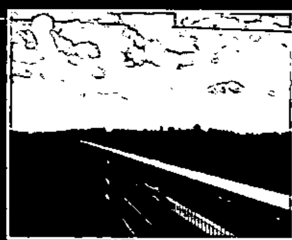
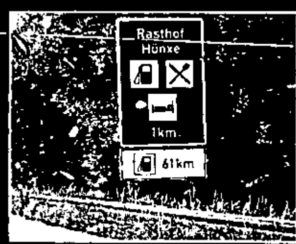
National Roads Authority
An tÚdarás um Bóithre Náisiúnta

M1 North Motorway Service Area

Environmental Impact Statement



Volume 1

Non Technical Summary

FEBRUARY 2008

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

RPS

ACKNOWLEDGEMENTS

This Environmental Impact Statement has been prepared by West Consult. A joint venture comprised of RPS and Roughan & O'Donovan Consulting Engineers and their Environmental Sub-consultants.

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PREFACE

The structure of the Environmental Impact Statement for the Proposed M1 North Motorway Service Area, near the village of Dromiskin Co. Louth is laid out in the preface of each volume for clarity. It consists of 3 volumes as follows;

Volume 1 – Non-Technical Summary

A non-technical summary of information contained in Volume 2.

Volume 2 – Environmental Impact Statement

This volume deals with the environmental impact of the proposed development including the structure, associated signage, access / egress points and associated auxiliary works to the proposed development.

Volume 3 – Technical Appendices

Specialist technical reports on which information in Volume 2 is based.

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2 BACKGROUND TO THE PROJECT

The introduction of long lengths of motorways and high quality dual carriageways into the network of national roads in Ireland represents a new departure in Irish transport development. One of the consequences of this development is the requirement to cater for road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. Currently, drivers on motorways must exit the road to avail of local facilities in close by towns and villages.

In response, the NRA has developed a policy for the provision of service areas on the national road network. **Figure 2.1** shows the indicative distribution of service areas throughout the country as outlined by the NRA (www.nra.ie). The full details of this policy entitled *Policy Statement on the Provision of Service Areas on Motorways and High Quality Dual Carriageways* is available from the NRA website (www.nra.ie).

A **Service Area** is defined as: *a facility for motorists and their passengers, which provides parking, fuel station, toilets, convenience shop and restaurant/food outlet facilities. Motel/hotel type facilities catering for the needs of road users may also be included depending on the location of the proposed service area and the perceived need for such a facility. Operators of service areas will typically ensure that fuel and toilet facilities are permanently available to road users and food facilities are available over an extensive period for a minimum of 16 hours each day. A Garda enforcement area will also typically be included.*

The M1 North Service Area is one of three pilot service areas proposed for development in the short term. The other two motorway service areas include one on the M4 (between Enfield and Kinnegad) and a second one on the M1 (further south between Balbriggan and Lusk). These will be the subject of separate EIAs. The provision of the other areas shown on **Figure 2.1** will follow after the three service areas included in the pilot programme.

1 INTRODUCTION

West Consult, a joint venture incorporating Roughan & O'Donovan and RPS, have been commissioned by the National Roads Authority (NRA) to prepare a Preliminary Design and Environmental Impact Assessment (EIA) of a motorway service area adjacent to the M1 Motorway near the village of Dromiskin in Co. Louth.

There are currently no dedicated motorway service areas along motorways and dual carriageways in Ireland. Presently inter-county traffic travelling long distances must exit motorways in order to avail of service facilities that may be available at neighbouring towns or villages.

The NRA has put forward proposals and policies to provide service areas across the country. This includes the provision of such a service area on the M1 motorway north of Castlebellinham, which is the primary focus of this Environmental Impact Statement (EIS). The EIS is comprised of three volumes of which this Non-Technical Summary is the first.

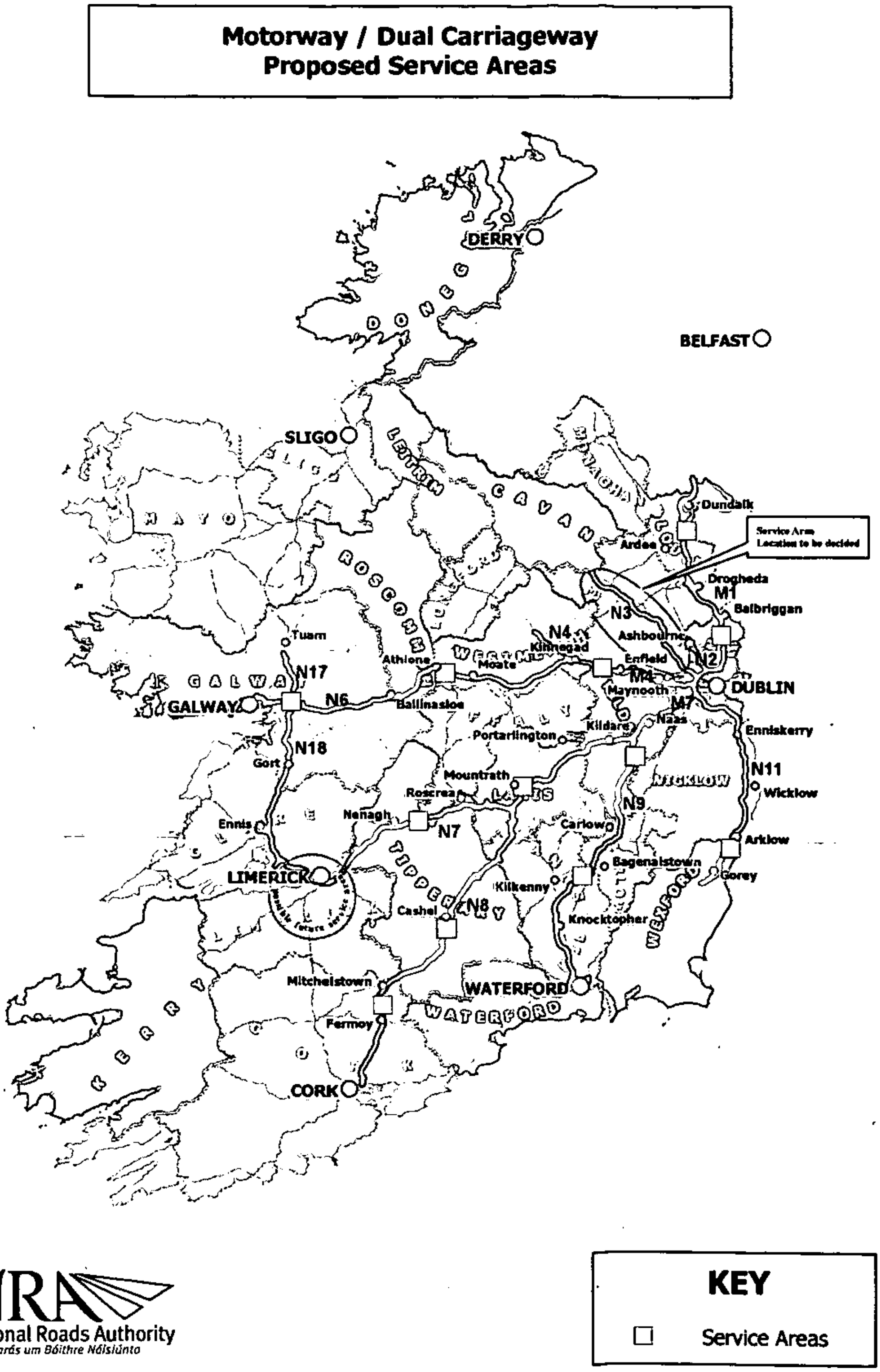
1.1 PURPOSE OF THE PROJECT

The primary purpose of this project is to provide fuel and rest facilities on a 24-hour basis on the northern section of the M1 Motorway in order to aid inter-county and long distance traffic. This will assist the road safety campaign put forward by the Road Safety Authority and help in the reduction of driver fatigue and accidents on the national primary road network.

