in visual obstruction afforded by existing hedgelines and woodlands on the hillside to the south.	Potential views to the Preliminary Design on embankment as it traverses the north facing valley sides of the Burn Daurnett. There would be a noticeable deterioration in existing views.  Moderate adverse effect.	New planting implemented as part of the scheme would partially obscure views to parts of the Preliminary Design. There would be a noticeable to barely perceptible deterioration in existing views.  Slight to Moderate adverse effect.  (Winter: As for Year 1)
P41	Unknown property name. Single storey property	1058m  342m	The property has expansive elevated rear and side elevation views over the valley of the Burn Daurnett and to the hillside of Woodland Dooish. Views include the wind farm on the hilltop. The front elevation of the property faces south to Trusk hill.	Lack of foliage on hedgebanks adjoining disused railway line and upon intervening hedgebanks reduces visual obstruction afforded by these features.	Existing coniferous woodland would screen views to that section of the Preliminary Design immediately adjoining the property. Views would be extreme oblique rear elevation views and side elevation views to that section of the Preliminary Design from Ch 4850 east. A section of retained hedgebank between Ch 4840 to 5260 would also partially restrict views. There would be a significant to noticeable deterioration in existing views.	New scrub planting, in association with existing intervening vegetation, would partially conceal the Specimen Design within external views. There would be a noticeable deterioration in the existing view.  Moderate adverse effect.  (Winter: As for Year 1)



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P42	Unknown property name. Single storey property	1186m  490m	The property has a slightly more elevated position than P41. Views as for P41.	As for P41	Moderate to Substantial adverse effect.  As for P41, except landform would partially restrict views to the Preliminary Design. There would be a barely perceptible to noticeable deterioration in the existing view.  Moderate to Slight adverse effect	As for P41, except planting and landform would combine to partially curtail views. There would be a barely perceptible deterioration in existing views.  Slight adverse effect
P42A	Unknown property name. Two storey property.	1260m  530m	Property fronts to north. Front elevation views to Woodland Dooish hillside and existing wind farm part curtailed by existing coniferous hedgeline on opposite side of minor road.	Visual obstruction afforded by intervening hedge lines is reduced.	As for P42, except views from upper floor windows would be more extensive than those from the single storey property. There would be a noticeable deterioration in the existing view.  Moderate adverse effect	As for P42, except views from upper floor windows would again be more extensive. There would be a noticeable to barely perceptible deterioration in existing views.  Moderate to Slight adverse effect.
P43	Unknown property name. Two storey property.	1210m  478m	As for P41, except views are from 4no. side elevation windows and the rear elevation.	As for P41	As for P42A	As for P42A
P44	Unknown property name. Two storey property.	862m  154m	Views to the hillside of Woodland Dooish. Coniferous woodland in the foreground significantly curtails view from the property.	No significant change although a small number of trees immediately adjoining property lack foliage which reduces their visual obstruction.	Existing coniferous forestry would curtail views to that section of the Preliminary Design immediately adjoining property. Any views would be confined to extreme oblique views to that section from Ch 4850 east. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect.	In summer, new planting on the road embankments (implemented as part of the scheme) would largely conceal the Preliminary Design within external views. There would be a barely perceptible to no discernible deterioration in the existing view.

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						Slight adverse effect to No Change.  (Winter: As for Year 1)
P45	Unknown property name. Single storey property	1174m  492m	Rear elevation views as for P41 / P42, except views partly curtailed by an existing coniferous hedge along the boundary between P42 / P45.	No significant change	Views to the Preliminary Design would be largely curtailed by the existing hedgeline and existing coniferous woodland. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	New planting and existing vegetation would curtail views during Summer Year 15. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P46	Unknown property name. Two storey property.	1268m  546m	Views as for P41 from x2 side elevation windows and rear elevation windows. Oblique front elevation views towards P43. Property at a slightly higher elevation than P43.	Lack of foliage on hedgebanks adjoining disused railway line and upon intervening hedgebanks reduces visual obstruction afforded by these features.	Views part restricted by intervening landform and hedgebanks. Views mainly confined to those potentially available from the upper floor windows. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Existing intervening vegetation within hedgebanks and adjoining the disused railway line would partially restrict views to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P47	Unknown property name. Two storey property.	1308m  595m	Views from x4 ground floor windows and x3 upper floor windows as for P43 to hillside of Woodland Dooish and wind farm.	As for adjoining properties there is a reduction in the visual obstruction afforded by Intervening	Potential views from x3 upper floor windows towards the Preliminary Design on embankment to the north. Otherwise views as for P43, however property set slightly further back on hillside in	New planting implemented as part of the scheme in association with existing retained vegetation would partially restrict views to

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				hedgelines and vegetation adjoining the disused railway line.	comparison to P43. There would be a noticeable deterioration in the view.  Moderate adverse effect	the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P48	Unknown group of two single storey properties. However, both with rooflights.	1285m  543m	The orientation of both properties exploits the views over the valley of the Burn Daurnett as for P43. However, properties at a slightly lower elevation than P43, which further restricts views.	As for P47	Given the slightly reduced elevation of these properties relative to P43, landform, adjoining buildings (P49 / 50) and intervening vegetation would partly restrict views to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.	Intervening vegetation, including that associated with a retained section of existing hedgebank, would partially conceal the Preliminary Design within external views. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect.  (Winter: As for Year 1)
P49	Unknown property name. Two storey property.	1215m  447m	Oblique side elevation and rear elevation views as for P43 except partly curtailed by property P50.	As for adjoining properties there is a reduction in the visual obstruction afforded by intervening hedgelines and vegetation adjoining the disused railway line.	Potential views to the Preliminary Design on embankment to the north. Existing intervening vegetation and the adjoining P50 would, however, partially restrict views to the Preliminary Design. There would be a noticeable deterioration in the existing view.  Moderate adverse effect	New scrub planting on the embankments to the Preliminary Design, in association with existing vegetation, would partially conceal the Preliminary Design within views. There would be a noticeable to barely perceptible deterioration in

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						the existing view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P50	Unknown property name. Two storey property	1136m  382m	Potential front and side elevation views from five upper floor and four lower floor windows together with side elevation views. Character of existing views as for P41/ P43. Property occupies an open elevated position with extensive views to north.	As for P49	Potential views from this elevated position to sections of the Preliminary Design on embankments to the north. Views also to that section of the Preliminary Design directly adjoining property from Ch 4850. There would be a significant to noticeable deterioration in existing views.  Substantial to Moderate adverse effect.	New planting, in association with existing vegetation within hedgelines (including the existing retained section of hedgebank adjoining the disused railway line) would partly screen the Preliminary Design during summer, year 15. There would be a noticeable deterioration in the view.  Moderate adverse effect  (Winter: As for Year 1)
P51	Unknown property names. A line of x5 properties; x4 two storey and x1 single storey.	1195m  412m	Properties front towards the existing minor road. Properties have rear and oblique side elevation views north to the Burn Daurnett as for P43/ P50. However, elevation falls with road as it descends the hillside towards existing 4 ways junction between Goland and Carrickmagrath. There is also a low ridgeline to the north, which further restricts views.	As for adjoining properties there is a reduction in the visual obstruction afforded by intervening hedgelines and vegetation adjoining the disused railway line.	Potentially restricted views towards the Preliminary Design but sections of scheme on embankment potentially visible. There would be a noticeable deterioration in existing views.  Moderate adverse effect	New planting (implemented as part of the scheme) would partially reduce the visibility of the Preliminary Design within views. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.

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						(Winter: As for Year 1)
P52	Unknown property names, x2 single storey properties (x1 with rooflights).	1461m  677m	Views similar to those from other properties along the road, i.e. (P51). However, views part restricted by existing trees and vegetation adjoining the properties. Properties slightly elevated above adjoining road, which enables more extensive views to hillside on opposite side of valley.	Lack of foliage on a number of existing deciduous trees and shrubs immediately adjoining the property would partially open up views from the property.	The position of the properties, which are set back on a slight "shelf" further restricts views to the Preliminary Design which is further reinforced by landform. Views also part restricted by adjoining buildings P51, P53 and P54. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect.	The combination of existing vegetation and new planting (implemented as part of the scheme) means that here would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P53	Unknown property names. Group of x3 single storey properties. (Roof-lights on x2 properties).	1247m  445m	Existing views from front elevation of properties as for those from rear elevation of P51.	As for P51	Potential views towards the Preliminary Design. More open views through a gap in the vegetation associated with the disused railway line by P54. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Potential summer views to Preliminary Design through the gap in the existing vegetation associated with the dismantled railway line. However, new scrub planting implemented as part of the scheme would partially reduce its visual impact. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect  (Winter: As for Year 1).

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P54	Unknown property name. Two storey property	932m  120m	Property located on the edge of rising ground above the Burn Daurnett. Extensive views to the hillsides above the Twin Towns including the wind farm.	Visual obstruction afforded by existing vegetation immediately adjoining property reduced in Winter.	Open views towards sections of the Preliminary Design on embankment through a gap in the line of vegetation along the disused railway. There would be a significant deterioration in views.  Substantial adverse effect.	Unimproved grassland/ scrub is proposed on the road embankments at this point to reflect the open character of the local landscape. At Year 15, this would partially reduce the visual impact of the Preliminary Design. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect  (Winter: As for Year1)
P54A	Unknown property name.	740m  150m	Property sited on land, which falls away to a nearby stream. Views to south largely curtailed by existing intervening broadleaved vegetation.	Filtered views through intervening vegetation.	Landform would partially curtail views to the Preliminary Design. However, potential views to the Preliminary Design on embankment as it passes the property. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Landform and existing vegetation would reduce the visibility of the Preliminary Design within Summer views at Year 15. There would be a noticeable to barely perceptible deterioration in the existing view.  Slight to Moderate adverse effect  (Winter: As for Year 1)
P54B	Unknown property names. Unknown Property Status	760m  80m	Views generally over a rural landscape within which the hedgebanks associated with the disused railway line are a distinct and noticeable feature.	Reduced visual obstruction to views from vegetation adjoining the disused	Potential views from x2 properties to the Preliminary Design, which passes in close proximity to the properties. Proposed noise barrier would provide	Some reduction in visibility of the due to the partial screening effects of new planting implemented as

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				railway line.	some visual screening to views to traffic.  Substantial adverse effect	part of the scheme.  Substantial to Moderate adverse effect.  (Winter: As for Year 1)
P55	Unknown property name. Single storey property	1200m  346m	Front elevation views to the hilltops above Woodland Dooish. However, views part restricted by existing vegetation adjoining the dismantled railway line and an existing conifer hedgerow enclosing P56. A small hillock or knoll adjoining P54 also restricts low level views to the north.	Significant difference due to reduced visual obstruction afforded by existing vegetation adjoining disused railway line.	Views to the Preliminary Design on embankment, which would be visible through and above the existing vegetation adjoining the disused railway line. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Restricted views would still be available to that section of the Preliminary Design at Ch 5500 due to the gap in the visual screen afforded by existing vegetation adjoining the dismantled railway line. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P56	Unknown property name. Single storey property	1141m  261m	Views from the rear elevation of the property curtailed by adjoining coniferous hedge line and an adjoining outbuilding. Existing vegetation adjoining the dismantled railway line also curtails views.	Reduced visual obstruction to views from vegetation adjoining the disused railway line. However, views remain curtailed by existing coniferous hedgeline and outbuilding.	Views to the Preliminary Design would be severely curtailed by surrounding vegetation and the outbuilding. There would be a barely perceptible deterioration in the view.  Slight adverse effect	No summer views due to existing vegetation. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P57	Unknown property name. Single storey	1150m  242m	This property abuts the substantial line of vegetation along the dismantled railway. Views to the south and east from the front and side elevations.	Significant change. Existing vegetation adjoining the disused	Direct Winter views to the Preliminary Design on embankment as it passes the property. There would be a significant to	Existing vegetation would partly curtail views from the rear elevation of the

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	property			railway line provides little visual obstruction to views.	noticeable deterioration in the view.  Substantial to Moderate adverse effect.	property. However, there is a gap in the vegetative screen. There would continue to be a noticeable deterioration in the view.  Moderate adverse effect  (Winter: As for Year 1)
P58	Unknown property name. Single storey property	1168m  275m	Property faces north with front elevation views from x3 windows to the adjoining hilltops on the opposite side of the valley including the wind farm. However, views severely curtailed by existing vegetation adjoining the dismantled railway line.	As for P57	Potential winter views to Preliminary Design on embankment in close proximity. There would be a significant to noticeable deterioration in the existing view.  Substantial to Moderate adverse effect.	There would be a noticeable to barely perceptible deterioration in the existing view at Year 15 due largely to the screening afforded by existing vegetation. This would be supplemented by new scrub planting implemented as part of the Preliminary Design.  Moderate to Slight adverse effect.  (Winter: as for Year 1)
P59	Unknown property name. Single storey property	1280m  386m	Property fronts towards the existing adjoining road. Property largely enclosed by an evergreen hedge bank on both sides including the rear property boundary.	No significant change to existing vegetation within property boundaries. However, reduced visual obstruction to hedgebanks adjoining the disused railway line.	Severely restricted views to Preliminary Design due to existing vegetation. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	New scrub planting, in association with existing vegetation, would conceal the Preliminary Design within external views. There would be no discernible deterioration in the existing view.



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						No Change  (Winter: as for Year 1)
P60	Unknown property name. Single storey property	1330m  432m	Slightly elevated position to that of P59. Views from x2 end elevation windows over and above P59. Views severely curtailed by adjoining vegetation.	Reduced visual obstruction afforded by existing vegetation adjoining disused railway line.	Potential views to Preliminary Design restricted by adjoining vegetation and by landform associated with the existing bridge over the dismantled railway adjoining a 4-way junction. However, potential views from an elevated position to that section of Preliminary Design on embankment on approach from west. There would be a noticeable deterioration in the view.  Moderate adverse effect	Summer views would be restricted by existing intervening vegetation and new planting associated with the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P61	Unknown property name. Single storey property	1407m  509m	Front elevation views from slightly higher elevation than that of adjoining P60. Views also part restricted by clipped hedgerow enclosing property and by adjoining P59 and 60. Mounding adjoining P60 also restricts views.	Some reduction in visual obstruction afforded by intervening vegetation.	Potential front elevation views similar to those from rear elevation of P60. However, intervening buildings / mounding provide some visual obstruction. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	As for P60, existing vegetation and new planting implemented as part of the Preliminary Design would partially reduce its visibility. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P62	Unknown property name. Single storey	1407m  495m	The property is enclosed on three sides by existing coniferous vegetation with views only available towards the existing minor road in front of the property.	No significant change	Views effectively blocked by the dense evergreen vegetation surrounding the property. There would be no discernible	As for year 1.

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	property				deterioration in the existing view.  No Change.	
P63	Unknown property name. Two storey property	1462m  577m	The property is situated at a slightly elevated position with front elevation views to the hillsides opposite including the wind farm. Views part curtailed by intervening vegetation, including an existing coniferous hedgeline adjoining P61.	Slightly more extensive views due to reduction in visual obstruction afforded by existing vegetation on valley sides above Burn Daurnett, including that adjoining disused railway line.	Potential restricted views to that section of the Preliminary Design on embankment on approach to a 4-way junction. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect	New scrub planting on the embankments would partially reduce the visual impact of the Preliminary Design upon summer views. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect (Winter: As for Year 1)
P64	Unknown property name. Two storey property	1528m  701m	Property orientated in such a way that it does not exploit the view from the hillside, i.e. it fronts southwest and north-east along the face of the hillside. Property also heavily enclosed by existing vegetation that further restricts views.	Lack of foliage on enclosing vegetation enables more extensive views, largely from building curtilages.	Potential extreme oblique views from the front/ side elevation towards the Preliminary Design. However, existing vegetation would severely restrict views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	In summer, existing vegetation would further curtail views. There would be no discernible deterioration in the existing view.  No Change. (Winter: As for Year 1)
P65	Group of x3 two storey properties. All unknown property names except for Brookdale House.	1840m  1036m	Properties are situated at a similar elevation on the hillside except for Brookdale House, which is lower down the hillside. Properties sited on a noticeably level "shelf" on the hillside.	Existing hedgelines afford less visual obstruction to views during Winter.	Potential but severely restricted views towards the Preliminary Design. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	New planting implemented as part of the scheme would (at this distance) potentially reduce the visual impact of the Preliminary Design at Year 15. There would be a barely perceptible to no discernible deterioration in

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						the existing view.  Slight adverse effect to No Change  (Winter: As for Year 1)
P66	Unknown group of x1 two storey and x2 single storey properties.	1964m  1195m	Views from elevated position over valley of Burn Durnett to hillside on opposite side of valley. Coniferous vegetation partially encloses properties.	Slightly more extensive views from properties due to lack of foliage on existing vegetation.	Potential, but severely restricted views towards the Preliminary Design from at least two of the three properties. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change	Summer views to the Preliminary Design from these properties would be largely curtailed by existing vegetation supplemented by new planting implemented as part of the scheme. There would be no discernible deterioration in the existing view.  No Change  (Winter: As for Year 1)
P67	Unknown property name. Single storey property	1569m  36m	Oblique front elevation views from the property restricted by a clipped hedgerow on the boundary with the adjoining P68 and the hedgerow on the opposite side of the road. The property is orientated to exploit views to the hillside of Woodland Doolsh.	More extensive views due to lack of visual obstruction afforded by hedgebank on opposite side of road.	The Preliminary Design would become a major element within views and would pass within close proximity to the property. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	New planting would partially reduce the potential visual impact of the Preliminary Design within views. There would remain a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.  (Winter: As for Year 1)

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P68	Unknown property name. Two storey property	909m  72m	Front elevation views as for P67 except that the view is generally more open to the north.	As for P67	As for P67, except that Meenglass side road and underbridge would form a more prominent element in the view. Preliminary Design would also pass property on embankment in close proximity. There would be a significant deterioration in views.  Substantial adverse effect.	As for P67, new planting would partially reduce the potential visual impact of the Preliminary Design within views. However, there would remain a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.  (Winter: As for Year 1)
P69	Unknown property name. Two storey property	944m  82m	Views from the property restricted by existing vegetation. However, more open views to north towards the hillside above the Twin Towns and the wind farm.	Less visual obstruction afforded by existing vegetation immediately adjoining property to south.	The close proximity of the Preliminary Design means that the scheme will become a major element within views. A noise barrier would also provide some visual screening to traffic. Further, a proposed access track to a neighbouring property would also compromise views from the property. There would be a significant deterioration in views.  Substantial adverse effect.	New planting on the embankments to the Preliminary Design would partially reduce its potential visual impact within summer views. However, the access track would remain prominent within direct and close proximity views from the property. There would continue to be a significant deterioration in views.  Substantial adverse effect.  (Winter: As for Year 1)
P70	Unknown property name. Single storey property	674m  139m	Rear elevation views to the hilltops above the Twin Towns with the wind farm. Front elevation views from x4 windows are restricted by rising landform and existing vegetation adjoining the minor road. Property at a lower elevation to that of the adjoining minor road.	Reduced visual obstruction afforded by intervening hedgelines and woodland.	Potential views to the Preliminary Design from front elevation windows as it passes on embankment. There would be a significant to noticeable deterioration in views.	New planting on the embankments to the Preliminary Design, in association with existing vegetation would reduce

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					Substantial to Moderate adverse effect.	the potential visual impact of the Preliminary Design upon summer views. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P71	Unknown property names. Group of x2 single storey properties.	670m  134m	Properties front towards Twin Towns. Properties largely enclosed by existing industrial buildings and vegetation, which partly curtail views. Property also on steeper part of the hillside.	As for P70	Views to the Preliminary Design are partly curtailed by existing buildings and landform. However, views to embankments on approach to the Meenglass side road and underbridge would be available. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Existing vegetation and proposed planting would further restrict views. There would be a barely perceptible to noticeable deterioration in the existing view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P72	Unknown Property names. Group of x2 two storey properties.	70-95m  795- 825m	Both properties front and have views towards the Woodland Dooish hillside. Potential views from the front elevation to the existing N15. Rear and side elevation views to hillside to south.	Visual obstruction afforded by intervening hedgelines reduced in Winter.	Rear elevation: Potential views to the Preliminary Design part restricted by existing vegetation within hedgelines. However, the Preliminary Design would be clearly visible between Ch 6700-7100 where the scheme emerges from the visual concealment provided by existing coniferous woodland. There would be a noticeable deterioration in the view.  Moderate adverse effect.  Front elevation: Property would benefit	Rear elevation: As for Year 1. That section of the Preliminary Design between Ch 6700-7100 would remain open in response to local landscape character.  Front elevation: As for Year 1.

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					from a reduction in traffic on the existing N15. There would be a barely perceptible improvement in the existing view.  Slight beneficial effect	
P73	Unknown property name. Single storey property	50m  850m	Front elevation views to the Woodland Dooish hillside and existing N15. Rear elevation views largely curtailed by an existing (largely coniferous) hedgeline.	More extensive views from rear elevation due to reduction in visual obstruction afforded by hedgeline adjoining rear elevation.	Potential views to the Preliminary Design restricted by property P72 and a largely evergreen hedgerow. There would be a barely perceptible deterioration in existing views.  Slight adverse effect  Front elevation: As for P72	Visual obstruction afforded by existing hedgeline restored. There would be a barely perceptible to no discernible deterioration in the view.  Slight adverse effect to No Change  Front elevation: As for Year 1
P73A	Unknown property names. Group of predominantly single storey properties.	30-100m  850-950m	Front elevation views over existing N15 to low ridgeline and rising hillside to south above Burn Daurnett part restricted by intervening vegetation within hedgelines.	Filtered views and reduced visual obstruction afforded by intervening hedgelines in Winter.	Views to Preliminary Design on hillside above Burn Daurnett compensated by a reduction in traffic upon existing N15 directly in front of properties. Properties set back slightly further from existing N15 than P30 and 36. There would be a barely perceptible improvement in existing views.  Slight beneficial effect	Existing vegetation and new planting implemented as part of the scheme would reduce the visibility of the Preliminary Design within Summer views. There would be a barely perceptible to noticeable improvement in the view.  Slight to Moderate beneficial effect.
P74	Unknown property names. Group of x3 single storey	228m  636m	Properties are located on the valley floor of the Burn Daurnett. Properties largely enclosed by existing vegetation, which is both broadleaf and coniferous. Views from the front elevation of the properties	Slightly more open views to south due to lack of foliage on intervening	Views similar to that of P72 in that a section of the Preliminary Design (Ch 6700-7100) would be partially visible. However, existing, part coniferous	The enclosing vegetation would reduce the potential visual impact of the Preliminary Design upon

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	properties.		orientated north towards the existing N15.	hedgelines.	vegetation enclosing property restricts views. There would be a barely perceptible to noticeable deterioration in existing views.  Slight to Moderate adverse effect	Summer views. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect.  (Winter: As for Year 1)
P75	Unknown property names. Group of x2 single storey properties.	258m  580m	Properties front towards the Woodland Dooish hillside and are at a similar elevation to P74. Properties are also partly enclosed by existing vegetation, the majority of which is coniferous.	As for P74	Potential rear elevation views as for P74.	Potential rear elevation views as for P74.
P76	Unknown property name. Two storey property.	647m  216m	Property situated on the hillside above Burn Daurnett and fronts to the northeast. Rear and side elevation views restricted by landform and adjoining vegetation.	Some reduction in visual obstruction afforded by intervening vegetation.	Winter views to that section of the Preliminary Design, which is in a shallow cutting as it emerges from existing coniferous woodland at Ch 6700. Potential views also to the Carrickmagrath side road and overbridge. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	Existing vegetation would partially reduce the visual impact of the Preliminary Design within summer views. New planting would partially conceal the overbridge within external views. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P77	Unknown property names, x1 single storey and x2 two storey properties.	376m  141m	Properties front towards the Woodland Dooish hillside and the existing N15. Southernmost properties are at a similar elevation to P76. Elsewhere, views are part curtailed by existing vegetation. Views for the x2 two-storey properties to the hillside to the south are more extensive from the upper floor windows.	Less visual obstruction afforded by intervening vegetation within hedgelines on hillside to south.	View similar to those from P76 however, property slightly more distant from Preliminary Design. There would be a noticeable deterioration in the view.  Moderate adverse effect.	As for P76, existing vegetation would partially reduce the potential visual impact of the Preliminary Design within Summer views. There would be a noticeable to barely perceptible deterioration in

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						the view.  Slight to Moderate adverse effect.  (Winter: As for Year 1)
P78	Unknown property names. Group of x2 single storey properties.	461m  356m	Properties situated at a low elevation on gently rising ground above the Burn Daurnett. Properties front towards the Woodland Dooish hillside. Views to rear curtailed by existing woodland that is located to the immediate rear of both of the properties.	Existing deciduous woodland to immediate south is dense enough to maintain visual screening.	Potentially no views to the Preliminary Design due to the density of the woodland/ vegetation directly to the rear of the properties. There would be no discernible deterioration in the existing view. Similarly, views to the west would be curtailed by landform.  No Change.	As for Year 1.
P79	Unknown property name. Two storey property	657m  141m	Property fronts towards the Woodland Dooish hillside. Landform rises to immediate south of property, which severely restricts views. Coniferous woodland also curtails views to the immediate south.	Lack of foliage on deciduous hedgeline to immediate southwest of this property reduces visual obstruction of this feature.	The elevated position of the property means that views to the Preliminary Design would potentially be available from an upper floor window on the side of the property over the existing intervening vegetation (woodland and hedgelines). Also, potential extremely oblique views from front elevation windows to that section on approach from the west to the 4-way junction. There would be a noticeable deterioration in views.  Moderate adverse effect.	Existing vegetation would restrict summer views. There would be a noticeable to barely perceptible deterioration in existing views.  Slight to Moderate adverse effect.  (Winter: As for Year 1)
P80	Unknown property name, x1 single storey property	607m  169m	Property fronts towards the Woodland Dooish hillside as for P79; however the property is situated at a slightly lower elevation.	No significant change	Preliminary Design largely concealed from view due to landform and existing vegetation. P79 also obstructs views to Preliminary Design on approach from the west. There would be a barely perceptible deterioration in the view.	Existing vegetation would reduce the visibility of the Preliminary Design within views from the property during summer. There would be a barely



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					Slight adverse effect.	perceptible to no discernible deterioration in the view.  Slight adverse effect. to No Change  (Winter: As for Year 1)
P80A	Unknown property name. Single storey property	610m  200m	As for P80.	No significant change	Potential views from a side elevation window to the same section of the Preliminary Design as for P80. There would be a barely perceptible to a noticeable deterioration in existing views.  Slight to Moderate adverse effect	As for P80, existing vegetation would reduce the visibility of the Preliminary Design within views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No change
P81	Unknown property name. Single storey property	990m  150m	Views over the Burn Daurnett valley to the Woodland Dooish hillside and the wind farm above the Twin Towns from the garage and the rear of the property. Views from residential part of building largely curtailed by adjoining garage and partly by adjoining properties P67/68.	Lack of foliage on vegetation associated with disused railway line reduces visual obstruction afforded by this feature.	Potential views from end elevation of property towards section of Preliminary Design on approach from the west. Rear elevation views from building curtilages to that section of Preliminary Design to immediate north of property. There would be a significant to noticeable deterioration in existing views.  Substantial to Moderate adverse effect.	New planting on the embankments to the Meenglass side road and underbridge would reduce the visibility of this section of the Preliminary Design. The verges to that section on approach from the west would be planted with scrub in response to local landscape character. There would be a noticeable deterioration in the view.  Moderate adverse effect

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						(Winter: As for Year 1)
P82	Unknown property name. Single storey property	1052m  204m	Existing front elevation views from an elevated position towards the Woodland Dooish hillside and the wind farm above the Twin Towns.	As for P81	Potential views towards the Preliminary Design on approach from the west. Views to that section of the Preliminary Design in front of the property would be largely obscured by landform, and P67/68 and P81. However, that section on approach from the west would be prominent within the view. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.	New scrub planting on the embankments to the Preliminary Design to the west and the Meenglass side road and underbridge would reduce the visual impact of the scheme within summer views. There would be a noticeable deterioration in existing views.  Moderate adverse effect.  (Winter: As for Year 1)
P83	Unknown property name. Two storey property	1044m  208m	Views as for P82	As for P81	As for P82, except that potential views from the upper floor windows to that section of the Preliminary Design directly in front of the property. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	As for P82, except views from the upper floor windows to that section of the Preliminary Design directly in front of property. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P84	Unknown property name. Single storey property	1031m  208m	Extensive views from front elevation over valley of the Burn Daurnett to hillside of Woodland Dooish and the wind farm.	Some reduction in visual obstruction afforded by intervening hedgelines, including that adjoining the	Oblique front elevation views to that section of the Preliminary Design on approach to the 4-way junction from the west. That section to north of property would be largely concealed by landform. There would be a noticeable	New scrub planting on the embankments to the Preliminary Design to the west and the Meenglass side road and underbridge would reduce the visual

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				disused railway line.	deterioration in the view.  Moderate adverse effect.	impact of the Preliminary Design within summer views. There would be a noticeable deterioration in existing views.  Moderate adverse effect.  (Winter: As for Year 1)
P85	Unknown property names. Group of x5 Single and Two storey properties	Approx. 970m  150m	Properties front towards minor road to the immediate south. Extensive rear elevation views over the Burn Durnett valley towards the Woodland Dooish hillside and the wind farm above the Twin Towns.	Lack of foliage on hedgebanks adjoining disused railway line reduces its visual obstruction.	Winter views to Preliminary Design from elevated position relative to the scheme. The elevated position and the close proximity of the properties to the scheme mean that the Preliminary Design would form a major element within views. There would be a significant deterioration in views.  Substantial adverse effect.	New planting (implemented as part of the scheme) on the embankments to the Preliminary Design together with existing vegetation along the disused railway line would partially conceal the scheme within views. However, there would remain a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P86	Unknown property name. Single storey property	1041m  219m	Potential views from x4 front elevation windows as for P85. Property elevated above and views part restricted by P85. An existing hedgeline restricts views from the property to the west.	As for P85	Property is further from Preliminary Design, but more elevated than P85. Preliminary Design would remain visible. There would be a noticeable deterioration in views.  Moderate adverse effect.	As for P85, new planting would partly conceal the Preliminary Design within views. However, there would remain a noticeable to barely perceptible deterioration in the view.  Moderate to Slight

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						adverse effect.  (Winter: As for Year 1)
P87	Unknown property names. Group of X1 Single and x3 Two storey properties.	1078m  218m	Front elevation views as for P86. However, views partly curtailed by adjoining P85.	As for P85	As for P86	As for P86.
P88	Unknown property name. New Two storey property	1016m  182m	As for P85.	Lack of foliage on hedgebanks adjoining disused railway line reduces its visual obstruction.	Winter views to Preliminary Design from elevated position relative to the scheme. The elevated position and the close proximity of the properties to the scheme mean that the Preliminary Design would form a major element within views. There would be a significant deterioration in views.  Substantial adverse effect.	New planting (implemented as part of the scheme) on the embankments to the Preliminary Design together with existing vegetation along the disused railway line would partially conceal the scheme within views. However, there would remain a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.  (Winter: As for Year 1)
P89	Unknown property name. Single storey property	1100m  255m	Front elevation views as for P85 but property set back where landform evens out near to crest of the hill. An existing coniferous hedgeline curtails views to the west.	Loss of foliage from existing vegetation within hedgelines and mature trees within non-residential property on opposite side of the road opens	Property set slightly further back from Preliminary Design on the crest of the hill in comparison to other adjoining properties. In addition, outbuildings within the non-residential property opposite also curtail views. There would be a noticeable to barely perceptible	New planting on the embankments to the Preliminary Design and existing vegetation adjoining the disused railway line would reduce the visual impact of the

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				views.	deterioration in views.  Moderate to Slight adverse effect.	Preliminary Design. There would be a barely perceptible deterioration in existing views.  Slight adverse effect.  (Winter: As for Year 1)
P90	Unknown property name. Single storey property	1168m  331m	Property well set back in relation to the neighbouring properties (P85-P89).	No significant change	Views to the Preliminary Design largely curtailed by existing buildings and landform. There would be a barely perceptible to no discernible deterioration in existing views.  Slight adverse effect to No Change	Intervening vegetation and landform would effectively curtail views to the Preliminary Design. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P91	Unknown property names. Group of x3 Single storey properties	1053m  180m	Properties generally front towards the adjacent hillside and the wind farm above the Twin Towns.	As with other properties along this minor road lack of foliage on vegetation adjoining the disused railway line reduces the visual obstruction afforded by this feature.	Properties set back further from the Preliminary Design in comparison to P92. The Preliminary Design would form a noticeable element within views from this elevated position, which would be partially filtered during winter by existing vegetation adjoining the disused railway line. There would be a noticeable deterioration in views.  Moderate adverse effect.	Preliminary Design would be partly screened within views due to existing vegetation adjoining the dismantled railway line. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P92	Unknown property name.	1044m	Property situated at an elevated position and fronts towards the Twin Towns and the hillsides above.	As for P91	Front elevation views towards the Preliminary Design from x3 upper floor	As for P91, Preliminary Design would be partly

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	Two storey property	179m			windows and x1 lower floor window and conservatory. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	screened within views due to existing vegetation adjoining the dismantled railway line. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P93	Unknown property name. Two storey property	1100m 253m	Similar view and orientation as for P92 except that the property is situated at a slightly more elevated position. Views from front elevation also partly obstructed by adjoining P92.	As for P91	As for P92. However, views from x7 front elevation windows towards the Preliminary Design (including the adjoining single storey extension). There would be a noticeable deterioration in the existing view.  Moderate adverse effect.	As for P92, however, due to the property being set further back from the road there would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P94	Unknown property name. x2 Single storey properties	1044m 158m	Property situated at an elevated position. Views as for P91. Views also partly curtailed by P95.	As with other properties along this minor road lack of foliage on vegetation adjoining the disused railway line reduces the visual obstruction afforded by this feature.	Views from property partly curtailed due to its lower elevation in comparison to P91. As a result views to the Preliminary Design are partly curtailed by landform. The Preliminary Design would also be in a slight cutting as it passes the property. There would be a noticeable deterioration in views.  Moderate adverse effect.	The potential visual impact of the Preliminary Design would be reduced due to screening afforded by existing vegetation adjoining the disused railway line. There would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect.

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						(Winter: As for Year 1)
P95	Unknown property names. Group of x2 Two storey properties.	957m  68m	Views largely as for P91 to P94.	As for P94	The properties are situated at an elevated position and in close proximity to the Preliminary Design. The Preliminary Design would become a prominent element within views. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	The visibility of the Preliminary Design would be reduced due to the existing vegetation adjoining the disused railway line. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse.  (Winter: As for Year 1)
P96	Unknown property names. Group of x2 Two storey properties.	1070-1110m  125-230m	Properties occupy an elevated position with views to the hilltop above Mullagharry. Summer views locally curtailed by existing densely vegetated hedgelines. Views from the northernmost of the two properties would be curtailed by adjoining P94.	Reduction in visual obstruction afforded by intervening hedgeline.	Restricted oblique front elevation views to the Carrickmagrath side road and overbridge and front elevation views to those parts of the Preliminary Design on embankment on approach to the Sessiagh O'Neill side road and underbridge. The Preliminary Design would also be in slight cutting and intervening vegetation would partly filter views to the scheme. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	The existing dense hedgerows would further curtail summer views. There would be no discernible deterioration in the existing view.  No Change.
P97	Unknown property names. Group of x3 Two storey properties.	1189m  284m	Properties located in an elevated position on a hilltop above the Burn Daurnett. Landform is almost level and views are pastoral and local including fields with densely vegetated hedgelines.	Reduction in visual obstruction afforded by adjoining hedgelines.	Views to that section of the Preliminary Design closest to the properties would be obscured by landform. However, potential, but more distant views to that section on embankment at the Sessiagh	Existing vegetation would largely curtail views to that section of the Preliminary Design on approach to the Sessiagh O'Neill side road

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					O'Neill side road and underbridge. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change	and underbridge. There would be no discernible change in the view.  No Change (Winter: As for Year 1).
P98	Unknown property name. Single storey property	830m  80m	Elevated front elevation views towards hill-top above Twin Towns. Landform falls away quite abruptly directly in front of property.	As for P95	Elevated position in close proximity to Preliminary Design. Whilst in cutting potential views into cutting and to traffic using the road from elevated position above (landform falls away abruptly). There would be a noticeable to a significant deterioration in views from x6 front elevation windows.  Moderate to Substantial adverse effect	As for Year 1, except new planting (implemented as part of the scheme) in association with existing vegetation, would partly screen views to the Preliminary Design. There would be a noticeable deterioration in views.  Moderate adverse effect (Winter: As for Year 1).
P98A	Unknown property name. Two storey property	825m  80m	The property has elevated rear elevation views to the hilltop above the Twin Towns. From the front elevation rising ground up to a hedgeline adjoining the existing minor road is visible.	Visual obstruction afforded by adjoining hedgelines both within adjoining fields and within that adjoining the minor road is reduced.	Potential views from x4 front elevation windows and a number of side elevation windows to the Preliminary Design over rising ground and in slight cutting. The embankments to the Carrickmagrath-side road and overbridge would be prominent features within the foreground to views. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	New planting along the embankment on approach to the overbridge would reduce its potential visibility within summer views. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse. (Winter: As for Year 1)
P99	Unknown property name.	830m	The property has front elevation views towards the hilltops above the Twin Towns including the wind farm.	Some reduction in visual obstruction	Restricted views from property despite its close proximity to the Preliminary	There would be a noticeable deterioration to.



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	Single storey property	34m	However, these are now part obstructed by new development on the opposite side of the minor road which was under construction at the time of survey. An existing part coniferous hedgeline restricts views to the south.	afforded by hedgeline on rear boundary to property.	Design due to the scheme being in cutting. The driveway approach to the property would be part removed to accommodate the embankment to the Carrickmagrath side road and overbridge. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	in existing views due to the screening effects of existing vegetation and new planting implemented as part of the Preliminary Design.  Moderate adverse effect  (Winter: As for Year 1)
P100	Unknown property names. Group of Two storey properties under construction.	800m  82m	The properties have front elevation views uphill to the south. Properties on the opposite side of the minor road form the foreground to the view.	Lack of foliage on vegetation on opposite side of the minor road would reduce visual obstruction.	End elevation and oblique front elevation views to the Carrickmagrath side road and overbridge. Views partly restricted to that section of the Preliminary Design in cutting. A noise barrier would provide some visual screening to traffic. There would be a significant to noticeable deterioration in existing views.  Substantial to Moderate adverse effect	New planting (implemented as part of the scheme) along the embankment adjoining the overbridge together with intervening existing vegetation within hedgelines would reduce the visibility of the Preliminary Design within summer views. There would be a noticeable deterioration in the view.  Moderate adverse effect  (Winter: As for Year 1)
P100A	Unknown property names. Group of x2 Single storey properties.	Approx. 810m  120-140m	As for P100	As for P100	Views to Preliminary Design restricted by intervening landform (rising ground) and the fact that Preliminary Design is within cutting. Views to that section on approach to Sessiagh O'Neill side road and underbridge restricted by P101/ 102. There would be a noticeable	At Summer Year 15, existing vegetation and new planting would reduce the visibility of the Preliminary Design within views. There would be a noticeable to barely

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					deterioration in the view.  Moderate adverse effect	perceptible deterioration in views.  Slight to Moderate adverse effect.
P101	Unknown property name. Single storey property	864m  88m	The property is situated at a slightly higher elevation in relation to the adjoining buildings and fronts towards the Twin towns. Views from the rear of the building are restricted by the immediately adjoining hedge line (part coniferous). A local knoll also restricts views from the rear of the property.	Visual obstruction afforded by hedgelines within fields to the rear of the property reduced during Winter.	Views from the rear elevation of the property to the Preliminary Design where it is at grade or in slight cutting. Oblique front elevation views also to the Carrickmagrath side road and overbridge. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.	Existing intervening vegetation within hedgelines, in association with new planting on the overbridge embankments, would reduce the impact of the Preliminary Design within views from both the front and the rear elevation during summer. Existing hedgelines about the rear boundary to the property. There would be a noticeable deterioration in existing views.  Moderate adverse effect.  (Winter: As for Year 1) -
P102	Unknown property name. Single storey property	828m  121m	Property fronts towards the Twin Towns. The view from the rear elevation is part restricted by an adjoining outbuilding and by landform, which rises to the rear of the property, as well as hedgelines.	As for P101	Views towards the Preliminary Design partly curtailed by the adjoining outbuilding, rising landform and intervening vegetation within hedgelines. Preliminary Design is also in slight cutting or close to existing grade as it passes the property. There would be a noticeable deterioration in existing views.	Existing intervening hedgelines as well as new planting would reduce the visibility of the Preliminary Design within Summer views. There would be a noticeable to barely perceptible deterioration in the view.