1.2 CONSULTATION

As part of the consultation strategy for the EIA, statutory and non-statutory organisations were contacted in October 2007 seeking comments on the proposal. A total of 52 groups were contacted and 10 responses were received. Comments received as part of the consultation process were considered as part of the preparation of this document. Further statutory consultation will take place once the EIS is submitted for planning consent.

Figure 2.1: Indicative Distribution of Service Areas along Motorways and High Quality Dual Carriageways in Ireland.



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3 DESCRIPTION OF THE PROJECT

3.1 GENERAL

The proposed M1 North Motorway Service Area will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. The project will be comprised of two sites on the M1 Motorway, with one site east and one site west of the M1 Motorway, and will be located within County Louth, approximately 2.5km to the northwest of Castlebellingham and 1km to the west of Dromiskin, as shown on **Figure 3.1.**

Public access to the two motorway service area sites will be restricted to direct access from the M1 Motorway.

Facilities will be provided on both sides of the road to cater separately for northbound and southbound traffic. The following will be provided within each site of the proposed development: segregated parking areas for passenger cars, Heavy Commercial Vehicles (HCVs) and Coaches; fuel facilities; a convenience shop; restaurant; toilets and showers; indoor and outdoor children's play areas; a tourist information kiosk; recreation and picnic areas; and a Garda enforcement area. Restricted access from the local road network into each site will be provided for employees only.

3.2 EXISTING CONDITIONS

The proposed M1 North Motorway Service Area is located within the Townland of Whiterath. Towns in the vicinity of the proposed site include; Dunleer and Drogheda to the south; Dundalk to the north; Castlebellingham and Dromiskin to the east; and Mansfield town and Ardee to the west.

The motorway service area is divided into two sites, one to the west of the M1 Motorway, hereafter referred to as the western site, and the other to the east of the M1 Motorway, hereafter referred to as the eastern site, where the County Road CR182 crosses over the M1 Motorway. The nearest motorway junctions to the site are the Dundalk South junction, approximately 5km north of the site, and the Castlebellingham junction, approximately 2.5km to the south.

The western site is bounded by the M1 Motorway to the east, the CR 185 to the south, a field ditch to the west and by the CR184 to the north. The eastern site is bounded by the Dublin Belfast Railway to the east, open fields and bogland to the south, the M1 Motorway to the west and by the CR182 to the north.

The topography in the area consists of generally flat and undulating lands. The area is characterised by a combination of rural developments, townland and agricultural fields. Ribbon type development housing and buildings exist along the county roads while denser housing developments and facilities exist towards the town and village of Castlebellingham and Dromiskin. Agricultural fields exist along the line of the M1 Motorway and Dublin Belfast Railway where the proposed M1 North Motorway Service Area would be located. The proposed project would directly affect four separate landowners.

The land upon which the eastern site would be located is gently undulating and varies in level between 17.5m Above Ordnance Datum (AOD) on the eastern boundary and 9.5m AOD near the southern end of the site. The low-lying area comprises a small area of bogland known locally as the Red Bog. The lands forming the western site are virtually level, between 3.9 and 4.5m AOD. The land use is predominantly agricultural, mostly tillage. The southern section of the eastern site is traversed by a small stream, which flows into the Red Bog. The western site contains no significant watercourses on-site but there is a small stream located at the northern corner of the site. At present the lands are drained by overland or sub-surface flow into these watercourses.

3.3 SITE LAYOUT

The indicative site boundary is shown in **Figure 3.2** and the indicative site layout is shown in **Figure 3.3**. The main elements of the motorway service area include:

- Roads including slip lanes to and from the service areas;
- Parking facilities for passenger car vehicles, coaches and HCVs;
- Building facilities;
- Fuel station facilities;
- Garda enforcement area;
- Lighting;
- Water Supply;
- Drainage; and
- Earthworks.

3.4 ROADS AND PARKING

The M1 North Motorway Service Area will be restricted to direct access from the M1 Motorway via diverge and merge slip lanes. Access to and from the local road network will be provided for employees only, via barrier-controlled access roads.

The indicative layout of the car parking bays is shown in **Figure 3.3a (east site) and Figure 3.3b (west site).** The design of the motorway service area gives priority to passenger vehicles, with separate parking areas provided for passenger cars, HCVs and coaches. The passenger parking areas are located beyond the fuel facilities giving drivers the opportunity to fuel up before driving to the parking area to avail of the facilities.

3.5 BUILDING FACILITIES

The following facilities will be provided in the main building structure:

- Convenience Shop;
- Restaurant Seating Area;
- Toilet Block;
- Shower Cubicles;
- Information Kiosk;
- Indoor and Outdoor Play Areas;
- Baby Changing Room;
- Staff Canteen; and
- Outdoor Picnic Area.

The overall size of each amenity building will be approximately 1,200sqm, including approximately 250sqm for the convenience shop and restaurant seating for approximately 200 people.

The cashier serving point is located inside the main entrance of the amenity building, with the payment point designed so that it can continue to take fuel payments if the rest of the facility is supplying a reduced service. Beyond this entrance lobby, the public area of the building is opened up, offering the services of a convenience shop and up to two concession serveries with a large seating area. The public toilets and showers are set off to one side of the shop area. Staff locker rooms, staff canteen and access to the back of the concession areas are accessed from a separate entrance adjacent to the serveries.

The amenity building in each service area will have curved roofs which are divided into two elements, each of which consists of a sinusoidal curve. The buildings will be fully accessible, following guidance given in "Building for Everyone" published by the National Disability Authority.

3.6 FUEL STATION FACILITIES

The covered forecourt layout has been designed to accommodate separate fuelling facilities for passenger cars and HCVs/ coaches. The design allows for one-way traffic flow only through the two forecourt areas.

The forecourt layout is sufficiently spacious to ensure the free flow of traffic during peak hours permitting the maximum use of the available fuel dispensers.

The fuel storage tanks will be underground double-skinned steel tanks with a capacity of 40,000 litres. The tank array, located within the HCV petrol forecourt area will contain up to 10 tanks. The final configuration and size of the tank array will be determined by the operator and will be dependant on storage capacity, delivery period and product selection. Minimum groundcover above the tanks will be 0.9 metres. Minimum separation between tanks will be 0.15 metres.

A separate area for fuel delivery will be provided for each fuel station facility to minimise operational interference and enhance safety. They will be located opposite the HCV forecourt filling area on the opposite side of the main HCV carriageway.

3.7 SURFACE WATER DRAINAGE

The proposed eastern and western service area sites will each be provided with separate but similar surface water drainage systems designed to accommodate a rainfall intensity of 50mm per hour. None of the proposed works will discharge to the existing motorway drainage system.

The forecourts and the paved surfaces surrounding the fuel pumps will be contoured to ensure that all rainwater and accidental spillages in the area will be directed to gullies in the forecourt areas and then into a separate surface water closed pipe drainage system. This system will discharge to a full-retention light liquids separator with sufficient storage capacity to accept an accidental spillage from a single cell of a fuel delivery vehicle. From the interceptor the runoff will pass into the carriageway drainage system where it will get secondary and tertiary treatment within a separator and constructed wetlands, before being discharged into the receiving watercourse.

The runoff from the motorway slip roads, the internal roadways in the service areas and the HCV parking will be collected by means of kerbs and road gullies or similar. Closed-pipe systems will collect the runoff and discharge, via separators that remove grit, oils and "floatables" from the water, to Stormbloc (or similar approved), underground storage systems. The storage system will be surrounded by an impermeable engineering membrane. All surface water will flow via an attenuation device and shut-off valve to the constructed wetland before feeding into the receiving watercourse.

Runoff from the roof of amenity building (including the runoff from the forecourt canopies) will discharge to a dedicated closed-pipe drainage system, which will discharge directly to the constructed wetland. It will not pass through the attenuation/infiltration system.

The proposed motorway service area sites do not cross any rivers or significant water bodies. However, the access routes into the sites from the M1 Motorway do cross a number of unnamed tributaries of Ballough Stream, which will be culverted with appropriately sized culverts.

3.8 WATER SUPPLY

The daily usage of water for restaurants, toilets and daily staff is expected to be approximately 34,000 litres/day. An existing 180mm diameter public water supply is located at the junction of the CR185 and CR184, approximately 600 metres to the east of the development. A new 200mm diameter watermain will be provided from this existing 180mm watermain.

This water supply will satisfy the minimum fire fighting requirements of 2,250 litres/minute for 1 hour.

3.9 MATERIALS REQUIRED

An estimated 38,000m^3 of earthworks capping material will be required for the two sites. Due to the nature of the existing ground, it is likely that the capping material will be sourced from outside the site. This will result in some 7,600 lorry movements both ways assuming 10 cubic metres per lorry load. If the earthworks are completed over a 6-month period the daily traffic load will be in the order of 64 lorry movements both ways.

Apart from the import of earthworks fill material, the pavement construction materials that will be hauled to site in bulk include granular sub-base material, bituminous pavement materials, concrete and drainage filter material.

The project includes concrete works for the raft/piling foundation for the amenity building and the pavement construction for the hard standings for the lorry parks and the fuel service stations. It is estimated that the construction of these structures will involve pouring some 1,000m^3 of concrete, which could involve up to 200 truckloads of concrete over a six month period.

Due to the access restrictions on the local roads all of this material will have to be hauled via the M1 Motorway.

3.10 BRIDGES AND STRUCTURES

There are no new significant bridge structures required for the project.

3.11 SIGNS AND MARKINGS

Advanced signage will be provided on the M1 motorway to advise motorists of the approach to the proposed motorway service area. Internal directional signage will also be provided within the proposed motorway service area.

A road traffic sign displaying fuel prices will be provided adjacent to the motorway approximately 1km advance of the diverge slip lane for the motorway service area. The maximum height of the sign will be 8 metres.

Signage providing information about the approaching motorway service area will be provided in the motorway verges at approximately 10km, 1km and 0.5km in advance of the service area. This signage will include the distance to the approaching service area and symbols indicating the services that will be available i.e. toilets, food, fuel etc. In addition some of the signs may provide distance information to the subsequent service area along the route. The height of this signage will be no greater than 8 metres. The final dimensions and layout of the signage will be determined during the detailed design stage.

A concessionaire advertising sign will be provided on each motorway service area site. It will be located adjacent to the diverge slip lane into each site in close proximity to the internal roundabout. The sign will be up to 12 metres in height and will accommodate advertising for the fuel pricing and amenities provided at the motorway service area. The final dimensions and layout of the sign will be determined during the detailed design stage.

3.12 LIGHTING

For the safety of road users, road lighting will be provided: along the section of the M1 Motorway between the diverge and merge slip roads, extending to 150 metres in advance of and beyond the slips; along the merge / diverge slip roads and along the full length of the internal road network. This is to ensure that the vehicle routes are clear both during night and daytime. Lighting will be provided in the parking areas, to enhance safety of pedestrians and to give a secure environment for the parked vehicles.

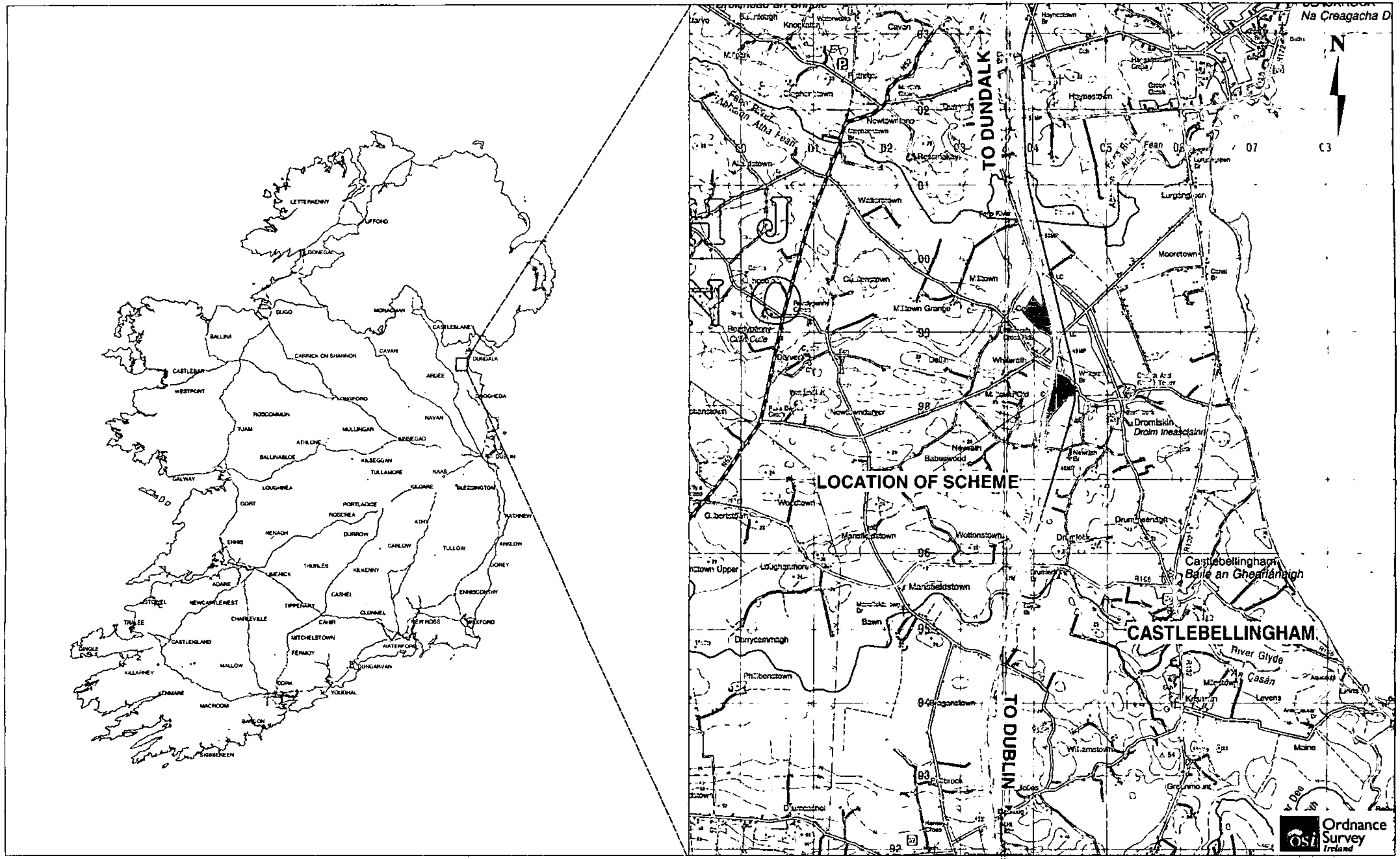
In addition, lower spillage of lighting in proximity to sensitive receptors has been integrated in the lighting design in order to minimise visual intrusion during nighttime periods.