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					Moderate adverse effect	Moderate to Slight adverse effect  (Winter: As for Year 1)
P103	Unknown property name. Two storey property	818m  158m	As for P102, property fronts towards the Twin Towns. Views from rear elevation as for P102.	Visual obstruction afforded by hedgelines, including that adjoining the stream flowing to the immediate east, and to the rear of the property reduced during Winter.	As for P102, except that views would be largely confined to those from the upper floor windows. Landform would largely curtail views from the lower floor windows. There is also a gap in the partial screen afforded by intervening hedgelines through which views would be available. There would be a noticeable deterioration in existing views. Moderate adverse effect	As for P102, there would be a noticeable to barely perceptible deterioration in the view, largely due the screening provided by existing intervening vegetation. The gap in the hedgeline would also be planted as part of the Preliminary Design. Moderate to Slight adverse effect  (Winter: As for Year 1)
P104	Unknown property name. Two storey property	765m  234m	Property fronts towards hillside above Woodland Dooish. Views from x1 end elevation window and rear elevation views up hillside to south.	As for P103	Views from upper floor windows on rear elevation as for P102. However, lower elevation views curtailed by Intervening landform. There would be a noticeable to barely perceptible deterioration in existing views.  Slight to Moderate adverse effect	Existing intervening vegetation within hedgelines, new planting and rising landform would largely curtail views to the Preliminary Design. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P105	Unknown property names. Group of x1 Two storey and x2	670m  329m	The properties are situated just above the floor of the valley drained by the Burn Daurnett. They are all at a similar elevation. Each property at differing orientations enabling views over the Burn Daurnett and to rising	Lack of foliage on hedgelines to the south of the properties reduces visual	Potential oblique views uphill to the Preliminary Design over a hillside clothed in woodland and hedgelines. Views generally restricted by landform	New planting (implemented as part of the scheme) on the road embankment would

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	Single storey properties (x1 with side elevation windows)		ground to the south.	obstruction afforded by these features.	although potential views available to that section of the Preliminary Design on embankment on approach to the Sessiagh O'Neill side road and underbridge. There would be a barely perceptible deterioration in the view.  Slight adverse effect	reduce the visibility of the Preliminary Design within summer views. There is also a large area of scrub woodland on the hillside to the south of the property, which also restricts views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change. (Winter: As for Year 1)
P106	Ballybofey settlement.	-----	Settlement lies on a slight ridge that carries the existing N15. Properties on the western outskirts of the settlement are linear in nature with properties on either side of the road. This is followed by more extensive development either side of the road as the town centre is approached. Much of the settlement is built upon this low ridge-line before it descends to the River Finn and the river crossing into Stranorlar. Views to a green hillside to the south of the Twin Towns with a widespread but scattered settlement pattern. Some properties directly overlook the existing N15.	No significant change	The majority of properties adjoining the existing N15 and adjoining residential areas to the south would have views towards the Navenny grade separated junction and the link road to the Twin Towns, as well as sections of the Preliminary Design either side of the junction. This would introduce a new road to what is currently a green hillside with widespread and scattered settlements to the west. This character, however, changes to the east of the proposed junction where extensive areas of new residential development are ongoing. There would be a noticeable to barely perceptible deterioration in the view for the majority of properties.  Moderate to Slight adverse effect.	New planting at, and either side of the junction, and adjoining the link road would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible deterioration in existing views.  Slight adverse effect  (Winter: As for Year 1)  For those properties that front onto the existing N15 or have their rear elevations facing the existing N15: As for Year 1.

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					For those properties which front onto the existing N15 (or have their rear elevations facing the existing N15) there would be a slight beneficial effect upon views due to a reduction in traffic using the existing N15. However, views to the Navenny grade separated junction would be available.  Slight beneficial effect	
P106A	Ballybofey settlement (that part of settlement on lower-lying land adjoining River Finn)	-----	From this part of the settlement recent residential development on the hillsides to the south of the Twin Towns is more readily apparent within views.	No significant change	Whilst the junction with the link road to the Twin Towns and the link road itself would be visible the Preliminary Design would be seen in the context of existing residential development. This would reduce the potential visual impact of the Preliminary Design, which would be seen within the context of a developing urban environment. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect	As for views from other parts of Ballybofey new planting (implemented as part of the scheme) would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible to no discernible deterioration in existing views.  Slight adverse effect to No Change  (Winter: As for Year 1)
P107	Summerhill House. Two storey property	1297m  183m	The property has open views towards Mullahagarry Hill (to the east of the existing N13). Recent and ongoing residential development has compromised the previously rural character of the elevated view from this property.	No significant change	Whilst the property is located close to the mainline of the Preliminary Design landform would partially curtail views to the Navenny Junction. However, there would also be potential views from the upper floor windows of the property to the opposite side of the cutting to the mainline as well as those sections of the scheme on to the east. There would be a	New planting is proposed on the cutting slopes adjoining the property to enclose the Navenny link road junction. However, this would curtail previously open and expansive views from the property. There would be

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					significant to noticeable deterioration in views.  Substantial to Moderate adverse effect.	a noticeable deterioration in the view.  Moderate adverse effect  (Winter: As for Year 1)
P108	Unknown property name. Single storey property	1450m  240m	The property has front elevation views over open fields before the landform drops to the River Finn. Also views to the Twin Towns.	No significant change. Hedgebanks within local environs to property clipped to 1m height.	Oblique front elevation views to that section of the Preliminary Design on embankment on approach to the Daisy Hill side road and underbridge. Landform would conceal the Navenny junction within views. There would be a noticeable deterioration in views.  Moderate adverse effect.	Existing vegetation and new planting implemented as part of the scheme would partially reduce the visibility of the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P109	Unknown property name. Single storey property but with an end elevation window within the loft space.	1447m  215m	The property has front elevation views to Glencovet Hill (telecoms mast) largely over pastoral fields with dense hedgelines.	Some reduction in visual obstruction afforded by intervening hedgelines.	Front elevation views to that section of the Preliminary Design on approach to the Daisy Hill side road and underbridge. An existing evergreen hedge on the rear boundary to the property would curtail lower floor rear elevation views. There would be a noticeable deterioration in views.  Moderate adverse effect	Within views from the front elevation existing dense hedgelines, in association with new planting, would partially reduce the visibility of the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect  (Winter: As for Year 1)

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P110	Unknown property name. Two storey property	1570m  334m	Front elevation views as for P109.	As for P109, less visual obstruction afforded by intervening hedgelines.	Potential front elevation views to the approaches to the Daisy Hill side road and underbridge. There would be a significant to noticeable deterioration in existing views.  Substantial to Moderate adverse effect	Intervening vegetation and proposed planting (implemented as part of the scheme) would reduce the visibility of the Preliminary Design within views from the front elevation. There would be a noticeable deterioration in existing views.  Moderate adverse effect  (Winter: As for Year 1)
P111	Unknown property names; x3 Single storey properties	1610m  381m	Front elevation views over existing minor road to Glencovet Hill (including telecom mast) from slightly elevated position. Views over pastoral landscape enclosed by hedgebanks. Existing coniferous hedgeline on boundary to northernmost property partially restricts views.	As for P109/ 110	Potential views to that section of the Preliminary Design on embankment on approach to the Daisy Hill side road and underbridge. Potential views also into the cutting at approximate Ch 9900. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Intervening vegetation within hedgelines, in association with new planting, would partially screen views to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P112	Unknown property names; x1 Two storey and x1 Single storey properties (x1 with rooflights)	1770m  443m	Properties are sited at a slightly elevated position with front elevation views towards the wind farm and Mullagharry Hill (to the east of the existing N13) over pastoral fields with hedgelines. New residential development (P173) is also an element within the view.	Less visual obstruction afforded by intervening hedgelines.	Potential elevated views towards the Preliminary Design on embankment on approach to the Daisy Hill side road and underbridge. Views to the Navenny grade separated junction screened by landform. There would be a noticeable deterioration in existing views.	Intervening vegetation within hedgelines would partially screen views to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in

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					Moderate adverse effect	the view. Moderate to Slight adverse effect  (Winter: As for Year 1)
P113	Unknown property name. Row of x4 Single storey properties.	1730m  412m	Views as for P112.	As for P112	As for P112. Views to Navenny grade separated junction screened by landform.  Moderate adverse effect	As for P112  Moderate to Slight adverse effect  (Winter: As for Year 1)
P114	Unknown property name. Two storey property.	1616m  308m	Rear elevation views to the wind farm and towards Mullagharry Hill over pasture and hedgelines.	As for P112, less visual obstruction afforded by intervening hedgelines.	Potential views as for P112 and 113, except property closer to Preliminary Design but at a lower elevation. Views to Navenny grade separated junction and cuttings screened by landform and buildings, including P108 / 109. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Intervening vegetation would partially screen views to that section of the Preliminary Design on embankment. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P115	Unknown property name. Two storey property	1686m  396m	Similar existing views as for P114, however views also partially curtailed by P114.	As for P112, less visual obstruction afforded by intervening hedgelines.	Views partially obstructed by P114 but views would be available to same section of Preliminary Design as for P114. There would be a noticeable deterioration in existing views.  Moderate adverse effect	As for P114, some visual screening afforded by intervening hedgelines and new planting. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect



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						(Winter: As for Year 1)
P116	Unknown property name. Single storey property	2017m  791m	Front elevation views over pastoral fields with hedgelines to hills above the Twin Towns, to Mullahagarry Hill (to the east of the existing N13) and the hilltop (with the mast) above Edenmore House. Some recent new residential development ongoing within foreground of views. An existing coniferous hedgeline curtails views to the north.	No significant change within local area of property.	Potential but restricted oblique front elevation views towards that section of the Preliminary Design on embankment on approach to Daisy Hill side road and underbridge. Also, potential views to where the Preliminary Design enters cutting at Ch 9900. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	New planting and intervening hedgelines would partially restrict views. There would be a barely perceptible to no discernible deterioration in the view.  Slight adverse effect to No Change  (Winter: As for Year 1)
P116A	Unknown property names. X2 Two storey properties	Approx. 2000m  Approx. 700-800m	Side elevation views to north over valley of Burn Durnett and Twin Towns and hilltops above the settlement. New buildings under construction.	Reduction in visual obstruction afforded by existing hedgelines within middle distant views.	Views part restricted by P118. However, views to that section of Preliminary Design on embankment on approach to Daisy Hill side road and underbridge. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect	Intervening hedgelines would reduce the visibility of the Preliminary Design at Year 15. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  Winter: As for Year 1
P117	Unknown property name. Single storey property.	1946m  725m	Front elevation views as for P116.	No significant change within local area of property.	As for P116	As for P116
P118	Unknown property names; x2 Single and x1 Two storey properties.	1861m  623m	Properties have front elevation views towards the Twin Towns and the hill-tops above within which the majority of the settlements are visible. Properties located on the edge of a slight ridge.	Less visual obstruction from intervening hedgelines.	Potential views as for P112 except that these properties are generally more elevated. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Intervening hedgelines would partially conceal the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.

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						Moderate to Slight adverse effect  (Winter: As for Year 1)
P119	Unknown property names. Residential area consisting of single and two storey properties.	1609m  455m	Generally the properties have front elevation views over the minor road running through the residential area. Existing views are largely confined to other residential buildings (including those within an adjoining development, P121) with restricted views or "glimpses" towards the hills above the Twin Towns.	Reduction in visual obstruction afforded by intervening hedgelines.	Potential, but restricted views between buildings to that section of the Preliminary Design on embankment on approach to Daisy Hill side road and underbridge. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect	Intervening hedgelines would partially conceal the Preliminary Design. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P120	Unknown property names; x2 Single storey and x1 Two storey properties at entrance to a new residential area.	1481m  245m	Front elevation views over pastoral fields enclosed by hedgelines to the hill-top above Edenmore House (including its mast) and Mullagharry Hill (to the east of the existing N13).	Less visual obstruction afforded by intervening hedgelines.	Preliminary Design would pass on embankment through an area of pastoral fields. Properties at a slightly elevated position relative to Preliminary Design. There would be a significant to noticeable deterioration in the existing view.  Substantial to Moderate adverse effect	As for P111, intervening vegetation within hedgelines would partially screen views to the Preliminary Design. There would be a noticeable deterioration in the view.  Moderate adverse effect  (Winter: As for Year 1)
P121	Residential street (new properties as for P119). Largely Two storey properties with rooflights.	Generally 1485m  Generally 347m	Views from the properties are generally "inward" looking and towards other properties within the housing estate, rather than being open and expansive. However, more open and expansive views available from rear elevations of properties on the north side of the street through the estate.		Potential but restricted views to that section of the Preliminary Design on embankment on approach to the Daisy Hill side road and underbridge. Also, potential but restricted views to the cutting slopes on the northern side of the road as the Preliminary Design enters cutting at Ch 9900 (for properties on the northern edge of the development)).	Existing intervening hedgelines would partially screen views to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.

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					There would be a noticeable deterioration in the view.  Moderate adverse effect	Moderate to Slight adverse effect.  (Winter: As for Year 1)
P122	Unknown property names; x2 single storey properties.	Approx 1450m  150-170m	Front elevation views over open fields and oblique views to existing housing (including P121). Rear elevation views to hill-top above Edenmore House with its mast, although restricted by existing vegetation.	Front elevation views: No significant change (low-clipped hedgerows)          Rear elevation views: reduction in visual obstruction afforded by intervening hedgelines.	Front elevation: Potential oblique views to parts of the cutting slopes associated with the Navenny junction. There would be a noticeable deterioration in views.  Moderate adverse effect.      Rear elevation views to that section on approach to Daisy Hill side road and underbridge. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.	Front elevation: Views from front elevation would be partially curtailed by new planting implemented as part of the scheme. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.  Views from the rear elevation would be partially screened by existing intervening vegetation within hedgelines. There would be a noticeable deterioration in the existing view.  Moderate adverse effect.  (Winter: As for Year 1 for both front and rear elevation views)
P123	Unknown property name. Single storey	700-1300m  Approx 130-	Setting for this property now compromised by adjoining and ongoing residential development. However, front elevation views over open fields with hedgelines and	Reduction in visual obstruction afforded by intervening	Preliminary Design would be on embankment within close proximity to the property. There would also be	As for Year 1.  (Winter: As for Year 1)

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	property	630m	Juncus (rushes) within fields from two front elevation windows.	hedgelines.	potential views along the cutting at approximate Ch 9900 to the east. There would be a significant deterioration in the existing view.  Substantial adverse effect	
P124	Unknown property name. Single storey property.	1323m  241m	Extensive views over the Twin Towns to the hill-tops above the settlements from the rear and the side elevation.	No significant change	Potential rear elevation views to that section of the Preliminary Design on approach from the west and restricted oblique views into the Navenny grade separated junction cuttings. Potential views from end elevation into Navenny grade separated junction cuttings and sections east to the Daisy Hill side road and underbridge. Views to Navenny link road as it climbs hillside to existing N15. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect.	New planting (implemented as part of the scheme) would partially conceal the more distant sections of the Preliminary Design. There would be a noticeable deterioration in views.  Moderate adverse effect.  (Winter: As for Year 1)
P125	Unknown property name. Single storey property	1178m  113m	Extensive hill-top views over the Twin Towns and the hillsides above the settlements.	No significant change	Potential end elevation and oblique front elevation views into Navenny grade separated junction cutting and that section on approach to Daisy Hill side road and underbridge. Rear elevation views to that section on approach from the west including Sessiagh O'Neill side road and underbridge.  Front/ End elevation: There would be a significant to noticeable deterioration in the existing view.  Substantial to Moderate adverse effect.	Front/ End elevation: As for P124  Rear elevation: New planting and existing hedgelines would reduce the visibility of the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.

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					Rear elevation: There would be a noticeable deterioration in the existing view. Moderate adverse effect.	(Winter: As for Year 1)
P126	Unknown property names. A line of Two storey properties.	1411m  338m	Views from the front elevation of the properties as for P124/ P125. However, in contrast these properties are positioned closer to the crest of the hill and are set back further from the top of the valley sides to the Burn Daurnett.	No significant change	Potential, but very restricted views to that part of the link road as it climbs the northern sides of the Burn Daurnett valley through existing residential development on approach to the existing N15. Views to the cuttings associated with the Navenny grade separated junction would be curtailed by landform. There would be a barely perceptible to no discernible deterioration in the view.  Slight adverse to No Change	As for Year 1.
P127	Unknown property name. Single storey property.	1160m  100m	Front elevation views curtailed by the deciduous hedge line on the property boundary.	Expansive views over the Twin Towns from the front elevation to the properties. Hedgeline is Birch, which provides virtually no Winter screen.	The Preliminary Design would be on high embankment directly in front of the property. There would be a significant deterioration in views.  Substantial adverse effect.	In summer the hedge line would reduce the visibility of the Preliminary Design. There would be a noticeable deterioration in views.  Moderate adverse effect.  (Winter: As for Year 1)
P127A	Unknown property name. Two storey property	1170m  100m	Front elevation views over valley of Burn Daurnett to the Twin Towns.	No significant change	The Preliminary Design would be on high embankment directly in front of the property. There would be a significant deterioration in views.  Substantial adverse effect.	As for Year 1  This section of the Preliminary Design would remain largely open.
P128	Unknown property name. Single storey property and x1	1161m  109m	Front elevation views curtailed by an existing coniferous hedgeline (height 10 metres plus) on property boundary and existing Birch hedgeline on adjoining P127.	More open views through adjoining Birch hedgeline especially from the	Potential oblique views from front elevation and from side elevation windows through a gap in the hedgeline at the entrance to the property (side	In Summer, there would be additional visual screening afforded by the Birch hedgerow on the

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	Two storey property.			more recently built 2-storey property.	boundaries open, i.e. no-hedgerows). The Preliminary Design would be on embankment directly in front of property. A noise barrier would provide some visual screening to traffic. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.	boundary to P127.  Moderate adverse effect (Winter: As for Year 1)
P129	Unknown property name. Single storey property	1200m  104m	Property is currently enclosed by vegetation that is largely coniferous, except for that on its western boundary, which is largely deciduous. P127 restricts views to the west.	Visual obstruction afforded by existing vegetation on western boundary reduced.	Potentially very restricted views to the Preliminary Design due to existing vegetation and intervening buildings. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	There would be no discernible deterioration in the existing view.  No Change (Winter: As for Year 1)
P130	Unknown property name. Single storey property	1184m  109m	Open and expansive views from x4 front elevation windows over the Twin Towns, including the wind farm upon the hill-tops above the settlements and the hillside of Woodland Dooish.	No significant change	Open views to Preliminary Design in close proximity on embankment as it passes the property. However, a noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	As for Year 1. (Winter: As for Year 1)
P131	Unknown property name. Two storey property	1141m  48m	Generally open and expansive views as for P130.	No significant change	As for P130.	As for P130.
P132	Unknown property name. Single storey property	1221m  147m	End elevation and oblique front elevation views as for P130.	No significant change	As for P130. Property overlooks Preliminary Design as it passes on embankment from an open elevated position in close proximity to the scheme.	As for P130. (Winter: As for Year 1)

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P133	Unknown property names. x2 Single storey properties.	1300m  228m	Front elevation views over the Twin towns and the hill-tops above the settlements, which includes the wind farm. Local views are part restricted by adjoining properties and existing vegetation.	Some reduction in screening afforded by existing vegetation adjoining P131	Potential views to the embankment section of the Preliminary Design adjoining P131 but part restricted by landform and buildings. There would be a noticeable deterioration in the view.  Moderate adverse effect	Summer views would be further restricted by existing vegetation. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.
P134	Unknown property name. Two storey property.	1398m  322m	Rear elevation views to hill-tops above Twin Towns over valley of the Burn Daurnett.	No significant change	Potential but restricted views to that part of the Preliminary Design adjoining P131, over and between intervening buildings. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect	As for Year 1  No Change.  (Winter: As for Year 1)
P135	Unknown property name. Two storey property.	1368m  305m	Property largely enclosed by an existing hedgeline (partly deciduous and partly coniferous) through which the only available view is via the entrance to the property.	Some reduction in screening effect of the hedgerow that encloses the property.	Restricted views to that section of the Preliminary Design adjoining P131 through gap in hedgeline at entrance to property. There would be a barely perceptible deterioration in the view. Landform also partially restricts views.  Slight adverse effect	The hedgerow enclosing the property would be in full leaf. However, gap through hedgeline at entrance would remain. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P136	Unknown property name. Two storey	1313m  251m	Property fronts towards adjoining road. End elevation views to the hill-tops above the Twin Towns including the wind farm part restricted by adjoining vegetation within	No significant change	Restricted views to that part of the Preliminary Design adjoining property P131. There would be a barely	Intervening hedgeline would restrict views from rear and end elevation of

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	property		hedgeline and garage.		perceptible deterioration in the view.  Slight adverse effect	property. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P137	Line of x1 Single and x2 Two storey properties.	1172m  102m	Rear elevation views over land that falls away to the north. Intervening hedgelines including that adjoining the disused railway line restrict Summer views.	Lack of foliage on intervening hedgelines (including that adjoining the disused railway line) reduces visual obstruction.	Potential views to Preliminary Design within oblique rear elevation views on approach from the west and in close proximity through partial visual screen afforded by vegetation adjoining the disused railway line. Potential oblique views to that section of the Preliminary Design adjoining P131. There would be a significant to noticeable deterioration in the existing view from both building elevations.  Moderate to Substantial adverse effect	Intervening hedgebanks adjoining the disused railway line would provide some visual obstruction to views. There would be a noticeable deterioration in the existing view.  Moderate adverse effect  (Winter: As for Year 1)
P137A	x3 Single storey properties	1170-1220m  100-160m	Front elevation views to west largely curtailed by P137. Potential views between buildings to the west. Oblique side and rear elevation views to east to adjoining buildings.	Reduction in visual obstruction afforded by intervening hedgebanks/vegetation.	Restricted views to that section of the Preliminary Design on approach from the west between individual buildings within P137.  Potential end and oblique side elevation views to that section of the Preliminary Design adjoining P131.  For both views there would be a noticeable deterioration in the existing view. Moderate adverse effect	Intervening vegetation within gardens to adjoining properties and within intervening hedgelines would partially restrict views. There would be a noticeable to barely perceptible deterioration in existing views.  Moderate to Slight adverse effect.



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P138	Unknown property name. Single storey property.	1127m  60m	Views from the property severely restricted by an adjoining coniferous hedgeline on the boundary with P139. Dense vegetation to rear of property also restricts Summer views.	Views from rear of property more one due to lack of foliage.	Potentially, extreme oblique views to that section of Preliminary Design on embankment adjoining P131. There would be a noticeable deterioration in the existing view.  Moderate adverse effect  Views from rear elevation to Preliminary Design on approach from the west. There would be a significant deterioration in the existing view.  Substantial adverse effect.	Front elevation: As for Year 1  Rear elevation: New planting would reduce the visual impact of the Preliminary Design upon views from the rear elevation. There would be a significant to noticeable deterioration in the existing view.  Substantial to Moderate adverse effect.
P139	Unknown property name. Single storey property.	1115m  22m	Property currently enclosed by a tall coniferous hedgerow. No views from property other than to the enclosing hedgerow and through a gap in the hedgerow at the entrance to the property.	No significant change	The Preliminary Design would be in extremely close proximity to the property and on embankment. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	Property would be enclosed by proposed broadleaved woodland (Implemented as part of the scheme). Whilst this would be similar to the pre-change circumstances of the property the Preliminary Design would remain in close proximity to the property on embankment. There would be a noticeable to significant deterioration in views.  Moderate to Substantial adverse effect.  (Winter: As for Year 1)

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P140	Unknown property name. Single storey property	1100m  73m	Front elevation views to the hill-tops above the Twin Towns including the wind farm (unaffected). Rear elevation views to the existing dense vegetation associated with the disused railway line over the rear garden to the property.	Lack of foliage on hedgebanks adjoining disused railway line opens up views.	Rear elevation views to the Preliminary Design partly curtailed by the existing vegetation within the hedgeline associated with the dismantled railway line. However, Preliminary Design passes property on embankment in close proximity to the property. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect.	Existing vegetation associated with the disused railway line would partly screen the Preliminary Design within views. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)  (Winter: As for Year 1)
P141	Unknown property name. Single storey property	955m  71m	The property has front elevation views towards the existing minor road and to P140. Rear and side elevation views curtailed by existing vegetation associated with the disused railway line and adjoining scrub woodland.	Reduced visual obstruction afforded by intervening vegetation.	Potential views to the Preliminary Design restricted by rising landform to immediate south of property. Rear and side elevation views also partly curtailed by adjoining outbuildings. Potential restricted views to that section of Preliminary Design upon approach from the west. There would be a noticeable deterioration in the view.  Moderate adverse effect	Existing vegetation adjoining the disused railway line would severely restrict views. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse
P142	Unknown property name. Single storey property.	914m  108m	The property front towards the existing minor road and overlooks waste ground on the opposite side of the road. The adjoining P141 also restricts views uphill to the south.	Views from rear elevation more open due lack of foliage on intervening vegetation.	Views to the Preliminary Design would be severely curtailed by landform and adjoining property P140 / 141. Potential extreme oblique views from front elevation of building and restricted views from rear elevation due to P140 / 141 and existing vegetation. There would be a noticeable to barely perceptible deterioration in the view.	New planting (implemented as part of the scheme) and existing vegetation associated with the former railway line would partially conceal the Preliminary Design within views. There would be a barely perceptible

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					Moderate to Slight adverse effect.	deterioration in the existing view.  Slight adverse effect.
P143	Unknown property name. Single storey property.	816m  150m	Property fronts towards the adjoining road. Views to building on opposite side of road (P144) and oblique views to Twin Towns. Existing vegetation within hedgelines restricts views from the rear and side elevation of the property.	Lack of foliage within hedgelines over hillside to west slightly opens up views.	Views to the Preliminary Design would be severely restricted by landform and vegetation. Potential views from rear elevation to the Navenny link road. There would be a barely perceptible deterioration in existing views.  Slight adverse effect	Existing vegetation would be in full leaf and would largely conceal views to the Preliminary Design. Landform would also continue to restrict views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change  (Winter: As for Year 1)
P144	Unknown property name. Single storey property.	820m  196m	Property fronts towards the road. Views restricted by an existing coniferous hedgeline to the immediate south of the property.	No significant change	Views to the Preliminary Design would be severely curtailed by the existing coniferous hedge and outbuildings. There would be a barely perceptible deterioration in existing views.  Slight adverse effect	As for P143, existing vegetation and landform would reduce the visibility of the Preliminary Design within existing views. There would be barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect. to No Change  (Winter: As for Year 1)
P145	Unknown property name.	859m	Front elevation views from five windows over the minor road and to existing woodland. Rear elevation views are	Woodland on opposite side of road is a less	Potential very restricted views to the Preliminary Design, including the link	Existing woodland would be in full leaf during

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	Two storey property	250m	curtailed by the adjoining church and the school.	effective visual screen during Winter.	road to the existing N15. There would be a barely perceptible deterioration in the view.  Slight adverse effect	summer months. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.
P146	Unknown property name. Two storey property.	1704m  205m	Property fronts towards Ballybofey and the hill-tops above the settlement, which includes the wind farm. Rear elevation views curtailed by landform and existing vegetation.	Slightly more open views from rear of property.	Potential extreme front elevation views towards the link road to the existing N15. Views from rear of property severely restricted by existing woodland and vegetation associated with the dismantled railway line. There would be a barely perceptible deterioration in the view.  Slight adverse effect	As for Year 1  (Winter: As for Year 1)
P147	Unknown property names. Row of Single and Two storey properties.	560m  489m (fro Mainline)  Between 95-270m from Navenny link road.	Front elevation views from a low-lying position within the floodplain of the Burn Daurnett. Views from front elevation of buildings to green hillside becoming more urban as residential development upon the hillside takes place. Views from rear elevations to wooded course of the Burn Daurnett.	Existing hedgelines associated with the disused railway line provides less visual obstruction during Winter.	Potential views to the Navenny grade separated junction. Whilst junction is in substantial cutting it would be potentially visible in part. Potential views from front elevation of properties towards Ballybofey link road as it descends the hillside. Oblique rear elevation views to link road as it climbs valley sides to existing N15. Noise barriers would provide some visual screening to traffic. There would be a significant to noticeable deterioration in existing views.  Substantial to Moderate adverse effect	Existing vegetation (including that within the hedgelines adjoining the disused railway line) would reduce the visibility of the Preliminary Design within views. There would be noticeable deterioration in the view.  Moderate adverse effect
P148	Residential area of Single and	568m	Views from the properties are largely "inward" looking to the adjacent properties. Restricted views to hillsides and	No significant change	Generally properties front towards Ballybofey and away from the	New planting (implemented as part of

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	Two storey properties.	315m	hill-tops above the Twin Towns including the wind farm.		Preliminary Design. Potentially restricted views from property as for P149.  Slight adverse effect	the Preliminary Design) including that adjoining the Navenny grade separated junction and the Ballybofey link road would partially reduce the visibility of the Preliminary Design within summer views at Year 15. Vegetation within the hedgerows adjoining the disused railway line would also restrict views. There would be no discernible deterioration in the view.  No Change  (Winter: As for Year 1)
P149	Unknown property name. Single storey property.	723m  331m	Front elevation views over existing residential development towards Ballybofey. Property at a slightly elevated position on the slopes above the Burn Daurnett.	No significant change	Potential oblique views to the link road to the existing N15 partly curtailed by adjoining outbuildings to the northeast of the property. Views to the mainline largely curtailed by landform although potential views to the Navenny grade separated junction cuttings. There would be a noticeable deterioration in the existing view.  Moderate adverse effect	New planting in association with existing vegetation would reduce the visibility of the Preliminary Design (especially the Navenny grade separated junction). There would be a barely perceptible deterioration in the existing view.  Slight adverse effect
P150	Unknown property name. Two storey	611m  410m	Front elevation views up the hillside to the south and towards P105. Hillside includes scattered settlements as well as pasture enclosed by hedgerows.	Lack of foliage on intervening hedgerows reduces their visual	Potentially very restricted winter views to Preliminary Design on hillside. There would be a barely perceptible to no	Existing vegetation would screen the Preliminary Design within summer

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	property			obstruction.	discernible deterioration in the view.  Slight adverse effect	views. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P151	Unknown property name. Single storey property	706m  334m	Property is completely enclosed by vegetation. However, there are limited and restricted views to Ballybofey.	Some reduction in visual obstruction afforded by enclosing vegetation.	As for P150  No Change	As for P150
P152	Unknown property name. Single storey property.	661m  390m	Property located at the base of the hillside. Views from front elevation largely curtailed by existing vegetation adjoining P151/153 and upon the hillside above the property.	No significant change	As for P150	As for P150
P153	Unknown property name. Single storey property	704m  352m	Property located at the foot of the hillside and is largely enclosed by existing vegetation.	No significant change	As for P150	As for P150
P154	Unknown property names; X3 Single storey properties.	687m  335m	Properties front towards the industrial premises opposite. Rear elevation views up the hillside curtailed by landform and the existing vegetation.	No significant change	As for P150	As for P150
P155	Unknown property names; x2 Single storey properties.	591m  456m	Properties front towards hillside opposite, however views are partly curtailed by landform and vegetation.	No significant change	Potential, but extremely limited views to that section of the Preliminary Design on embankment at the Sessiagh O'Neill side road and underbridge at Ch 7900. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect.	Existing vegetation would largely screen views to the Preliminary Design during summer. There would be no barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.

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P156	Unknown property names. Row of Two storey properties.	340m  456m (from Mainline)  Between 40-60m from Navenny link road.	Generally views available from both the front and rear elevations of the properties to the hillside forming the southern side of the Burn Daurnett Valley and to the north as it rises towards the existing N15. Recent residential development is a noticeable element within views.	Hedgeline on eastern boundary to housing estate affords less visual obstruction during Winter.	Potential but filtered views towards the link road through the existing hedgeline to the rear of the properties. Restricted views to the Navenny grade separated junction. A noise barrier would provide some visual screening to traffic. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Summer views to the link road would be curtailed by the existing hedgeline adjoining the rear elevations. Further curtailment to views would be provided by vegetation adjoining the watercourse of the Burn Daurnett. New planting on the northern side of the Navenny grade separated junction would screen views to the junction. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P157	Unknown property names. Row of x5 Single storey properties.	274m  776m (from Mainline)  Between 35-110m from Navenny link road.	Front elevation views as for P156. However the views are also curtailed by these adjoining properties (P156).	Less visual obstruction afforded by hedgelines on hillside above Burn Daurnett.	As for P156	As for P156
P158	Unknown property names. Row of Two storey properties.	408m  627m	Front elevation views from these properties as for P156; however the view is part restricted by the existing vegetation adjacent to the Burn Daurnett, and by adjoining properties (P156/159), especially for the westernmost group of properties. Views also restricted by P147.	As for P157	As for P156 except that the adjacent vegetation would filter views from the lower floor windows. There would be a barely perceptible to noticeable deterioration in existing views.	Summer views would be part curtailed by existing vegetation adjoining the Burn Daurnett (and adjoining properties for views from the lower

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					Slight to Moderate adverse effect	elevation of the properties). There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P159	Unknown property names. Row of Two storey properties adjacent to the Burn Daurnett.	463m  638m	Front elevation views "inward" to other properties within housing estate, i.e. P156 and P158. Views from rear elevation to existing vegetation adjoining the Burn Daurnett to the immediate rear of the properties.	Reduction in visual obstruction afforded by existing vegetation on the banks of the Burn Daurnett.	Potential filtered views through existing vegetation from the rear elevation to the Navenny grade separated junction and the link road itself as it descends the hillside to the Burn Daurnett. Potential views from the front elevation to the link road as it climbs the hillside to the existing N15 would be partly curtailed by the adjoining P156. Views would be restricted to those that would be available between buildings. There would be a barely perceptible to noticeable deterioration in existing views.  Slight to Moderate adverse effect	Existing vegetation and proposed planting would partially screen or at least curtail views to the Preliminary Design. There would be a barely perceptible change in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P160	Unknown property names. Row of mainly Two storey properties (some Single storey properties).	369m  652m	Views from these properties towards the hillside forming the southern slopes to the valley of the Burn Daurnett would be largely confined to views from the upper floor windows on the rear elevations of the buildings. Views would be over and above adjoining buildings and existing vegetation adjoining the Burn Daurnett. Views from the front elevation are towards adjoining residential development on the opposite side of the road.	Hedgelines on the hillside above the Burn Daurnett provide less visual obstruction to views.	Potential upper floor rear elevation views to Navenny grade separated junction and the link road itself. These would in part be restricted by P158. The cuttings to this junction would be partially visible. There would be a barely perceptible to noticeable deterioration in existing views.  Slight to Moderate adverse effect	Views from the lower floor rear elevation windows would be curtailed by existing vegetation during Summer. Also, new planting (implemented as part of the scheme) would reduce the visibility of the Preliminary Design (including the Navenny junction) in summer views.



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						There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P161	Unknown property names. Row of mainly Single storey properties.	307m  651m	Front elevation views similar to those from the rear elevation of P160. However, part restricted by properties on the opposite side of the road (P160).	As for P161	Potential filtered front elevation views to the Navenny grade separated junction. The cuttings to this junction would, however, be partly concealed due to the orientation of the view from the properties relative to the junction. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.	Existing vegetation and the new planting implemented as part of the scheme would further restrict views to the Navenny grade separated junction. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P162	Unknown property name. Single storey property	320m  726m	Slightly more elevated position compared to adjoining P161. Front elevation views to hillside above Burn Daurnett as for P161 part restricted by adjoining residential development.	As for P161	As for P161	As for P161
P163	Unknown property name. Single storey property	554m  491m	Front elevation views from x3 windows largely confined to residential properties on the opposite side of the road (P148). Views to hillside to south above Burn Daurnett largely confined to a number of hedgelines visible above P148.	Less visual obstruction afforded by intervening hedgelines on the hillside forming the north-facing valley sides to the Burn Daurnett.	As for P148	As for P148
P164	Unknown property name.	487m	Rear elevation views largely curtailed by existing buildings (P148) but restricted views to hillside adjoining	No significant change	As for P148	As for P148

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	Two storey property	540m	P167.			
P165	Unknown property name. Two storey property	487m 568m	Rear elevation views largely confined to the upper floor windows. Surrounding vegetation/ buildings curtail views from the lower floor windows.	No significant change	As for P148 for the upper floor windows only.	As for P148 for the upper floor windows only.
P166	Unknown property names. Row of mainly Single storey properties	606m 573m (from Mainline)  Between 60-110m from Navenny link road	Front elevation views up hillside forming southern sides to the Burn Daurnett Valley similar to P147. Views to a green hillside recently compromised by ongoing residential development within the left of views. Summer views part curtailed by existing vegetation within hedgelines within adjoining fields.	Some reduction in visual obstruction afforded by intervening hedgelines.	Potential front elevation views to the link road as it descends the hillside and directly into the Navenny grade separated junction part restricted by landform. Side and rear elevation views to link road as it crosses Burn Daurnett from westernmost property and from rear elevations on all properties respectively. Noise barriers would provide some visual screening to traffic. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.	Existing vegetation and new planting (implemented as part of the scheme) would restrict views to the Navenny grade separated junction. There would be a noticeable deterioration in existing views.  Moderate adverse effect  (Winter: As for Year 1)
P167	Large residential development containing Two storey properties.	Approx. 800-1200m  Approx. 80-480m	Generally 'inward' looking views into the estate, although for the uppermost properties views from the front elevations to the hill-tops above the Twin Towns. Views from the rear elevations of properties on the western side of the development restricted by an existing hedgeline.	Hedgeline on western boundary of site and hedgebanks along disused railway line provides less visual obstruction during Winter.	Potential 'glimpse' views for the majority of properties within the central and eastern parts of the estate between buildings on the western boundary filtered by the hedgeline to the Ballybofey link road as it descends the hillside. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  Potential views to Ballybofey link road from the rear elevation of buildings filtered by the existing hedgeline in	The hedge line would largely screen views to the Ballybofey link road during summer. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)  Existing vegetation and

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
					winter. There would be a barely perceptible to noticeable deterioration in existing views.  Slight to Moderate adverse effect	the generally restricted nature of views would further screen the Ballybofey link road within summer views. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P167A	Properties still under construction at the time of summer survey but nearing completion. Two-storey properties.	Approx. 1000-1150m  30-170m	Front elevation views from elevated position over estate and to hill-tops on opposite side of valley above the Twin Towns. Rear elevation views part curtailed by existing dense (but with gaps) hedgeline.	Hedgeline on western boundary of site provides less visual obstruction during Winter.	Potential views from the upper floor windows within the uppermost properties within the estate to the link road for much of its length en-route to the existing N15. Navenny grade separated junction in close proximity to properties but views restricted by landform. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	Existing vegetation and new planting, implemented as part of the scheme, would reduce the visibility of the Preliminary Design within summer views especially the Navenny grade separated junction. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P168	Unknown property name. Two storey property	758m  430m	Distant front elevation views to the west, which include the hill-top above Lough Mourne. Immediate foreground to views formed by residential development which curtails views.	No significant change	Potential views would be confined to the link road section of the Preliminary Design for much of its length until it meets the existing N15. Views to the Navenny grade separated junction would be obstructed by P167/167A. There would be a barely perceptible deterioration in the view.	Views would be restricted by existing hedge lines and new planting implemented as part of the scheme. There would be a barely perceptible to no discernible deterioration in the existing view.