3.13 CONSTRUCTION STAGE

The infrastructure for the northbound and southbound service areas comprises approximately 4.5km of single carriageway road within the sites and slip roads and associated tapers to be constructed adjacent to the live M1 Motorway. The pavement works also include some 23,500m^2 of vehicle parking and 11,500m^2 of hard standing at the fuel service station forecourts.

The amenity buildings and fuel service stations will form a significant element of the works to be executed. These works will require careful planning due to the lead in times for the delivery of the specialist materials.

It will not be permitted to use the existing CR182, CR184 and CR185 for haulage of plant and materials to and from the site, and consequently all haulage to and from the site and access to and from the site will have to be made from the M1 Motorway. It will also not be permitted to use the local road network to move construction materials between the sites on each side of the motorway.



TransportR21

NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

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Project Title: M1 NORTH MOTORWAY SERVICE AREAS

Drawing Title: LOCATION OF THE SCHEME

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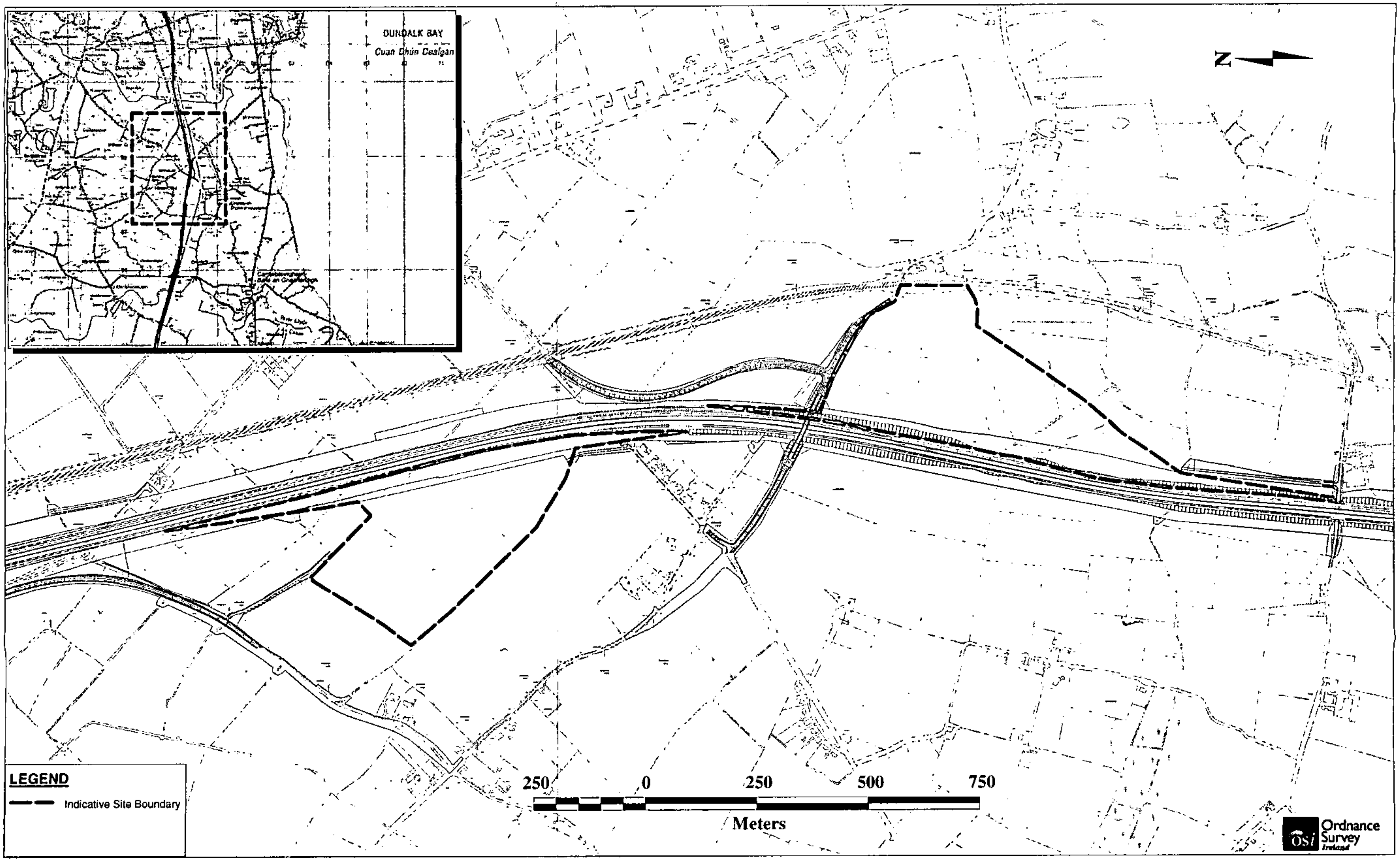
Drawn: E.I.	Job No: MDT0146	
Checked: L.C.	Scale: NOT TO SCALE	Figure No: 3.1 / Rev: A01
Approved: A.G.	Date: 07/12/2007	



Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	INDICATIVE SITE BOUNDARY

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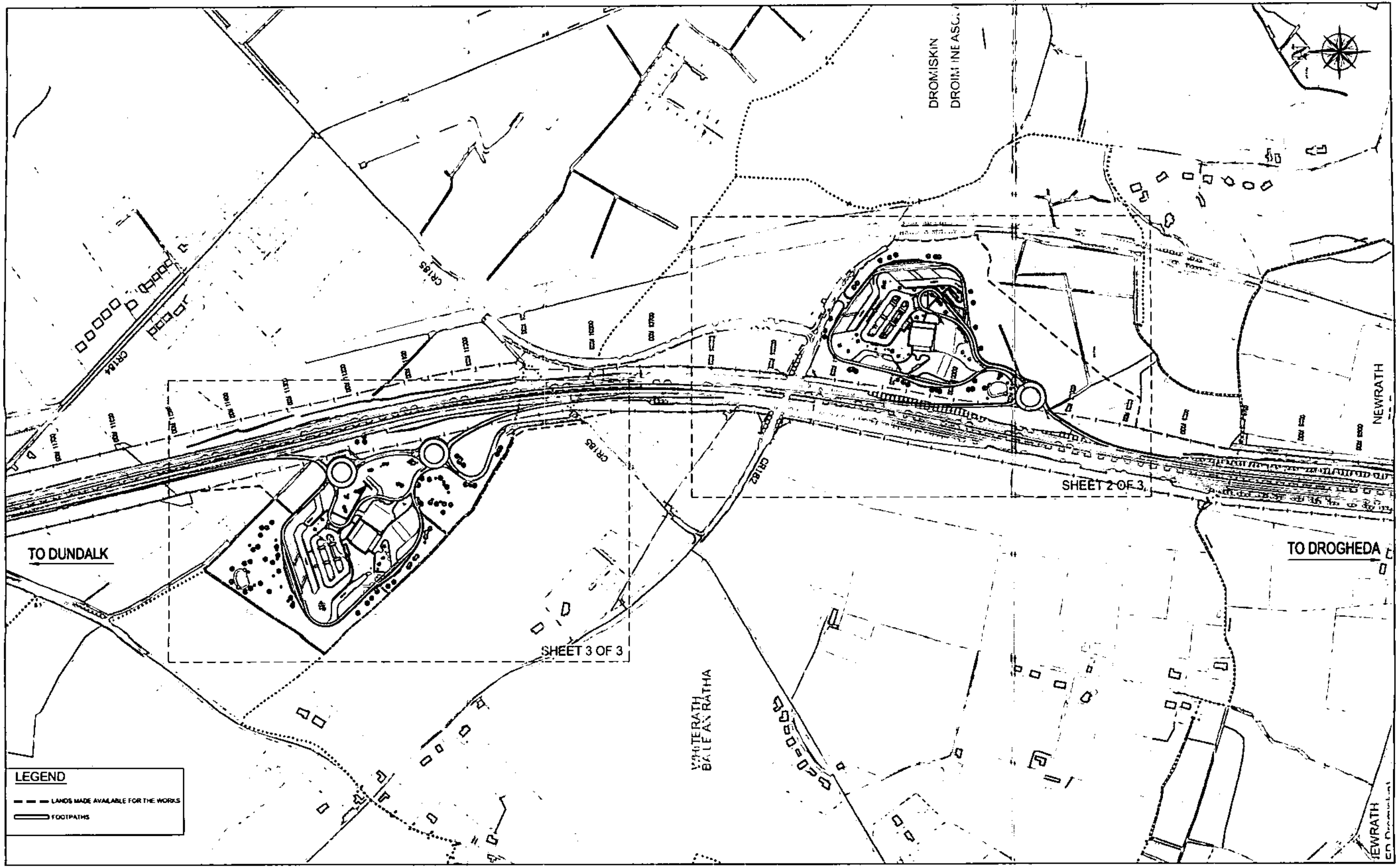
NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority



Transport 21

NDP NATIONAL DEVELOPMENT PLAN

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	INDICATIVE SCHEMATIC LAYOUT SHEET 1 OF 3
Status	FINAL
Scale	1:2500 @ A1 Size
Drawing No	3.3
Rev	A01

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4 ALTERNATIVES

4.1 INTRODUCTION

In line with Section 50 (2) (*e*) of the Roads Act 1993 (as amended 2007) and the EIA Regulations 1989 to 2001, consideration has been given to alternatives taking into account the environmental effects.

4.2 METHODOLOGY

The methodology employed in the identification of alternative sites and selection of a preferred site followed four broad steps:

1. Identification of a study area for provision of facilities based on NRA Policy;
2. Identification of suitable stretches within the study area which satisfy broad engineering criteria;
3. Desktop review based on the Dunleer – Dundalk Motorway Project EIS, OS and vector mapping and a windshield survey of environmental constraints within each possible alternative site; and
4. Identification of preferred site.

NRA Policy has identified approximately 50 to 60km as the optimal spacing between service areas on national primary routes. On the basis of a total route length between Dublin and the Border of approximately 100km the provision of two service areas was considered optimal. The first motorway service area is proposed to be located on the segment of motorway between Dublin and Balbriggan and a second on the segment of motorway between Castlebellingham and Dundalk. The distance between the two service areas is approximately 50km. For the M1 North service area, a study area broadly located between Junction 14 at Charleville and Junction 16 at Dundalk South was initially identified; however, after consideration of engineering constraints, as described below, an area between R166 (Newrath) overbridge and the point where the River Fane crosses the M1 Motorway was selected for further investigation (see **Figure 4.1** for location).