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					Slight adverse effect.	Slight adverse effect to No Change.  (Winter: As for Year 1)
P169	Unknown property name. Two storey property	772m 467m	Rear and side elevation views to existing residential development including P167. Side elevation views over pastoral fields to nearby settlements.	No significant change	Views from the front elevation towards Ballybofey would be largely unaffected apart from potential views towards the link road. Potential, but restricted views to the Navenny grade separated junction from the upper floor windows on the rear elevation to the building. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	Existing and proposed vegetation would partially restrict views to the Preliminary Design. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change  (Winter: As for Year 1)
P170	Unknown property name. Two storey property	616m 649m	Property largely enclosed by mature trees. Rear elevation views towards the hillside forming the southern side to the valley of the Burn Daurnett compromised by recent residential development. Views from x1 upper floor window and lower floor windows curtailed by an existing hedgeline in summer.	Little significant change. Hedgerow to the rear of the property is dense Beech and still forms a reasonable visual barrier.	Potential, but very limited views to the link road. These would be confined to those available from two upper floor, side elevation windows. Rear elevation views to Navenny grade separated junction curtailed by P167. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect.	New planting and existing hedgelines would partially conceal the link road within views. There would be a barely perceptible to no discernible deterioration in the view  Slight adverse effect to No Change  (Winter: As for Year 1)
P171	Unknown property names. Row of mainly Single storey properties	670m 531m	Views from the rear elevation and oblique side elevation views to the hillside forming the southern sides of the Burn Daurnett Valley part curtailed by P167 and in summer by vegetation associated with the disused railway line. Recent housing developments and	Reduction in the visual obstruction afforded by intervening hedgelines.	Potential rear and side elevation views to the Navenny grade separated junction part curtailed by P167 and filtered by the existing vegetation along the dismantled railway. A noise barrier would provide	Existing vegetation and proposed planting would reduce the visibility of the Preliminary Design within summer views. There

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	fronting towards the Twin Towns.		industrial units form the main characteristic of the view.		some visual screening to traffic. There would be a noticeable deterioration in existing views.  Moderate adverse effect  Potential views from the front elevation to the link road as it climbs the hillside to the existing N15. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.  As above existing and proposed vegetation would reduce the visibility of the link road. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P172	Unknown property names. Row of single storey properties	672m  561m	Views as for P171. However views more restricted due to adjacent properties and P167 and P167.	No significant change	As for P171, except there would be a barely perceptible deterioration in the view due to the generally more restricted nature of the views from both rear and front elevation.  Slight adverse effect.	As for P171, existing vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible to no discernible deterioration in the existing view for both front and rear elevation views. Slight adverse effect to No Change. (Winter: As for Year 1)
P173	"The Beeches".	Approx. 700-	Properties situated on the hillside above the Finn Valley.	No significant change	No views for the majority of the	Existing vegetation would

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	Recent residential development of Two storey properties.	1200m  120m at its closest point.	Views largely "inward" looking and also curtailed by the adjoining residential development P167.		properties towards the Preliminary Design. Views to Finn crossing largely curtailed by existing buildings. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	partially reduce the visibility of the Finn crossing. There would be a barely perceptible to no discernible deterioration in the view.  Slight adverse effect to No Change  (Winter: As for Year 1)
P173A	"The Beeches". Recent residential development of Two storey properties.	Approx. 1200-1400m  30m at its closest point.	For outermost properties views are over agricultural fields with rushes/ hedgelines.	Reduction in visual obstruction afforded by intervening hedgelines.	As for P123, properties on the southern edge of the development would have largely open views to the Preliminary Design as it passes properties on embankment or at grade. There would be a significant deterioration in the view.  Substantial adverse effect	New planting would partially conceal some of the Preliminary Design within views but much of this section would remain open in response to local landscape character. There would be a significant deterioration in the view.  Substantial adverse effect.
P174	Unknown property name. Single storey property	895m  55m	Front elevation views towards the floodplain of the Finn valley and to the hills above Stranorlar. Summer views to the immediate east curtailed by existing vegetation within hedge lines.	Vegetation within hedgelines adjoining minor road and P175 affords less visual obstruction.	Front elevation views (x3 windows) to the Finn crossing on embankment as it crosses the Finn floodplain. Also, potential side and rear elevation views to that section of the Preliminary Design within the adjoining woodland. A noise barrier would provide some visual screening to traffic within both front and rear elevation views. There would be a significant deterioration in views.  Substantial adverse effect.	Existing vegetation and new planting (implemented as part of the scheme) would reduce the visibility of the Preliminary Design within summer views. There would be a significant to noticeable deterioration in the view.  Significant to Moderate

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						adverse effect.  (Winter: As for Year 1)
P175	Unknown property name. Two storey property	804m  83m	Rear and side elevation views over the Finn Valley, partly curtailed by an existing hedgeline immediately adjoining the property which contains mature Beech trees.	Reduction in partial visual obstruction afforded by intervening hedgeline immediately adjoining property.	Potential rear and side elevation views to the Finn crossing as for P174. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	As for P174, existing vegetation (largely the hedgeline immediately adjoining the property which would provide an important partial visual and physical screen to the Preliminary Design) and new planting would reduce the visibility of the Preliminary Design within summer views. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect  (Winter: As for Year 1)
P176	Unknown property name. Single storey property	866m  83m	Front elevation views over the Finn Valley to Stranorlar, to the St Joseph's Hospital and the hills above. An existing coniferous hedgeline partially restricts views from the side and rear elevations.	More of Finn floodplain visible due to reduction in visual obstruction afforded by intervening hedgelines.	Front elevation: Evergreen hedgeline between this property and P174 largely screens views to the Finn and the additional hedgeline by P175 would provide further filtering of views. A noise barrier would also provide some visual screening to traffic within views from the front elevation. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Front elevation: Existing vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect

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					Rear elevation: Also potential views from rear elevation to that section of the Preliminary Design emerging on embankment from cutting. A noise barrier would provide some visual screening to traffic within views from the rear elevation. There would be a significant deterioration in the view.  Substantial adverse effect	Rear elevation: New planting implemented as part of the scheme would reduce the visibility of the Preliminary Design within side and rear elevation views. There would be a noticeable deterioration in the existing view.  Moderate adverse effect  (Winter: As for Year 1)
P177	Unknown property name. Single storey property	878m  106m	Front elevation views as for P176 from x5 windows.	As for P176	Front elevation: Potential oblique views over the Finn Valley again restricted by the existing evergreen hedgeline adjoining P176. This would also partly screen potential views to the embankment as it crosses the Finn floodplain. A noise barrier would provide some visual screening to traffic. There would be a noticeable deterioration in the view.  Moderate adverse effect.  Rear elevation views: As for P176	Front elevation: Existing vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible to noticeable deterioration in existing views.  Moderate to Slight adverse effect  Rear elevation views: As for P176, except screening afforded by proposed planting would be further reinforced by that afforded by existing vegetation.  (Winter: As for Year 1)



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P178	Unknown property name. Two storey property	887m  118m	Front elevation views as for P176/ 177. Oblique front elevation views from x5 windows over the Finn valley partly restricted by P175. Rear elevation views as for P176/ 177.	As for P176	Front elevation: Oblique views to the Finn crossing from the front elevation of the property partially restricted by adjoining buildings and filtered by the hedgeline adjoining P176. A noise barrier would provide some visual screening to traffic. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect  Rear elevation: As for P176	Rear elevation: Existing vegetation within hedgelines adjoining P175 would restrict views to the Preliminary Design on embankment as it crosses the Finn floodplain. There would be a noticeable deterioration in the view.  Moderate adverse effect.  Rear elevation: As for P176  (Winter: As for Year 1)
P179	Unknown property names; x2 Two storey properties.	797m  252m	Side elevation views from one window on easternmost property and oblique rear elevation views across the Finn valley and to the hillsides above.	Hedgeline adjoining P175 affords less visual obstruction during Winter.	Oblique front elevation views to that section of Preliminary Design on embankment as it crosses the Edenmore Side Road and Underbridge, part restricted by nearby buildings. There would be a noticeable deterioration in the view.  Moderate adverse effect  Side elevation views (property nearest to Preliminary Design) and oblique rear elevation views to Finn crossing on embankment. There would be a noticeable deterioration in the view.  Moderate adverse effect.	New planting implemented as part of the scheme would partly conceal the Preliminary Design within views. There would be a noticeable to barely perceptible deterioration in the view.  (Winter: As for Year 1)  Side and rear elevation views: The existing hedgeline by property P175 would provide some visual screening to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the view.

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						Slight to Moderate adverse effect  (Winter: As for Year 1)
P180	Unknown property name. Two storey property	894m  212m	View as for P178 from x5 front elevation windows. Summer views restricted as for P179 by hedgeline adjoining P175. Existing coniferous hedgeline within front gardens also restricts views over Finn floodplain.	More extensive views over Finn floodplain. Lack of visual obstruction afforded by hedgeline adjoining P175	Potential views as for P178. There would be a noticeable deterioration in the view.  Moderate adverse effect.  Views from rear elevation curtailed by adjoining building.	As for P178
P181	Unknown property name. Single storey property	874m  250m	Front elevation views over Finn Valley part obscured by P179 from x3 front elevation windows.	As for P180	Oblique views to the Finn crossing from the front elevation of the property partially restricted by adjoining buildings and filtered by the hedgeline adjoining P176. There would be a noticeable deterioration in views.  Moderate adverse effect	Existing vegetation within hedgelines adjoining P175 would restrict views to the Preliminary Design on embankment as it crosses the Finn floodplain. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.
P182	Unknown property name. Single storey property	864m  273m	Views over minor road in front of property and towards open fields within Finn floodplain.	As for P180	Views largely screened by the hedge line and evergreen planting on the boundary of the property and by P179. However, potential oblique views to the Finn crossing on embankment. There would be a barely perceptible to no discernible deterioration in the view.  Slight adverse effect to No Change	The hedgeline adjoining P175 would further reinforce the visual screening to views from this property. There would be no discernible change to the view.  No Change  (Winter: As for Year 1)

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P183	Unknown property name. Two storey property	913m  267m	Front elevation views from x5 windows over the Finn Valley. Property elevated above the adjoining road and P182.	Reduction in visual obstruction afforded by hedgelines within Finn floodplain.	As for P179, potential oblique views to the Finn crossing on embankment. There would be a noticeable deterioration in the view.  Moderate adverse effect.	As for P179, there would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect  (Winter: As for Year 1)
P184	Unknown property name. Single storey property	857m  352m	Front elevation views over minor road and towards pastoral fields within the Finn floodplain. Hills above Stranorlar and the hospital form the backdrop to views.	Reduction in visual obstruction afforded by existing hedgeline adjoining P175.	Potential oblique views to the Finn crossing on embankment. However, views would be part restricted by the intervening properties P175 / 179. There would be a noticeable deterioration in existing views.  Moderate adverse effect	The hedgeline adjoining P175 would provide some visual obstruction to views. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect
P185	Unknown property names. Row of Single and Two-storey properties.	847m  406m	Generally, front elevation views over the Finn Valley as for the adjoining properties P174 to P184.	Lack of foliage on hedgelines within Finn floodplain enables more extensive views over adjoining fields. Reduction in visual obstruction afforded by hedgeline adjoining P175.	Potential extreme oblique front elevation views to the Finn crossing on embankment part restricted by intervening buildings and hedgelines. There would be a barely perceptible to noticeable deterioration in existing views.  Slight to Moderate adverse effect	Existing vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P186	Unknown property name. Two storey property	806m  409m	Views from rear elevation and side elevation views across Finn floodplain. Landform falls away below the properties only slightly towards the River Finn.	As for P185	As for P185, except potential side and oblique rear elevation views to the Finn crossing on embankment. There would be a barely perceptible to noticeable deterioration in existing views.	Existing vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a barely

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					Slight to Moderate adverse effect	perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P187	Unknown property names. Row of Single storey properties.	808m  520m	Rear elevation views over the Finn valley and to the hill-tops above the Twin Towns.	No significant change except reduction in visual obstruction afforded by intervening hedgelines.	Potentially, severely oblique and restricted rear elevation views (by P186) to the Preliminary Design as it crosses the Finn floodplain on embankment. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	Intervening vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P188	Unknown property names. x2 Two storey properties.	908m  423m	Views largely confined to those available from the upper floor windows on the front elevation of the properties. Views characterised by residential development within the foreground to views but with views extending to Stranorlar and the hill tops above the settlement.	As for P187	Potential restricted upper floor views to the Finn crossing on embankment. There would be a noticeable to barely perceptible deterioration in existing views.  Moderate to Slight adverse effect	Intervening vegetation would reduce the visibility of the Preliminary Design within summer views. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P188A	Unknown property names. x2 Two storey properties slightly elevated	Approx 1000m  Approx. 440m	Front elevation views over adjoining residential properties to Twin Towns and hillsides above the settlements.	As for P187	Potential oblique views to the Finn crossing on embankment. There would be a barely perceptible to noticeable deterioration in existing views.	Due to the elevated position of the properties, which would reduce the potential screening effect of intervening vegetation,

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	above Finn floodplain.				Moderate to Slight adverse effect	there would be a barely perceptible deterioration in the existing view.  Slight adverse effect
P189	Properties adjoining existing N15 eastbound from Stranorlar (north side of the existing N15)	Between 10-35m  Between 430-980m at its closest point (crossing of the Finn floodplain)	Views essentially urban in character within the foreground to views. However, views extend to the hillsides on the opposite side of the Finn floodplain above P174 to 188 and to P211. The existing N15 is a prominent element immediately in front of the properties.	Visual obstruction afforded by hedgelines on the hillsides and hill-tops of the opposite side of the Finn valley would be reduced during Winter.	Whilst a number of sections of the Preliminary Design would be visible from these properties over and between buildings on the opposite side of the existing N15, including that section in cutting as it descends the hillside, front elevation views from the properties would benefit from a reduction in traffic using the existing N15 immediately in front of the properties. There would be a barely perceptible to noticeable improvement in the existing view.  Slight to Moderate beneficial effect	Vegetation along the disused railway line and new planting (implemented as part of the scheme) would reduce the visibility of the Preliminary Design within summer views. There would be a noticeable improvement in the existing view.  Moderate beneficial effect.  (Winter: As for Year 1)
P189A	Properties adjoining existing N15 eastbound from Stranorlar (Southside of the existing N15)	Between 15-200m  Between 650-1150m at its closest point (crossing of the Finn floodplain)	Similar view to P189 from the rear elevation but existing vegetation associated with the disused railway line largely screens views to the Finn and the opposite side of the valley from the more lower lying properties.	Reduction in the visual obstruction afforded by vegetation adjoining the disused railway line.	Rear elevation: Views to the cutting above the Finn floodplain on approach to the Edenmore side road and underbridge. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.  Front elevation: There would be a noticeable improvement in the view due to a reduction in traffic using the route.  Moderate beneficial effect	Rear elevation: Existing vegetation associated with the disused railway line would be in full leaf and would partly screen views to the Preliminary Design. New planting on the cutting slopes would also partially disguise the cutting within views. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect

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						(Winter: As for Year 1)  Front elevation: As for Year 1
P189B	Unknown property names. Row of Single and Two storey properties.	Between 10-45m  Between 410-610m at its closest point (crossing of the Finn floodplain)	As for P189a	As for P189A	As for P189A	As for P189A
P189C	Unknown property names. Estate of Two storey properties under construction.	10m  Between 250-410m at its closest point (crossing of the Finn floodplain)		Significant reduction in visual obstruction afforded by vegetation adjoining the disused railway line.	Rear elevation: That section of the Preliminary Design in cutting as it descends the hillside to the Finn floodplain would be visible together with that section on embankment as it crosses the Finn floodplain. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect  Front elevation: A reduction in traffic on the existing N15 would result in a noticeable improvement in the existing view.  Moderate beneficial effect.	Rear elevation: New planting on the cutting slopes would disguise the cutting whilst existing vegetation along the disused railway line would partially curtail views from the rear elevation. There would be a noticeable deterioration in views.  Moderate adverse effect  Front elevation: As for Year 1  (Winter: As for Year 1)
P190	Unknown property name. Single storey	26m  238m	Front elevation views to the existing N15 in close proximity. Rear elevation views curtailed by existing vegetation on the boundary to the property.	Significant reduction in visual obstruction afforded by vegetation	Front elevation: Extreme oblique front elevation views and direct end elevation views to the Stranorlar roundabout	Front elevation: New planting along the embankments on the

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	property			along the disused railway line and to the rear of the property.	including signage and lighting. There would be a noticeable deterioration in views.  Moderate adverse effect  Rear elevation: That section of the Preliminary Design on embankment as it crosses the Finn floodplain would be visible with filtered views from the property. There would be a noticeable deterioration in the view.  Moderate adverse effect	junction and adjoining the approaches would reduce the visibility of the junction (including lighting) within views. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.  Rear elevation: Existing vegetation adjoining the disused railway line would largely screen views to the Preliminary Design. There would be no discernible deterioration in the existing view.  No Change  (Winter: As for Year 1)
P191	Unknown property name. Two storey property	39m  264m	The property fronts the existing N15. Rear elevation views over the Finn Valley part screened by existing vegetation associated with the disused railway.	As for P190	Rear elevation: Filtered rear elevation views from lower floor windows and more open views from the upper floor windows to the Preliminary Design as it crosses the Finn Valley on embankment. Also cutting visible above Edenmore House. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.  Front elevation: Extreme oblique views	Rear elevation: As for P190, except views from upper floor windows over existing visual screen afforded by vegetation along the disused railway line. Views from the lower rear elevation windows would be curtailed by existing vegetation associated with the disused railway line.

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					from front elevation to Stranorlar roundabout junction part restricted by adjoining P190. There would be a noticeable deterioration in the view.  Moderate adverse effect	There would be a noticeable deterioration in the view.  Moderate adverse effect.  Front elevation: As for P190, new planting would reduce the visibility of the junction within views. There would be a noticeable to barely perceptible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P192	Unknown property name. Two storey property	66m  219m	Front elevation views over the Finn valley to the wooded hillside above Edenmore House. The existing N15 is in close proximity to the property and is slightly elevated above the existing road. Existing vegetation associated with the disused railway line partly curtails views.	Reduction in visual obstruction afforded by hedgelines within the Finn floodplain, including that adjoining the disused railway line.	Potential views to the Finn crossing on embankment over the Finn floodplain. Oblique front elevation views from x5 front elevation windows to the Stranorlar roundabout, including lighting. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect.	Summer views to the Finn crossing part curtailed by existing vegetation associated with the disused railway line and existing hedgelines within the Finn floodplain. New planting around the Stranorlar roundabout (implemented as part of the scheme) would also reduce the visibility of the junction. There would be a noticeable deterioration in the view.  Moderate adverse effect.



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						(Winter: As for Year 1)
P193	Unknown property name. Single storey property	20m  88m	Restricted summer views over the Finn valley and to the hillside above Edenmore House due to existing vegetation associated with the disused railway line and existing hedgelines within the Finn floodplain. Existing N15 immediately in front of property.	As for P192	There would be open views to the slightly raised Stranorlar roundabout in close proximity to the property. The junction would become a major element within the view. A noise barrier would provide some visual screening to traffic. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect.	New planting (implemented as part of the scheme) around the junction would reduce the visibility of the Preliminary Design at Summer Year 15. There would be a noticeable deterioration in views.  Moderate adverse effect  (Winter: As for Year 1)
P194	Unknown property name. Two storey property	33m  67m	Views as for P193 from x5 front elevation windows.	As for P192	As for P193	As for P193
P195	Unknown property name. Two storey property	43m  158m	Views from x5 upper floor and x2 lower floor windows on the front elevation of the property. Summer views effectively curtailed by the existing mature tree line that follows the stream to the immediate west of the property and the disused railway line.	Filtered views through existing woodland adjoining the stream to the immediate west of the property.	Filtered views to the Stranorlar roundabout and the Finn crossing. Also oblique views to the cutting through the hillside above the Finn floodplain. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect	Existing vegetation would effectively curtail Summer views to the Stranorlar roundabout and the Finn crossing. There would be a barely perceptible deterioration in existing views.  Slight adverse effect  (Winter: As for Year 1)
P196	Unknown property name. Two storey	67m  209m	Slightly more elevated position than P195. Similar views from front elevation of property since, as for P195, property is broadly orientated to the south as for P195.	As for P195	Potential oblique filtered views from the front elevation to the Stranorlar roundabout. However, these are largely	Existing vegetation (in association with new planting implemented as

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	property		However, existing vegetation forming the boundary to P195 further restricts views to the west.		screened by existing intervening buildings (including P205). Property also fronts towards the Finn crossing on embankment. There would be a noticeable deterioration in the view.  Moderate adverse effect.	part of the scheme) would effectively curtail Summer views. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P197	Unknown property names. Group of Single and Two storey properties (including Kia Meua).	12m  691m	Views from the front elevations of these properties effectively curtailed by existing vegetation within hedge lines within the Finn floodplain and within gardens. Existing views over Finn floodplain and existing N15 to the hillsides above forming the southern side of the Finn Valley.	More extensive views due to lack of visual obstruction afforded by hedgelines within the Finn floodplain.	Existing vegetation would filter views to the Preliminary Design. There would be a barely perceptible deterioration in the existing view, which would be confined to the upper floor windows from the 2-storey properties.  Slight adverse effect.	Summer views to the Preliminary Design effectively curtailed by existing vegetation. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P198	Scattered individual properties on the hillside above the Finn Valley.	328m  1300m	Properties have extensive views over the Finn valley to the hillsides beyond due to their elevated relative position.	No significant change, except some properties would experience a reduction in visual obstruction afforded by existing planting within gardens.	Views generally open and expansive. Whilst potentially visible the Preliminary Design would be at distance and would represent a relatively inconspicuous element within the overall panorama. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	Due to the screening effect of existing vegetation and distance from the Preliminary Design, there would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P199	Unknown property name. Single storey property.	26m  510m	The property is enclosed by an evergreen hedgeline which forms the boundary to the property and effectively curtails views.	No significant change	No views to the Preliminary Design due to the enclosing evergreen hedge line.	As for Year 1.

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P200	Unknown property name. Single storey property.	25m  587m	The property has views over the Finn floodplain and the existing N15, which are part restricted by an enclosing evergreen hedgeline of approximately 1.5m height.	Visual obstruction afforded by vegetation adjoining the existing disused railway line reduced.	Extreme oblique views to the Finn crossing and the Stranorlar roundabout in part filtered by existing vegetation within the Finn floodplain and associated with the disused railway. There would be a barely perceptible deterioration in existing views.  Slight adverse effect	Existing vegetation would largely curtail Summer views from the property. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P201	Unknown property name. Single storey property	29m  452m	Front elevation views from the property as for P200.	No significant change	Existing coniferous hedge line on the property boundary, which faces the Stranorlar roundabout, would effectively curtail views. Property faces to south and away from the Stranorlar roundabout and Finn crossing. There would be no discernible deterioration in the existing view.  No Change	As for Year 1.
P202	Unknown property name. Two storey property	44m  388m	Front elevation views over the Finn valley through a gap in the vegetative screen provided by vegetation associated with the disused railway. Property overlooks the existing N15.	Visual obstruction afforded by existing vegetation adjoining the disused railway line reduced.	Upper floor window views to the Stranorlar roundabout over an existing coniferous hedgeline (approximately 5m height) on the property boundary facing the junction and to the Finn crossing on embankment. There would be a barely perceptible to noticeable deterioration in existing views.  Slight to Moderate adverse effect	Existing vegetation and new planting (implemented as part of the scheme) would further restrict views at Summer Year 15. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P202A	Unknown property name. Two storey	440m  320m	Property sited at an elevated position on a local hillock above the Finn floodplain. Extensive views over Finn floodplain to south. Existing conifers and deciduous	Reduction in visual obstruction afforded by vegetation	Potential views to that section of the Preliminary Design to the immediate west of the property and oblique front	Views restricted by existing intervening vegetation, including that

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	property		trees and shrubs largely curtail views to west.	adjoining property and by hedgelines within the Finn floodplain.	elevation views to that section which crosses the Finn floodplain on embankment. However, filtered by existing vegetation. There would be a noticeable deterioration in the view.  Moderate adverse effect	immediately adjoining the property. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P203	Unknown property name. Single storey property	30m  351m	Front elevation views over the existing N15 and over the Finn floodplain through a gap in the vegetation associated with the disused railway line. Otherwise views restricted by existing vegetation associated with the disused railway line. Property fronts to south.	As for P202	Potential oblique and filtered winter views to the Finn crossing on embankment. Low-clipped evergreen hedgerow curtails views to Stranorlar roundabout. There would be a barely perceptible deterioration in existing views.  Slight adverse effect	Existing vegetation would further screen views in summer. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P204	Unknown property name. Two storey property	9m  233m	Front elevation views due south over existing N15 and the Finn floodplain. Depth of view restricted by existing vegetation associated with the disused railway line. End elevation views from x1 upper floor window and x1 lower floor window to the west.	Hedgelines adjoining disused railway line, vegetation adjoining the stream alongside P195 and mature trees afford reduced visual obstruction.	Potential filtered winter views to the Finn crossing from the end elevation. Extreme oblique and side elevation Winter views to the Stranorlar junction. There would be noticeable deterioration in existing views.  Moderate adverse effect	Mature trees (x2) immediately adjoining the property would curtail/ restrict summer views to the Stranorlar roundabout. Views to Finn crossing curtailed by existing vegetation associated with the disused railway line. There would be a barely perceptible deterioration in the view.  Slight adverse effect (Winter: As for Year 1)

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P205	Unknown property name. Two storey property	48m  233m	Front elevation views over Finn floodplain to the east. Rear elevation views largely screened by existing and adjoining outbuildings and filtered by existing vegetation adjoining the stream.	More filtered views from property.	Views to the Preliminary Design would be generally curtailed by adjoining buildings and existing vegetation. However, potential views to that section of the Preliminary Design on embankment to the north of the Stranorlar roundabout. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Existing vegetation and new planting (implemented as part of the scheme) would further restrict Summer views at Year 15. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P205A	Unknown property name. Unknown property status	70m  110m	Existing vegetation adjoining a stream to the immediate east of the property contains views. Views to south curtailed by adjoining buildings. More open views to west.	Some reduction in vegetative screen afforded by existing vegetation adjoining the stream.	As for P193 there would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect	Planting, implemented as part of the scheme would partially conceal the Preliminary Design within views. There would be a noticeable deterioration in the view.  Moderate adverse  (Winter: As for Year 1)
P206	Unknown property names. Row of Single and Two storey properties.	637m  588m	Front elevation views over the minor road to the hillside above including the residential properties on the other side of the road. Rear elevation and end elevation views over the Finn floodplain to the north.	Reduction in visual obstruction afforded by existing hedgelines within the Finn floodplain.	Potential extreme oblique rear and side elevation views to the Finn crossing on embankment. No views to the Preliminary Design from the front elevation due to existing buildings, vegetation and rising landform. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	Existing vegetation would be in full leaf during Summer and would screen views. Views to the Finn crossing on embankment would be further restricted. There would be no discernible deterioration in the existing view. No Change. (Winter: As for Year 1)

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P207	Unknown property names. Row of Single and Two storey properties.	760m  617m	Properties slightly elevated above Finn floodplain. Views from front elevations of properties over existing residential development (P206) and to hill-tops above Stranorlar.	As for P206	Potential views from front elevation of properties to Finn crossing on embankment. Rear elevation views curtailed by existing vegetation and landform. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	As P206, existing vegetation within the Finn floodplain would further restrict views to the Finn crossing on embankment. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P208	Unknown property names; x2 Single storey properties.	1647m  310m	Front elevation views as for those from rear elevation of P114. Properties at a similar elevation to that of the adjoining road (slightly lower than P113). Front elevation views part restricted by existing coniferous vegetation within gardens.	Visual obstruction afforded by hedgelines is reduced in Winter.	Potential views to that section of the Preliminary Design on embankment on approach to the Daisy Hill side road and underbridge. Views to Navenny grade separated junction and cutting slopes screened by landform and intervening buildings. There would be a noticeable deterioration in existing views.  Moderate adverse effect	Summer views would be restricted in their extent by the existing hedgeline which adjoins the property. Views to that section of the Preliminary Design on embankment would also be restricted by intervening hedgelines and new planting. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)
P209	Unknown property name. Two storey building.	1612m  277m	Potential front elevation views as for those from rear elevation of P114. Summer views generally restricted by the coniferous hedgeline and the hedgerow on the opposite side of the lane.	As for P208	Potential, but restricted views from front elevation as for P208. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Existing vegetation would reduce the visibility of the Preliminary Design in Summer. However, as for P208, potential views would remain available.

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						There would be a barely perceptible to a noticeable deterioration in existing views.  Slight to Moderate adverse effect  (Winter: As for Year 1)
P210	Unknown property name. Single storey property	1588m  247m	The property has an unusual orientation in relation to the surrounding properties being at 90 degrees to the adjoining road. Consequently, front elevation views are directed straight towards the adjoining group of properties (P208-209). Views foreshortened and largely confined to the immediate area in front of both the front and rear elevation.	As for P208	Potential oblique front elevation views to that section of the Preliminary Design on embankment at the Daisy Hill side road and underbridge at Ch 9550. No clear views from rear elevation. Due to orientation of property there would be a noticeable to barely perceptible deterioration in the view, which would largely be confined to the building cartilage adjoining the front elevation of the building.  Moderate to Slight adverse effect.	Visual impacts upon views largely confined to those from the building cartilage adjoining the front elevation. Existing hedgelines would further restrict views to the Preliminary Design. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)
P211	Unknown property names; x2 Single storey properties.	1694m  217m	Elevated positions with extensive views across the Finn valley towards the Twin Towns and the hill-tops above the settlements. (See Viewpoint 3, Figure 7.9)	No significant change to immediate foreground of views. Some reduction in visual obstruction to middle distance views due to lack of foliage on intervening hedgelines.	Front elevation views (rear elevation views for the lower, more westerly property) over extensive section of the Preliminary Design as it approaches the properties from the west. There would be a significant deterioration in views.  Substantial adverse effect.	As for Year 1 due to the open and elevated character of the view.
P212	Unknown property names;	1602m	Views from the front elevation of the properties restricted by the hedge lines that adjoin the existing minor road in	Visual obstruction afforded by hedgelines	Potential views to that section of the Preliminary Design on embankment on	Summer views would be restricted by the

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	x2 Single storey properties.	215m	front of the properties. Front elevation views across the farmland enclosed by hedgelines.	is reduced in Winter.	approach to the Daisy Hill side road and underbridge. The property to the east would potentially have a more oblique view to the Preliminary Design. There would be a noticeable to barely perceptible deterioration in the view.  Moderate to Slight adverse effect.	hedgelines immediately in front of the properties. There would be a barely perceptible deterioration in existing views.  Slight adverse effect  (Winter: As for Year 1)
P213	Unknown property name. Two storey property	1592m  188m	Front elevation views restricted by existing vegetation within hedge lines but more extensive views available from upper floor windows from both front and rear elevations.	Visual obstruction afforded by hedgelines within views from front elevation is reduced in Winter. Views from rear elevation largely unchanged.	Front elevation: Potential upper floor oblique views towards that section of the Preliminary Design on embankment at the Daisy Hill side road and underbridge. There would be a noticeable deterioration in the view.  Moderate adverse effect.  Rear elevation: Potential views to that section of the Preliminary Design on embankment as it approaches and enters cutting at Ch 9900 over a largely open landscape. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.	Front elevation views: There would be a noticeable to barely perceptible deterioration in views due to the partial screening effects of existing and new planting.  Moderate to Slight adverse effect.  Rear elevation:  As for Year 1 due to the lack of intervening screening vegetation and the open character of the landscape.  Substantial to Moderate adverse effect.  (Winter: As for Year 1)
P214	Unknown property name. Two storey	1290m  55m	Generally summer views restricted by the adjoining hedge line in front of the property. Otherwise there would be upper floor views to the hillside above P211.	Considerably less visual obstruction afforded by existing	The Preliminary Design would be on high embankment directly in front of the property. A noise barrier would provide	New planting (implemented as part of the scheme) on the



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	property		Rear elevation views to south from x4 upper floor windows and x3 lower floor windows.	hedgeline immediately adjoining rear elevation to property.	some visual screening to traffic. There would be a significant deterioration in views.  Substantial adverse effect.	embankments to the Daisy Hill side road and underbridge and existing vegetation would reduce the visibility of the Preliminary Design within the view. There would be a significant to noticeable deterioration in the view.  Substantial to Moderate adverse effect.  (Winter: As for Year 1)
P215	Unknown property name. Two storey property.	1277m  135m	Property is at a similar elevation to P214. It is enclosed by vegetation. Views from property restricted and largely confined to enclosing hedgelines. Views from x2 end elevation windows and x4 upper floor windows on the front elevation. Property fronts to the east.	Woodland on opposite side of road affords less visual obstruction during Winter. Also opens up views to north.	Side elevation: Potential end elevation views from x2 windows part restricted by adjoining P214. However, winter views to the Preliminary Design as it passes the property on high embankment and in close proximity. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.  Front elevation: Potential views to that section of Preliminary Design on embankment on approach to the cutting at Ch 9900. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Existing vegetation and new planting (implemented as part of the scheme) would reduce the visibility of the Preliminary Design within views. There would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect.  Front elevation: Views from the front elevation would be largely screened by intervening woodland. There would be a barely perceptible deterioration in the existing view.

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						Slight adverse effect.  (Winter: As for Year 1)
P216	Unknown property name. Single storey property (with windows in attic/loft space)	1278m  142m	Property at the same elevation as P215. Front elevation views over the River Finn valley unaffected. Rear elevation views curtailed by existing vegetation.	Lack of foliage on vegetation within woodland adjoining property opens up views to north.	Rear elevation: As for P215, for views from the rear elevation there would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.  Front elevation: Potential front elevation views (from loft space windows) to the Finn crossing on embankment but at distance. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	Rear elevation: As for P215, for views from the rear elevation, there would be a noticeable to barely perceptible deterioration in the view.  Slight to Moderate adverse effect.  (Winter: As for Year 1)  Front elevation: Existing vegetation within hedgelines would reduce the visibility of the Finn crossing within Summer views from the front elevation. There would be a barely perceptible deterioration to no discernible change in the view.  Slight adverse effect to No Change.  (Winter: As for Year 1)
P217	Unknown property name. Single storey property	1139m  254m	Property located on the side of the valley at a lower elevation to P215/216. Landform starts to fall steeply at or about the location of P217. Property enclosed by vegetation. Front elevation views curtailed by existing	Whilst no foliage on vegetation within woodland on opposite side of road to	Views to Preliminary Design would be curtailed by existing vegetation, which due to its density would continue to obstruct views during winter. Landform	No Summer views due to the density and distribution of existing vegetation. There would be no

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			woodland on opposite side of road.	property it is still dense enough to obstruct views.	and existing development (P173) screens views to the west. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P218	Unknown property name. Single storey property	1099m  300m	Property generally as enclosed by existing vegetation as P218 but at a slightly lower elevation. Views severely curtailed.	Whilst woodland not as dense as it is adjoining P217 and views through are possible it is still of sufficient depth to provide some visual obstruction.	As for P217	As for P217
P219	Unknown property name. Two storey property.	1043m  354m	A distinctive stone property with front elevation views (from x5 windows) over the Finn Valley and to the hills above Stranorlar. Summer views from the property curtailed by existing vegetation adjoining the road.	Filtered views through existing woodland on opposite side of road.	No views from the rear elevation due to the intervening landform. Potential restricted views (largely from upper floor windows) to the Finn crossing. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	Views severely restricted in Summer by the surrounding existing vegetation. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P220	Unknown property name. Two storey property	Approx. 1100m at its closest point  310m	Front elevation views from an elevated position over the Finn valley, towards the Twin Towns and the hill-tops above the settlement. A detached property with a sense of grandeur. Views curtailed by existing trees and vegetation in Summer.	Lack of foliage on intervening vegetation reduces visual obstruction afforded by existing trees and woodland.	Rear elevation views to Preliminary Design would be curtailed by intervening landform and vegetation. No views.  Front elevation views to the link road as it crosses the valley of the Burn Daurnett within a largely urban setting. There would be a barely perceptible to no discernible deterioration in the existing view.	Rear elevation views as for Year 1.  Existing vegetation and new planting (implemented a part of the scheme would reduce the visibility of the link road.

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					<p>Slight adverse effect to No Change.</p> <p>Potential side elevation views to the Finn crossing from an elevated position. There would be a noticeable to barely perceptible deterioration in the view.</p> <p>Slight to Moderate adverse effect.</p>	<p>There would be no discernible deterioration in the existing view.</p> <p>No Change.</p> <p>Existing vegetation would further screen views to the Finn crossing during Summer. There would be a barely perceptible to no discernible deterioration in the existing view.</p> <p>Slight adverse effect to No Change.</p> <p>(Winter: As for Year 1)</p>
P221	Unknown property names. x2 Single storey properties.	990m - 401m	Summer views from the front elevation curtailed by existing vegetation on the opposite side of the road. Rear elevation views largely curtailed by landform and P173.	Reduced visual obstruction afforded by woodland on opposite side of road.	<p>No views to Preliminary Design from rear elevation.</p> <p>Views from front elevation severely restricted by intervening landform. There would be a barely perceptible deterioration in existing views.</p> <p>Slight adverse effect</p>	<p>Intervening vegetation on the opposite side of the road would curtail summer views to the Preliminary Design. There would be no discernible deterioration in the existing view.</p> <p>No Change</p> <p>(Winter: As for Year 1)</p>
P221A	Unknown property names; x2 Two storey properties.	Approx 900m 450-470m	Upper floor views from front elevation from an elevated position over the Finn valley, towards the Twin Towns and the hill-tops above the settlement.	Reduction in visual obstruction afforded by woodland in front of properties.	Restricted views to that section of the Preliminary Design on embankment as it crosses the Finn floodplain. There would be a barely perceptible deterioration in	Woodland on opposite side of road would screen views. There would be no discernible deterioration in

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					existing views.  Slight adverse effect.	the existing view.  No Change  (Winter: As for Year 1)
P222	Unknown property name. Single storey property	957m  459m	Views as for P221A except that the property is enclosed by vegetation and views are curtailed.	Vegetation within garden and hedgeline on opposite side of the road affords less visual obstruction.	As for 221A except that views further filtered by existing vegetation enclosing the property. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	No summer views due to existing vegetation.  No Change  (Winter: As for Year 1)
P222A	Unknown property name. Single storey property	Approx. 900m  540m	Property slightly elevated above the Finn valley. Front elevation views restricted by vegetation adjoining the road in front of the property and within the front garden of the property (Beech hedgeline and line of fastigiated trees restrict Summer views).	As for P222	Potential filtered views to the Finn crossing within oblique front elevation views. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change	Views severely restricted in Summer due to existing vegetation. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P223	Unknown property names. Row of Single and Two storey properties.	705m  660m	Views from front elevation of properties to a hedgeline on the opposite side of the road. Properties at the level of the Finn floodplain.	Hedgeline on opposite side of the road affords less visual obstruction.	No views to Preliminary Design.  No Change	No views to Preliminary Design  No Change  (Winter: As for Year 1)
P224	Unknown property names; x2 Two storey properties.	580m  664m	Front elevation views to existing road in front of properties. Rear elevation views curtailed by existing vegetation within back gardens and within hedgelines within Finn floodplain.	Southernmost of the two properties enclosed by a part coniferous and dense Beech hedgerow which maintains some visual obstruction	Possible views to Navenny grade separated junction from upper floor windows but largely curtailed by intervening residential development (P167 and P170). There would be a barely perceptible to no discernible deterioration in the existing view.	Intervening vegetation and new planting would largely conceal the Preliminary Design. There would be no discernible deterioration in the existing view.