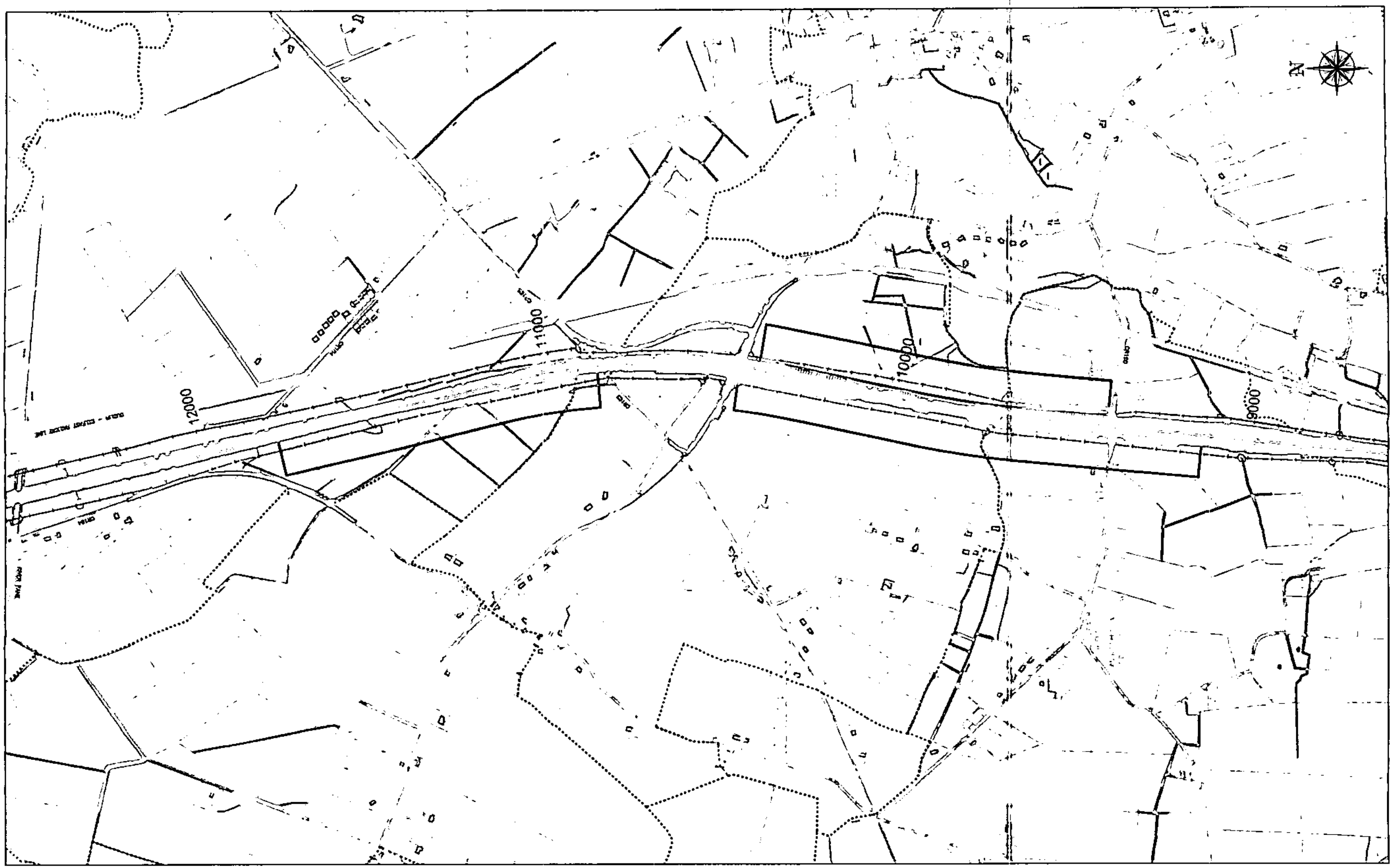
A total of two locations were identified as suitable to the west of the M1 and one location to the east. Following this a desktop review of environmental constraints within an approximately 300m band of each location (as shown in **Figure 4.2**) and a windshield survey were undertaken.

4.3 ENVIRONMENTAL SITE SELECTION ASSESSMENT

Site selection typically involves a comparative evaluation of a number of sites. Each individual site will have its own advantages and disadvantages; however, the core aim is to compare the alternatives, taking into account environmental / engineering considerations and ensure that unacceptable levels of environmental impact are avoided.

The various environmental, engineering and policy issues associated with each site are then compared in an objective manner.

The assessment concluded that no one site on the western side of the M1 presents a clear environment/engineering choice. However, there are marginally fewer sensitive receptors within 300m of W1 (24) compared to W2 (27) and W2 would require crossing of a tributary of the River Fane. As a result W1 was considered the preferred site west of the motorway. Therefore, based on the site selection assessment, W1 and E1 are the preferred sites, as shown in **Figure 4.2**, and are brought forward for consideration in the EIA.



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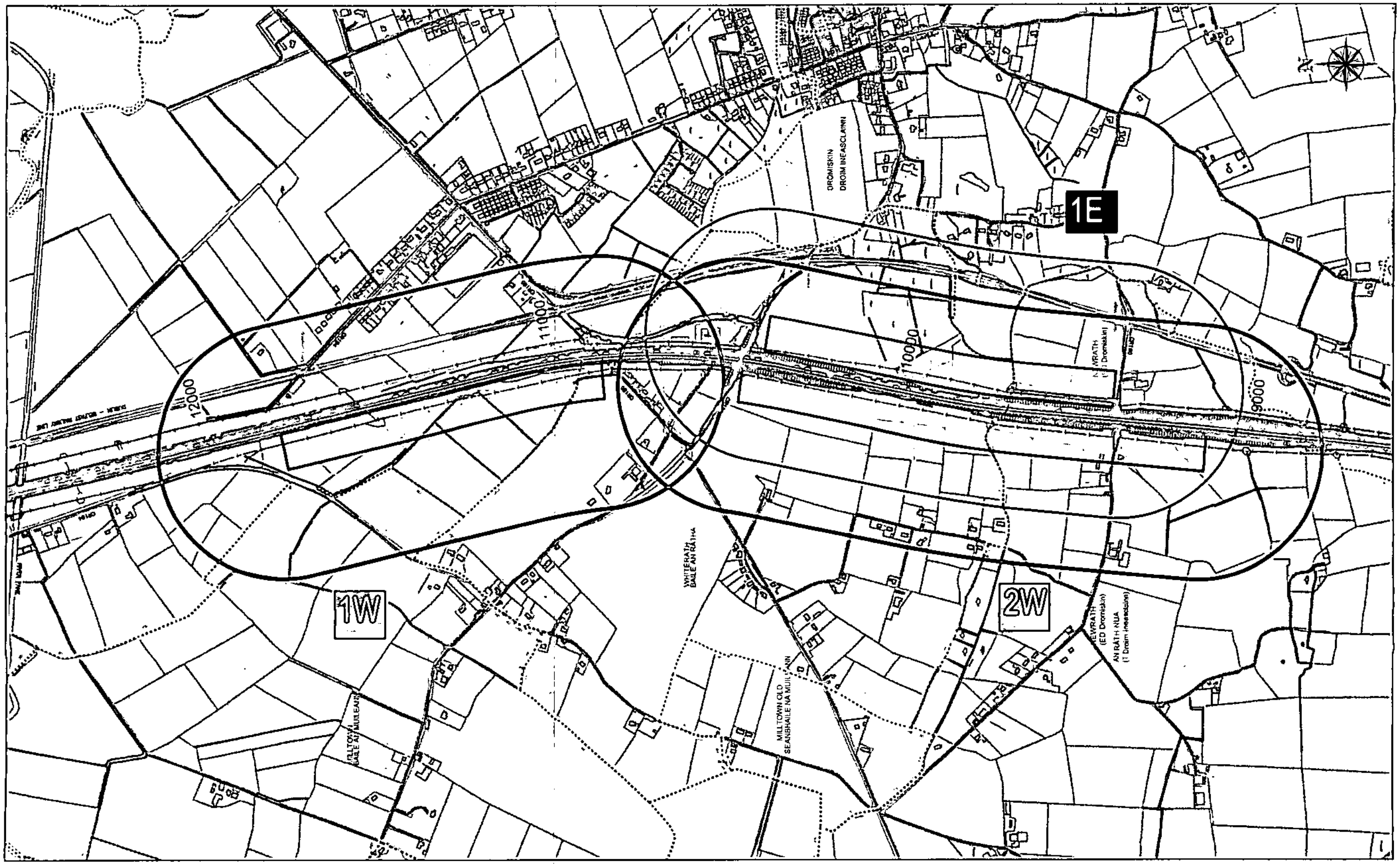
Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	SITES CONSIDERED
Status	FINAL
Scale	N T S
Date	MAY '07
Drawing No	4.1
Rev	A01



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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	ENVIRONMENTAL CONSTRAINTS ASSESSED WITHIN 300m

Scale	N T S	Status	FINAL
Date	MAY '07	Drawing No.	4 2
		Rev	A01

5 ENVIRONMENTAL IMPACT OF THE PROJECT

This section of the Non-Technical Summary describes the likely significant environmental impacts arising from the proposed M1 North Motorway Service Area. Where possible, design measures have been included to reduce or eliminate possible impacts but where this has not been possible, mitigation measures are suggested to reduce or eliminate the identified impacts of the proposal.