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				during Winter. Lack of foliage on large Sycamore within P170 increases extent of view to southwest.	Slight adverse effect to No Change.  No Winter views to Finn crossing on embankment from rear elevation	No Change.  No Summer views to Finn crossing on embankment.  (Winter: As for Year 1)
P225	Unknown property name. Two storey property	587m  729m	No end elevation windows on east facing elevation. Further new development ongoing to east of property. A number of large trees within the garden and boundary to property also restrict views.	Less visual obstruction and more filtered views during Winter.	No views to Preliminary Design	No views to Preliminary Design
P226	Unknown property name. Two storey property	1085m  190m	Property occupies a prominent hilltop position with open and expansive views over the Finn Valley towards the Twin Towns and the hillsides above the settlement.	Some reduction in screening effect afforded by intervening mature trees within hedgelines to south-west.	Potential views to the Finn crossing would be screened by the adjacent properties P173. Views to the link road screened by P167. However, some x9 windows front towards the Navenny grade separated junction and cutting to the south of P167, which would be prominent within the view. Lighting and signage would also be visible on approach to the Navenny grade separated junction. There would be a significant deterioration in the view.	Extensive new planting around the Navenny grade separated junction would partly curtail views to the junction. There would be a noticeable deterioration in the view.  Moderate adverse effect  (Winter: As for Year 1)
P227	Unknown property names. x2 Single storey properties.	831m  453m	Open and expansive views over the Finn valley to the Twin towns and the hills above the settlements from the front elevations of the properties.	No significant change	Substantial adverse effect  Potential restricted views to the link road as it crosses the valley of the Burn Daurnett en-route to the existing N15. Views to the Finn crossing restricted by the adjacent properties P173. Views to the Navenny grade separated junction curtailed by P167. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change.	New planting would assist with visual integration of the link road to the existing N15. There would be no discernible deterioration in the existing view.  No Change

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P227A	Unknown property name. Single storey property	Approx. 900m  370m	Property fronts to west. Extensive views over Twin Towns and hillsides above settlements. Considerable residential development within foreground to views (P167/ 168).	Reduction in visual obstruction afforded by vegetation adjoining disused railway line to rear of property. Otherwise, no significant change.	As for P227, views confined to the link road as it crosses valley of Burn Daurnett en-route to the existing N15. There would be a barely perceptible to no discernible deterioration in the existing view.  Slight adverse effect to No Change	As for P227
P228	Unknown property names. A line of Single and Two storey properties (predominantly Single storey properties).	939m  240m	Properties located on rising ground above Edenmore House. Front elevation views over tree screen enclosing Edenmore house to the hill-tops above Stranorlar.	Filtered views through woodland within grounds to Edenmore House, which enables views through to the Finn floodplain.	Winter views over and through existing tree screen from this elevated position to the Finn crossing on embankment as it crosses the floodplain. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	Existing vegetation would curtail views to the Finn crossing during Summer. There would be a barely perceptible deterioration in the view.  Slight adverse effect.  (Winter: As for Year 1)
P228A	Edenmore House x2 storey property.	600m  150m	Property largely enclosed by dense woodland which largely restricts views from house.	Filtered views through woodland which encloses property.	Side and rear elevation views to Finn crossing only partly restricted by adjoining outbuildings. A noise barrier would provide some visual screening to traffic. There would be a significant deterioration in the view.  Substantial adverse effect	Existing woodland largely screens views to Preliminary Design as it crosses Finn floodplain. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect
P228B	Unknown Property Name and status within grounds to Edenmore House.	640m  80m	Views from property partly curtailed by existing mature woodland on the boundaries to Edenmore House. However, property adjoins boundary to grounds and there is a gap in the woodland screen, which affords views to northwest over the Finn floodplain.	Significant reduction in screening afforded by existing trees on boundary to Edenmore House.	Side elevation views to that section of the Preliminary Design on embankment in close proximity to the property. There would be a significant deterioration in views to the northwest.  Substantial adverse effect	Some reduction in the visibility of the Preliminary Design due to the screening effects of adjoining trees. However, scheme would remain on embankment in close proximity to property.

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						There would be a noticeable deterioration in views.  Moderate adverse effect  (Winter: As for Year 1)
P229	Unknown property name. Detached Two storey property enclosed by woodland.	910m  150m	Property enclosed by woodland. The property is situated at an elevated position overlooking the Finn Valley.	As for P228	Front elevation filtered views to the Finn crossing on embankment as it crosses the floodplain. There would be a significant deterioration in views.  Substantial adverse effect	Existing dense vegetation would largely curtail views from the property. There would be a noticeable to barely perceptible deterioration in views.  Moderate to Slight adverse effect.  (Winter As for Year 1)
P230	Unknown property name. Two storey property	1158m  330m	Property fronts to east with views over rural landscape. Views from x2 end elevation windows to north restricted by existing vegetation and outbuildings.	Filtered views through existing vegetation.	Severely restricted to no views to Preliminary Design. Views screened by the adjacent outbuildings. There would be no discernible deterioration in views.  No Change	As for Year 1.
P231	Unknown property name. Two storey property	1123m  211m	Property on hill-top above Finn Valley. Hedge line immediately in front of the property partially curtails views. However, views from upper floor windows over Finn Valley.	Filtered views through hedgeline adjoining property in Winter.	Finn crossing and other sections of Preliminary Design to north visible within views from the upper floor windows. There would be a noticeable deterioration in the existing view.  Moderate adverse effect.	Views severely restricted in summer due to existing vegetation. There would be a noticeable to barely discernible deterioration in the existing view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)



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P232	Unknown property name. Two storey property	1039m  226m	Existing vegetation conceals the property within views from the road. However, property occupies an elevated hillside location above P229. (Review of aerial photography indicates that existing woodland directly in front of property is immature, height unknown). Property fronts to north-east.	Reduction in any visual obstruction afforded by intervening woodland.	Potential views to the Finn crossing as it crosses the Finn floodplain on embankment. Given its elevated position and extensive views would potentially be available. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Existing vegetation would provide some screening to views during Summer. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P233	Unknown property names. A number of both Single and Two storey properties.	1112m  1221m	This group of properties are situated on a prominent hilltop position overlooking the Finn Valley.	No significant change	Finn crossing potentially visible within distant views. Whilst somewhat distant the Preliminary Design would interrupt what are attractive views from an elevated position overlooking an attractive river valley. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect	Existing vegetation and new planting would provide some screening of the Preliminary Design within views. However, the Preliminary Design would remain potentially visible. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P234	Unknown property name. Two storey property	1282m  1073m	Views from building cartilage curtailed by existing woodland immediately adjoining property. Property fronts to south-east.	No significant change	No views to Preliminary Design. Existing woodland and landform would curtail views.  No Change	As for Year 1 no views to the Preliminary Design due to the woodland and landform.  No Change

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						(Winter: As for Year 1)
P235	Unknown property name. Single storey property	1282m  1171m	Rear elevation views largely curtailed by existing woodland and landform. Property set back further from the edge of the hill-top than P233.	Some reduction in visual obstruction afforded by existing woodland allowing filtered views.	Potential distant views to Preliminary Design as it crosses Finn floodplain and descends hillside in cutting. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	Woodland adjoining the property would potentially screen views during Summer.  No Change  (Winter: As for Year 1)
P236	Unknown property name. Two storey property	1230m  795m	Front elevation views from an elevated position over the Finn valley and to the hillsides beyond. Direct views over a shallower valley carrying a stream which flows into the River Finn.	Less visual obstruction afforded by hedgelines within shallow river valley.	Potential distant views to the Preliminary Design as it descends the southern sides of the Finn Valley before crossing the Finn floodplain. Also views to that section on embankment north of Stranorlar roundabout. However, views would be at distance. There would be a noticeable deterioration in the view.  Moderate adverse effect.	New planting (implemented as part of the scheme especially that on the cutting slopes) and existing vegetation would reduce the visibility of the Preliminary Design within views. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect  (Winter: As for Year 1)
P237	Unknown property names. Row of x2 Single storey properties (one with rooflights) and x1 Two storey property.	1203m  180m	The properties are located in an elevated position with views over a shallow river valley, which is essentially open and green in character.	Reduction in visual obstruction afforded by hedgelines in shallow river valley.	Potential views towards that section of the Preliminary Design on embankment between 12750-13500 approximately. The Preliminary Design would introduce a new road within an hitherto rural and largely unspoilt valley. There would be a significant deterioration in views.  Substantial adverse effect	As for Year 1.
237A	Unknown property name.	Approx. 1080m	Similar ridge-top position to P237. Property orientated south to Finn floodplain. Property enclosed by existing	Filtered views through enclosing trees and	Views from side and end elevation windows over that section of Preliminary	Existing vegetation adjoining property would

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	Two storey property	250m	trees and woodland. (New build under construction)	woodland.	Design in adjoining shallow valley to immediate east of property. There would be a noticeable deterioration in views.  Moderate adverse effect	partly restrict views. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P237B	Unknown property name. Single storey property	1160m  270m	Views largely curtailed by existing vegetation and adjoining buildings.	Partial filtered views through vegetation in front of property.	Potential restricted views (partly by P237) to that section of Preliminary Design on embankment as it traverses the shallow river valley. There would be a noticeable deterioration in views.  Moderate adverse effect	Existing vegetation would restrict views to Preliminary Design. There would be a barely perceptible deterioration in the view.  Slight adverse effect.
P237C	Unknown property name. Unknown property status.	750m approx (N13)  210m	Property enclosed by existing mature hedgelines and farm outbuildings. Views restricted.	Significant change in screening afforded by existing vegetation.	Filtered views through existing vegetation within hedgelines. Potential views to that section of the Preliminary Design on embankment from an elevated position. There would be a noticeable change in view.  Moderate adverse effect	Existing vegetation within adjoining hedgelines would largely curtail views from the property. There would be a barely perceptible change in view.  Slight adverse effect  (Winter: As for Year 1)
P238	Unknown property name. Two storey property	839m (N13)  77m	The property is in a slightly elevated position overlooking the valley as for P237.	As for P237	As for P237, the Preliminary Design would introduce a new road within a largely unspoilt rural river valley. The Preliminary Design would be on embankment in close proximity to the property. There would be a significant	As for Year 1.

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					deterioration in views. Substantial adverse effect	
P239	"Knockfair": Two storey property	428m (N13)  444m	Property situated just over the crest of the hill above the shallow river valley.	Filtered views through woodland adjoining P237a during Winter.	Potential views towards that section of the Preliminary Design on embankment between Ch12900-13900 approximately. Landform would partially obscure the Preliminary Design within views. However, the scheme would introduce traffic to a hitherto shallow river valley of rural character. There would be a potentially noticeable deterioration in views.  Moderate adverse effect	Existing vegetation would restrict views to the Preliminary Design in the Summer months. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect.  (Winter: As for Year 1)
P240	Unknown property name. Two storey property	528m (N13)  430m	Views from the front elevation due east partly curtailed by existing woodland/ hedgelines, including conifer trees on boundaries to Golf Course. (New build under construction).	Reduced visual obstruction from intervening hedgelines affording filtered views.	Potential oblique front elevation views (largely upper floor windows) to cutting as it descends the hillside towards the Finn floodplain. Potential views to that section on embankment north of the Stranorlar roundabout. There would be a noticeable deterioration in the existing view.  Moderate adverse effect	At Summer Year 15, existing and new planting, implemented as part of the scheme would reduce the visibility of the Preliminary Design. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)
P241	A number of Single and Two storey properties (including the Golf Course)	386m (N15)  895m	Properties located on the ridge-top over which the minor road runs before dropping into Stranorlar. Views over the Finn valley and the golf course.	Filtered views through existing trees and hedgelines allowing more extensive views over the Finn floodplain.	Potential restricted views to the Finn crossing on embankment as it crosses the Finn floodplain and to that section of the Preliminary Design in cutting as it descends the hillside above the Finn Valley. There would be a barely perceptible deterioration in the existing view.	Views would be restricted in summer due to existing vegetation. There would be no discernible deterioration in the existing view.  No Change.

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					Slight adverse effect	(Winter: As for Year 1)
P242	Unknown property name. Two storey property	170m (N13)  228m	Views from the front elevation of the property to the hillside opposite, over farmland and the existing N13. However, this existing road is partially concealed by the low ridgeline on which property P259 is situated.	No significant change	Oblique front elevation views (from x5 windows, x3 on the upper floor) to the Kilross roundabout including lighting. Views to that section of the Preliminary Design on low embankment between Ch 14800-15100 curtailed by P259. The existing downgraded former road would also be upgraded directly in front of the property. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Existing vegetation and new planting (implemented as part of the scheme) would partially screen views at Summer, Year 15. There would be a barely perceptible to noticeable deterioration in existing views.  Moderate to Slight adverse effect.  (Winter: As for Year 1)
P243	Unknown property name. Two storey property	166m (N13)  158m	Similar views and orientation as for P242 except the existing N13 would be more readily apparent within views from this property. Existing conifer trees adjoining property also provide some visual screening.	Filtered views through some intervening hedgelines.	Potential front elevation views from x5 upper floor and x4 lower floor windows to the majority of the Kilross roundabout including lighting, and that part of the Preliminary Design from Ch 14800 as it emerges from cutting. Also potential views into part of the cutting itself. There would be a significant to noticeable deterioration in views.  Moderate to Substantial adverse effect.	New planting to enclose the Kilross roundabout would partially screen the junction within views from the property. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P244	Unknown property name. Single storey property	203m (N13)  53m	Front elevation views to the hillside above P243 over the existing N13. Views to existing N13 junction largely screened by an existing conifer hedgeline and trees on the boundary of the property with P258.	No significant change	Existing N13 would provide access to the property. Direct front elevation views to the Kilross roundabout from the front elevation. A noise barrier would provide some visual screening to traffic. There would be a significant to noticeable deterioration in views.	New planting immediately in front of the property would partly curtail low level views to the Kilross roundabout and its approaches. However, potential views to lighting

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					Moderate to Substantial adverse effect.	and high-sided traffic to those sections on embankment. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P245	Unknown property name. Single storey property.	78m (N13)  61m	Front elevation views over the access road to the property to existing vegetation on the opposite side of the road that severely curtails Summer views. Views over the vegetation to the hillside on the opposite of the valley.	Views remain restricted due to density of vegetation despite lack of foliage on nearby vegetation.	Direct views to the Kilross roundabout including its lighting. There would be a significant deterioration in the view.  Substantial adverse effect.	New planting (implemented as part of the scheme) would reduce the visibility of the Kilross junction within views. There would be a barely perceptible deterioration in the view since new planting would re-establish the density of the existing scrub woodland. However, lighting would be visible over and above the vegetative screen.  Slight adverse effect.  (Winter: As for Year 1)
P246	Unknown property names: x2 Two storey properties.	73m (N13)  67m	Properties located at an elevated position above P245. Open views to the hillside above the existing N13.	Reduced visual obstruction from scrub vegetation directly in front of properties.	The Kilross junction, including it's lighting, would be prominent within views from these properties. There would also be potential views to that section of the Preliminary Design as it emerges from cutting at Ch14800. There would be a significant deterioration in views.	New planting to enclose the Kilross junction (implemented as part of the scheme) would partially screen the junction in views. However, these properties are at a higher elevation

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					Substantial adverse effect	than the adjoining P245 and views to high-sided traffic would still be possible. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P247	Unknown property name. Single storey property	24m (N13)  24m	Front elevation views from x3 windows. Views include the existing T-junction with the R236 and regular traffic movements within close proximity views from the front elevation.	As for P246	The Kilross roundabout, including lighting, would be prominent within views. Traffic movements are an element within existing views. However, the roundabout would introduce a major new junction within direct front elevation views from the property. There would be a significant to noticeable deterioration in views.  Substantial to Moderate adverse effect	New planting, implemented as part of the scheme, would curtail views to the Kilross roundabout. However, lighting would remain visible as well as high-sided vehicles. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect  (Winter: As for Year 1)
P248	Unknown property name. Two storey property	112m (N13)  112m	Elevated position but sited behind P246. Front elevation views to the wooded hillside above, but including, P246. Also, potential restricted views to the existing N13.	No significant change although filtered views through a number of trees within foreground to property.	Views partly curtailed by P246. Restricted views to the Kilross roundabout, including it's lighting, largely from the upper floor windows, but partly screened by landform. Also, potential views to that section of the Preliminary Design as it emerges from cutting. There would be a noticeable	As for other properties surrounding the Kilross junction new planting (implemented as part of the scheme) together with the partial screening effect of intervening vegetation, would largely screen the

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					deterioration in the view.  Moderate adverse effect.	junction within views. There would be a barely perceptible deterioration in existing views.  Slight adverse effect  (Winter: As for Year 1)
P249	Unknown property name. Single storey property.	76m (N13)  76m	Property fronts to existing N13. Open views over low-lying agricultural land including hedge lines and scattered properties. End elevation views from x2 windows to east.	No significant change	Views from x2 end elevation windows to the Kilross roundabout restricted by a hedgeline and landform. There would be no discernible deterioration in views.  No Change	As for Year 1
P250	Unknown property name. Two storey property	25m (N13)  25m	Front elevation views as for P249. End elevation views as for P248.	Filtered views through existing trees on southern boundary of property	Potential end elevation views restricted by adjoining properties and landform. There would be a barely perceptible deterioration in the view.  Slight adverse effect	An existing hedgeline would curtail views from the end elevation of the property during Summer. In combination with new planting enclosing the Kilross junction there would be no discernible deterioration in the view.
						No Change'  (Winter: As for Year 1)
P251	Unknown property names. x2 Two storey properties (Base to a third under construction)	40m (N13)  40m	Front elevation views towards the existing N13 largely screened by existing woodland.	Filtered views largely confined to those from the upper floor windows through existing dense woodland to the existing N13.	Potential oblique front elevation views filtered by existing vegetation to the Kilross roundabout, including its lighting, and that section of the Preliminary Design as it emerges from cutting at Ch 14800. There would be a noticeable deterioration in the view.	The existing woodland would curtail views to the Kilross junction and other sections of the Preliminary Design. This would be reinforced by other planting implemented as part of the scheme. There



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					Moderate adverse effect.	would be no discernible deterioration in the view.  No Change  (Winter: As for Year 1)
P252	Unknown property name. Two properties on rising ground above R232 (both Single storey).	872m (N13)  955m	Open and expansive views over an extensively low-lying rural landscape with a backdrop of more distant hills.	Filtered views through intervening hedgelines and reduced visual obstruction afforded by these features.	Potential very restricted winter views to the Kilross roundabout. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	New planting (implemented as part of the scheme) to enclose the Kilross roundabout would conceal it within views from the properties. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P252A	Unknown property name. Single storey property	820m (N13)  900m	Property sited on low-lying land at similar elevation to R232. Views over pastoral fields and to the existing R232.	No significant change	No views to Preliminary Design	No views to Preliminary Design
P253	Unknown property names; x3 Two storey properties.	335m (N13)  390m	Front elevation views towards the wooded hillside upon which P255/256 are located. Direct front elevation views over existing R232.	No Significant Change	No end elevation window views.  No Change	As for Year 1
P254	Unknown property name. Two storey property	102m (N13)  101m	An existing outbuilding screens lower floor views from the property, whilst views to the existing N13 are screened by an adjacent woodland. Extreme oblique views to the existing T-junction.	No significant change	Potential views to the Kilross roundabout, including lighting, which would be noticeable within oblique views from the upper floor windows. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Existing vegetation and new planting (implemented as part of the scheme) would largely screen views to the Preliminary Design at Summer, Year 15. However, lighting would

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						remain visible. There would be a noticeable improvement in the existing view as traffic would now be concealed from view.  Moderate beneficial effect  (Winter: As for Year 1)
P255	Unknown property name. Two storey property	329m (N13)  408m	Property is generally enclosed by existing vegetation, and is situated on slightly rising ground above the R236.	Filtered views through vegetation adjoining property.	Potential filtered winter views through existing vegetation to the Kilross roundabout. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	Due to the visual screening afforded by existing vegetation adjoining the property there would be no views to the Preliminary Design.  No Change  (Winter: As for Year 1)
P256	Unknown property name. Two storey property	472m (N13)  472m	Front elevation views over the R236 to the essentially rural landscape beyond. Views are open and extensive.	No significant change	Potential views from this elevated position to the Kilross roundabout. There would be a barely perceptible to noticeable deterioration in views.  Slight to Moderate adverse effect.	As for other properties existing and proposed planting would screen parts of the Kilross roundabout within views. There would be a barely perceptible deterioration in the view.  Slight adverse effect  (Winter: As for Year 1)
P257	Unknown property name. Single storey	124m (N13)  202m	Property fronts towards wooded hillside. No end elevation windows. An existing hedge line (largely coniferous) on the boundary of the property provides	Partial reduction in visual obstruction afforded by adjoining	No clear views to the Kilross junction due to the intervening hedgeline.	As for Year 1

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	property		screening to summer views. Views from the rear elevation largely curtailed by an existing coniferous hedge line.	hedgerow.	No Change	
P258	Unknown property name. Single storey property	13m (N13)  61m	Front elevation views from x3 windows to existing T-junction within close proximity to the property.	No significant change	In the short term, whilst traffic would be moved slightly further from the property, the Kilross roundabout and the adjoining roads of the Preliminary Design would form a major element within views. A noise barrier would provide some visual screening to traffic. There would be a noticeable deterioration in the view.  Moderate adverse effect.	Property would potentially benefit in the long term due to new planting (implemented as part of the scheme) which would provide some visual screening and a physical buffer to the Kilross roundabout. Existing traffic, which is very close to the property, would be moved further away. There would be a noticeable improvement in the view.  Moderate beneficial effect.
P259	Unknown property name. Single storey property	13m (N13)  80m	Front elevation views to the wooded hillside opposite and over the existing N13.	No significant change	Front elevation: Potential front elevation views directly into the cutting at Ch 14800 and to that section of the Preliminary Design on slight embankment on approach/ emerging from the cutting. However, traffic would be taken further away from the property and the Kilross roundabout would not be visible due to the visual screening afforded by intervening outbuildings. A noise barrier would provide some visual screening to traffic. There would be a barely perceptible improvement in views.  Slight beneficial effect	Front elevation: New planting would screen much of the Preliminary Design at Year 15. There would be a barely perceptible to noticeable improvement in the view.  Slight to Moderate beneficial effect.  Rear elevation: New planting would partially reduce the visibility of the upgraded road and

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					Rear elevation: Views over upgraded road which provides new access to Stranorlar. There would be a significant to noticeable deterioration in views.  Substantial to moderate adverse effect.	junction. There would be a noticeable deterioration in views.  Moderate adverse effect
P260	Unknown property names: x2 Single storey properties and a further 2-storey property to rear of single storey properties.	39m (N13)  256m	Front elevation views to wooded hillside on rising ground above the existing N13. Traffic on existing N13 also prominent within foreground to views.	No significant change	Views to the Preliminary Design on slight embankment as it emerges from cutting at Ch 14800. Proposed link road to Kilross roundabout would have similar visual effects to that of the existing N15 but would be slightly closer to the property. There would, however, be a reduction in traffic using the existing N13. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	New planting would partially screen the mainline within views. However, traffic would remain slightly closer to the properties than existing. There would be a barely perceptible to no discernible deterioration in existing views.  Slight adverse effect to No Change  (Winter: As for Year 15)
P261	Unknown property name. Single storey property	27m (N13)  278m	Front elevation views largely as for P260; however the property is closer to the existing N13.	No significant change	Potential views as for P260 except existing hedgeline on boundary with P260 filters winter views. P260 also curtails views to the Kilross roundabout. However, in contrast to P260, traffic would remain at its current position relative to the property but reduced in volume. There would be a barely perceptible improvement in existing views.  Slight beneficial effect	As for Year 1
P262	Unknown	23m (N13)	Views over existing N13 to woodland and the hills	No significant change	A low ridge would screen the Preliminary	As for Year 1

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	property name. Two storey property	368m	opposite. Views from a single end elevation window to north-east at least part obscured by an adjoining agricultural outbuilding.		Design within oblique front elevation views. End elevation views severely curtailed by the outbuilding. There would be a reduction in traffic on the existing N13 and a barely perceptible improvement in the existing view. Slight beneficial effect	
P263	Unknown property name. Two storey property	23m (N13)  319m	Front elevation views over existing N13 to the wooded hillside beyond.	No significant change	Oblique front elevation views to that section of the Preliminary Design on embankment as for P261. However, traffic volumes on the existing road would be reduced. There would be a barely perceptible improvement in existing views.  Slight beneficial effect	As for Year 1
P264	Unknown property name. Two storey property	43m (N13)  260m	Property fronts towards existing N13. An existing coniferous hedgeline screens views from the rear elevation of the property. Views from the rear elevation also partly obstructed by an existing outbuilding.	No significant change	Potential views to the Preliminary Design partly curtailed by local landform and the outbuilding. The low ridge on which P259 sits would also potentially obstruct views to much of the Kilross Junction. A reduction in traffic volume on the existing N13 would have a barely perceptible improvement to the existing view.  Slight beneficial effect	As for Year 1
P265	Unknown property name. Single storey property	190m (N13)  96m	Rear elevation views to hillside rising above property largely obstructed by an adjoining outbuilding. Existing N13 visible within views from front elevation.	No significant change	Potential rear elevation views to that section of the Preliminary Design as it emerges from cutting at Ch 14800. There would be a noticeable deterioration in views from the rear elevation.  Moderate adverse effect	New planting and existing vegetation would partially screen views. There would be a noticeable to barely perceptible deterioration in the existing view.  Moderate to Slight adverse effect

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
						(Winter: As for Year 1)
P266	Unknown property name. Two storey property	134m (N13)  117m	Views from the rear elevation of the property obstructed by an existing hedgeline to the immediate rear of the property. Property fronts towards existing N13.	Filtered views through hedgeline to rear of property to P265.	Potential side and oblique front elevation views to the Kilross roundabout and that section of the Preliminary Design on embankment as it approaches the junction. However, there would be a reduction in traffic using the existing N13. There would be a noticeable deterioration in the view.  Moderate adverse effect.	As for P265
P267	Unknown property names. Group of Single and Two storey properties within Tircallen.	244m (N13)  237m	Front and rear elevation views over the shallow river valley to the existing quarry. Generally the views could be described as 'green' and 'rural'.	Reduction in visual obstruction afforded by intervening hedgelines	Preliminary Design would be prominent on embankment between Ch12750-13900 approximately before it enters deep cutting as it approaches Tircallen from the south. There would be a significant deterioration in views.  Substantial adverse effect	New planting and existing vegetation would reduce the visibility of the Preliminary Design within Summer views. There would be a noticeable deterioration in the view.  Moderate adverse effect.  (Winter: As for Year 1)
P268	Unknown property name. Two storey property	263m (N13)  331m	Views as for P267	Filtered views through existing vegetation within a hedgelines adjoining property.	As for P267, except that views would be part restricted by adjoining outbuildings.  Substantial adverse effect	As for P267, except that views would be part restricted by adjoining outbuildings.  Moderate adverse effect.  (Winter: As for Year 1)
P269	Unknown property name. Two storey property	320m (N13)  292m	Property located on a prominent position on the ridgeline. Open and extensive views to a wooded hillside and a shallow river valley. End elevation window views to north.	No significant change	Whilst the Preliminary Design is in cutting immediately adjoining the property there would views to that section of the scheme on embankment	New planting and existing vegetation would reduce the visibility of the Preliminary Design within

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
					between Ch 12750-13900 and 14500-14600. There would be a significant deterioration in views.  Substantial adverse effect	Summer views. There would be a noticeable deterioration in the view.  Moderate adverse effect. (Winter: As for Year 1)
P269A	Unknown property names. Group of Single and Two storey properties within Tircallen (including 2-storey property under construction)	Between 120-240m (N13)  270-325m	Views to north largely curtailed by landform. Coniferous woodland immediately adjoining settlement recently felled.	No significant change	Views to north curtailed by an intervening ridge. Preliminary Design largely in cutting to north of settlement. Views to south curtailed by adjoining P267. There would be no discernible deterioration in the view.  No Change	As for Year 1
P269B	Unknown property name. Unknown property status.	350m  150m	Views to north largely curtailed by landform. Views to south by existing vegetation and P282.	Some reduction in screening afforded by vegetation within adjoining hedgelines.	Preliminary Design within deep cutting s it passes property. Landform also restricts views to north, including to that section of Preliminary Design on embankment as it emerges from cutting at Ch 14800. There would be a barely perceptible change in view.  Slight adverse effect	Landform would continue to curtail views, with further reduction in visibility of the Preliminary Design due to intervening vegetation. There would be a barely perceptible to discernible deterioration in the view.  Slight adverse to No Change
P270	Unknown property names. Group of Single and Two storey properties on hillside above existing N13.	578m (N13)  1061m	Extensive views over agricultural valley to a wooded hillside.	No significant change	Potential but restricted views to the Kilross roundabout and that section of the Preliminary Design emerging from cutting at Ch 14800. However, Preliminary Design would take traffic further away from property in comparison to the existing N13. There	New planting to enclose the Kilross junction would screen views from the properties. There would be a barely perceptible improvement in the existing view.

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
					would be a barely perceptible to no discernible change in the view.  Slight beneficial effect to No Change.	Slight beneficial effect  (Winter: As for Year 1)
P271	Unknown property name. Two storey property	416m (N13)  931m	The property has similar oblique front elevation views to that of P270, but is situated at a slightly lower elevation to P270.	No significant change	As for P270	As for P270
P272	Unknown property name. Two storey property	288m (N13)  364m	Views as for P268, except from rear elevation.	Filtered views through adjoining woodland.	As for P268	As for P268 except that existing vegetation would further curtail Summer views.
P273	Unknown property names; x2 Two storey properties.	179m (N13)  445m	Front elevation views over farmland with hedgelines.	Filtered views through intervening hedgelines.	Potential oblique views from the upper floor, front elevation windows of the property to that section of the Preliminary Design on embankment between Ch 12750-13900 through the shallow river valley. However, views would be curtailed by landform. There would be a barely perceptible deterioration in the existing view.  Slight adverse effect	Existing vegetation would effectively conceal the Preliminary Design within Summer views from the properties. There would be no discernible deterioration in the existing view.  No Change.  (Winter: As for Year 1)
P274	Unknown property names. Group of properties on higher ground above existing N13.	268m (N13)  1176m	Extensive views to distant hillsides and over the valley carrying the existing N13 and over the Finn valley to Edenmore House.	No significant change	Potential distant views to the Finn crossing and the cutting through the hillside on the southern side of the Finn Valley. However, Preliminary Design would take traffic further from away from the property in comparison to the existing N13. There would be a barely perceptible improvement to no discernible change in the existing view.  Slight beneficial effect to No Change	Existing vegetation would reduce the visibility of the Preliminary Design within views from the property. There would be slight beneficial effect upon the existing view.  Slight beneficial effect  (Winter: As for Year 1)



Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
P275	Unknown property name. Properties on the hillside above Stranorlar.	-----	Extensive views over the valley of the Burn Daurnett and River Finn including the valley floor and parts of the Twin Towns.	Lack of foliage on hedgelines and woodland on hillsides on the south-facing slopes reveals more of the rising landform of the valley sides.	<p>The Preliminary Design would potentially be visible as it weaves its way across the north facing slopes forming the southern sides to the valley of the Burn Daurnett. Both the Navenny grade separated junction and the cutting as the Preliminary Design descends the hillside before crossing the Finn floodplain would be potentially visible.</p> <p>For properties higher up the hillside above Stranorlar this would result in a noticeable deterioration in existing views.</p> <p>Moderate adverse effect</p> <p>For properties lower down the hillside and closer to Stranorlar existing vegetation and buildings would provide some concealment to the Preliminary Design. Generally there would be a barely perceptible to a noticeable deterioration in views, but getting closer to a barely perceptible change with reducing elevation.</p> <p>Slight to Moderate adverse effect</p>	<p>For properties further up the hillside existing vegetation and proposed planting (implemented as part of the scheme) would further conceal the Preliminary Design within Summer views. There would be a barely perceptible deterioration in the view.</p> <p>Slight adverse effect.</p> <p>For properties lower down the hillside there would be a barely perceptible to no discernible deterioration within views at Summer Year 15.</p> <p>Slight adverse effect to No Change.</p> <p>(Winter: As for Year 1)</p>
P276	Unknown property name. Single storey property	200m  965m (from Mainline)  120m (to Navenny link road)	Generally open views to north-facing valley sides above the Twin Towns. Agricultural slopes, extensive and ongoing residential development visible including that on opposite side of the road.	As for P275	<p>Direct views to Navenny grade separated junction and the link road as it descends the hillside to cross the Burn Daurnett and then rise again to the existing N15. Extensive residential development has recently compromised rural landscape character of these views. A noise barrier would provide</p>	<p>New planting on the south side of the Navenny grade separated junction would screen the junction within views. There would be a barely perceptible deterioration in the view.</p>

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line)	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
					some visual screening to traffic. There would be a noticeable deterioration in the view.  Moderate adverse effect	Slight adverse effect.  (Winter: As for Year 1)
P277	Unknown property name. Two storey property	Approx. 160m  Approx. 980m from Mainline  Between 60-210m to Navenny link road.	Generally rear elevation views as for P276	Filtered views through intervening hedgelines.	As for P276	As for P276
P278	Unknown property name. x2 Two storey properties	120m  960m from Mainline  40m (to Navenny link road.	Generally rear and side elevation views from upper floor windows over existing hedgeline immediately adjoining P276.	Filtered views through hedgeline enabling views from lower floor windows and building carillages.	Upper floor windows: As for P276  Lower floor windows: Slight adverse effect  A noise barrier would provide some visual screening to traffic within both upper and lower floor window views from this property.	Upper floor windows: As for P276  Lower floor windows: No Change
P279	Unknown property names. x5 Single storey property	Between 40-110m  Between 990-1035m from Mainline  25-50m from Navenny link	Generally rear and side elevation views restricted by adjoining buildings and existing vegetation within gardens.	Filtered views through hedgeline adjoining rear elevation to properties.	Views to that section of the Preliminary Design to the immediate rear of the properties would be restricted. A noise barrier would provide some visual screening to traffic. There would be a noticeable to barely perceptible deterioration in views.  Moderate to Slight adverse effect.	Intervening hedgeline would largely curtail views to that section of the link road to the rear of the properties. There would be a barely perceptible change in views.  Slight adverse effect

Ref No.	Location	Distance to existing N15 (Centre-line)  Distance to Proposed Scheme (Centre-line) road.	Description of existing view (Summer)	Description of existing view (Winter if different)	Change from Existing View:  Winter Year 1	Change from Existing View:  Year 15 Summer (Winter if different)
P280	Properties in Glenview Park. Two storey properties	Between 30-50m  1110-1130m to Mainline  Approx. 50m to centre of the proposed traffic signal junction.	Views over existing N15 directly in front of properties, and over intervening hedgeline adjoining N15 to hillside to south.	Filtered views through adjoining hedgeline and reduced visual obstruction from existing vegetation within gardens to P279.	Direct to oblique front elevation views to the traffic signal junction forming the intersection between the existing N15 and the link road. Regular traffic movements would be replaced by potentially more frequent traffic queuing, but there would be a reduction in traffic volumes. There would be a barely perceptible deterioration in the view.  Slight adverse effect.	As for Year 1
P281	Unknown property name. Single storey property	15m  1040m to Mainline  60m to Navenny link road.	Front elevation views over existing N15 to factory on opposite side of road. Rear elevation views over intervening residential development and agricultural land to north facing hillside above the Twin Towns.	Low clipped hedgeline on property boundary and to its immediate east would afford less visual obstruction and partially filter views.	Front elevation views: As for P280  Rear elevation views: Views from elevated position. As for P278, there would be a noticeable deterioration in the view.  Moderate adverse effect	Front elevation views: As for P280  Rear elevation views: As for P278.  Slight adverse effect
P282	Tircallen House	400m (N13)  140m	Property largely enclosed by existing woodland and not visible from publicly accessible areas. Rising landform to the north and east of the property would curtail views.	Potential filtered views through existing broadleaved vegetation to the south of the property.	Potential views through existing vegetation to the immediate south of the property to that section of the Preliminary Design on embankment. That section to the immediate east of the property would not be visible where it runs in deep cutting. There would be a potential noticeable deterioration in the existing view.  Moderate adverse effect	Existing vegetation would largely curtail views to the Preliminary Design. There would be a potential barely perceptible deterioration in the existing view.  Slight adverse effect.

## **APPENDIX 9.1**

### **RESULTS OF BIOTIC WATER QUALITY ASSESSMENT**

## Results of Biotic Water Quality Assessment

Numbers shown are numbers of individuals per sample. Q indices calculated as follows.  
1 or 2 individuals = Present, <1% = Scarce/Few, <5% = Small numbers, 5-10% = Fair numbers, 10-20% = Common, 25-50% = Numerous, 50-75% = Dominant, E >75% = Excessive.

The EPA faunal indicator groups of sensitivity to pollution are A (sensitive), B (less sensitive), C (tolerant), D (very tolerant) and E (most tolerant).