5.1 HUMAN BEINGS

This section of the EIS deals with the potential impacts of the proposed development on human beings. These effects have been grouped into:

- Planning Context of the Proposed Development;
- Community/Socio-Economic Impacts;
- Traffic Impacts;
- Air Quality Impacts;
- Noise & Vibration Impacts; and
- Landscape & Visual Impacts.

5.1.1 Planning

This section of the EIS considers the strategic and statutory context governing planning and development at the subject site. This includes an assessment of the national, regional and local strategic planning context, as well as an assessment of the Louth County Development Plan 2003 - 2009 and other relevant statutory planning context documents. This section also examines issues governing prospective trends in development.

The proposed motorway area will operate along an established transportation corridor (M1 motorway). The delivery and operation of the M1 North Motorway Service Area is anticipated to have a significant positive impact on the strategic policies and objectives for the national road network and the economic development of both the county and the country, particularly given the M1's designation as a major inter-urban link.

It is not anticipated that the M1 North Motorway Service Area would significantly alter the current land use structure within the surrounding environs. Rather it is likely that an effective continuation of rural activities such as agriculture will prevail.

5.1.2 Socio-Economic

The delivery of a motorway service area at this location will constitute an asset for this area and will deliver significantly enhanced facilities for M1 Motorway road users, both local and national, who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. In terms of likely and significant impacts on population and employment, it is more likely that the proposed development will catalyse employment levels as it secures an increased attractiveness to employers and employees alike. There will be no impact on the resident population or population change as the proposed service area will not catalyse further resident population increases in the service area catchments.

Each motorway service area will primarily provide fuel and service facilities with ancillary retail and restaurant uses to motorway users. The proposed development should not be considered as a convenience store similar to that located within a town centre. As access by customers will be restricted from the motorway only, local custom will not be diverted to the facility. Therefore, the impact on local retail development within the surrounding environs will be slight.

Mitigation measures have been proposed particularly for the construction phase in order to minimise impacts for the local community in the vicinity of the site.

5.1.3 Traffic

The Traffic Impact Assessment (TIA) assesses the impact of the proposed development on the local road network and deals with the traffic and highway considerations of the development proposals. This includes an assessment of the existing traffic conditions (through the aid of traffic surveys) and of the future traffic conditions with and without the proposed development in place.

Given that there is no published data available for a motorway service area in Ireland reference has been made to international sources and in addition traffic surveys were undertaken at several fuel stations along national primary routes in Ireland.

The results of the traffic assessment showed that the proposed Motorway Service Area once in operation would not result in traffic congestion problems on the road network. All junctions have been proven to operate satisfactorily in the Opening Year 2009 and the Design Year 2024. Measures will be put in place to restrict all vehicles, with the exception of staff vehicles, from accessing the site from the local road network during operation.

A traffic assessment during the construction phase was also undertaken. The construction of both the eastern and western sites of the Motorway Service Area is expected to occur simultaneously and is likely to take approximately 12 months to complete. It will not be permitted to use the existing local road network for any construction traffic, including personnel movements, and consequently all haulage and access to and from the site for plant and materials will have to be made from the M1 Motorway. Various measures for the construction stage are required including the implementation of a construction traffic management plan.

5.1.4 Air Quality

This assessment identifies the existing pollutant trends in the area and establishes spatial information and pollutant concentrations for comparison with Air Quality Standards Regulations (SI No. 271 of 2002). Future air quality trends as a result of traffic variations with and without the proposed development in place have been predicted using the screening air quality assessment from the U.K Highway Agency Design Manual for Roads and Bridges. Recommended mitigation measures for the Construction Phase of the proposed project are also detailed.

A total of two residential receptors were assessed for future air quality. The operational effects of the project on local air quality are predicted to be negligible. The predicted increase in pollutant concentrations is very small to extremely small and absolute concentrations are well within current air quality limits. Therefore, additional mitigation measures are not required.

The NRA recommends a semi-quantitative approach to determine the likelihood of a significant impact at construction stage. Following the implementation of appropriate environmental management controls, only minor, localised and temporary adverse effects are anticipated, at worst during dry conditions, from construction related dust. Mitigation measures to minimise construction impacts include the implementation of a dust minimization plan and control of the stockpiling of material on site.

5.1.5 Noise and Vibration

Noise is a feature of most structural developments particularly during the construction phase. This will be the case during the construction of the proposed motorway service area. Noise from vehicles and buildings will also continue during the operational phase of the development as part of the day-to-day operation.

The potential noise and vibration impacts of the proposed M1 North Motorway Service Area were assessed with particular attention given to noise sensitive receptors within 300m of the proposed development.

The proposed development will result in short-term negative impacts at a number of sensitive receptors in the vicinity of the motorway service area during the construction phase. Measures have been proposed to control and reduce these impacts during construction.

5.1.6 Landscape and Visual

The landscape in the study area can be sub-divided into two landscape character areas: Muirhevna Plain and Dundalk Bay Coastline.

A review of the Louth County Development Plan identified two protected views within 2-3km of the proposed service area. These include Castlebellingham Scenic route (SR8) running south along the coastline and Seabank View (VP9).

The proposed M1 North Motorway Service Area will result in new built elements in the local landscape. The principal sources of impact of such a development include:

- Disturbance from construction and during operation;
- Imposition of new features in the landscape; and
- Movement in a static landscape.

The following features have been taken into account during the prediction of impacts: the level of new roads, buildings and car parks; slip roads; junctions or structures; gantries and road signs; lighting; traffic on the associated roads, including headlight glare; loss of trees and open space.

A visual impact assessment was also undertaken and the assessment showed that a number of properties would be negatively impacted by the proposed development. Mitigation measures have been put forward in order to minimise this negative impact. This includes the development and implementation of a Landscape Master Plan incorporating screening for sensitive receptors visually impacted.

5.2 NATURAL ENVIRONMENT

This section looks at the impacts on the natural environment and includes the terrestrial and aquatic environments, soils, geology, hydrogeology, surface water drainage and climate.

5.2.1 Terrestrial Ecology

The nearest designated site is Dundalk Bay (Site Code 00455/04026), which is designated as a candidate Special Area of Conservation (cSAC), proposed Natural Heritage Area (pNHA) and Special Protection Area (SPA). Stabannan-Braganstown SPA/pNHA, an area of high ornithological importance as a feeding area for wintering waterfowl, is located approximately 3.5km to the southwest of the site.