	D1	D2	D3	D4	D5	D6	D7	EPA rating
<b>ANNELIDA</b>								
<b>Hirudinea (Leeches)</b>								
<i>Glossiphonia complanata</i>	-	1	-	-	-	-	-	D
<b>Oligochaeta (worms)</b>								
<i>Oligochaeta indet.</i>	-	-	22	-	1	-	-	-
<i>Lumbricidae indet.</i>	-	1	-	7	3	-	-	-
<b>AMPHIPODA</b>								
<i>Gammarus sp.</i>	46	1	1	46	137	-	1	C
<b>MOLLUSCA</b>								
<b>Gastropoda (snails)</b>								
<i>Lymnaea peregra</i>	-	-	-	-	-	1	-	D
<i>Ancylus fluviatilis</i>	-	-	8	2	-	1	1	C
<i>Potamopyrgus jenkinsi</i>	-	-	3	-	-	-	-	C
<i>Zonitoides sp.</i>	-	-	-	-	-	-	1	C
<i>Bithynia sp.</i>	-	-	13	-	-	-	-	C
<b>ARTHROPODA – INSECTA</b>								
<b>Ephemeroptera (mayflies)</b>								
<i>Baetis muticus</i>	1	-	-	45	33	-	-	B
<i>Baetis rhodani</i>	69	16	40	40	73	38	32	C
<i>Leptophlebiidae indet.</i>	-	-	-	1	-	-	-	B
<i>Ecdyonurus sp.</i>	1	-	-	-	-	-	-	A
<i>Rhithrogena sp.</i>	7	-	-	2	-	-	-	A
<i>Ephemerella ignita</i>	25	-	52	-	3	34	82	C
<b>Plecoptera (stoneflies)</b>								
<i>Leuctra hippopus</i>	1	-	3	1	-	1	-	B
<i>Leuctridae indet.</i>	-	-	-	2	1	-	-	B
<b>Trichoptera (caddis flies)</b>								
<i>Philopotamus montanus</i>	3	-	-	3	1	-	-	C
<i>Plectonemia conspersa</i>	-	-	-	1	-	-	-	C
<i>Polycentropus flavomaculatus</i>	-	-	1	-	-	-	-	C
<i>Polycentropidae indet.</i>	-	-	-	1	-	-	-	C
<i>Rhyacophila dorsalis</i>	1	1	-	-	5	-	-	C
<i>Rhyacophila sp.</i>	-	-	-	-	-	1	-	C
<i>Hydropsyche sp.</i>	5	-	-	-	-	-	-	C
<i>Ceraclea sp.</i>	-	-	-	1	-	-	-	B
<i>Limnephilidae indet.</i>	-	-	-	1	-	-	-	B
<i>Limnephilidae Instar II</i>	3	-	-	-	-	-	-	B
<i>Goeridae indet.</i>	6	-	-	1	-	-	-	B

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	D1	D2	D3	D4	D5	D6	D7	EPA rating
<b>Diptera (true flies)</b>								
Chironomidae indet.	9	100	1	7	42	6	12	C
Tipulidae indet.	-	-	1	2	4	4	3	C
Simuliidae indet.	16	60	2	13	76	35	8	C
<b>Coleoptera (beetles)</b>								C
Hydrophilidae larvae indet.	-	-	2	-	-	1	-	C
Helodidae (larvae)	-	-	-	11	1	-	-	C
<i>Hydraena gracilis</i>	6	-	-	22	1	-	-	C
<i>Colymbetes</i> sp.	-	-	-	-	1	1	-	C
<i>Elmis aenea</i> (larvae)	47	-	4	2	13	-	6	C
<i>Elmis aenea</i>	22	-	-	2	-	-	1	C
<i>Limnius volckmari</i> (larvae)	46	1	29	-	2	1	1	C
<i>Limnius volckmari</i>	5	-	4	8	-	-	-	C
<b>Arachnida</b>								
(Order) Hydracarina indet. (water mites)	-	-	4	-	-	-	1	C
Arachnida indet.	-	-	-	1	-	-	-	-
<b>Hemiptera (water bugs)</b>								
<i>Microvelia</i> sp.	-	-	-	1	-	2	-	C
Hemiptera indet.	1	-	-	-	-	-	-	C
<b>Total no. of individuals</b>	20	8	17	25	17	13	12	
<b>Total no. of species or taxa</b>	320	181	190	222	397	126	149	
<b>Q-index</b>	Q 3-4	Q 3	Q 3	Q 3	Q 3	Q 3	Q 3	

**APPENDIX 9.2**

**RESULTS OF PHYSIO-CHEMICAL WATER ANALYSIS**

### Results of Physio-Chemical Water Analysis

[illegible]

**Notes :** METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

**NFP** = NO FIBRES PRESENT

☒ Validated



[illegible]

**Notes:** METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

**NDP = NO DETERMINATION POSSIBLE**

**NFP** = NO FIBRES PRESENT

☒ Validated

[illegible]

**Notes :** METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

**NFP = NO FIBRES PRESENT**

☒ Validated

**APPENDIX 9.3**  
**APPROPRIATE ASSESSMENT**

**APPENDIX 9.3 APPROPRIATE ASSESSMENT**  
**(Following Article 6 (3) of the European Union Habitats Directive (92/43/EEC))**

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***\*Assessment of the effects of the project on the integrity of the site River Finn candidate Special Area of Conservation (cSAC) (site code 002301), as well as River Foyle and Tributaries cSAC (site code UK0030320) and Croaghonagh Bog cSAC (site code 00129).***

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*Describe the elements of the project that are likely to give rise to significant effects on the site*

The proposed road scheme impacts directly on the River Finn cSAC at one location – a bridge crossing of the river south of the existing N15, to the east of Stranorlar.

The construction of the bridge will result in the loss of some riparian habitat. The impact of this will be minimal on the north bank but on the south bank an area (approximately 0.2ha, of which only half is within the cSAC) of alder, ash, willow and sycamore woodland will be lost. A potential otter holt or couch is present on the north bank and disturbance to this will constitute a moderate negative impact.

Two other cSACs are located within 4km of the preliminary design (River Foyle and Tributaries cSAC and Croaghonagh Bog cSAC).

Lough Foyle and Tributaries cSAC will not be directly impacted on by the Preliminary Design. There is the potential for indirect impacts on this designated area as a result of siltation or pollution of Lough Mourne, which in turn could impact on the Mourne Beg and Derg rivers. However, provided adequate mitigation measures are put in place as described in the EIS the cSAC will not be impacted upon.

There will be no direct or indirect hydrological or hydrogeological impacts on Croaghonagh Bog cSAC, which lies within 1.1km of the Preliminary Design. This is because the bog is at elevation above the proposed route and is hydraulically disconnected from the aquifer underlying the route. As such the hydrology of the bog will not be affected by the Preliminary Design.

There will be no significant impacts on either Lough Foyle and Tributaries cSAC or Croaghonagh Bog cSAC and therefore no further assessment is necessary.

*Set out the conservation objectives of the site*

To maintain the favourable conservation status of the species listed on Annex II of the EU Habitats Directive, and habitats listed on Annex I of this directive, as well as examples of other important habitats, that are supported by the River Finn cSAC site.

The site is a candidate SAC selected for the following habitats: **active blanket bog**, a priority habitat listed on Annex I of the E.U. Habitats Directive.

The site is also listed for lowland **oligotrophic lakes**.

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**wet heath and transition mires**, also on Annex I of the E.U. Habitats Directive.

The site is also selected for the following species listed on Annex II of the same directive –  
**Atlantic Salmon and Otter.**

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*Describe how the project will affect key species and key habitats*

The River Finn cSAC is crossed by a clear span bridge in the Preliminary Design and will therefore be directly impacted during the construction phase. However at the proposed crossing point of the River Finn the cSAC boundary extends approximately 2-5m beyond the edges of the river channel. It therefore only covers the river channel and the riverbanks at this location. The primary concerns are the loss of riparian habitat and any impacts on an existing potential otter holt or couch located at the crossing point, and the risk of siltation impacting on fisheries habitat. Disturbance to the potential otter holt/couch will constitute a moderate negative impact. The passage of salmonids and otter will not be affected by the construction or operation of the proposed river crossing.

The construction of the bridge will result in the loss of some riparian habitat. The impact of this will be minimal on the north bank but on the south bank an area (approximately 0.2ha, of which only half is within the cSAC) of alder, ash, willow and sycamore woodland will be lost.

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*Describe how the integrity of the site (determined by structure and function and conservation objectives) is likely to be affected by the project or plan (e.g. loss of habitat, disturbance, disruption, chemical changes; hydrological changes etc).*

Annex I habitats or Annex II species, for which the River Finn cSAC is designated, will not be significantly negatively impacted, provided that the mitigation measures proposed in this EIS, are fully implemented. Consequently, the integrity of the European site will not be adversely affected by the proposed development, in the context of the site's conservation objective.

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*Describe mitigation measures that are to be introduced to avoid, reduce or remedy the adverse effects on the integrity of the site*

All works will be carried out in accordance with the Environmental Assessment and Construction Guidelines (NRA, 2006).

In particular, all works carried out on or near watercourses will be in accordance with the Guidelines for the crossing of watercourses during the Construction of National Road Schemes (NRA, 2006) and in consultation with the relevant statutory bodies (the Loughs Agency and National Parks and Wildlife Service (NPWS)).

Best practice and detailed mitigation measures will be adopted during the construction phase to minimise the risks of siltation or accidental spillage to the River Finn cSAC. The boundaries of the construction area will be defined at the outset of works with fencing to avoid accidental disturbance beyond the site.

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The mitigation measures will include protection of fish

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stocks and provision for fish passage, angling amenity and mammal passage along river banks, pollution control, protection of bankside vegetation, protective fencing of relevant areas, and certain seasonal restrictions on in-stream works.

All works that may affect potential otter holts will be conducted according to best practice (the National Roads Authority (2005) Guidelines for the treatment of Otter during the Construction of National Road Schemes). If necessary, otters will be temporarily excluded from this location prior to construction of the bridge, but the retention of the existing riverbanks will ensure that any holt is left intact and is accessible when the construction phase is complete.

Each of the culverts and bridges along the Preliminary Design will incorporate provision for mammal passage in accordance with the NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes, the NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes and the NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. The locations of mammal underpasses will be decided at the detailed design stage in conjunction with Design Engineers, as it will depend on the engineering requirements of the Preliminary Design.

Mammal resistant fencing will be required to guide otters and badgers to passage facilities and to prevent animals crossing the new roadway. The specification for mammal-resistant fencing is given in the NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.

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**Results of consultation**

<i>Name of agencies consulted</i>	<i>Summary of response</i>
Loughs Agency	<p>The Agency has several concerns regarding the potential for increased run-off and pollution of protected watercourses as well as the potential impacts on the fisheries interests of the site.</p> <p>Works must be carried out in accordance with best environmental practice and the Agency requests a copy of the EIS and other documents as appropriate for review.</p> <p>The Agency requests that works should be carried out in line with the following publications: Fisheries Guidelines for Local Authority Works; Sustainable Drainage Systems; Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites.</p> <p>The Agency requests that dates of proposed works are sent to the Environment Research Officer before works commence.</p>

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\* Prepared in accordance with documents: European Commission (2000) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC and European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/49/EEC; clarification of the concepts of: Alternative solutions, Imperative reasons of overriding public interest, Compensatory Measures, Overall Coherence, Opinion of the Commission.

**APPENDIX 10.1**  
**DATA SOURCES**



## Data Sources

The **Record of Monuments and Places (RMP)** is a list of archaeological sites known to the National Monument Section of the Heritage and Planning Division, Department of Environment, Heritage and Local Government (DEHLG), which receive statutory protection. These records are accompanied by Ordnance Survey six-inch maps on which all recorded monuments are marked and numbered.

The **Sites and Monuments Record (SMR)** provides details of documentary sources and field inspections of recorded sites where these have taken place, and also contain information on potential sites within the county which are not contained in the RMP. The Donegal SMR also lists a large number of Post Medieval upstanding structures and houses, which are not contained in the RMP or the County Development Plan and therefore receive no statutory protection.

The **Register of Historic Monuments** is a list of archaeological areas and historic monuments, which are known to the Minister and afforded statutory protection under the National Monuments (Amendment) Act 1987. The list is held by the National Monuments and Historic Properties Section of the Heritage and Planning Division (DEHLG), and includes information on the protected status of recorded monuments.

The **Archaeological Inventory of County Donegal** is a published list of the recorded monuments found in the county, giving locational details and descriptions. It is listed by type of monument followed by townland.

The **Dúchas Database of Sites and Monuments** is a digital Geographical Information System (GIS), which maps all recorded archaeological sites in County Donegal. Although this system has provided a basis for the archaeological distribution maps of the area selected for the N15 bypass route, its accuracy and consistency is not guaranteed and therefore cannot be used as a statutory document.

The **Topographical Files and Registers of the National Museum of Ireland** are the national archive of all known finds recorded by the National Museum. It relates primarily to artefacts but also includes references to monuments and has a unique archive of records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance (see Appendix 10.6).

**Cartographic Sources** of the study area include the Down Survey maps of 1655-9 and the first, second and third edition 6" OS maps dating from 1836 and 1905 were also consulted. It is understood that 18<sup>th</sup> century estate maps of the principal estates of the area are in existence but none of the librarians consulted for the purposes of this research were aware of the location of these maps.

**Written Sources** that were consulted have included various publications and journals that are housed in the National Library of Ireland, the National Monument Section of the Heritage and Planning Division research library and local history articles and books in Donegal County Library, Letterkenny. A full bibliography of all written sources consulted is given at the end of this report.

**Aerial photographs** of the study area, provided by McCarthy Hyder, provided initial information on the terrain and its likely potential for archaeology and built heritage sites. The photographs were also an important source of information regarding the precise location of recorded sites and their extent.

The **Donegal County Development Plan (2000)** does not include an inventory of buildings and groups of buildings of architectural, historic and artistic importance, which will provide the basis for

a coherent range of policy measures including the designation of protected structures. However, the current County Development Plan (2006-2012) does include a Recorded of Protected Structures, which was consulted as part of this assessment. This record is based on the interim architectural inventory, which has been under preparation, by the National Monument Section of the Heritage and Planning Division (previously Dúchas – The Heritage Service) for some years.

The **Excavation Bulletin** includes a catalogue of all excavated sites and structures within the country since the early 1970's. These were consulted to identify previous archaeological fieldwork within the study area.

The **Department of Irish Folklore** (previously The Irish Folklore Commission) holds a body of research material, which encompasses all aspects of folk narrative and song, beliefs and customs, as well as folk life and social traditions.

The **National Inventory of Architectural Heritage** identifies and records the architectural heritage of Ireland in a systematic and consistent manner so that a source of guidance is provided for the selection of structures for protection. Data is supplied to Local Authorities, which allows them to make informed judgements on the significance of building stock in their functional area. As surveys are completed for designated areas (a town or county) the results are sent in **draft form** to the relevant local authority for comment. Final adjustments are then made before the survey is published. The inventory is held by the National Monuments and Architectural Protection Division (DEHLG).

**APPENDIX 10.2**  
**FIELD RECORD SHEET**

**N13/15 Ballybofey / Stranorlar EIS**

Inspected By: \_\_\_\_\_

Date: \_\_\_\_\_

**SITE DETAIL**

Site Type	Townland	Parish	Barony	OS Name?
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**STATUS**

RMP	Nat. Mon.	Co. Dev. Plan	Aerial Photo	AAP
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**REFERENCE Nos.**

SMR No. CO.....	CH No.	CAS No.	New Site No.	GPS Gr. Ref I...../ ITM.....
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**MAPPING**

OS 1 <sup>st</sup> ed.	OS 2 <sup>nd</sup> ed.	OS 3 <sup>rd</sup> ed.	RMP	NGR E...../ N.....
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**DESCRIPTION****Topography & Landuse****Aspect:**

e.g. on a S-facing slope

**Land Use:**

Agricultural: Pasture / Arable / Fallow

Industrial / Commercial &amp; Retail / Residential / Leisure/Other

**Description / Sketch / Measurements**

**Any other relevant comments?**

## **APPENDIX 10.3**

### **ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

## Archaeological and Historical Background

### Prehistoric Period

As yet no Mesolithic site has been found in Co. Donegal but several flint artefacts dating to this period have been recovered. A find of several Bann Flakes just north of Derry (approximately 30km northeast of the Twin Towns) seems to confirm the viewpoint that the River Foyle and its tributaries served as a water highway into the interior of the county during the Mesolithic period (c. 7000–4000 B.C). At Castlefinn (approximately 12km to the east of the Twin Towns) a collection of narrow blades from the Early Mesolithic were also found (Woodman 1985, 171; quoted in Nolan *et al* 1995, 3).

Several other objects belonging to the Late Mesolithic have been found in the county. One small flint work site at Dunaff Bay in Inishowen has been excavated. This site was found on a raised beach of the post-glacial, maximum marine transgression, suggesting a date between 3500–3000BC. It is likely that by this time Neolithic agriculturists were living in Donegal and building the great megalithic tombs of the county, which in number and quality are amongst the best in Ireland; a number of these have been excavated (Flanagan 1966, 1–38; quoted in Nolan *et al* 1995, 7). A megalithic tomb (DG 086-002 01) in the townland of Croaghonagh, marked Giants Bed on the 2<sup>nd</sup> edition Ordnance Survey Map of Donegal (1906) lies approximately 125m to the south of the Preliminary Design. No trace of the megalithic structure survives at the location but there is an oval mound present which measures 27m by 15m (Lacy *et al* 1983, 47).

The occurrence of many Wedge-tombs and Cist burials in the County testifies to the continued settlement of Donegal during the earlier Bronze Age. (Waddell 1970, 112 – 4; quoted in Lacy *et al* 1983, 6).

In the townland of Croaghonagh approximately 32m to the south of the Preliminary Design route there is a standing stone (DG 086-002 02) marked 'standing stones' on the 2<sup>nd</sup> edition Ordnance Survey Map (1906). There is now no sign of these stones, the location of which were by the shore of Lough Mourne (Lacy *et al* 1983, 92). A second possible standing stone (DG 077-029, Plates 1 and 2) is located in the townland of Goland, which will be directly impacted upon by the Preliminary Design.

Beltany Stone circle (approximately 12km to the northwest of the Twin Towns) is located on a prominent hilltop near the town of Raphoe. The Irish name Beltany derives from *Baal Tine* or Baal's Fire and suggests that the pagan practice of sun worshipping was practiced at this site. The stone circle has a diameter of 44m and is comprised of 64 stones though it is believed that there were several more stones constituting the circle originally. The circle's interior contains a tumulus, which may have been a burial cairn. There is also a standing stone to the south east of this site. Although few stone circles are known in Donegal in comparison with the adjacent concentration in Derry and Tyrone, Beltany is one of the largest in Ireland (Lacy *et al* 1983, 73 – 74).

The oldest stone sculptures in Donegal belong to the Iron Age (c. 600 B.C–400 A.D) that is to pagan Celtic times when images of gods and goddesses were created in wood and stone. There is a cluster of such icons in East Donegal. A carved stone head was found in the 1940's between Conway and Ballybofey, which almost certainly dates from pre-Christian times (Nolan *et al* 1995, 54–55).

## Early Medieval Period

County Donegal is made up of a number of historic areas. The most important are the territories occupied from the fifth century onwards by the northern Uí Neill dynasties, the Cinéal Conaill and the Cinéal Eogain, before the latter expanded into mid-Ulster. It is from these dynasties that the county derives the names of its two main parts, Inis Eogain and Tír Conaill.

The availability of documentation from the sixth century on gives clearer insights to Donegal at the time. The area, conquered by three branches of the northern Uí Neill in the previous century, became dominated by two of these, the Cinéal Conaill and the Cinéal Eogain. The rivalry between these two dynasties and their chief descendants, the O'Neills and the O'Donnells was to be an abiding feature of Ulster history down to the eventual conquest by the English a thousand years later.

The Early Medieval period is depicted in the surviving sources as entirely rural, characterised by the basic territorial unit known as *túath*. It is estimated that there were probably at least one hundred and fifty kings in Ireland at any given time during this period, each ruling over his own *túath*. (Byrne 1973, 174).

During this turbulent period, roughly circular defensive enclosures known as ringforts were constructed to protect farmsteads. They were enclosed by an earthen bank and exterior ditch and ranged from 25m to 60m in diameter. The smaller sized and single banked type (univallate) was more than likely home to the lower ranks of society while larger examples with more than one bank (bivallate / trivallate) housed the more powerful kings and lords. There are no recorded ringforts existing within the study corridor. There is one recorded enclosure site (DG078-018), which lies approximately 150m to the west of the Preliminary Design. This monument is located in the townland of Mullandrait.

Farmsteads were also enclosed by huge drystone walls as an alternative to the excavated defences of ringforts. These have the same circular arrangement as ringforts but the walls can be quite substantial, with examples occurring where the height reaches up to 3m and the thickness up to 6m across. There is one possible recorded cashel (AH 2, Figures 10.1 (Sheet 2), 4 and 6; Plates 3 and 4) existing within the study corridor in the townland of Goland. A direct impact on this monument that had been truncated by the construction of the railway in the 19<sup>th</sup> century has been avoided.

Souterrains, or artificial underground passages are frequently found within ringforts or cashels and occasionally occur in ecclesiastical enclosures. They consist of a concealed narrow entrance at ground level leading into a passage, which opens into a single chamber or series of chambers. They probably functioned as places of refuge or as storage facilities. There is one recorded example of a souterrain (DG078 039) c.600m to the east of the Preliminary Design in the townland of Gortletteragh.

In the study area around the towns several cashels and enclosures dot the landscape, testifying to the widespread settlement of the locality in early historic times. Such monuments were the agricultural homesteads of the early Christian period and their proliferation in east Donegal is indicative of the good quality of the agricultural land. The townland of Goland for instance has three examples of Cashels / Enclosures within close proximity to the Preliminary Design.



Christianity was introduced very early in Donegal, the Tripartite Life claiming that Patrick himself worked in the County. Colmcille (patron saint of the Diocese of Raphoe and whose feast day is celebrated on the 9<sup>th</sup> of June), one of the greatest personalities in the early history of Christianity in these islands, was a leading figure of the Cinéal Conaill. A proliferation of some of the earliest known Christian cross-incised slabs and carved crosses are found in the west of County Donegal.

There are several literary references indicating the presence of the Vikings in Donegal (Byrne 1973, 268; quoted in Lacy *et al* 1983, 7). The Cinéal Eogain were successful however in wiping out the Norse settlements. Two important collections of silver bracelets probably imported by the Scandinavians have been found in Inishowen. It is from the frequent Viking raids on the County that Donegal, then known as Tír Chonaill in the old Irish administration system (the land of Conall), became known as Dún na nGall meaning the Fort which repelled the foreigner which was later anglicised to Donegal. Over time the Vikings assimilated into Gaelic culture and their descendants are found throughout the County.

### Anglo-Norman and Medieval Period

The presence of the Normans in northern Donegal is well documented (Orpen 1915, 275 – 288; quoted in Lacy *et al* 1983, 8). The annals of Ulster record how, in 1199, John de Courcy plundered Inishowen after having camped for nine days at Derry. On that occasion Echmarcach, the chief of the O'Doherty's was killed. The colonists came back on several occasions and quickly learned to exploit the traditional feud between the Cinéal Conaill and the Cinéal Eogain. The territory of the Cinéal Conaill is best indicated by the extent of the Diocese of Raphoe, established in the twelfth century, conforming to the political configuration of that time. It has been suggested that there may be a number of mottes in Donegal (McNeil 1975, 52 & 54 in Lacy *et al*, 1983, 9). However, the most important archaeological evidence for the Norman penetration into Donegal is the great pile of Greencastle at the entrance to Lough Foyle, built by Richard de Burgo Earl of Ulster in 1305 (Waterman 1958, 74 – 88 in Lacy *et al*, 1983, 9).

During the later middle ages the already ancient connections between Scotland and Donegal were strengthened by the arrival of groups of gallowglasses. These mercenary forces have left behind them such remains as grave slabs and gave rise to the important Donegal family, the Mac Suibnes.

After the withdrawal of the Normans from the Inishowen peninsula with the death of the Brown Earl in 1333 (Nicholls 1972, 128; quoted in Lacy *et al* 1983, 9), the whole of Donegal passed into the hands of the Cinéal Conaill under the O'Donnells and their vassals. The O'Neills, by now supreme in Tyrone, continued to make claims on the territory of their ancestors and, in particular, on the Lagan district. The rejection of these claims culminated in the erection, in 1526 - 27, by Manus O'Donnell of his castle at Cinéal Eogain (Bradshaw 1979, 24; quoted in Lacy *et al* 1983, 9). This castle was probably located near the junction of the rivers Mourne and Finn (approximately 20 km to the east of the Twin Towns) on a site in present County Tyrone, opposite Lifford. It was here that Manus composed the monumental 'Life' of his ancestor Colmcille. The castle was later abandoned by the O'Donnell's when the present county boundary was established and the rivalry of the two ancient factions of the northern Ui Neill resolved in the face of the Elizabethan conquest.

The first written reference to the Twin Towns was in 1548 when they are called collectively Strathbofey (a portmanteau word or a blend when two meanings are

condensed into one word). Stranorlar however predates the foundation of Ballybofey (Kerrigan, 1951, 309).

During the second part of the sixteenth century a number of English military expeditions were launched in the territory of Donegal (Falls 1970, 96 – 97; quoted in Lacy *et al* 1983, 9), but it was not until near the conclusion of the Nine Years War that permanent military garrisons were placed by the Tudor government in the County. In 1600 Sir Henry Docwra established the Governorship of Lough Foyle, which included the northern pretender to the chieftainship of the O'Donnells, and by some of the O'Dohertys from Inishowen (Hayes-Mc Coy 1976, 130; quoted in Lacy *et al* 1983, 9). From his base at Derry, Docwra established garrisons throughout northern and eastern Donegal such as at Lifford and Rathmullan (Hunter 1981, 14 - 28) and somewhat later Ballyshannon was secured as a base for the military Governorship of the southern part of the County.

### Post-Medieval Period

The defeat of the Gaelic chieftains of Ulster at the Battle of Kinsale in 1601, the ensuing 'Flight of the Earls' from Rathmullan in 1607 and the revolt of Sir Cahir O'Doherty in Inishowen, paved the way for the confiscation by the crown of the territory of Donegal along with the greater part of the rest of Ulster.

Donegal was divided into numerous plantation estates and most of these were parcelled out to the English and Scottish 'undertakers and servitors' who were to colonise the land. Some land in the County was also granted to the newly established Trinity College in Dublin. The old ecclesiastical lands were retained by the reformed church and the remainder of the land was given to a number of native Irish grantees (Moody and Hunter 1976, 198 – 199; quoted in Lacy *et al*, 1983, 9).

Located in the prime agricultural land of the Finn Valley, Stranorlar was chosen as a frontier post for the Plantation of Ulster when it was granted to Henry Clare in 1610 (Kerrigan 1951, 309). Soon afterwards it was passed onto Peter Benson with 1,500 acres, on condition that he would build a fortified bawn of stone and lime and settle it with 24 families, all British, who would take the Oath of Supremacy and form a garrison to defend it from the natives. Stranorlar thus started as a village with ten houses. Ballybofey did not exist at this time (Kerrigan-1951, 309).

Planned towns were also built, many of them preserving some of their original layout to the present day. One of the most evocative survivals of this period in Donegal is the Jacobean monument to Sir Richard Hansard and Dame Anne, his wife, in the Clonleigh Parish Church in Lifford.

Sir Ralph Bingley, a reputed adventurer built Drumboe Castle (DG078-014) early in the 17<sup>th</sup> century. He also erected a bridge at Ballybofey. After his death in 1625, his wife, Lady Anne remarried a man by the name of Robert Harrington. They soon ran into trouble with Dublin Castle for their liberal attitudes towards the native Irish. A courtier of the Bingley estate, a man by the name of Orwell managed to secure the king's pardon and Lady Anne & her husband were rewarded patents and permission to hold markets and fairs on the feast of St. Luke (18<sup>th</sup> Oct) and St Gregory. Thus began the tradition for Ballbofey as a market town, which remains to this day. Around 1640 the Harringtons left Drumboe. In 1641 the occupant was William Bassil, who later became Oliver Cromwell's Attorney General in Ireland. Several generations of the Bassil family lived at Drumboe until the end of the 18<sup>th</sup> century when the last of the family line, Mary married an English doctor, Sir Samuel Hayes. The Hayes lineage remained in occupation of Drumboe until the beginning of the 20<sup>th</sup> century. Traditionally, an Abbey

(DG 078:005) is believed to have been located at Drumboe (townland of Drumboe Lower) but no remains of antiquity associated with the establishment have been located.

There are records for patents for markets and fairs predating 1641 (Nolan *et al* 383, 1995); Ballybofey's patent dated to 6th July 1603 to Sir Ralph Bingley for a Saturday market and two-day fairs.

Stranorlar's Church of Ireland Church was built on the foundation of an old Catholic church, with its graveyard still showing headstones dating back to the 17<sup>th</sup> century. The Presbyterian Church dates from 1709 and the old Catholic chapel was built before Catholic emancipation (Kerrigan, 1951, 310).

Stranorlar was the seat of a Yeomanry corps in the 18<sup>th</sup> and 19<sup>th</sup> centuries.

Ballybofey town developed in the early 19<sup>th</sup> century, with the growth of the bleaching greens and Sir Edmund Hayes' Ironworks in Drumboe. Ballybofey was essentially the home of the returned native Irish who came back from the mountains in contrast to Stranorlar, the plantation town.

During large-scale emigration, which resumed after the Napoleonic wars, Ballyshannon was one of the smaller ports that contributed slightly by means of occasional ships (Houston & Smyth 1993, 345).

Issac Butt (1813 – 1879), the founder of the Home Rule party is buried in the Church of Ireland cemetery in Ballybofey. Another distinguished figure associated with the Twin Towns, is Francis Brown the blind poet born in Stranorlar in 1816.

The Great Famine (1845 –1849) did not affect Donegal too significantly by comparison with other locations in Ireland with census figures showing a decrease in population of 40,000 people between the years 1841 –1851 (Houston & Smyth 1993, 345).

By the mid 18<sup>th</sup> century the importance of Stranorlar and Ballybofey as commercial centres was accentuated by the spread of a railway network and the provision of postal telegraphs. The Finn Valley Railway (standard gauge of 5' 3" later converted to 3' gauge) was opened from Strabane to Stranorlar on 7<sup>th</sup> Sept 1863. Subsequent section extensions were added to Druminin in 1882, Donegal in 1889, Killibegs in 1893, Glenties in 1895 and Ballyshannon in 1905. Finn Valley Railway was amalgamated with Co. Donegal Railway in 1891. Railways were of considerable importance in the development of late Victorian and Edwardian seaside resorts. All these lines went into disuse on January 1<sup>st</sup> 1960 (Celkin 1951, 406-417).

## Previous Fieldwork in the Study Area

Up until this assessment, no previous archaeological investigations had been undertaken within the study area for the Preliminary Design. However, due to initial recommendations made within the impact assessment on the potential archaeological resource, it was decided to undertake advance archaeological testing in association with the Preliminary Design. As a result, in 2005, RMP 1 and 3 were tested along with AAP 8, 9, 32, 38 and 39. This work was undertaken under licence to the Department of Environment, Heritage and the Local Government and revealed nothing of archaeological significance in any of the tested areas.

An earlier archaeological monitoring brief in relation to the development of the Ballybofey / Stranorlar Sewerage scheme was carried out intermittently between April 1998 and April 1999 by Fiona Rooney of Archaeological Consultancy Ltd. The stratigraphy revealed during the monitoring indicated no features, deposits or artefacts of archaeological significance (Bennett 2000, 43).

**APPENDIX 10.4**

**PROTECTION OF CULTURAL HERITAGE**

## Protection of Cultural Heritage

The Cultural Heritage in Ireland is safeguarded through both National and International policy designed to secure the protection of the Cultural Heritage resource to the fullest possible extent (Dept. of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997. The Cultural Heritage can be divided loosely into the archaeological resource covering sites and monuments from the prehistoric period to the 18<sup>th</sup> century, and the built heritage resource, encompassing standing structures and sites of cultural importance of a post-18<sup>th</sup> century date. There is however, in this case, an overlap between the two categories of sites as archaeological monuments of a late post-medieval date have been added to the Record of Monuments and Places for County Donegal.

The National Monuments Act 1930 to 2004, the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which are held to include all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A national monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2).

There are a number of mechanisms under the National Monuments Act, which are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

### Ownership and Guardianship of National Monuments

National monuments may be acquired by the Minister whether by agreement or by compulsory order. The State or Local Authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the Local Authority as guardian of that monument if the State or Local Authority agrees. Once the site is in ownership or guardianship of the State it may not be interfered with without the written consent of the Minister. There are no national monuments under guardianship of the State within the bypass corridor.

### Register of Historic Monuments

Section 5 of the 1987 Act states that the Minister is required to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference of sites recorded in the Register without the permission of the Minister is illegal, and two months notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. This list was largely replaced by the RMP following the 1994 Amendment Act, but still holds records of monuments under Preservation Orders, Temporary Preservation Orders or those under ownership or guardianship of the State. All registered monuments are now included in the Record of Monuments and Places.

## Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference to the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation surrounding the site must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders by the written consent, and at the discretion, of the Minister. There are no Preservation Orders attached to any of the sites within the bypass corridor.

## Record of Monuments and Places

Section 12 (1) of the 1994 Act provides that the Minister for Arts, Heritage, Gaeltacht and the Islands shall establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises of a list of monuments and relevant places and a map or maps showing each monument and relevant place in respect of each county in the State. Sites recorded on the Record of Monuments and Places all receive statutory protection under the National Monuments Act 1994. All recorded monuments within the bypass corridor are represented on the accompanying maps.

Section 12 (3) of the 1994 Act provides that "where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the work until two months after the giving of notice".

## Protection under the Record of Protected Structures and County Development Plan

The Built Heritage is protected by the *Heritage Act 1995*, the *Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999*, and the *Local Government (Planning and Development) Acts 1963-1999*. Section 2.1 of the 1995 *Heritage Act* describes the architectural heritage as "all structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents, and, without prejudice to the generality of the foregoing, includes railways and related buildings and structures and any place comprising the remains or traces of any such railway, building or structure".

The *Heritage Act* promotes the interest in, knowledge and protection of the Irish heritage, including the architectural resource, with the establishment of the Heritage Council. All heritage buildings owned by a local authority are protected from damage and destruction by the 1995 *Heritage Act*.

The 1999 *Architectural Heritage Act* requires the Minister to establish a survey, which will identify, record and assess the architectural heritage of the country. The National Inventory of Architectural Heritage (NIAH) records all built heritage structures within specific counties in Ireland. The Donegal inventory is completed by Dúchas – The Heritage Service and was consulted for the purpose of this research. As inclusion in the inventory does not provide statutory protection, the document is used to advise

local authorities on compilation of a Record of Protected Structures as required by the *Local Government (Planning and Development) Act 1999*.

The *Local Government (Planning and development) Act 1999* requires local authorities to establish a Record of Protected Structures (RPS) to be included in the County Development Plan (CDP). This plan includes objectives designed to protect the Cultural Heritage during the planning process. Buildings recorded in the RPS can include recorded monuments, structures listed in the NIAH or buildings deemed to be of architectural, archaeological or artistic importance by the Minister. Sites, areas or structures of archaeological, architectural or artistic interest that are listed in the RPS receive statutory protection from injury or demolition under the 1999 Planning Act. Any damage or demolition of a site registered on the RPS is considered an offence. This list is not always comprehensive in every county. There is one Protected Structure (Edenmore House), located within the vicinity of the proposed route. This is listed within the County Donegal Development Plan (2006-2012).

The Local Authority has the power to order conservation and restoration works to be undertaken by the owner of the protected structure if it considers the building to be in need of repair. Similarly, an owner or developer must make a written request to the Local Authority to carry out any works on a protected structure and its environs, which will be reviewed within three months of application. Failure to do so may result in prosecution.



## **APPENDIX 10.5**

### **LIST OF RMP SITES WITHIN THE WIDER AREA (150-500m FROM PRELIMINARY DESIGN)**

## List of RMP Sites within the Wider Area of Preliminary Design (150-500m)

**RMP No:** DG 069:028  
**Nat. Grid Ref:** None given  
**Townland:** Teevickmoy  
**County:** Donegal  
**Classification:** Ringfort  
**Dist. from Preliminary Design:** 391m W

**Description:**

Marked on OS 1<sup>st</sup> edition map as 'fort' with a single ditch. It is untitled on the 2<sup>nd</sup> edition map. It is not marked on the 3<sup>rd</sup> edition. There is no trace of this now. It was located on very good quality agricultural land. Its elevated setting would allow for views to north and west.

**RMP No:** DG 069:029  
**Nat. Grid Ref:** None given  
**Townland:** Magheracorran  
**County:** Donegal  
**Classification:** Ringfort  
**Dist. from Preliminary Design:** 487m NE

**Description:**

The ringfort is depicted as a single banked and titled 'fort' on the 1<sup>st</sup> edition OS Map. On the later editions of the OS maps the monument is untitled. The ringfort measures 13m internally. The inner height of the bank is 0.75m and externally 1.75. There are several gaps in the bank but no obvious entrance is discernible. The monument is situated on the eastern edge of a plateau of good agricultural land.

**RMP No:** DG 077:013  
**Nat. Grid Ref:** 21152/39315  
**Townland:** Goland  
**County:** Donegal  
**Classification:** Cashel  
**Dist. from Preliminary Design:** 449m NW

**Description:**

Site was almost probably a cashel situated south of a river in marshy ground with rock outcrop to the east. The site has almost been completely destroyed. There is now a field fence running along what probably was the northwestern perimeter of the cashel. The site is named 'fort' on the 1<sup>st</sup> edition OS map.

**RMP No:** DG 077:014  
**Nat. Grid Ref:** 20991/39203  
**Townland:** Goland  
**County:** Donegal  
**Classification:** Enclosure site  
**Dist. from Preliminary Design:** 223m NW

**Description:**

Not marked on OS 1<sup>st</sup> edition. Untitled but marked as a circular enclosure on OS 2<sup>nd</sup> & 3<sup>rd</sup> edition. There appears to be no trace of this site. The area is under afforestation and possibly the site was destroyed during plantation. It seems very likely that the site was a cashel rather than a ringfort.

**RMP No:** DG 077:026  
**Nat. Grid Ref:** 21160/39306

**Townland:** Goland

**County:** Donegal

**Classification:** Standing stone

**Dist. from Preliminary Design:** 338m NW

**Description:**

This site was recorded through the assistance of Coillte & the wildlife service. The monument is situated in boggy ground, which is a commercial forest plantation. It is set about three quarters of the way up a hill which slopes in a southerly direction. The wide stone has an east west orientation. It is fairly irregular in shape along its top. It is 1.90m high with a maximum width at the southern base of 2.10m. Its maximum thickness is 0.50m.

## **APPENDIX 10.6**

### **LIST OF STRAY FINDS WITHIN THE STUDY AREA**

## List of Stray Finds within the Study Area

Information on artefactual finds from the study area in County Donegal has been recorded by the National Museum of Ireland since the late 18th century. Locational information relating to these finds is important in establishing prehistoric and historic activity in the study area.

**Reg. No.:** 1959:34  
**Townland:** Teevickmoy  
**Parish:** Stranorlar  
**Barony:** Raphoe South  
**County:** Donegal  
**Find:** Rotary Quern. The upper stone of a rotary quern with a side projection through which a handle hole has been bored. The diameter of the stone is 38cm and it weighs 66lb. The grinding surface is flat.  
**Findplace:** Not recorded

**Reg. No.:** 1926:46  
**Townland:** Edenmore  
**Parish:** Ballindrait?  
**Barony:** -  
**County:** Donegal  
**Find:** Plaster cast of socketed axe. Original in owner's possession.  
**Findplace:** Not recorded.

**Reg. No.:** 1932:7037  
**Townland:** Edenmore  
**Parish:** Clonleigh  
**Barony:** Raphoe North  
**County:** Donegal  
**Find:** Socketed axe head, which is decorated. Described as the only one of its type found in Ireland. The ornamentation is based on north French patterns. Similar axe found in Holytown, Lanarkshire, Scotland.  
**Findplace:** Found when a drain was being cut on the farm of Mr Hord.

**Reg. No.:** 1968:6  
**Townland:** Cashelnavean  
**Parish:** Stranorlar  
**Barony:** Raphoe South  
**County:** Donegal  
**Find:** Seven fragments of part of a shallow wooden dish that is broken and warped. The largest fragment is 63cm long by 21cm wide and is enough to allow reconstruction. It was carved from a single piece of wood, probably alder. It has an oval shape and the rim is rounded. The walls are c.1.5cm thick and it is estimated the original size would have been 65cm by c.35cm. Early Christian or later.  
**Findplace:** At a depth of 6 feet in a bog, during turf cutting.

**Reg. No.:** 1930:544  
**Townland:** Ballybofey  
**Parish:** Stranorlar  
**Barony:** Raphoe South  
**County:** Donegal  
**Find:** Polished stone axe head.  
**Findplace:** Not recorded

**Reg. No.:** Record only  
**Townland:** Ballybofey  
**Parish:** Stranorlar  
**Barony:** Raphoe South  
**County:** Donegal  
**Find:** Flat copper axe head, 6in long by 3 1/2in at broad end.  
**Findplace**

**Other townlands consulted for which there were no files.**

✓ Croaghonagh  
Meencrumlin  
Meencargagh  
Goland  
Carrickmagrath  
Sessiagh (O'Neill)  
Navenney  
Dreenan  
Mullandrait  
Treanmullin  
Castlenbane  
Knockfair  
Mullaghagarry  
Tircallan  
Lisnaree  
Kilross

**APPENDIX 10.7**

**CULTURAL HERITAGE PLATES**

## Cultural Heritage Plates



Plate 1 RMP 1 (DG077-029) from east



Plate 2 RMP 1 (DG077-029) from north





Plate 3 Interior of RMP 2 (DG077-015) from southeast

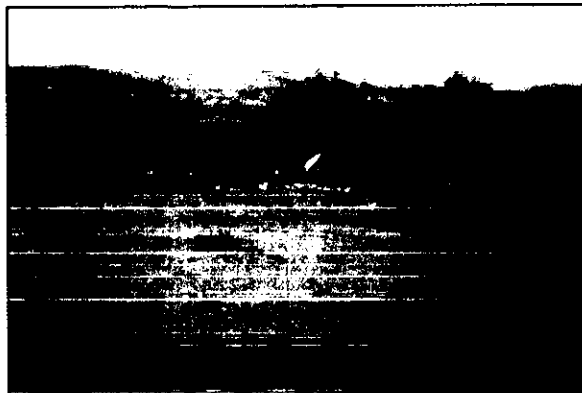


Plate 4 RMP 2 (DG077-015) from south



Plate 5 Edenmore House (AH 8), from south



Plate 6      Outhouse associated with Edenmore House  
(AH 8) from east



Plate 7      Tircallan House (AH 9) from southeast



Plate 8      Outhouse at rear of Tircallan House (AH 9)

Plate 9      Not Used



Plate 10 AAP 5, from west



Plate 11 AAP 32, from east

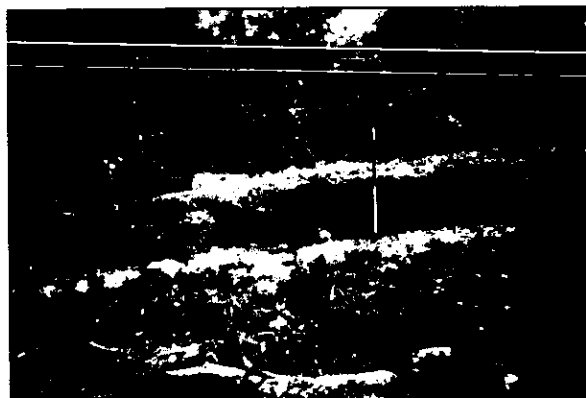


Plate 12 AAP 33, from east



Plate 13 AAP 36 from west

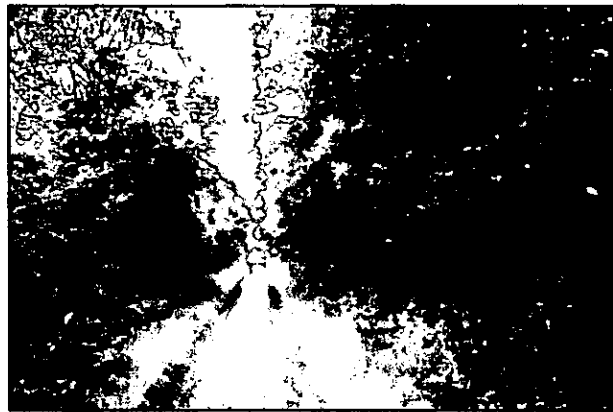


Plate 14 Looking west along AH 1 (disused railway line)  
in Mullandrait Townland



Plate 15 Level Crossing on AH 1 in Croghanagh  
Townland

Plate 16 Not Used



Plate 17 AAP 4 from southwest

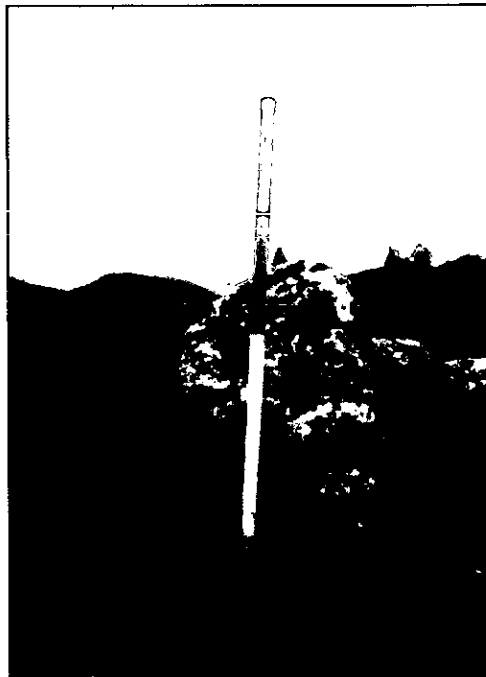


Plate 18 AAP 4 from east



Plate 19 South wall of AH 3 from north



Plate 20 AAP 6 from south



Plate 21 AAP 9 from south



Plate 22 AAP 15 from west



Plate 23      AAP 16, ('Fairy Well and Fairy Rock')  
from south



Plate 24      AH 5 from south





Plate 25 AAP 21 from south



Plate 26 AAP 23 from south



Plate 27 AAP 24 from east



Plate 28 AAP 30 from east

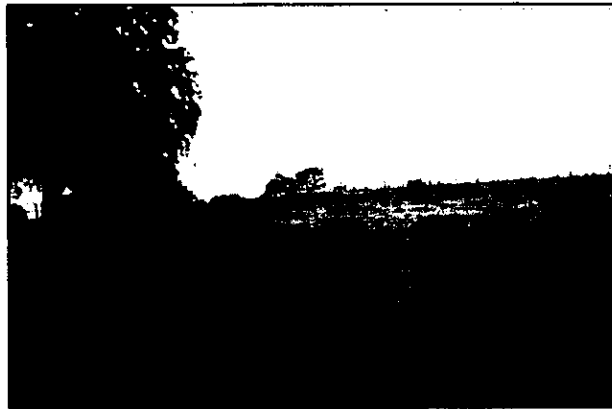


Plate 29 AAP 35 from southwest



Plate 30 AAP 38 from southeast

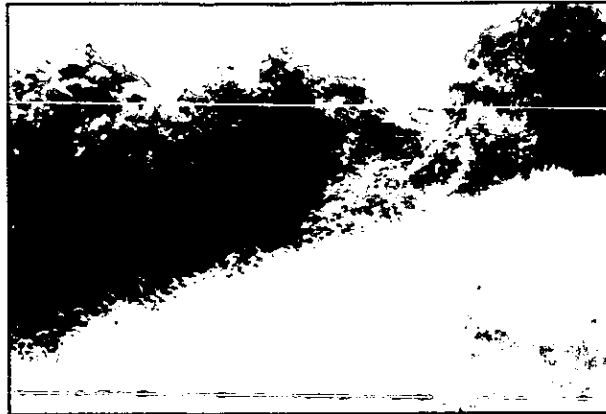


Plate 31 AAP 25 (River Finn Crossing), from northeast



Plate 32 AAP 31, Tircallan and Mullaghagarry  
townland boundary from northeast



Plate 33 AH8, Field boundary along W edge of  
estate facing SE



Plate 34 AH8, Field boundary at NW corner of estate  
facing NE

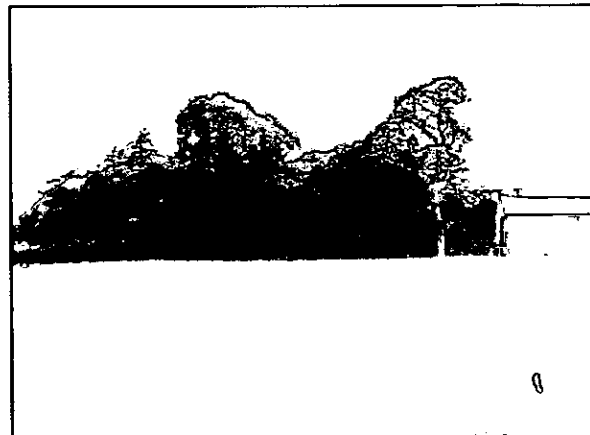


Plate 35 AH8, Field boundary to N of outbuildings, facing E



Plate 36 The site of RMP3, facing SE

**APPENDIX 11.1**  
**EXISTING AIR QUALITY**

## Existing Environment

Background air quality surveys were undertaken in 2002 and 2006 to measure pollutant concentrations at points along the existing N13/N15 and the Specimen Design.

### 2002 Survey Methodology

The 2002 survey was undertaken by ANV Technology. Short term monitoring was undertaken to gather data for NO<sub>2</sub> and PM<sub>10</sub>. NO<sub>2</sub> and PM<sub>10</sub> are significant pollutants associated with vehicle emissions. The main pollutant source in the area is believed to be vehicle emissions and domestic fires in the urban areas during wintertime. There were no power plants or significant industrial sources noted within the study area during the assessment period.

Monitoring was undertaken at five locations, three along the existing road (AQ3, AQ4 and AQ5) and two along the Specimen Design (AQ1 and AQ2) as shown below. The former sampling points were chosen to represent locations, which are currently likely to be exposed to vehicular emissions due to the existing road, while the latter points are in rural areas along the Specimen Design.

NO<sub>2</sub> was measured at 4 locations using Ogawa diffusive samplers (AQ1 – 4). These are pre-treated pads, which selectively absorb NO<sub>2</sub> on exposure. Laboratory analysis using UV spectroscopy was undertaken by RPS Laboratories, UK. The diffusive samplers were on-site over a five-week period from 29<sup>th</sup> October 2002 to 6<sup>th</sup> December 2002.

Monitoring of PM<sub>10</sub> was undertaken over a two-day period at two locations (AQ3 and AQ5) using a gravimetric method. Air is pumped through pre-weighed filters at a flow rate of 16.7l/min. The equipment used was a Rupprecht and Patashnick Partisol Model 2000 Air Sampler fitted with a PM<sub>10</sub> head, with United States Environmental Protection Agency (USEPA) Reference Method designation RFPS - 0694-098. Gravimetric analysis was performed on AND Analytical Balance GR-202, with resolution 0.01mg.

### Measurement Locations and Sampling

Label	Location	Parameters measured
AQ1	Meenglass crossroads (Chainage 6100)	NO <sub>2</sub>
AQ2	Trusk Road (Chainage 7800)	NO <sub>2</sub>
AQ3	Existing N15 at Mullandrait (approximately 300m from proposed Stranorlar Roundabout)	NO <sub>2</sub> , PM <sub>10</sub>
AQ4	N15 at Ballybofey at junction where Link Road joins existing road	NO <sub>2</sub>
AQ5	Existing N15 at Cappry	PM <sub>10</sub>

It should be noted that the short term monitoring carried out only provides an indication of the baseline pollutant levels. This is because pollutant levels vary throughout the year due to variations in meteorological conditions and source emissions.

## Survey Results

The measured average concentration levels of PM<sub>10</sub> and NO<sub>2</sub> are presented below. The NO<sub>2</sub> levels were similar to predicted levels. The concentration level of particulates was relatively high in the urban area, at locations AQ3 and AQ5. This was probably due to domestic fires. The air quality was good in the urban areas (AQ3 and AQ4) with respect to nitrogen dioxide.

### Measured Average Concentration Levels of PM<sub>10</sub> and NO<sub>2</sub> (2002)

Location	Description	Measured Average Concentration (µg/m <sup>3</sup> )	
		PM <sub>10</sub>	NO <sub>2</sub>
	Measurement period	2 days	5 weeks
AQ1	Meenglass	Not measured	4.4
AQ2	Trusk Road	Not measured	6.6
AQ3	N15 Mullandrait	75	13
AQ4	N15 Ballybofey	Not measured	13
AQ5	N15 Cappry	38	Not measured

## 2006 Survey Methodology and Results

The 2006 survey was undertaken and reported by Hyder Consulting. Air quality monitoring of NO<sub>2</sub> by diffusion tube was undertaken for five months from 8<sup>th</sup> August 2006, to 16<sup>th</sup> January 2007 at 11 locations along the existing N15. Both roadside and background locations were monitored to establish a general overview of the air quality within the vicinity of the existing N15. The monitoring was undertaken by means of NO<sub>2</sub> diffusion tube. This allows a relatively cheap and easy method for monitoring a wide area with a reasonable level of accuracy. The diffusion tubes were exposed to the ambient air at each site at approximately one-month intervals before being changed and collected. The tubes were then sent to an approved laboratory for analysis.

Results from the diffusion tube monitoring are presented in the table below. The location of the monitors is presented on Figure 11.1.

Tube Id	August	September	October	November	December	Average
DT1	13.7	9.4	13.8	10	7.1	10.8
DT2	15.9	13.9	Tube Missing	14.7	13.6	14.5
DT3	9.6	10.5	16.5	14.6	11.0	12.4
DT4	4.1	4.3	4.4	3.9	4.0	4.1
DT5	44	33.0	39.5	42.4	34.7	38.7
DT6	32.7	38.2	47.9	40.8	37.0	39.3

DT7	29.2	26.1	33.1	32.2	22.1	28.5
DT8	15.3	17.0	24.2	19.1	18.4	18.8
DT9	16.7	16.2	20.7	21.3	17.0	18.4
DT10	4.5	4.1	5.0	3.3	4.4	4.3
DT11	30.9	25.8	34.2	34.6	23.9	29.9

Air quality monitoring of PM<sub>10</sub> was undertaken for a number of months at two locations. However due to communication problems with the monitors data could only be retrieved from the monitors for 3 weeks and Site 1 (Located on the existing N15) and Site 2 (Located near to the Specimen Design). Site 1 was used to establish intermediate-roadside concentrations and Site 2 was used to establish background concentrations. Turnkey Osiris dust monitors were used to continuously measure dust, and in particular PM<sub>10</sub> concentrations. The Turnkey Osiris dust monitors measure dust levels through a light scattering technique using a photometer which gives simultaneous indication of the PM<sub>1</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and total suspended particle (TSP) mass fractions.

The monitored average PM<sub>10</sub> concentrations are presented in the table below.

Monitor Location	Monitoring Period	Average PM <sub>10</sub> Concentration
Site 1	13/11/06 – 03/12/06	16.0
Site 2	13/11/06 – 03/12/06	13.4

The monitoring data has been compared to the AQSR Standards and is presented on the Table below.

Objective Concentration (AQSR) 2004	Measured As	Number of exceedances Permitted (AQSR)	Number of Exceedances Recorded	
			Site 1 (Roadside)	Site 2 (Background)
50µg/m <sup>3</sup>	24-hour average Limit Value	35	0	0
30µg/m <sup>3</sup>	Upper Assessment Threshold	7	0	0
20µg/m <sup>3</sup>	Lower Assessment Threshold	7	6	2
Objective Concentration (AQSR) 2005	Measured As	PM <sub>10</sub> Pollutant Concentration		
		Site 1 (Intermediate-Roadside)	Site 2 (Background)	
40µg/m <sup>3</sup> (Annual Average)	Average Monitored	16	13.4	



**APPENDIX 11.2**  
**TRAFFIC FLOWS**

## Traffic Flows

### Traffic Flow Data incorporated in DMRB modelling

Do Nothing	AADT			%HGV	Type of road	Speed DM
	2006	2011	2026			
Existing N15 West of Meencrumlin	8400	9900	12700	10.0%	C	100
Existing N15: Meencrumlin - Cappry Road	8400	9900	12700	10.0%	C	80
Existing N15: Cappry Rd - Town Centre	13100	15500	19800	10.0%	B	50
Existing N15 Town Centre - R252 Junction	16900	20100	25700	10.0%	B	30
Existing N15 - R252 Junction - N13/N15 Junction	16800	19900	25500	10.0%	B	30
Existing N15 - N15/N13 Junction - Lifford Rd Roundabout Location	6800	7900	10100	10.0%	C	50
Existing N15 - East of Lifford Rd roundabout	6800	7900	10100	10.0%	C	100
Existing N13 - North of Kilross	9800	11500	14300	10.0%	C	100
Existing N13 - Kilross - N13/N15 Junction	11700	13800	17500	10.0%	C	50
Existing R252 - North to Town Centre	3500	4600	5800	10.0%	B	50
Cappry Road	3000	4200	5500	10.0%	C	50
Navenney/Edenmore Road	5200	6100	7800	10.0%	C	80
R236 east of Kilross Junction	3100	3900	5400	10.0%	C	80
<b>Do Something</b>						
Existing N15 West of Meencrumlin		9900	12700	10.0%	C	100
Existing N15 Meencrumlin - Cappry Road		1500	1700	10.0%	C	80
Existing N15 Cappry Rd - Town Centre		7100	9100	10.0%	B	50
Existing N15 Town Centre - R252 Junction		7500	8800	10.0%	B	30
Existing N15 - R252 Junction - N13/N15 Junction		7300	8600	10.0%	B	30
Existing N15 - N15/N13 Junction - Lifford Rd Roundabout Location		3000	4300	10.0%	C	50
Existing N15 - East of Lifford Rd roundabout		3500	5000	10.0%	C	100
Existing N13 - North of Kilross		11500	14900	10.0%	C	100
Existing N13 - Kilross - N13/N15 Junction		5000	6000	10.0%	C	50
Existing R252 - North to Town Centre		4600	5800	10.0%	B	50
Cappry Road		1200	1500	10.0%	C	50
Navenney/Edenmore Road		6100	7800	10.0%	C	80
R236 east of Kilross Junction		3600	4800	10.0%	C	80
Specimen Design (SD) - Meencrumlin - Link Rd Interchange		8400	10800	10.0%	A	100
SD - Link Rd Interchange - Lifford Rd Roundabout		12600	16900	10.0%	A	100
SD - Lifford Rd Roundabout - Kilross		9400	12400	10.0%	A	100
SD Link Road		7900	10800	10.0%	A	100

Routes which are shaded experience a change of less than 10% with the Specimen Design

**APPENDIX 11.3**

**OVERALL CHANGE ASSESSMENT**

## Overall Change Assessment

### Details in determination of Overall Change in Exposure

Pollutant	Link title	Link length, km	Properties within 50m	Emissions, kg/yr			Change in emission rate kg/km/yr	Change in Overall Exposure Index
				Do something	Do minimum	Difference		
Specimen Design								
NO <sub>x</sub>	Meencrumlin to Navenny	8.7	5	21,922	0	21,922	2520	12599
	Navenny to Lifford junction	2.85	1	10,623	0	10,623	3727	3727
	Lifford to Kilross	3.75	2	11,702	0	11,702	3120	6241
	Link road	1.2	12	2,681	0	2,681	2235	26815
PM <sub>10</sub>	Meencrumlin to Navenny	8.7	5	646	0	646	74	371
	Navenny to Lifford junction	2.85	1	313	0	313	110	110
	Lifford to Kilross	3.75	2	344	0	344	92	184
	Link road	1.2	12	82	0	82	69	825
Existing route								
NO <sub>x</sub>	Existing N15 to Cappry Rd	6.50	24	2,507	15,734	-13,226	-2035	-48836
	Existing Cappry rd to town centre	2.45	140	3,773	8,237	-4,464	-1822	-255076
	Existing N15 R252junction -N13/15 junction	1.65	112	915	2,749	-1,834	-1111	-124484
	Existing N15, N15/13 junction to Lifford roundabout	1.60	58	2,137	6,381	-4,243	-2652	-153810
	Existing N13, Kilross - N15/13 junction to route	4.20	35	1,261	2,548	-1,287	-306	-10726
PM <sub>10</sub>	Existing N15 to Cappry Rd	6.50	24	70	409	-339	-52	-1252
	Existing Cappry rd to town centre	2.45	140	101	221	-120	-49	-6851
	Existing N15 R252junction -N13/15 junction	1.65	112	29	87	-58	-35	-3962
	Existing N15, N15/13 junction to Lifford roundabout	1.60	58	64	196	-131	-82	-4763
	Existing N13, Kilross - N15/13 junction to route	4.20	35	37	71	-35	-8	-288

**APPENDIX 11.4**

**REGIONAL ASSESSMENT**

## Regional Assessment

The Regional Air Quality Assessment determined the overall impact on air quality in terms of the total annual emissions both with the bypass and for the "do minimum" scenario.

Total annual emissions of carbon (C), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), Total Hydrocarbons (THC) and fine particulate matter (PM<sub>10</sub>) were determined using traffic flow data and speed related emission data using the DMRB Stage 3 Methodology.

This procedure involved dividing the proposed and existing network into sections according to the characteristics of the traffic on the road i.e. where the traffic flow and speed are reasonably consistent. Where this was likely to be different on opposing carriageways, each carriageway was assessed separately. This is shown below.

The emissions of each pollutant were derived for each section, in terms of g/year, based on the distance, the traffic flow and the typical emission. The total emissions were obtained by summing the emissions for each road section. The total emissions for the proposed network and the do-minimum scenarios were compared to assess the regional air quality impact.

## Road Divisions and Effective Traffic Flows

Scenario	Route	Chainage / Description	Length (km)	Speed (kph)	AADT	AADT
					2011	2026
Do Something	Preliminary Design / North direction	0-8750	8.7	100	4200	5400
		8750-8800	0.05	30	4200	5400
		8800-11450	2.65	100	6300	8450
		11450-11550	0.1	60	6300	8450
		11550-11600	0.05	30	6300	8450
		Roundabout	0.05	30	10365	13760
		11700-15100	3.4	100	4700	6200
		15100-15400	0.3	100	5900	7150
	Preliminary Design / South direction	15400-15100	0.3	100	5900	7150
		15100-11850	3.25	100	5700	6200
		11850-11750	0.1	60	5700	6200
		11750-11700	0.05	30	5700	6200
		Roundabout	0.05	30	10365	13760
		11600-8800	2.8	100	6300	8450
		8800-8700	0.1	30	4200	5400
		8700-0	8.7	100	4200	5400
	Link 2-way	Link 2-way	0.05	30	7900	10800
		Link 2-way	0.1	30	7900	10800
		Link 2-way	1.08	100	7900	10800
	Existing N15 / 2-way	Ex N15 to Cappry Rd	6.00	90	1500	1700
		Ex N15 to Cappry Rd	0.50	30	1500	1700
		EX Cappry rd to town centre	2.00	50	7100	9100
		EX Cappry rd to town centre	0.45	30	7100	9100
		Ex N15 town centre-R252	0.15	30	7500	8800
		Ex N15 town centre-R252	0.30	20	7500	8800
		Ex N15 R252 junction -N13/15 junction	1.20	30	7300	8600
		Ex N15, N15/13 junction to Lifford roundabout	1.00	50	3000	4300
		Ex N15, N15/13 junction to Lifford roundabout	0.30	30	3000	4300
		Ex N15, N15/13 junction to Lifford roundabout	0.30	20	3000	4300
		Ex N13, Kilross - N15/13 junction to route	4.00	50	5000	6000
		Ex N13, Kilross - N15/13 junction to route	0.20	30	5000	6000

N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Scenario	Route	Description	Length km	Speed (kph)	AADT	AADT
					2011	2026
Do Minimum	Existing N15 / 2-way	Ex N15 to Cappry Rd	6.00	80	9900	12700
		Ex N15 to Cappry Rd	0.50	30	9900	12700
		EX Cappry rd to town centre	2.00	50	15500	19800
		EX Cappry rd to town centre	0.45	30	15500	19800
		Ex N15 town centre-R252	0.15	30	20100	25700
		Ex N15 town centre-R252	0.15	20	20100	25700
		Ex N15 town centre-R252	0.15	10	20100	25700
		Ex N15 R252 junction -N13/15 junction	1.00	30	19900	25500
		Ex N15 R252junction -N13/15 junction	0.20	10	19900	25500
		Ex N15, N15/13 junction to Lifford r'bout	1.00	50	7900	10100
		Ex N15, N15/13 junction to Lifford r'bout	0.30	30	7900	10100
		Ex N15, N15/13 junction to Lifford r'bout	0.30	20	7900	10100
		Ex N13, Kilross - N15/13 junction to route	4.00	50	13800	17500
		Ex N13, Kilross - N15/13 junction to route	0.20	30	13800	17500



## **APPENDIX 12.1**

### **Glossary of Terms**

<b>Acoustic barrier</b>	Solid walls or partitions, solid fences, earth mounds, buildings, etc used to reduce noise, without eliminating it.																		
<b>Ambient sound</b>	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.																		
<b>Assessment period</b>	The period in a day over which assessments are made.																		
<b>A-weighting</b>	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.																		
<b>Background noise</b>	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the $L_{90}$ noise level (see below).																		
<b>Broadband</b>	Containing the full range of frequencies.																		
<b>Decibel [dB]</b>	<p>The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound is heard.</p> <p>The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping.</p> <p>Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds;</p> <table> <tr> <td>Four engine jet aircraft at 100m</td><td>120 dB</td></tr> <tr> <td>Riveting of steel plate at 10m</td><td>105 dB</td></tr> <tr> <td>Pneumatic drill at 10m</td><td>90 dB</td></tr> <tr> <td>Circular wood saw at 10m</td><td>80 dB</td></tr> <tr> <td>Heavy road traffic at 10m</td><td>75 dB</td></tr> <tr> <td>Telephone bell at 10m</td><td>65 dB</td></tr> <tr> <td>Male speech, average at 10m</td><td>50 dB</td></tr> <tr> <td>Whisper at 10m</td><td>25 dB</td></tr> <tr> <td>Threshold of hearing, 1000 Hz</td><td>0 dB</td></tr> </table>	Four engine jet aircraft at 100m	120 dB	Riveting of steel plate at 10m	105 dB	Pneumatic drill at 10m	90 dB	Circular wood saw at 10m	80 dB	Heavy road traffic at 10m	75 dB	Telephone bell at 10m	65 dB	Male speech, average at 10m	50 dB	Whisper at 10m	25 dB	Threshold of hearing, 1000 Hz	0 dB
Four engine jet aircraft at 100m	120 dB																		
Riveting of steel plate at 10m	105 dB																		
Pneumatic drill at 10m	90 dB																		
Circular wood saw at 10m	80 dB																		
Heavy road traffic at 10m	75 dB																		
Telephone bell at 10m	65 dB																		
Male speech, average at 10m	50 dB																		
Whisper at 10m	25 dB																		
Threshold of hearing, 1000 Hz	0 dB																		
<b>dB(A): A-weighted decibels</b>	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.																		
<b>Do-Minimum</b>	Describes a scenario under which the road scheme that is under consideration does not proceed.																		
<b>Do-Something</b>	Describes a scenario under which the road scheme that is under consideration proceeds.																		
<b>Façade Noise Level</b>	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself.																		
<b>Free Field</b>	Free field noise levels are measured or predicted such that there is no contribution made up of reflections from nearby building façades.																		
<b>Heavy vehicle</b>	Heavy vehicles are assumed to be buses, rigid trucks and semi trailer trucks with a																		

weight greater than 3 tonnes. Also heavy vehicles can be defined in terms of length as buses, or trucks with a length exceeding 5.25 metres.

<b>L<sub>10</sub></b>	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
<b>L<sub>10,1-hour</sub></b>	The L <sub>10</sub> level measured over a 1-hour period.
<b>L<sub>10,18-hour</sub></b>	The arithmetic average of the L <sub>10,1-hour</sub> levels for the 18-hour period between 6 am and 12 midnight on a normal working day. It is a common traffic noise descriptor.
<b>L<sub>90</sub></b>	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L <sub>90</sub> noise level expressed in units of dB(A).
<b>L<sub>den</sub></b>	The day-evening-night composite noise indicator adopted by the EU for the purposes of assessing overall annoyance.
<b>L<sub>day</sub></b>	The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the day periods of a year.
<b>L<sub>evening</sub></b>	The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the evening periods of a year.
<b>L<sub>night</sub></b>	The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the night periods of a year.
<b>L<sub>eq</sub></b>	Equivalent sound pressure level - the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
<b>Loudness</b>	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is 400% times the loudness of a sound of 65 dB.
<b>Noise</b>	Sound which a listener does not wish to hear.
<b>Sound</b>	A fluctuation of air pressure which is propagated as a wave through air.
<b>Sound level meter</b>	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.

## **APPENDIX 12.2**

### **Noise Survey Results**

Full Measurement Results for Location 1 (dB)

Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
08/08/2006 16:00	48.2	80.0	35.6	47.5	39.3
08/08/2006 16:15	45.1	54.1	37.3	47.5	41.4
08/08/2006 16:30	44.9	54.3	37.9	47.2	40.8
08/08/2006 16:45	51.0	61.6	41.7	54.3	45.3
08/08/2006 17:00	51.0	60.2	40.8	54.1	45.4
08/08/2006 17:15	48.5	61.1	40.4	52.1	43.5
08/08/2006 17:30	45.7	58.8	37.4	49.1	40.9
08/08/2006 17:45	44.3	53.3	34.8	47.5	39.0
08/08/2006 18:00	44.9	58.5	37.3	47.7	40.7
08/08/2006 18:15	43.6	63.4	35.7	46.0	39.5
08/08/2006 18:30	48.0	59.0	39.3	51.4	42.0
08/08/2006 18:45	47.8	56.2	38.5	51.2	42.5
08/08/2006 19:00	46.5	55.7	37.6	49.3	41.2
08/08/2006 19:15	44.0	55.4	35.6	46.6	39.0
08/08/2006 19:30	45.5	53.2	37.0	48.6	40.6
08/08/2006 19:45	43.6	52.7	36.1	46.1	39.0
08/08/2006 20:00	41.1	48.1	34.3	43.5	37.4
08/08/2006 20:15	40.5	52.0	34.4	42.8	37.7
08/08/2006 20:30	40.7	54.6	33.9	43.4	36.1
08/08/2006 20:45	44.9	54.9	33.6	48.0	38.3
08/08/2006 21:00	44.0	59.2	34.7	46.5	37.8
08/08/2006 21:15	39.6	47.9	31.8	42.3	35.2
08/08/2006 21:30	43.0	52.9	34.9	45.4	38.2
08/08/2006 21:45	43.7	53.1	35.1	47.4	37.9
08/08/2006 22:00	43.1	52.6	34.4	46.3	38.0
08/08/2006 22:15	41.2	49.3	32.9	44.4	36.1
08/08/2006 22:30	45.6	55.6	36.6	48.7	39.8
08/08/2006 22:45	43.7	53.6	34.5	46.8	37.8
08/08/2006 23:00	46.0	55.9	35.6	49.3	39.2
08/08/2006 23:15	48.9	57.0	39.3	52.2	43.3
08/08/2006 23:30	44.6	55.1	35.4	48.0	38.8
08/08/2006 23:45	39.4	48.9	30.7	42.3	35.0
09/08/2006 00:00	35.6	45.3	29.4	38.5	31.4
09/08/2006 00:15	39.2	49.9	29.0	42.2	31.9
09/08/2006 00:30	35.4	49.7	25.5	38.9	28.0
09/08/2006 00:45	41.3	51.4	26.6	45.6	30.9

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Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
09/08/2006 01:00	40.1	49.2	32.2	43.3	34.9
09/08/2006 01:15	40.8	52.8	28.3	44.1	32.9
09/08/2006 01:30	33.2	46.1	21.4	36.9	24.0
09/08/2006 01:45	34.2	48.6	23.1	37.5	26.9
09/08/2006 02:00	40.8	53.6	26.9	44.0	29.3
09/08/2006 02:15	37.4	51.2	28.2	40.0	30.4
09/08/2006 02:30	38.1	48.3	28.1	41.6	31.4
09/08/2006 02:45	37.9	48.9	21.2	41.8	27.2
09/08/2006 03:00	34.7	48.3	21.1	37.8	26.9
09/08/2006 03:15	38.8	50.1	29.0	41.7	33.2
09/08/2006 03:30	42.8	55.5	33.2	45.4	35.8
09/08/2006 03:45	40.3	54.2	28.7	43.6	33.4
09/08/2006 04:00	39.5	52.9	28.1	42.9	31.3
09/08/2006 04:15	41.3	55.8	29.5	44.7	33.7
09/08/2006 04:30	42.3	61.6	28.6	43.5	33.7
09/08/2006 04:45	40.3	51.8	26.7	43.5	30.8
09/08/2006 05:00	43.1	55.2	32.0	46.5	35.8
09/08/2006 05:15	42.2	57.9	32.3	44.1	35.8
09/08/2006 05:30	42.1	60.2	29.3	44.2	34.6
09/08/2006 05:45	40.7	55.0	31.8	43.5	36.1
09/08/2006 06:00	46.6	62.0	31.1	49.5	38.0
09/08/2006 06:15	48.2	56.8	40.2	51.5	43.0
09/08/2006 06:30	50.5	62.7	38.7	53.9	42.9
09/08/2006 06:45	47.1	57.5	40.0	50.0	42.3
09/08/2006 07:00	44.7	54.7	38.3	46.8	40.6
09/08/2006 07:15	46.8	57.5	37.9	50.5	41.5
09/08/2006 07:30	49.4	63.1	40.6	53.5	42.8
09/08/2006 07:45	47.3	56.6	38.6	51.4	41.7
09/08/2006 08:00	50.0	61.9	39.4	52.7	42.9
09/08/2006 08:15	56.3	67.3	45.7	59.4	50.6
09/08/2006 08:30	48.3	63.7	38.7	51.3	42.0
09/08/2006 08:45	44.4	54.5	37.8	46.5	40.7
09/08/2006 09:00	42.8	51.0	35.2	45.1	39.3
09/08/2006 09:15	44.1	56.2	35.3	47.1	38.3
09/08/2006 09:30	49.1	62.3	38.9	52.4	42.0
09/08/2006 09:45	48.8	59.4	40.2	52.1	42.7
09/08/2006 10:00	51.0	61.5	40.0	54.4	43.7
09/08/2006 10:15	48.8	59.0	39.5	52.0	41.9

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Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
09/08/2006 10:30	51.9	63.7	40.3	55.6	44.3
09/08/2006 10:45	50.7	63.8	41.8	53.9	44.1
09/08/2006 11:00	50.3	61.2	42.5	52.9	45.8
09/08/2006 11:15	50.7	60.5	42.4	53.9	45.3
09/08/2006 11:30	48.5	55.5	41.4	51.3	44.2
09/08/2006 11:45	47.4	56.1	39.8	50.5	42.5
09/08/2006 12:00	50.2	61.7	41.7	53.9	44.2
09/08/2006 12:15	51.4	62.2	41.8	54.9	44.0
09/08/2006 12:30	53.5	66.3	38.8	57.7	42.7
09/08/2006 12:45	51.8	61.8	41.9	55.4	45.1
09/08/2006 13:00	50.9	60.2	42.0	54.2	45.0
09/08/2006 13:15	53.3	64.2	43.6	57.0	47.2
09/08/2006 13:30	54.9	65.7	44.5	58.3	48.0
09/08/2006 13:45	52.8	64.2	41.7	56.2	45.7
09/08/2006 14:00	52.6	62.2	42.9	55.5	46.1
09/08/2006 14:15	52.4	67.0	42.1	55.5	45.2
09/08/2006 14:30	52.6	66.2	41.4	56.6	44.5
09/08/2006 14:45	53.9	65.2	41.5	57.6	46.0
09/08/2006 15:00	51.5	61.1	39.7	55.3	44.9
09/08/2006 15:15	52.5	62.2	43.7	55.8	46.8
09/08/2006 15:30	53.1	62.3	40.7	56.8	45.2
09/08/2006 15:45	45.6	51.9	39.9	47.8	42.6

Full Measurement Results for Location 2 (dB)

Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
09/08/2006 18:00	43.9	65	35.5	46.1	38.1
09/08/2006 18:15	44.8	58.5	38.5	47.3	40.4
09/08/2006 18:30	49.8	69.5	34.3	46.8	37.9
09/08/2006 18:45	46.8	63.4	34.7	50.7	38
09/08/2006 19:00	50.2	69.4	37.1	49	40.1
09/08/2006 19:15	44.5	63	34.1	47.1	37.2
09/08/2006 19:30	42	59.5	34.8	43.5	37
09/08/2006 19:45	41.9	58.2	34.9	43.2	36.7
09/08/2006 20:00	40.4	55.4	34.1	42.2	36.1
09/08/2006 20:15	38.6	54.4	32.3	39.6	34.7
09/08/2006 20:30	41.2	61.6	33.6	43	35.6
09/08/2006 20:45	47.7	72.5	31.3	45.1	34.8

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Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
09/08/2006 21:00	47.1	74.9	32.7	45.3	34.8
09/08/2006 21:15	39.6	55.8	31.8	40.6	34.2
09/08/2006 21:30	38.8	56.6	31.4	38.8	33.6
09/08/2006 21:45	40.5	62.7	30.6	40.8	33.4
09/08/2006 22:00	40.2	60.3	31.2	39.3	33.7
09/08/2006 22:15	38.6	55.1	31.4	39.6	33.4
09/08/2006 22:30	39.8	59.8	31.6	40.9	34.5
09/08/2006 22:45	39.6	60.5	29.6	39.8	32.1
09/08/2006 23:00	40.2	60	31.2	40.3	33.7
09/08/2006 23:15	39.5	59.5	30.7	39.3	32.7
09/08/2006 23:30	38.6	59.1	27.6	36.7	30.4
09/08/2006 23:45	36.6	53.5	27.1	37.9	29.5
10/08/2006 00:00	35.6	47	28.9	38.2	32.3
10/08/2006 00:15	37.1	55.6	29.2	39.7	32.5
10/08/2006 00:30	37.6	58.4	30.5	39	32.6
10/08/2006 00:45	31.8	43.7	26.1	34	28.5
10/08/2006 01:00	30.4	40.5	25.4	32.6	27.5
10/08/2006 01:15	34	52.2	25	34.2	26.8
10/08/2006 01:30	33.6	56.6	24.3	31.2	26.4
10/08/2006 01:45	32.8	41.7	24.1	35.6	26.5
10/08/2006 02:00	34	45.4	28.5	36.5	30.5
10/08/2006 02:15	39.8	53.4	30.9	43.3	34.3
10/08/2006 02:30	36.9	48.5	30.9	39.3	33.2
10/08/2006 02:45	37.5	53.5	30.1	40.8	32
10/08/2006 03:00	36.1	47.2	27.5	40.2	30
10/08/2006 03:15	35.1	46.3	28.9	37.6	31.4
10/08/2006 03:30	35	51.9	29.4	37.5	31.4
10/08/2006 03:45	32.4	48	25.1	34.3	27.7
10/08/2006 04:00	31.2	40.8	25.2	34.4	27.1
10/08/2006 04:15	32.2	42.1	25.1	35.5	27.5
10/08/2006 04:30	30.4	41	25.1	33	27
10/08/2006 04:45	32.9	42.5	25.9	35.2	28.7
10/08/2006 05:00	31.6	42	26.5	34.3	28.4
10/08/2006 05:15	32	43.5	25.9	34.6	28.5
10/08/2006 05:30	32.6	51.1	24.3	35.8	26.3
10/08/2006 05:45	34.5	54.3	25.5	36.6	28
10/08/2006 06:00	35.9	54.8	25.2	37	28
10/08/2006 06:15	38.3	57.1	26.4	39.8	29.8



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Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
10/08/2006 06:30	36.1	51.8	29.2	38.2	31.6
10/08/2006 06:45	38.5	56.5	28.4	40.2	32.9
10/08/2006 07:00	42.2	59.6	31.4	41	33.7
10/08/2006 07:15	41.4	60.1	32.4	41.2	34.8
10/08/2006 07:30	42.1	58.9	33.1	42.8	37.1
10/08/2006 07:45	43	59.1	35.3	43.9	37.5
10/08/2006 08:00	43.7	58.3	35.9	46.5	38.4
10/08/2006 08:15	42.6	57.8	35.6	43.7	38.9
10/08/2006 08:30	42.9	59.5	35.7	44	38.3
10/08/2006 08:45	42.6	56.4	35.1	45.6	37.3
10/08/2006 09:00	50.2	68.8	34.7	46.2	37.7
10/08/2006 09:15	47.1	67.7	35.2	46.5	38.1
10/08/2006 09:30	45.7	73.1	33.7	47	37.2
10/08/2006 09:45	43.7	61.8	33	46.1	36.2
10/08/2006 10:00	40.4	58.2	33.1	41.6	36.1
10/08/2006 10:15	46.6	64.5	34.1	47.4	37.7
10/08/2006 10:30	43	63.1	35.1	44.1	38.1
10/08/2006 10:45	44.5	59.5	33.9	47.6	36.8
10/08/2006 11:00	45.1	64	33.8	44.7	37.3
10/08/2006 11:15	42.3	58.6	34.5	43.8	37.6
10/08/2006 11:30	42	57.6	33.6	44.2	37.1
10/08/2006 11:45	42.2	59	35	44.6	37.3
10/08/2006 12:00	47.4	72.1	35.4	46.3	37.9
10/08/2006 12:15	42.3	60	35.7	43.6	38
10/08/2006 12:30	43.3	61.3	35.7	45.1	38.4
10/08/2006 12:45	41.6	56	33.8	43.9	37
10/08/2006 13:00	43.6	65.7	33.4	46.2	36.1
10/08/2006 13:15	42.2	55.4	34.2	45.1	36.5
10/08/2006 13:30	44.6	65.6	35.2	47.4	37.9
10/08/2006 13:45	42.2	58.8	34.8	44.1	36.9
10/08/2006 14:00	41	57	34.3	42.1	36.8
10/08/2006 14:15	45.8	64.9	33.9	47.1	36.9
10/08/2006 14:30	41.8	57.6	33.2	44.1	36
10/08/2006 14:45	42.6	64.3	35.1	45.2	37.8
10/08/2006 15:00	41.8	53.4	35.6	44.1	37.9
10/08/2006 15:15	42.8	74.2	35.1	41.9	37.2
10/08/2006 15:30	41.9	58.1	35.3	44.3	37.8
10/08/2006 15:45	44.6	68.7	36.3	44.7	38.9

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Time Start (15 minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
10/08/2006 16:00	41.5	56.4	34.7	42.9	37.5
10/08/2006 16:15	41.9	55.6	36.3	43.7	38.4
10/08/2006 16:30	42.6	57.1	36.1	45.2	38.7
10/08/2006 16:45	44.7	63.3	35.2	44.6	37.6
10/08/2006 17:00	41.5	54.6	35	43	37.9
10/08/2006 17:15	40.9	64.3	34.3	43	36.7
10/08/2006 17:30	43	62.8	33.6	46.1	36.9
10/08/2006 17:45	42.2	60.3	34.8	44	37.7

Full Measurement Results for Location 3 (dB)

Time Start (15 Minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
08/08/2006 17:00	64.6	83.3	38.5	69.5	44.1
08/08/2006 17:15	64.9	81.2	38.1	69.8	43.7
08/08/2006 17:30	64.2	79.2	36.8	69.4	43.0
08/08/2006 17:45	64.3	80.2	37.9	69.2	42.9
08/08/2006 18:00	63.9	83.2	37.0	68.7	41.1
08/08/2006 18:15	63.6	82.4	36.2	68.6	42.2
08/08/2006 18:30	63.2	81.8	36.8	67.8	40.5
08/08/2006 18:45	63.0	81.2	37.2	67.8	40.2
08/08/2006 19:00	62.7	77.5	36.5	68.1	41.9
08/08/2006 19:15	62.5	81.1	36.1	67.4	40.8
08/08/2006 19:30	62.9	77.1	32.9	67.8	38.2
08/08/2006 19:45	62.6	77.7	36.0	67.6	40.7
08/08/2006 20:00	61.9	78.0	33.4	66.1	38.1
08/08/2006 20:15	60.9	80.4	32.2	64.4	36.5
08/08/2006 20:30	60.4	76.2	33.9	64.0	38.1
08/08/2006 20:45	61.2	80.9	32.7	65.5	36.5
08/08/2006 21:00	60.7	78.0	32.8	64.4	36.7
08/08/2006 21:15	61.2	78.7	31.1	64.7	37.7
08/08/2006 21:30	60.0	77.8	30.0	62.3	33.7
08/08/2006 21:45	60.1	74.7	32.6	63.8	36.2
08/08/2006 22:00	58.4	79.5	28.5	57.6	32.4
08/08/2006 22:15	58.9	79.7	27.1	59.3	32.1
08/08/2006 22:30	57.8	76.1	27.5	59.1	32.3
08/08/2006 22:45	59.8	81.4	28.4	60.9	32.4
08/08/2006 23:00	56.9	75.2	26.0	57.2	31.0
08/08/2006 23:15	56.5	76.4	25.6	56.3	29.1

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Time Start (15 Minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
08/08/2006 23:30	57.2	81.2	24.5	52.3	27.1
08/08/2006 23:45	53.6	73.4	23.2	50.5	27.3
09/08/2006 00:00	56.5	77.1	25.2	53.7	29.6
09/08/2006 00:15	54.6	76.7	25.5	51.0	28.1
09/08/2006 00:30	56.0	78.1	25.4	53.1	29.0
09/08/2006 00:45	52.7	75.3	23.9	48.7	26.0
09/08/2006 01:00	53.8	78.0	22.1	46.0	25.2
09/08/2006 01:15	54.8	78.0	24.4	46.3	26.7
09/08/2006 01:30	52.0	76.8	21.1	44.0	25.0
09/08/2006 01:45	54.0	79.4	21.1	43.7	22.4
09/08/2006 02:00	28.3	48.9	21.6	28.2	23.0
09/08/2006 02:15	52.0	79.4	23.6	37.1	25.3
09/08/2006 02:30	55.0	81.2	23.2	47.4	25.2
09/08/2006 02:45	53.8	78.4	22.3	43.9	25.3
09/08/2006 03:00	28.4	41.9	22.3	31.9	24.1
09/08/2006 03:15	55.9	79.8	24.1	46.8	25.9
09/08/2006 03:30	50.0	74.9	25.9	42.0	27.2
09/08/2006 03:45	50.7	75.8	26.4	38.4	28.9
09/08/2006 04:00	57.8	78.9	26.0	51.9	29.5
09/08/2006 04:15	50.7	75.8	23.5	37.3	25.6
09/08/2006 04:30	57.9	80.4	26.7	52.8	29.4
09/08/2006 04:45	57.9	81.4	24.8	51.8	27.6
09/08/2006 05:00	57.7	82.8	26.8	50.6	29.7
09/08/2006 05:15	59.3	80.9	27.1	58.0	31.2
09/08/2006 05:30	60.9	81.7	29.9	61.2	33.2
09/08/2006 05:45	60.5	78.8	30.1	60.6	33.3
09/08/2006 06:00	60.8	81.8	29.7	62.2	35.3
09/08/2006 06:15	63.2	81.0	31.0	66.8	37.8
09/08/2006 06:30	64.1	80.9	36.2	68.6	42.7
09/08/2006 06:45	63.4	79.9	35.7	68.5	41.3
09/08/2006 07:00	64.4	82.2	36.1	69.5	41.6
09/08/2006 07:15	65.1	89.5	36.3	68.9	41.5
09/08/2006 07:30	63.4	82.8	37.7	67.7	41.6
09/08/2006 07:45	64.5	79.2	40.1	69.5	45.3
09/08/2006 08:00	63.9	81.2	38.8	69.2	43.6
09/08/2006 08:15	62.8	77.7	37.7	67.9	40.8
09/08/2006 08:30	63.8	83.0	37.4	68.1	44.3
09/08/2006 08:45	62.6	76.8	36.5	67.9	42.4

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Time Start (15 Minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
09/08/2006 09:00	63.2	80.3	38.7	67.9	43.9
09/08/2006 09:15	63.5	80.1	37.6	68.0	41.9
09/08/2006 09:30	63.7	80.5	37.8	68.6	41.8
09/08/2006 09:45	64.2	79.2	37.6	69.0	42.8
09/08/2006 10:00	65.2	85.0	39.6	69.4	45.2
09/08/2006 10:15	64.9	82.6	41.1	69.4	45.9
09/08/2006 10:30	64.9	79.4	41.4	69.5	44.7
09/08/2006 10:45	64.1	78.3	41.1	69.3	45.6
09/08/2006 11:00	63.4	79.1	40.7	68.3	46.8
09/08/2006 11:15	65.4	80.7	40.2	70.1	46.7
09/08/2006 11:30	64.6	81.4	41.7	69.7	45.6
09/08/2006 11:45	64.2	81.0	37.6	69.2	43.9
09/08/2006 12:00	63.8	79.4	38.9	68.8	44.3
09/08/2006 12:15	64.2	80.3	38.6	69.2	43.5
09/08/2006 12:30	63.8	79.9	41.5	68.8	47.1
09/08/2006 12:45	65.2	82.9	41.9	69.6	47.1
09/08/2006 13:00	64.2	82.3	39.6	68.7	45.7
09/08/2006 13:15	64.3	80.9	42.5	68.8	48.3
09/08/2006 13:30	64.1	82.0	44.8	68.9	47.9
09/08/2006 13:45	65.3	80.9	43.4	69.8	49.2
09/08/2006 14:00	65.3	79.6	41.7	69.9	48.0
09/08/2006 14:15	65.4	81.9	39.6	70.5	45.7
09/08/2006 14:30	65.2	79.6	42.1	70.1	47.8
09/08/2006 14:45	65.1	82.3	42.5	69.8	47.4
09/08/2006 15:00	63.9	81.4	40.6	68.8	45.2
09/08/2006 15:15	64.7	78.7	42.2	69.6	47.3
09/08/2006 15:30	64.8	80.8	41.2	69.7	46.1
09/08/2006 15:45	63.9	78.1	39.6	68.8	43.6
09/08/2006 16:00	65.3	83.3	40.9	70.2	46.1
09/08/2006 16:15	65.2	82.4	39.3	69.9	47.5
09/08/2006 16:30	65.7	83.4	42.0	70.2	47.6
09/08/2006 16:45	64.7	78.3	41.0	69.5	46.4

Full Measurement Results for Location A (dB)

Time Start (15 Minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
08/08/2006 11:15	74.8	90.8	41.5	79.5	48.4
08/08/2006 12:45	74.1	88.3	41.8	79.4	48.1
08/08/2006 13:00	73.9	93.2	41.7	78.6	47.2
Average	74.3	-	-	79.2	47.9

Full Measurement Results for Location B (dB)

Time Start (15 Minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
08/08/2006 11:45	67.5	78.8	51.6	70.3	61.6
08/08/2006 12:00	66.1	78.4	47.9	69.1	57.8
08/08/2006 13:30	66.6	77.3	48.0	69.8	58.4
Average	66.7	-	-	69.7	59.3

Full Measurement Results for Location C (dB)

Time Start (15 Minute Duration)	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
09/08/2006 10:40	69.8	85.0	43.7	74.7	50.0
09/08/2006 11:00	70.7	87.9	45.7	75.1	50.7
09/08/2006 12:00	68.8	81.9	40.2	74.1	48.4
Average	69.8	-	-	74.6	49.7

**APPENDIX 12.3**  
**CALCULATED TRAFFIC NOISE LEVELS**

**Table A - Results of Traffic Noise Calculations at Receiver Locations along Existing N13/N15 Corridor**

\* Where appropriate, the predicted noise levels with the implementation of mitigation are quoted in brackets.

# indicates that receiver represents single storey building – calculation height is therefore 1.5m above ground.

^ indicates a receptor that is inadvertently affected by nearby noise mitigation. Where there is a change in the predicted level the new level is indicated in brackets.

Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
1	67.0	66.6		68.0	67.5	
6	61.1	54.2		62.1	54.7	
7	63.2	55.5		64.1	56.0	
8	70.2	61.5		71.1	62.3	
9	66.7	59.1		67.6	59.6	
10	67.5	59.6		68.5	60.3	
11	71.0	61.9		71.9	62.7	
12	54.3	49.5		55.2	50.2	
13	67.7	59.6		68.6	60.3	
14	71.9	62.9		73.0	63.8	
15	67.8	61.2		68.7	62.0	
16	71.8	64.5		72.8	65.4	
17	65.4	57.7		66.3	58.2	
18	68.7	65.2		69.8	66.1	
19	68.5	65.4		69.5	66.4	
20	71.2	68.0		72.2	69.0	
21	67.6	64.4		68.6	65.5	
22	67.0	63.9		68.1	65.0	
23	70.0	66.8		71.0	67.8	
24	59.3	56.4		60.4	57.5	
25	58.2	55.4		59.2	56.4	
26	73.1	69.9		74.1	70.9	
27	71.0	67.8		72.0	68.8	
28	70.0	66.8		71.0	67.8	
29	55.5	52.5		56.5	53.5	
30	55.4	52.4		56.4	53.4	

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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
31	54.1	51.1		54.1	51.1	
32	53.0	50.0		71.1	68.0	
33	70.1	67.0		68.0	64.8	
34	67.0	63.8		59.0	56.2	
35	57.9	55.2		73.6	70.4	
36	72.6	69.4		61.4	58.5	
37	60.4	57.5		54.3	51.4	
38	53.2	50.4		53.3	50.5	
39	52.3	49.6		54.3	51.1	
40	53.2	50.0		52.4	49.4	
41	51.4	48.3		51.6	48.6	
42	50.6	47.6		51.4	48.2	
43	50.3	47.2		63.7	60.5	
44	62.6	59.4		61.9	58.8	
45	60.8	57.7		60.0	56.9	
46	59.0	55.9		67.7	64.5	
47	66.7	63.5		70.5	67.3	
48	69.5	66.3		69.2	66.0	
49	68.2	65.0		72.6	69.4	
50	71.6	68.4		67.5	64.3	
51	66.5	63.3		70.9	67.7	
52	69.9	66.7		70.6	67.4	
53	69.6	66.4		70.0	66.8	
54	68.9	65.7		71.2	68.1	
55	70.2	67.0		74.9	71.7	
56	73.8	70.6		69.8	66.6	
57	68.7	65.5		60.0	56.8	
58	59.0	55.8		68.7	65.5	
59	67.7	64.5		58.2	55.2	
60	57.2	54.2		70.6	67.4	
61	69.6	66.4		71.4	68.2	
62	70.3	67.1		71.3	68.1	
63	70.2	67.0		73.5	70.3	
64	72.5	69.3		66.9	63.7	



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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
65	65.8	62.6		66.7	63.5	
66	63.7	60.5		64.7	61.5	
67	66.7	63.5		67.7	64.5	
68	73.2	70.0		74.2	71.0	
69	68.0	64.8		69.0	65.8	
70	54.9	51.7		56.0	52.8	
71	74.3	71.1		75.3	72.1	
72	71.7	68.6		72.7	69.6	
73	72.4	69.3		73.4	70.2	
74	70.9	67.7		71.9	68.7	
75	56.8	54.0		57.8	55.0	
76	58.8	55.5		59.8	56.1	
77	66.6	63.5		67.6	64.2	
78	74.7	70.8		75.7	71.4	
79	57.9	55.7		59.0	56.5	
80	74.9	71.0		75.9	71.6	
81	75.3	71.5		76.4	72.0	
82	66.1	62.3		67.1	62.8	
83	76.1	72.1		77.1	72.7	
84	56.7	53.2		57.7	54.0	
85	76.1	72.1		77.1	72.7	
86	76.1	72.1		77.1	72.7	
87	76.4	72.5		77.5	73.1	
88	58.0	54.1		59.1	54.6	
89	76.1	72.1		77.1	72.7	
90	53.0	50.1		54.1	50.9	
91	60.1	56.3		61.1	56.9	
92	57.7	54.1		58.8	54.6	
93	70.2	66.3		71.3	66.9	
94	54.7	51.4		55.8	52.0	
95	76.1	71.9		77.1	72.6	
96	75.7	71.6		76.7	72.2	
97	75.0	71.1		76.1	71.7	
98	75.4	71.4		76.4	71.9	

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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
99	74.5	70.3		75.5	71.0	
100	75.9	71.8		76.9	72.5	
101	51.9	48.6		52.9	49.3	
102	54.1	49.9		55.1	50.6	
103	65.1	60.9		66.1	61.6	
104	75.4	71.3		76.4	71.9	
105	53.7	50.2		54.7	50.9	
106	73.2	69.0		74.2	69.7	
107	72.7	68.6		73.7	69.2	
108	71.9	67.8		73.0	68.5	
109	64.1	60.0		65.2	60.7	
110	72.5	68.4		73.5	69.0	
111	62.0	57.8		63.0	58.5	
112	72.6	68.5		73.6	69.1	
113	68.0	63.9		69.0	64.5	
114	71.6	67.4		72.6	68.1	
115	70.1	65.9		71.1	66.6	
116	70.1	65.9		71.1	66.6	
117	74.5	70.3		75.5	71.0	
118	74.2	70.1		75.2	70.7	
119	74.0	69.9		75.0	70.5	
120	64.0	59.9		65.1	60.6	
121	69.7	65.5		70.7	66.2	
122	53.4	49.6		54.5	50.2	
123	57.8	53.8		58.9	54.5	
124	75.0	70.9		76.1	71.6	
125	71.5	67.3		72.5	68.0	
126	75.3	71.2		76.4	71.8	
127	56.7	52.6		57.7	53.2	
128	73.5	69.4		74.6	70.1	
129	74.9	70.7		75.9	71.4	
130	70.6	66.5		71.7	67.1	
131	74.4	70.3		75.4	71.1	
132	72.7	68.6		73.7	69.3	

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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
133	75.5	71.4		76.5	72.0	
134	57.9	53.8		59.0	54.5	
135	54.5	50.5		55.6	51.5	
136	69.3	65.3		70.2	66.8	
137	67.8	63.8		68.7	65.3	
138	67.0	63.0		68.0	64.5	
139	65.0	61.0		65.9	62.4	
140	51.5	47.6		52.5	48.8	
141	67.1	63.1		68.1	64.6	
142	66.6	62.6		67.5	64.1	
143	68.4	64.3		69.3	65.8	
144	62.3	58.5		63.3	59.9	
145	70.5	66.5		71.5	68.0	
146	70.6	66.7		71.6	68.2	
147	67.0	63.1		67.9	64.6	
148	63.9	60.0		64.9	61.4	
149	52.2	48.2		53.1	49.7	
150	56.1	52.9		57.1	54.4	
151	70.0	66.0		70.9	67.5	
152	63.2	59.6		64.1	61.0	
153	70.0	65.9		70.9	67.4	
154	54.5	54.6		55.5	56.0	
155	62.3	58.5		63.3	59.9	
156	56.3	56.0		57.3	57.2	
157	59.2	58.2		60.1	59.5	
158	68.3	62.0		69.2	63.2	
160	66.6	64.1		67.5	65.2	
161	65.4	65.0		66.3	66.0	
162	65.4	65.7		66.3	66.8	
163	56.8	58.3		57.7	59.4	
164	70.1	70.3		71.0	71.4	
165	63.7	63.9		64.6	65.0	
166	54.6	55.2		55.6	56.2	
167	57.5	57.9		58.4	59.0	

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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
168	70.2	70.5		71.2	71.6	
169	55.2	55.6		56.1	56.6	
170	59.3	59.6		60.3	60.7	
171	71.0	71.5		71.9	72.5	
172	63.3	61.6		64.2	62.6	
173	54.6	54.9		55.6	56.0	
174	46.3	46.6		47.2	47.6	
175	43.5	42.8		44.4	43.8	
176	71.3	67.2		72.2	68.6	
177	73.7	69.6		74.7	70.3	
178	71.0	66.9		71.9	67.6	
179	65.9	61.8		66.9	62.5	
180	66.1	62.0		67.0	62.7	
181	73.2	69.0		74.1	69.8	
182	69.8	65.6		70.7	66.4	
183	71.8	67.7		72.8	68.5	
184	68.6	64.5		69.6	65.3	
185	68.9	64.8		69.9	65.5	
186	70.2	66.0		71.1	66.8	
187	59.4	55.3		60.4	56.1	
188	55.1	51.0		56.1	51.6	
189	59.1	54.9		60.1	55.6	
190	60.9	56.8		61.9	57.6	
191	70.1	65.9		71.0	66.7	
192	68.6	64.4		69.5	65.2	
193	67.5	63.4		68.5	64.1	
194	65.0	60.8		65.9	61.6	
195	67.9	63.8		68.8	64.5	
196	57.6	53.4		58.5	54.2	
197	61.2	57.1		62.2	57.8	
198	70.1	65.9		71.0	66.7	
199	61.8	57.6		62.7	58.4	
200	67.2	63.1		68.2	63.9	
201	54.6	50.5		55.6	51.3	

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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
202	63.9	59.8		64.9	60.6	
203	65.3	61.1		66.2	61.9	
204	69.2	65.1		70.2	65.8	
205	65.7	61.6		66.7	62.3	
206	62.6	58.5		63.6	59.2	
207	63.8	59.6		64.7	60.4	
208	62.7	58.6		63.7	59.3	
209	67.1	63.0		68.1	63.8	
210	55.5	51.4		56.4	52.1	
211	60.1	56.0		61.0	56.7	
212	64.8	60.7		65.7	61.4	
213	62.9	58.8		63.9	59.5	
214	59.9	55.8		60.8	56.5	
215	68.9	64.8		69.9	65.5	
216	59.7	55.6		60.7	56.3	
217	47.8	43.8		48.7	44.6	
218	66.5	62.3		67.4	63.1	
219	57.0	52.9		57.9	53.7	
220	65.0	60.9		65.9	61.7	
221	51.3	47.1		52.2	47.9	
222	64.6	60.5		65.5	61.2	
223	65.1	61.0		66.0	61.9	
224	58.8	54.7		59.7	55.5	
225	65.6	61.6		66.6	62.4	
226	58.1	54.1		59.1	54.8	
227	51.4	47.4		52.3	48.2	
228	51.7	48.4		52.7	49.3	
229	53.7	49.6		54.6	50.3	
230	46.3	42.0		47.2	42.7	
231	54.0	50.1		54.9	50.9	
232	54.0	50.7		54.9	51.5	
233	59.0	55.0		59.9	55.8	
234	71.8	67.7		72.8	68.5	
235	53.6	50.7		54.5	51.6	

N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required? *	Predicted Noise Levels, dB		Mitigation Required? *
	Do - Minimum	Do -Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
236	56.7	52.8		57.6	53.6	
237	66.6	62.5		67.5	63.4	
238	67.0	63.0		68.0	63.8	
239	62.2	58.2		63.1	59.0	
240	67.6	63.8		68.6	64.5	
241	59.5	56.3		60.5	57.2	
242	68.4	65.3		69.3	66.0	
243	55.3	54.7		56.2	55.8	
244	69.1	64.0		70.1	64.8	
245	66.0	61.2		67.0	62.1	
246	62.3	59.2		63.3	60.1	
247	60.6	57.8		61.5	58.7	
248	59.6	56.2		60.6	57.2	
249	60.1	57.0		61.0	58.0	
250	69.1	61.0		70.1	62.0	
251	66.9	64.2		67.8	65.2	
252	59.0	56.1		59.9	57.1	
253	55.7	62.8		56.6	63.8	
254	51.9	50.1		52.9	51.2	
379	50.6	54.5		51.5	55.5	
380	48.4	53.6		49.4	54.6	
393	70.1	65.5		71.0	66.4	

**Table B - Results of Traffic Noise Calculations at Receiver Locations along the Preliminary Design**

\*Where appropriate, the predicted noise levels with the implementation of mitigation are quoted in brackets.

# indicates that noise level has been calculated at a height of 1.5m above ground (i.e. building is single storey).

^ indicates a receptor that is inadvertently affected by nearby noise mitigation. Where there is a change in the predicted level the new level is indicated in brackets.

Do-Minimum noise levels for properties in the study area more than 300m from roads in the Do-Minimum model a minimum noise level of 45dB  $L_{den}$  has been assumed at these locations based upon the noise survey data. These receptors are highlighted in **BOLD**

Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required?	Predicted Noise Levels, dB		Mitigation Required?
	Do - Minimum	Do - Something		Do -Minimum	Do -Something	
	$L_{den}$	$L_{den}$		$L_{den}$	$L_{den}$	
256	3.5	57.6		3.5	58.7	
258#	27.2	57.6		28.1	58.7	
260	51.4	54.4		52.3	55.4	
261	<b>45.0</b>	55.8	^ ( 55.9 )	45.0	56.8	^ ( 56.9 )
262	<b>45.0</b>	66.1	YES ( 58.9 )	45.0	67.1	YES ( 59.9 )
263	<b>45.0</b>	57.9	^ ( 58.1 )	45.0	59.0	^ ( 59.2 )
264	<b>45.0</b>	60.3		45.0	61.3	YES ( 59.0 )
265	<b>45.0</b>	60.8	YES ( 57.7 )	45.0	61.9	YES ( 58.8 )
266	<b>45.0</b>	58.4	^ ( 58.5 )	45.0	59.4	^ ( 59.5 )
267	<b>45.0</b>	53.8		45.0	54.8	
268	<b>45.0</b>	59.2		45.0	60.2	
269	<b>45.0</b>	60.8	YES ( 58.7 )	45.0	61.8	YES ( 59.7 )
271	<b>45.0</b>	52.8		45.0	53.8	
272	<b>45.0</b>	51.1		45.0	52.1	
273	<b>45.0</b>	53.6		45.0	54.6	
274	<b>45.0</b>	52.4		45.0	53.4	
276	<b>45.0</b>	60.7	YES ( 58.4 )	45.0	61.7	YES ( 59.4 )
277	<b>45.0</b>	60.5	YES ( 58.7 )	45.0	61.5	YES ( 59.7 )
278	<b>45.0</b>	56.2	^ ( 56.5 )	45.0	57.3	^ ( 57.6 )
279	<b>45.0</b>	55.3	^ ( 55.8 )	45.0	56.3	^ ( 56.8 )
280	<b>45.0</b>	55.8	^ ( 56.4 )	45.0	56.8	^ ( 57.5 )
281	<b>45.0</b>	54.0	^ ( 54.2 )	45.0	55.0	^ ( 55.2 )
282	<b>45.0</b>	53.3	^ ( 53.7 )	45.0	54.4	^ ( 54.7 )
283	<b>45.0</b>	54.0		45.0	55.0	
284	<b>45.0</b>	54.7		45.0	55.8	
285	<b>45.0</b>	55.4		45.0	56.4	

N13/N15 Ballybofey/Stranorlar Bypass  
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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required?	Predicted Noise Levels, dB		Mitigation Required?
	Do - Minimum	Do - Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
286	45.0	54.2		45.0	55.2	
287	45.0	50.2		45.0	51.3	
288	45.0	60.6	YES ( 58.6 )	45.0	61.6	YES ( 59.6 )
289#	45.0	61.3	YES ( 58.9 )	45.0	62.3	YES ( 59.9 )
290	45.0	58.8		45.0	59.8	
291	45.0	60.5	YES ( 59.2 )	45.0	61.5	YES ( 60.2 )
292	45.0	53.2		45.0	54.3	
293#	45.0	60.6	YES ( 55.4 )	45.0	61.6	YES ( 56.4 )
294	45.0	53.6	^ ( 53.9 )	45.0	54.6	^ ( 54.9 )
295	45.0	58.3		45.0	59.3	
296	45.0	56.0		45.0	57.0	
297	45.0	53.0		45.0	54.1	
298	45.0	52.9		45.0	54.0	
299	45.0	51.8		45.0	52.9	
301	45.0	53.0		45.0	54.1	
302	45.0	59.2		45.0	60.2	^ ( 60.3 )
303	45.0	55.6	^ ( 55.8 )	45.0	56.6	^ ( 56.8 )
304	45.0	60.6	YES ( 59.1 )	45.0	61.6	YES ( 60.1 )
305#	45.0	56.4	^ ( 56.8 )	45.0	57.6	^ ( 57.8 )
306#	45.0	57.3	^ ( 58.1 )	45.0	58.3	^ ( 59.2 )
307	45.0	59.2		45.0	60.2	
308	45.0	59.5		45.0	60.7	YES ( 58.1 )
309	45.0	55.1	^ ( 55.6 )	45.0	56.1	^ ( 56.6 )
310	45.0	58.1		45.0	59.2	
311	45.0	51.2		45.0	52.3	
312	45.0	54.6	^ ( 54.8 )	45.0	55.8	^ ( 55.9 )
313	45.0	53.4		45.0	54.5	
314	45.0	53.3	^ ( 53.4 )	45.0	54.5	
315	45.0	53.7		45.0	54.8	
316#	47.7	61.0	YES ( 54.8 )	48.7	62.3	YES ( 56.1 )
317	51.6	68.2	YES ( 58.9 )	52.7	69.4	YES ( 60.1 )
318	51.8	63.6	YES ( 58.9 )	52.9	64.8	YES ( 60.1 )
319	44.1	57.2		45.1	58.4	
320#	47.0	62.4	YES ( 59.2 )	48.1	63.7	YES ( 60.4 )
321	37.1	58.7		38.1	59.9	



N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required?	Predicted Noise Levels, dB		Mitigation Required?
	Do - Minimum	Do - Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
322	45.0	58.7		45.0	59.9	
323	45.0	55.3		45.0	56.5	
324	45.0	67.6	YES ( 58.9 )	45.0	68.8	YES ( 60.1 )
325	45.0	57.1		45.0	58.3	
326	45.0	59.8		45.0	61.0	YES ( 60.3 )
327	45.0	54.9		45.0	56.1	
328	43.2	54.0	^ ( 54.3 )	44.2	55.2	^ ( 55.5 )
329	45.0	54.5		45.0	55.7	
330	45.0	50.7		45.0	51.8	
331	45.0	54.0		45.0	55.2	
332	45.0	54.2		45.0	55.4	
333	45.0	55.1		45.0	56.3	
334	45.0	52.6	^ ( 52.7 )	45.0	53.8	
335	45.0	53.8	^ ( 54.2 )	45.0	55.0	^ ( 55.4 )
336	45.0	58.2	^ ( 58.6 )	45.0	59.4	^ ( 59.8 )
337	45.0	54.3	^ ( 54.9 )	45.0	55.5	^ ( 56.1 )
338#	45.0	58.2		45.0	59.4	
339	45.0	61.1	YES ( 58.3 )	45.0	62.3	YES ( 59.5 )
340	45.0	52.7	^ ( 52.9 )	45.0	53.9	^ ( 54.1 )
341	45.0	52.7	^ ( 52.9 )	45.0	53.9	^ ( 54.1 )
342	45.0	54.6	^ ( 54.7 )	45.0	55.9	^ ( 56.0 )
343	45.0	56.3	^ ( 56.4 )	45.0	57.6	^ ( 57.6 )
344	45.0	57.9		45.0	59.2	
345	45.0	58.3		45.0	59.5	
346	45.0	53.9		45.0	55.1	
347	45.0	62.7	YES ( 58.3 )	45.0	63.9	YES ( 59.5 )
348#	45.0	60.0		45.0	61.2	YES ( 57.3 )
349	45.0	55.1		45.0	56.3	
350	45.0	58.1		45.0	59.3	
351	45.0	57.6		45.0	58.9	
352#	45.0	62.0	YES ( 57.9 )	45.0	63.2	YES ( 59.1 )
353	45.0	57.6	^ ( 58.1 )	45.0	58.8	^ ( 59.3 )
354	45.0	55.0		45.0	56.2	
355	45.0	55.3	^ ( 55.5 )	45.0	56.5	^ ( 56.7 )
356	45.0	51.1		45.0	52.3	

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Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required?	Predicted Noise Levels, dB		Mitigation Required?
	Do - Minimum	Do - Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
357	45.0	53.3		45.0	54.5	
358	45.0	61.1	YES ( 58.2 )	45.0	62.3	YES ( 59.4 )
359	45.0	58.3		45.0	59.5	
361	56.9	62.0	YES ( 58.7 )	57.8	63.1	YES ( 59.8 )
362	50.7	58.5	^ ( 58.8 )	51.6	59.6	^ ( 59.9 )
363	47.7	56.7	^ ( 56.9 )	48.6	57.8	^ ( 58.0 )
364	45.0	53.6	^ ( 53.7 )	45.0	54.7	^ ( 54.8 )
365	45.0	52.7	^ ( 52.8 )	45.0	53.8	^ ( 53.9 )
366	45.0	54.8		45.0	56.0	
367	45.0	54.5		45.0	55.6	
368	45.0	53.5		45.0	54.6	
369	45.0	60.0		45.0	61.1	YES ( 59.2 )
370	45.0	51.8	^ ( 52.1 )	45.0	52.9	^ ( 53.2 )
371	45.0	52.2		45.0	53.3	
372	45.0	56.8		45.0	57.9	
373	45.0	57.1		45.0	58.2	
374	45.0	57.7		45.0	58.9	
375	44.7	54.2		45.6	55.3	
376	48.2	59.2		49.1	60.4	
377#	49.5	60.5	YES ( 59.0 )	50.4	61.6	YES ( 60.1 )
378#	50.2	59.5		51.2	60.7	YES ( 59.7 )
381	55.9	57.3		56.8	58.6	
382	45.0	64.0	YES ( 59.2 )	45.0	65.1	YES ( 60.2 )
383	45.0	63.4	YES ( 58.8 )	45.0	64.6	YES ( 60.0 )
384	46.3	63.1	YES ( 58.9 )	47.3	64.3	YES ( 60.0 )
385	45.0	61.8	YES ( 58.4 )	45.0	63.0	YES ( 59.6 )
386#	45.0	56.5		45.0	57.7	
387#	45.0	53.8	^ ( 53.9 )	45.0	55.0	^ ( 55.1 )
388	45.0	58.7		45.0	59.7	
389	45.0	53.6		45.0	54.6	
390	45.0	62.7	YES ( 59.1 )	45.0	63.8	YES ( 60.1 )
391#	45.0	51.8	^ ( 52.3 )	45.0	52.9	^ ( 53.5 )
392	45.0	49.8	^ ( 50.0 )	45.0	51.0	^ ( 51.3 )
394	45.0	59.5		45.0	60.6	60.2
395	45.0	66.3	YES ( 59.0 )	45.0	67.4	YES ( 60.2 )

N13/N15 Ballybofey/Stranorlar Bypass  
Environmental Impact Statement

Receiver Location Reference	Opening Year (2011)			Design Year (2026)		
	Predicted Noise Levels, dB		Mitigation Required?	Predicted Noise Levels, dB		Mitigation Required?
	Do - Minimum	Do - Something		Do -Minimum	Do -Something	
	Lden	Lden		Lden	Lden	
396	45.0	63.9	YES ( 58.7 )	45.0	65.2	YES ( 59.9 )
397	45.0	65.0	YES ( 57.6 )	45.0	66.1	YES ( 58.7 )
398	45.0	61.4	YES ( 59.1 )	45.0	62.5	YES ( 60.2 )
399	45.0	58.7		45.0	59.9	
400	45.0	55.8		45.0	56.8	

## **APPENDIX 14.1**

### **Sichardt Radius of Influence Calculations**

# Sichardt Radius of Influence Calculations

## Radius of Influence (Sichardt)

$$R_o = C (H - h_w) \sqrt{k}$$

Empirical equation based on drawdown and permeability

Drawdown	$H - h_w$	expected	min	max
Hydraulic conductivity	$K$	8m 1.00E-05m/s 0.864m/d	1.00E-06 0.0864	13m 1.00E-04m/s 8.64m/d

Factor  $C$  1750

Radius of influence  $R_o$  44.3m

The following assumptions apply to this equation

- the aquifer is unconfined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness
- the water table is initially flat
- the aquifer is pumped at a constant discharge rate
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer
- the flow to the point of drawdown is in a steady state

## Data sources

Drawdown	s	Depth of cutting in saturated aquifer
Hydraulic conductivity	K	Based on judgement
Factor	C	Mid point in 1500 - 2000 range

\*Mansur & Kaufman (1962)

## **APPENDIX 14.2**

### **Design Manual for Roads and Bridges - Assessment of Pollution Impacts from Routine Run Off on Groundwater**

## Appendix 14.2

### Design Manual for Roads and Bridges - Assessment of Pollution Impacts from Routine Run Off on Groundwater

Component	Property or Parameter	Weighting	Range	Score	Rating
1	Traffic Density	15	15,000 to 50,000 AADT	2	30
2a	Rainfall Volume	15	> 1060mm		15
2b	Rainfall Intensity	15	Uneven (35 - 47 FEH 1 hour rainfall) Continuous linear e.g. ditch, grassed channel)	2	30
3	Soakaway Geometry	20		1	20
4	Unsaturated zone	20	Depth to water table <5m	3	60
5	Flow type	20	Consolidated deposits (mixed fracture and intergranular flow)	2	40
6	Effective grain size	7.5	Coarse sand	2	15
7	Lithology	7.5	<5% to >1% clay minerals	2	15
				<b>Total:</b>	<b>225</b>

\*Rainfall volume falls into the higher risk category. The rating from component 2a has therefore been used and the rating from component 2b excluded.

#### Risk Guide (Based on DMRB)

Overall risk score  
Overall risk score  
Overall risk score

<150:Low Risk of Impact  
150 - 250:Medium Risk of Impact  
>250:High Risk of Impact

Component	Data source
1	Future peak AADT estimated at 19,870 for year 2026 (Chapter 2 of EIS)
2a	Irish Meteorological Service Online: <a href="http://www.met.ie/climate/rainfall.asp">http://www.met.ie/climate/rainfall.asp</a>
2b	Data not available, however rainfall intensity in Ireland is generally low. Medium risk chosen
3	Based on Preliminary Design
4, 5, 6, & 7	Site investigation

To be read in conjunction with the Design Manual for Roads and Bridges, Volume 10, Section 3, Annex 1. HA216/06



Oifis Oheartha Doithre Náisiúnta Dún na nGall

# Donegal National Roads Design Office

Tel: 074-9724500

Fax: 074-9723535

Email [design@dnrdo.ie](mailto:design@dnrdo.ie)

Our Ref:

Your Ref:

**PRESCRIBED FORM OF NOTICE TO PRESCRIBED BODIES/PERSONS IN  
ACCORDANCE WITH SECTION 51 OF THE ROADS ACT 1993, AS AMENDED  
BY THE PLANNING AND DEVELOPMENT ACT, 2000.**

**DONEGAL COUNTY COUNCIL  
ENVIRONMENTAL IMPACT ASSESSMENT  
OF PROPOSED N13/ N15 BALLYBOFEY/ STRANORLAR BYPASS**

To An Taisce  
of Tailors' Hall  
Dublin 8

being a prescribed body for the purposes of section 51 of the Roads Act, 1993.

1. Donegal County Council has prepared an environmental impact statement under section 50 of the Roads Act 1993 in respect of new sections of national primary route N15 and N13 bypassing the towns of Ballybofey and Stranorlar and associated bridges and other works, (known as the N13/ N15 Ballybofey/ Stranorlar Bypass) and has applied to An Bord Pleanála ("the Board") for approval of the proposed road development under section 51 of that Act, as amended.
2. A copy of the Environmental Impact Statement is enclosed.
3. Written submissions in relation to the likely effects on the environment of the proposed road development may be made to An Bord Pleanála, 64 Marlborough Street, Dublin 1 before 29th February 2008 (i.e. not later than 28<sup>th</sup> February 2008).
4. A compulsory purchase order has been made in respect of the proposed road development and where written objections are made to the Board, it may at its absolute discretion hold an oral hearing.



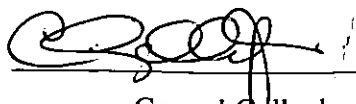
The Board may hold an oral hearing in relation to the likely effects on the environment of the proposal.

Evidence in relation to the likely effects on the environment of the proposal may be given at the oral hearing.

5. Before making its decision on the application for approval, the Board must consider the Environmental Impact Statement, any written submissions made to it and not withdrawn and, where an oral hearing is held, the report and any recommendations of the inspector holding the oral hearing where evidence was given in relation to the likely effects on the environment of the proposal. Public notice of any oral hearing will be given at a later date.

Further information may be obtained from:

Mr. Brendan O'Donnell  
Senior Executive Engineer  
Donegal County Council  
National Roads Design Office  
Donegal Public Services Centre  
Drumlonagher  
Donegal Town  
Tel 074-9724500 Fax 074-9723470  
Email: [brendan.odonnell@dnrdo.ie](mailto:brendan.odonnell@dnrdo.ie)



Carmel Gallagher  
Senior Staff Officer  
8 January 2008



NATIONAL DEVELOPMENT PLAN  
YOUR PLAN - YOUR FUTURE



National Roads Authority  
*An tÚdarás um Bóithre Náisiúnta*



Comhairle Chontae Dhún na nGall  
DONEGAL COUNTY COUNCIL

## N13 / N15 BALLYBOFEY/STRANORLAR BYPASS ENVIRONMENTAL IMPACT STATEMENT

### NON-TECHNICAL SUMMARY



November 2007



**McCARTHY HYDER**  
**CONSULTANTS**  
CONSULTING ENGINEERS



## INTRODUCTION

### General

This is the Non Technical Summary (NTS) of the information contained within the Environmental Impact Statement (EIS) for the proposed N13/N15 Ballybofey / Stranorlar Bypass. It is divided into the following sections:

- Introduction
- Preliminary Design Description
- Impacts of Preliminary Design
- The Way Forward

The EIS has been prepared by McCarthy Hyder Consultants on behalf of Donegal County Council (DCC). It documents the significant effects / impacts that the N13/N15 Ballybofey / Stranorlar Bypass will have on the environment, should it proceed. This includes the consideration of the effects on:

- Planning
- Socio-economics
- Agricultural Land
- Landscape and Aesthetics
- Surface Water Quality and Drainage
- Ecology (flora, fauna and fisheries)
- Architectural, Archaeological and Cultural Heritage
- Air Quality
- Noise and Vibration
- Land Use and Amenities
- Geology and Hydrogeology
- Inter-relationships.

### The Requirement for an Environmental Impact Statement

The EIS has been prepared in accordance with the relevant national and European legislation relating to roads and the need for the assessment of the effects of certain public and private projects on the environment. Relevant guidelines, including the Environmental Impact Assessment of National Road Schemes – A Practical Guide (National Roads Authority (NRA) 2005), the NRA Project Management Guidelines (Rev 1.1, March 2000), the Environmental Protection Agency (EPA) Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, 2003) and Guidelines on the Information to be Contained in an Environmental Impact Statements (EPA, 2002), have also been taken into consideration during the preparation of the EIS.

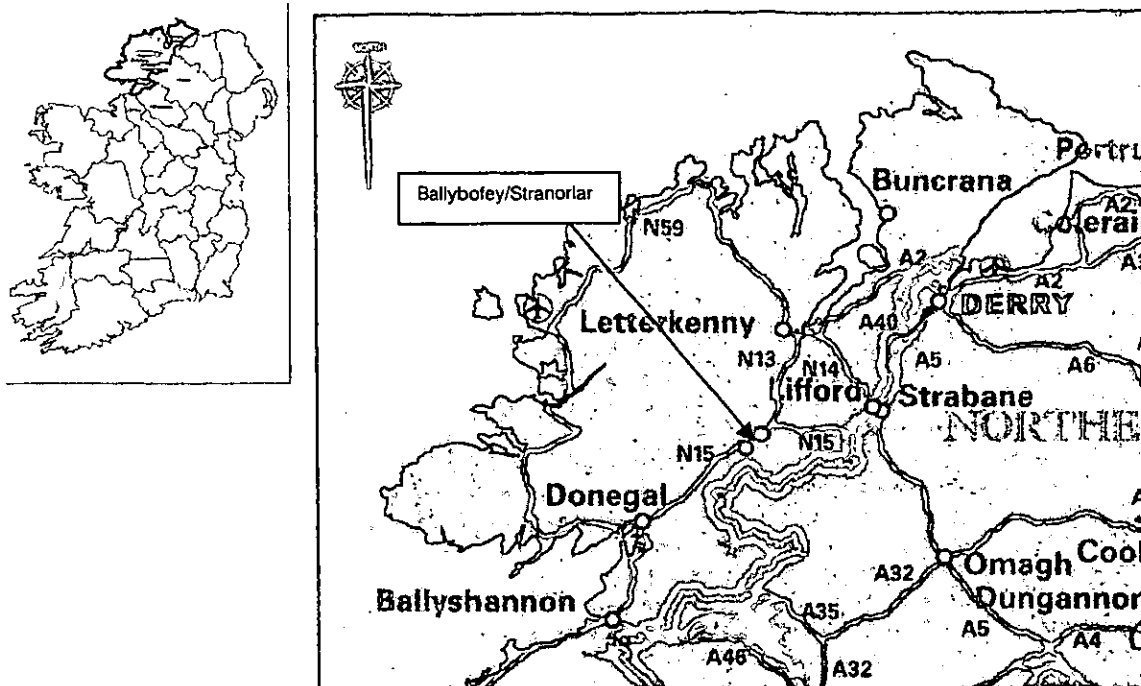
### Public Consultation

The EIS has been prepared following consultation with statutory and non-statutory bodies, as well as local interest groups and the public. Consultation has been conducted throughout all stages of the project, from the identification of environmental constraints, to the selection of the preferred route option and the development of the Preliminary Design.

### Existing Conditions

The N15 National Primary Route from Sligo via Donegal Town to Lifford passes through Ballybofey and Stranorlar (known as the Twin Towns) and intersects with the southern end of the N13 National Primary Route to Letterkenny / Derry at a T-junction in Stranorlar.

Figure 1: Location Plan



The existing single carriageway road is generally about 7.5 metres wide with hard shoulders, in some locations, of varying width. The road is sub-standard for overtaking and thus potentially unsafe. There are numerous frontages and private accesses along the road including private dwellings, business premises and farm / field entrances. In addition, on street parking is permitted in locations on the route within the Twin Towns.

Traffic congestion within the Twin Towns reduces the speed of traffic and contributes to the increase in journey times for drivers. These delays contribute to road user frustration and reduce the level of safety on the road. Community severance is increased due to the large volumes of traffic passing through the Twin Towns. Long sections of the road outside of the Twin Towns have visibilities below the required current NRA standards, which denies drivers adequate opportunity for safe overtaking, thus increasing driver frustration and traffic delay. The visibilities at junctions and at the large number of private accesses are also below standard.

NRA Traffic Forecast Indices for 2002–2040 (published 2003), supported by traffic counts, have been used to predict future traffic levels on the existing road network with and without the Preliminary Design in place. Traffic numbers have been estimated for 2011, which is the year the Preliminary Design would open and its design year, 2026.

The data indicates that if this section of the N13/N15 remains unimproved, traffic delays will increase significantly within the Twin Towns. The accident rate is also likely to increase further with traffic growth, as well as there being an increase in noise nuisance. Community severance will also continue.

In recent years, there have been a number of accidents along the sections of the N13 and N15 to be bypassed. There is a degree of uncertainty in predicting the amount of accident reduction produced by a road improvement. It is anticipated that the proposed road will result in a general improvement in road safety and, as a result, road accidents will decrease significantly.

#### Benefits of the Preliminary Design

The key objectives of the Preliminary Design are to:

- Provide a high quality road for strategic routes;

- Reduce traffic congestion along the National Roads through the Twin Towns;
- Maintain existing roads for local traffic;
- Improve safety along the existing roads and at junctions / accesses;
- Optimise journey times for long distance and local traffic;
- Encourage development of the Twin Towns', County and national economies;
- Minimise environmental and social impacts on the local residents and communities along the existing N13/N15; and
- Reduce the negative effects of peripheral location in Europe.

#### **Development and EIA of the Proposed Road**

The approach followed in the development of the Preliminary Design has regard to the NRA Project Management Guidelines (2000) and the Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2005). The first stage of the project involved the preparation of a Constraints Report to gather local information and identify constraints within a defined area around Ballybofey/ Stranorlar.

A number of preliminary bypass options were then developed. This included two routes to the north of the Twin Towns, and two to the south. Two of the route options were based on proposals contained within the Ballybofey and Stranorlar Development Plan (Variation No. 2), 1996. Detailed studies were undertaken on the four route options and the results were presented in the Route Selection Report, with a recommended preferred option (the amended Red Route was identified as the Emerging Preferred Route). Issues raised during the Public Consultation and the development of the Preliminary Design have been addressed with some realignments and changes to this preferred option.

It is envisaged that the next phase in the scheme development will be carried out under a design and build contract. As a result the final design for the scheme will be completed at the detailed design stage, prior to construction, by the successful design and build Contractor and may therefore vary in terms of detail from the proposals set out in this EIS. The design presented in this EIS has therefore been called the Preliminary Design to reflect this. The assessment of impacts and the proposed mitigation measures presented in this EIS are based on the Preliminary Design.

During the detailed design stage, the design and the environmental mitigation measures will be refined and developed to ensure efficiency and effectiveness. As outlined previously, this may result in some changes to the design as published in the EIS. Generally, the detailed design refinements will seek to develop the Preliminary Design so that it has no material change on the environmental impacts of the scheme. Indeed, opportunities may be identified that reduce the impacts of the scheme. Stringent contract requirements and close supervision will ensure that the final design will be of the required quality and that the necessary mitigation measures to minimise the impacts of the scheme will be fully implemented.

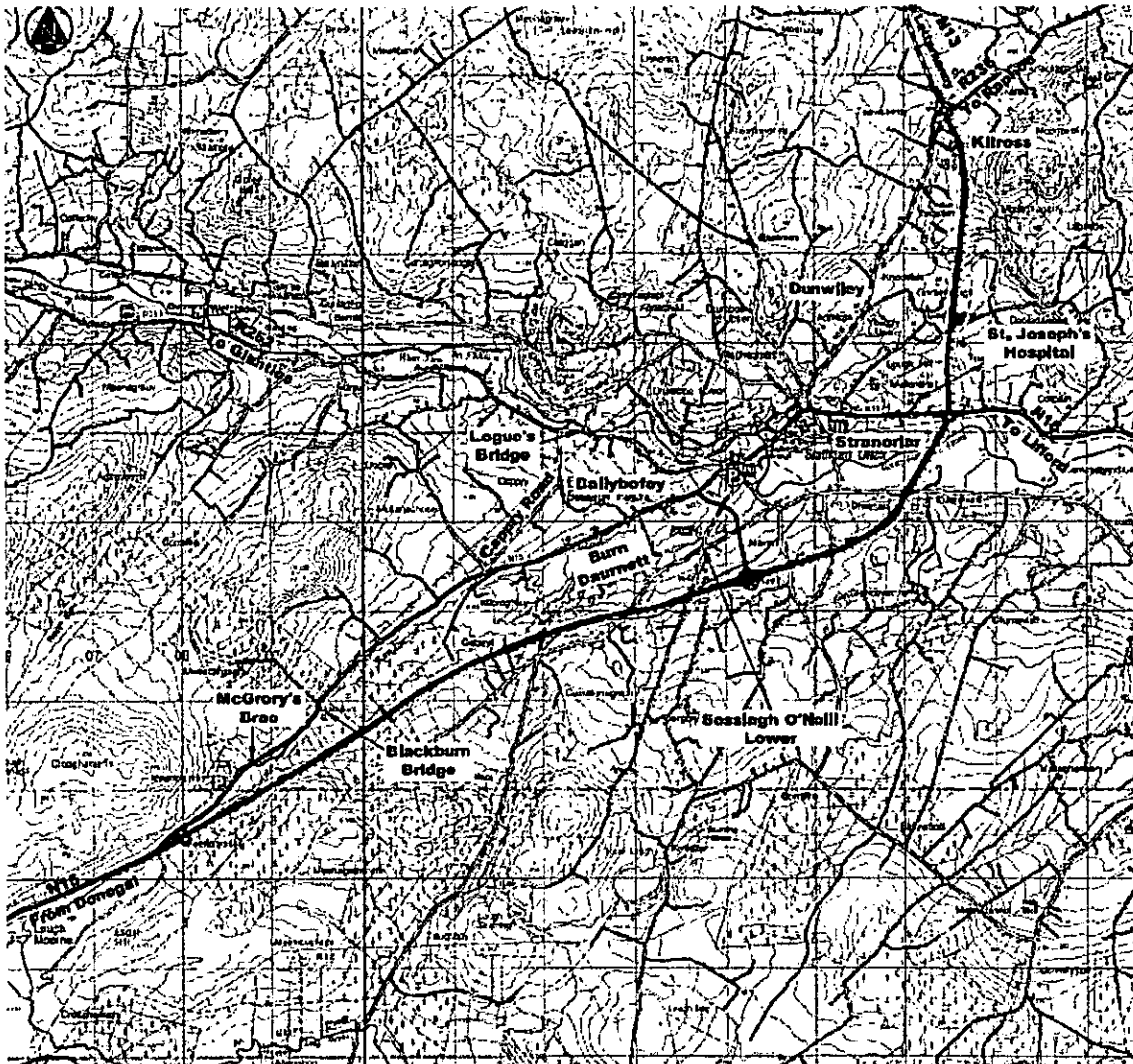
Subject to the satisfactory completion of the statutory procedures and to the availability of finance, it is anticipated that construction work will begin in early 2010. The construction period is anticipated to last approximately 2 years, with the road opening in late 2011 or early 2012.

## PRELIMINARY DESIGN DESCRIPTION

### Overview

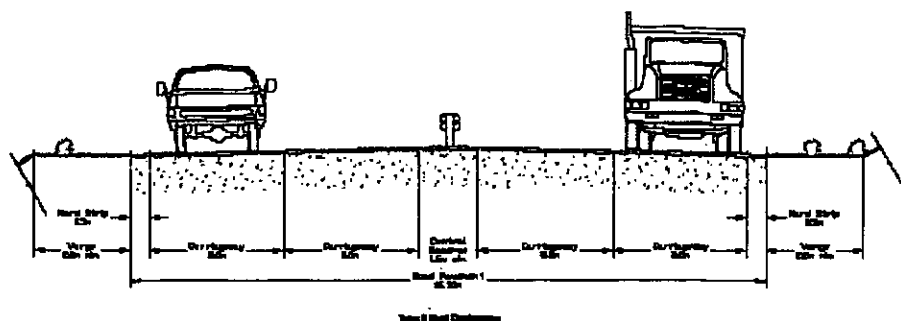
The Preliminary Design will be 14.9km in length. The route is shown below.

Figure 2: The Preliminary Design



The Preliminary Design is a mixture of standard single and Type 2 dual carriageway. The Type 2 dual carriageway system consists of two traffic lanes in each direction to allow continuous safe overtaking in both directions, with opposing traffic streams separated by a safety barrier.

**Figure 3: Type 2 Dual Carriageway Typical Cross Section**



The N13/N15 Ballybofey / Stranorlar Bypass commences in the townland of Cashelnavean adjacent to the northern edge of Lough Mourne. For approximately 0.4km the Preliminary Design then follows the line of the existing N15 along the north shoreline of Lough Mourne to the townland of Meencrumlin. From this point the Preliminary Design leaves the existing N15 and follows a route adjacent to the corridor of a disused railway line through the townlands of Croaghonagh, Golland, Carrickmagrath, Sessiagh O'Neil, and Navenny before turning to the north through the townlands of Dreenan and Edenmore to cross the River Finn downstream of the existing Dreenan Bridge. North of the river the Preliminary Design meets the existing N15 in the townland of Mullandrait. The Preliminary Design then heads north adjacent to an unnamed tributary of the River Finn through the townlands of Mullandrait, Castlebane and Mullaghagarry to eventually join the N13 at the existing N13/R236 junction in Kilross. The Ballybofey Link Road connects the Preliminary Design at Navenny to the existing N15 just to the west of Ballybofey, crossing the Burn Daurnett.

The key components of the Preliminary Design comprise:

- Approximately 0.4km standard single carriageway\* on line improvement adjacent to Lough Mourne, followed by 14.2km of Type 2 Dual Carriageway, followed by 0.3km wide single carriageway forming a 14.9km long southern bypass for the N13/N15, around the Twin Towns of Ballybofey and Stranorlar.
- Two grade separated junctions at Meencrumlin and Navenny
- A major bridge crossing of the River Finn.
- An additional five road bridges at minor road crossings and two accommodation bridges.
- Two roundabout junctions, at the N15 east of Stranorlar and at the N13 at Kilross.
- A 1.2km reduced single carriageway link road (the Ballybofey Link Road) joining the Preliminary Design to the existing N15 in Ballybofey at a new traffic signal junction. The Ballybofey Link Road includes a bridge crossing of the Burn Daurnett and traffic signal junctions with Creamery Road and Trusk Road.

### Environmental Operating Plan (EOP)

An EOP will set out the Contractors approach to managing environmental issues associated with the construction of the scheme. The EOP will also provide a documented account of the implementation of the environmental commitments or mitigation. Through this, the EOP will assist the Contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase. The EOP will incorporate key mitigation commitments related to construction and operation activities

## IMPACTS OF PRELIMINARY DESIGN

### Planning

At a national level, the Preliminary Design is in accordance with specific objectives within the National Development Plan (2007-2013) and the National Spatial Strategy for Ireland (2002-2020). In addition it will contribute to achieving objectives within sustainable development strategies by reducing congestion and vehicle journey times. The N13/N15 Ballybofey / Stranorlar Bypass is also supported by the objectives of the Border, Midlands and Western Operational Programme and the Regional Planning Guidelines for the Border Region.

The Preliminary Design is in accordance with policies in the County Donegal Development Plan 2006-2012 relating to transport and communications, employment generation, enterprise development and tourism policy and will potentially facilitate the objectives of other policies.

In relation to the Ballybofey Stranorlar Local Area Plan 2004-2010, the Preliminary Design is supported through a number of traffic and transport policies. The Local Area Plan recognises the potential for the Preliminary Design to allow the Ballybofey / Stranorlar area to meet its retail potential and further expand community and recreational facilities.

There is potential for certain landscape and built features to be impacted upon during construction and this could impact adversely on policies wishing to protect these features. Impacts are most likely in relation to policies which aim to protect the natural landscape and archaeological features. Appropriate mitigation to protect these features is proposed.

### Socio-Economic Assessment

Ballybofey and Stranorlar are located on the N13/N15 National Primary routes. This has significant implications in terms of traffic problems with congestion, traffic in shopping districts and possibly residential areas, increased road accidents, noise and air pollution. The Preliminary Design will address these problems and make the study area a safer, quieter, cleaner and more attractive place to live, work and visit.

The global beneficial impacts and associated long-term growth prospects are likely to outweigh the possible initial fall in business predicted by operators known to be vulnerable to a reduction in passing traffic. Although negative impacts in particular cases cannot be excluded, evidence from the post bypass situation in other towns, suggests that the introduction of a bypass has almost always benefited trade by enhancing ease of access and improving the local environment.

Without the construction of the Preliminary Design, traffic using the existing N13/N15 will continue to increase. As a result, residences in close proximity will suffer a continued reduction in residential amenity. Linked with the increase in traffic there will be an increased risk of accidents and congestion will also increase. In addition, the lack of proper infrastructure could curtail development within the Twin Towns and throughout County Donegal.

### Agricultural Land

The Preliminary Design will result in the removal of approximately 113Ha from agricultural production. The land affected is of a moderate to poor agricultural range and usage. The main enterprise affected will be livestock based. Dry-stock enterprises (e.g. beef, sheep) are the predominant farm enterprises found along the Preliminary Design. These are generally less severely impacted than dairy farms where livestock are moved on a twice-daily basis. In all cases mitigation measures will be implemented, which will reduce the impact.

Overall, with mitigation for severance (i.e. access provided to severed areas, or replacement of affected access points or gates), the construction of the Preliminary Design will result in a severe adverse impact at 2 farms (where the farm enterprise cannot be continued as a result of the Preliminary Design), major adverse impacts at 13 farms (where management or operational changes will be required), moderate adverse impacts at 26 farms (where the farm enterprise will experience some management or operational difficulties) and minor adverse impacts at 11 farms (where the farm will experience inconvenience such as loss of land on its boundary). There are 3 farms, which would not have a significant degree of impact. This assessment has been based on land take, level of severance and impact on animal handling facilities, taking into consideration the type of enterprise and farm size. Temporary impacts will also occur as a result of disruption



during construction. The impacts of the Preliminary Design upon agriculture, while significant to individual farmers, are not significant on a county or national level.

### **Landscape and Aesthetics**

The Preliminary Design will run through landscape areas characterised by scattered settlements and narrow lanes. Whilst only a small section of the Preliminary Design is within the Lough Mourne landscape character area, which is of highest landscape quality, the remainder of the Preliminary Design in this study is in areas assessed as being of Ordinary, Good and Very Attractive landscape quality. Nonetheless the area is not without appeal with a prominent setting afforded by several distant hill formations, and as such local people value it for these characteristics.

The Preliminary Design will introduce a new scale of road within a hitherto rural landscape setting. The degree of landscape impact varies along the length of the Preliminary Design ranging from Slight Adverse on the Croaghonagh Coniferous Woodlands character area to Large Adverse on some Good Quality landscape areas. It will, however, improve the general environmental quality of the urban areas of Ballybofey / Stranorlar by reducing traffic volumes passing through the Twin Towns.

Whilst the Preliminary Design is the result of an iterative design process that has sought to define an alignment that minimises its potential environmental impact, there are inevitable adverse effects upon a number of environmental disciplines, including landscape. Further consideration of ways in which to minimise the adverse landscape impact of the scheme will be given additional attention at Detail Design stage.

The Preliminary Design is assessed to have its greatest landscape impact where it passes through areas in deep cutting or on high embankment through areas of Good landscape. Such sections occur where the Preliminary Design will include a major cutting through a prominent hillside above the Finn Valley, where the Preliminary Design will cross the floodplain of the River Finn on high embankment and at Mullaghagarry-Kilross where the Preliminary Design is a deep cutting through a prominent ridge line.

The Preliminary Design is also adjudged as having its highest levels of adverse visual impact within views from viewpoints that are closest to its proposed route and where the viewpoint is from an elevated position, relative to a section of the Preliminary Design that is on high embankment or in deep cutting. In some instances the Preliminary Design will also impact upon some outstanding views from a number of residential properties.

It will also have a moderate adverse impact upon the night-time landscape within the Lough Mourne, the Croaghonagh Coniferous Woodlands, the River Finn floodplain and parts of the farmed agricultural landscape surrounding Stranorlar / Ballbofey, where it would introduce a new and more extensive source of light within largely dark areas.

The Preliminary Design will have a residual adverse effect upon local landscape character and upon a number of local views. This would be partially mitigated by new planting and seeding works.

### **Surface Water Quality and Drainage**

There are sensitive surface waterbodies close to the scheme (including the River Finn, Lough Mourne and Burn Daurnett).

With the exception of a small section where filter drains adjacent to Lough Mourne provide preliminary treatment, no mechanisms to treat highway drainage are present on the existing N13/N15. It is expected that the decrease in vehicle usage (and therefore potential for pollution arising from highway drainage) along the existing road will have an overall localised slight beneficial impact on water quality. As the River Finn is identified as being of high ecological importance / sensitivity, the localised beneficial impact will be of greater significance. Similarly, the water quality of road runoff entering the eastern part of Lough Mourne will also be improved, although the baseline water quality of the Lough is not expected to change significantly.

Culverts will be provided to ensure that the flow of surfacewater is not impeded by the Preliminary Design, whilst minimising the changes to natural stream conditions. Stream diversions will be designed to tie in to the existing channel and, where necessary, some rock or other erosion protection will be provided to minimise erosion at these outlets.

The Preliminary Design drainage measures, including a combination of swales (shallow grassed channels), filter drains and drainage ponds, will serve both to limit the runoff from the road to existing flow rates and to

provide some treatment of the road runoff. There is considered to be an acceptably low risk of pollution of underlying aquifers associated with these means of drainage. Where the provision of drainage ponds is not practicable, surface water runoff from the Preliminary Design will flow through petrol interceptors prior to discharge to receiving watercourses.

Potential impacts on the flood regime from the Preliminary Design have been assessed for the 1-in-100 year design event using a hydraulic model. The results indicate that the Preliminary Design would result in a slight adverse impact on local flood levels on a relatively wide area of the floodplain of the River Finn downstream of Ballybofey. A maximum flood level increase of approximately 4cm is predicted to occur immediately upstream of the Finn crossing. There will however be a slight beneficial impact on a small area of the northern floodplain downstream of the River Finn crossing, where maximum level decreases of approximately 2cm have been predicted.

The model shows that the Preliminary Design will have a slight adverse impact on local flood levels on the Burn Durnett floodplain upstream of the Link Road crossing. Maximum level increases of approximately 9cm have been predicted immediately upstream of the Burn Durnett crossing. Slight adverse effects have also been predicted on several small tributaries of the Burn Durnett and an unnamed tributary of the Finn at Treanamullin, by marginal localised increases in flow rate (but no appreciable effect on the extent of flooding).

In the main, land experiencing a slight increase in floodplain area is used for agriculture. A small residential estate in Navenny will also experience slight increases in floodplain area, although the flood water level will not impact on any houses. By providing large waterway areas for bridges crossing these rivers the proposed increases in flood level have been kept to a practical minimum.

Localised increases in flow rates in several small watercourses as a result of the proposed road have been kept to a practical minimum by including attenuation measures and additional culverts where appropriate.

A moderate adverse impact on one area of undesignated bog, which will be crossed by the Preliminary Design (between Ch 1400 and 2100) has been identified. Mitigation measures to minimise disruption to existing surface and groundwater drainage patterns will be implemented to reduce this impact.

Any impacts on watercourses during construction will be temporary. Due to the sensitivity of the River Finn, any water quality impacts during construction on this watercourse would be a potentially significant adverse impact. There is potential for cumulative effects on the water quality of Lough Mourne resulting in a moderately adverse impact, if there are overlapping construction periods of the Preliminary Design and the Lough Mourne Impoundment scheme (Donegal County Council scheme to raise the water level of the Lough). Potential impacts on the Burn Durnett will also be moderate during construction. Mitigation measures and good working practices will minimise the potential for pollution incidents during construction.

#### **Ecology (flora, fauna and fisheries)**

There is a high diversity of habitats in the area including a number of semi-natural grassland types. These include wet grassland, dry-humid acid grassland and neutral grassland, which often grade into one another. Improved grassland is very often rush-dominated due to the high water table and in some cases it is reverting to wet grassland, although this is not characteristically species-rich. The peat substrate that underlies much of the study area creates acidic conditions and, wet grassland can also be found grading into upland and lowland blanket bog.

Woodlands consist mainly of conifer plantations, with a low diversity of associated species. However, there are also a number of semi-natural woodlands and some areas of scrub.

There are three designated areas, including one candidate Special Areas of Conservation (cSAC) and two Natural Heritage Areas (NHA), within 0.5km of the Preliminary Design. Two other cSAC's are located 4km from the Preliminary Design. Of key interest is the River Finn, which is crossed by the Preliminary Design. This River is a cSAC designated for its blanket bog, lowland lakes, wet heath and on account of its international importance for salmon and otter. The River Finn additionally contains a number of aquatic species, which are protected.

Potentially, the most significant impact of the Preliminary Design will be the crossing of the River Finn, a cSAC. The scale of impact on this site is dependent on the precise method of construction, the care taken during the construction phase, and the measures employed to reduce the risk of pollution during the

operational phase. The Preliminary bridge design for the Finn crossing has no piers in-stream and retains the existing banks intact. This river is an internationally important watercourse, and the impacts arising from the construction and operation phase have been assessed as moderate. However, with adequate mitigation these impacts will be temporary.

A total of eleven other sites of ecological value have been identified along the Preliminary Design, nine of which are rated as being of high local importance. The scale of impact on seven of these sites will constitute a major negative impact. Within the Compulsory Purchase Order (CPO) boundary there may be scope to reduce the potential impact on some sites through minor alignment refinements at the detailed design stage. Appropriate and adequate landscape design will serve to compensate over time for loss of habitat, connect severed areas and offer opportunities for habitat creation.

Impacts on mammals and birds will directly occur through habitat loss and disturbance during construction, as well as through increased risks associated with crossing the Preliminary Design. Provision for the passage of mammals through sensitive culvert design, dedicated underpasses, and appropriate fencing and signage will reduce road casualties.

The ecological value of the various minor watercourse crossed by the Preliminary Design will be maintained through sensitive culvert design, construction timing and methodologies, landscape design and pollution control measures.

#### **Architectural, Archaeological and Cultural Heritage**

The assessment of the impact of the Preliminary Design on the architectural archaeological and cultural heritage has been based on a review of available information and field inspection. The effects have been considered within three main sections: archaeological heritage sub-divided into recorded archaeological monuments (RMP) and areas of archaeological potential (AAP); architectural heritage, including features of industrial heritage significance (AH); and cultural heritage (CH).

The landscape through which the Preliminary Design traverses contains sites dating from the Neolithic through to the late industrial period. A field inspection along the corridor of the Preliminary Design has confirmed the location of four archaeological monuments within 350m of the Preliminary Design, RMP 1 (possible standing stone), RMP 2 (enclosure, possible cashel), RMP 3 (Megalithic tomb and standing stone site) and RMP 4 (enclosure site).

RMP 2 lies to the south of the Preliminary Design and there will be a slight impact on this RMP. The area of the Preliminary Design that will travel closest to this site will be subject to archaeological test trenching in order to determine whether archaeological features are present in the area. The Preliminary Design will have an imperceptible impact on RMP 1, RMP 3 and RMP 4 and no further mitigation measures are therefore required.

A further 38 AAP were identified through aerial photography, cartographic analysis and field assessment and 29 of these will be adversely affected by the construction of the Preliminary Design, whilst 9 of the sites will only be imperceptibly impacted upon. Mitigation measures recommended for these sites include archaeological test trenching, geophysical survey, topographic survey, written and photographic records and further walkover surveys.

A total of eight AH sites will be adversely affected by the Preliminary Design, including two 18<sup>th</sup> Century houses (AH 8 Edenmore House and AH 9 Tircallan House). It is recommended that a written and photographic record be made of those parts of the grounds of Edenmore and Tircallan Houses that will be affected. It has also been recommended that written and photographic records are made of the five other AH sites (AH 1 Disused railway line, AH 3 vernacular architecture, AH 5 vernacular architecture, AH 7 possible vernacular architecture site) and a programme of testing trenching is recommended at AH 6 (millpond).

#### **Air Quality**

The existing air quality is generally good in the area of study. Levels of PM<sub>10</sub> approach and frequently exceed the Air Quality Standards Regulations (AQSR) Limit Values for 2010 throughout Ireland. The concentration of other pollutants such as nitrogen dioxide, carbon monoxide and benzene are well below the AQSR limits for 2010.

Construction activities such as earth moving, excavation and traffic movement generate dust, particularly during dry periods. Properties within 50m of the construction area may be adversely affected, although any impact is likely to be minor. The number of properties predicted to be adversely affected is twenty. The impact can be minimised with the implementation of an effective EOP. There will be negligible impacts on air quality due to exhaust emissions from heavy commercial vehicles associated with construction activities.

For the operational phase a comparative assessment of the existing route and Preliminary Design was undertaken. This evaluated the overall change in exposure of properties as a consequence of the Preliminary Design. It was concluded that there would be an overall reduction in the exposure to pollutants. Over 95% of the properties affected will experience a benefit.

Fourteen properties were identified as representing those that are likely to be most affected by the Preliminary Design. Pollutant concentrations were determined for these properties in 2006, 2011 and 2026, for the Do Minimum and Do Something scenarios. The change in pollutant concentration with the Preliminary Design was evaluated.

With respect to existing roads, receptors along the Main Streets in Ballybofey and Stranorlar would experience a substantial benefit with respect to reduction in  $PM_{10}$  concentration and a slight benefit with respect to  $NO_2$  concentration. An estimated 100 properties would experience this benefit.

The property closest to the existing road at Meencrumlin, is predicted to experience a moderate beneficial impact with respect to  $NO_2$  concentrations. All other properties assessed along the existing route are predicted to experience a slight beneficial impact.

For the Preliminary Design all receptors were assessed as subject to a slight or negligible adverse impact, with the exception of approximately twenty-one properties. These twenty-one properties were predicted to experience a moderate adverse impact with respect to  $NO_2$ . These were: ten properties in the new Lawnsdale development at Navenny, nine properties nearest the Ballybofey Link Road, a property near the Preliminary Design at Edenmore (Ch 10600) and a property at Carrickmagrath (Ch 7300). The predicted  $NO_2$  at properties likely to experience a moderate adverse impact is within the AQSR.

The impact at a national / international level was assessed by determining the total emissions of pollutants for the existing route and Preliminary Design. This assessment showed an increase in emissions of carbon, nitrogen oxides and  $PM_{10}$  of 17%, 27% and 42% respectively as a consequence of the Preliminary Design in 2026.

The River Finn is a cSAC. The AQSR limit value for adverse impact on vegetation is reached at a distance of about 15m from the centre of the road in 2011 within this designated site. This affects a relatively small stretch of the river, about 30m. The dry deposition of nitrogen is well below published critical load criteria for habitats.

## **Noise and Vibration**

Baseline noise surveys carried out for the Preliminary Design indicate that existing noise levels along the N13/N15 are typical of a rural/ urban environment.

A noise assessment has been undertaken to study the potential haul road traffic noise impact associated with the earthworks operations. The assessment results indicate that all predicted noise levels would comply with the noise limits set out within the NRA Guidelines and there would be no significant noise impact.

Noise levels have been calculated at receiver locations along the existing N13/N15 corridor and along the Preliminary Design. Calculations have been carried out for the years 2006 (in order to calibrate the noise model), 2011 and 2026 for both the Do-Minimum and Do-Something scenarios (the latter with and without mitigation included in the model).

The 2026 Do-Minimum noise levels in the study area are predicted to be slightly greater than in 2011 due to traffic growth, leading to an increase in traffic noise levels of approximately 1.0 dB.

Under the Do-Something scenario, noise levels at sensitive receiver locations (e.g. Sessiagh O'Neill, Goland, Edenmore and Mullandrait) where the Preliminary Design would be introduced, are expected to increase by more than 15 dB  $L_{den}$  at 100 receiver locations during the years 2011 and 2026. However, noise levels along the existing N13/N15 corridor will fall by 3dB at 214 receiver locations (i.e. 85% of receivers) during 2011 and 2026 relative to the Do-Minimum scenario. Overall, the range of traffic noise levels in the Do-Minimum

scenario along the existing corridor in 2011 and 2026 were predicted to be 43 – 77 dB and 44 – 78 dB  $L_{den}$  respectively. Under the Do-Something scenario these ranges are predicted to fall to 42 – 73 dB and 42 – 74 dB  $L_{den}$  during 2011 and 2026 respectively. This represents a net beneficial noise impact for receivers along the existing corridor.

The analysis has identified a total of 36 receivers along the Preliminary Design in 2026 that would experience noise levels in excess of the NRA Guidelines design goal of 60dB  $L_{den}$  and satisfy the associated test conditions for mitigation. The use of noise barriers or alternative mitigation measures adjacent to these receivers along the length of the proposed road would reduce noise levels to below the design goal. These mitigation measures will be developed further at the detailed design stage.

The Preliminary Design will reduce the levels of vibration experienced by dwellings adjacent to existing roads, and is not expected to have any adverse impact on dwellings located close to the Preliminary Design.

### Land Use and Amenities

Land use affected by the Preliminary Design is mainly agricultural. The Preliminary Design will result in properties at Ch 6200 and Ch 7800 being acquired as part of the Compulsory Purchase Order resulting in profound adverse impacts. The Preliminary Design will have a slight adverse impact on the dismantled railway line, with approximately 2655m directly impacted upon, sections affected by severance and areas where the route crosses the dismantled railway. This feature has been identified for possible future development as a recreational facility in the Ballyboley Stranorlar Local Area Plan 2004-2010.

### Geology and Hydrogeology

The Preliminary Design will require the construction of a number of cuttings and embankments, which will result in an impact on the geology and hydrogeology of the area. Minimisation of these impacts has been considered in the preparation of the Preliminary Design.

There will be localised disturbance of the subsoils and geology along the Preliminary Design, although no areas of particular geological significance have been identified. Overall the impact on the geology of the area is considered to be Slight Negative. Following mitigation the impact is considered to remain as Slight Negative.

Localised impacts on groundwater levels may occur adjacent to road cuttings. There is also an increased potential for contamination of groundwater from road runoff but this will be substantially mitigated by the use of drainage pollution control measures. Although the vulnerability of groundwater along the route is classified as 'High' and 'Extreme', the aquifers themselves are classified as 'Poor' or 'Locally Important'. Groundwater is not widely used for water supply in the area and the area is not considered sensitive from a groundwater viewpoint.

A review of well supply sources and field survey has identified a single private water supply in the vicinity of the Preliminary Design. No public or group groundwater supplies have been identified in the vicinity of the Preliminary Design. Close monitoring of the private water supply is proposed and where an impact is predicted modifications to the sources or augmentation with alternative supplies will be necessary.

Conservation sites reliant on groundwater have been identified and assessed in the vicinity of the Preliminary Design. No impact on any designated conservation sites is foreseen.

The Preliminary design passes through one upland bog. Drainage will be maintained beneath the road by the placement of rock fill. Areas of identified wet grassland may be adversely affected along the Preliminary Design. Consideration will be given to maintaining the local drainage in these areas at the detailed design stage. Overall, the impact on the hydrogeology of the area is considered to be moderate negative. Following mitigation the impact is considered to remain as moderate negative.

At the detailed design stage, further studies will be undertaken and mitigation measures developed within the EOP. The EOP will be prepared by the Contractor prior to construction commencing. The further investigations will comprise groundwater monitoring, visiting and sampling private wells at potential risk and regular review of data.

### **Inter-relationships**

Various aspects of the Preliminary Design can have different effects on a number of environmental subject areas. In addition mitigation to ameliorate an impact in one environmental area can have a knock on beneficial or detrimental effect on another subject area. The consideration of interactions/inter-relationships between subject areas provides an opportunity to consider the overall impact of the scheme. These potential effects have therefore been taken into consideration in the assessment of the Preliminary Design.

Potential indirect (or secondary effects) and cumulative impacts have been identified as a result of other development proposals or possible future opportunities for development in the area surrounding the Preliminary Design. These include:

- Lough Mourne Dam proposal to increase capacity of the existing reservoir,
- Potential future development of the dismantled railway as a recreational facility,
- Proposed Sports Campus.

## **THE WAY FORWARD**

### **The Oral Hearing**

Compulsory Purchase Orders (CPO) have been prepared for the Preliminary Design. Where written objections to the CPO are made to An Bord Pleanála on oral hearing may be held.

An application for approval of the N13/N15 Ballybofey / Stranorlar Bypass has been made to An Bord Pleanála under Section 51 of the Roads Act, 1993-2007 (as amended by the Planning and Development Act 2000). Written submissions may be made to An Bord Pleanála and before making its decision on the application, the Bord must consider the EIS and any submissions made. In addition where an oral hearing is held the Bord must consider the report and any recommendations of the Inspector holding the oral hearing.

### **Further Information**

Copies of the Environmental Impact Statement can be viewed between the hours of 09.00-12.30 and 13.00 – 16.30 (by appointment) at the following address:

**Donegal County Council**  
**Roads Section**  
**Harps Way**  
**Ballybofey**  
**County Donegal**

**Donegal National Roads Design Office**  
**Donegal Public Services Centre**  
**Drumlonagher**  
**Donegal Town**  
**County Donegal**

**Donegal County Council**  
**County House**  
**Lifford**  
**County Donegal**

Copies of the Environmental Impact Statement and copies of the Non-Technical Summary can be purchased for €100 and €5 respectively in hard copy and €5 together on CD from:

**Donegal National Roads Design Office**  
**Donegal Public Services Centre**  
**Drumlonagher**  
**Donegal Town**  
**County Donegal**  
**Tel: 074 9724500**  
**Fax: 074 9723470**  
**E-mail: [design@dl-roads.ie](mailto:design@dl-roads.ie)**

If you require further information about the project please contact the Project Engineer at the above address.

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