The key habitats identified were made up of a mixture of arable land, hedgerows, drainage ditches and wet grassland. In general the proposed sites have little or no ecological value particularly within the arable and agricultural areas. This habitat has a low species diversity and low wildlife value. The grassy verges that run adjacent to the M1 motorway have some wildlife value, particularly within the context of the adjacent low value arable land. In the context of the surrounding agricultural land, the Red Bog area (wet grassland/marsh area) is of high value and is locally important as it adds to the biodiversity of the area.

There were obvious signs of badger activity, including badger paths and droppings at both the eastern and western sites, particularly along the grassy verges adjacent to the M1 Motorway.

The activities associated with the proposed development that have the potential to affect the ecology of the site and surrounding area include:

- Direct Habitat loss;
- Disturbance;
- Fragmentation and
- Water Pollution

A variety of mitigation measures have been proposed to alleviate the aforementioned negative impacts. These include use of ecological planting within the Landscape Master Plan and the replacement of lost hedgerows, etc. through the construction of the proposed motorway service area. In addition, specific mitigation measures have also been devised prior to and during the construction phase. In particular, there are measures provided to address impacts to badgers.

Following the application of the recommended mitigation measures, the principal impacts of the proposed development will be addressed and no residual impacts are anticipated.

5.2.2 Aquatic Ecology

Watercourses potentially affected by the proposed development were identified where possible using the engineering drawings and the 1:50,000 O.S. Discovery Series maps. However, no major watercourses were identified within the proposed motorway

service area sites and visits determined that all watercourses draining the proposed development were small streams, most of which were largely dry ditches, heavily vegetated and silted with some pockets of open water.

The small stream/ditches within the eastern and western sites eventually enter a small tributary of the larger River Fane. The Fane and its tributaries hold good stocks of brown trout, salmon and sea trout (www.erfb.ie).

The habitat and water quality in the potentially affected watercourse severely limits its value for salmonids. However, all watercourses were seen to support stickleback *Gasterosteus aculeatus* and as such it cannot be definitively stated that they could not support salmonids. However, it is considered highly unlikely, due to lack of suitable habitat and existing water conditions.

The main potential impacts from the proposed development would arise from the following:

- Drainage from the completed development including car parking areas and services;
- Leakage or spillage of stored fuels;
- Loss of riverine habitat due to culverting;
- Obstruction to upstream movement of fish and other aquatic fauna;
- Increased runoff from roofed and paved areas and other hard surfaces;
- Seepage from the constructed wetland;
- Insufficient capacity of the constructed wetland, to cater for high flood events; and
- Impact of contaminated discharge on the aquatic environment.

In the absence of adequate mitigation measures the potential impact of the proposed development is classified as major.

Measures that will be incorporated to reduce permanent impacts from the project include:

- Earth moving or excavation works close to watercourses shall follow and implement the principles of the sediment control plan described **Chapter 15** to avoid damage to watercourses.
- The watercourses shall be checked for salmonid fish and crayfish or any other protected species likely to occur prior to construction of culverts. If protected species are found they shall be translocated to suitable adjacent habitat.
- Culverts shall be designed to accommodate the passage and movement of fish species.
- Riparian leave strip of at least five metres and where possible 10m shall be fenced off along both sides of the watercourses impacted. This area shall be left undisturbed during the construction phase and retained as a wildlife corridor after the completion of the development.
- All surface water runoff from the completed development shall be passed through a sustainable drainage system.

5.2.3 Soils, Geology & Hydrogeology

The regional topography is gently undulating and is characterised by the presence of drumlins. The topography of the proposed development site is generally flat; although lower lying ground is present in the southern portion of the eastern site.

According to the Geological Survey of Ireland (GSI) the subsoil geology the mapping shows a distinctive difference in the quaternary (subsoils) geology between the eastern and western site.

The eastern site comprises of till derived from Lower Palaeozoic rocks with areas of peat while the western site is comprised predominantly of beach sands and gravels.

The GSI Bedrock Geology indicates that the site is underlain by the Clontail Formation. These rocks are Ordovician – Silurian (Lower Palaeozoic) in age and consist of green-grey, medium to thickly bedded, coarse and very fine-grained greywackes, with dark grey, thinly bedded, poorly graded, quartzose fine sandstone to siltstone units. The thickness of the formation is undocumented. There is no faulting in the vicinity of the proposed development site.

The National Draft Gravel Aquifer Map produced by the GSI (www.gsi.ie) has classified the sand and gravel (raised beach deposits) beneath the western site, as a locally important sand and gravel aquifer. This aquifer is moderately productive, i.e. it is yielding enough water to boreholes or springs to supply villages, small towns or factories. The extent of this aquifer is less than 10km^2.

The groundwater vulnerability rating for the proposed development site is considered to be moderate for the bedrock aquifer beneath the eastern site and extreme for the gravel aquifer beneath the western site.

There are two key potential impacts on soils, geology and hydrogeology associated with the operation of proposed development: a) the management of surface water run off; and b) contamination of surface and ground water sources. There would also be several impacts during construction, including excavation of overburden, effect of dewatering, contamination and soil erosion.

Several detailed mitigation measures for the operational and construction phases have been proposed including the integration of a Sustainable Drainage System (SuDS) within the drainage design and implementation of a sediment erosion control plan.

5.2.4 Surface Water Drainage

The surface water drainage design has been based on the Modified Rational Method and is designed to accommodate, without surcharge, a once in five-year rainfall event, assuming a maximum rainfall intensity of 50mm per hour. The proposed eastern and western service areas will each be provided with separate but similar surface water drainage systems.

Surface water run-off can affect the water quality of receiving watercourses as it can contain suspended solids, oil, organic matter, and metals. Mitigation measures in the form of pollution control systems (i.e. constructed wetlands) immediately before discharge to the adjoining watercourses shall be provided at each proposed outfall location. Upstream, to prevent discharge of oil, petrol or other liquids to the constructed wetlands, full retention light liquids separators shall be used on the forecourt drainage and hydrodynamic vortex separators shall be used on the drainage systems serving the roadways and car parks.

The construction of the proposed service area will create an impervious area within the existing catchment as a result of internal roads, parking areas, service area buildings, etc. The impervious areas will increase the volume of storm runoff relative to the existing drainage network. The drainage from the service area will also increase the rate of runoff. This could, if unmitigated, potentially cause flooding downstream of the outfall point. Therefore, SuDS techniques shall be implemented on the site to minimise the risk of increasing the peak flows in the watercourses. The SuDS system aims to limit surface water runoff rates from developments to the previously existing greenfield rate.

Proposed culvert crossings could reduce storage capacity of the existing land drains. Culverts could also act as hydraulic restriction causing flooding upstream. Culverts can also impact on aquatic ecology by blocking the upstream movement of fish. Therefore, culverts will be designed to accept the flow from a once in 100 years flood event and consultations with the appropriate authorities will take place during the detailed design stage with regard to any in stream works and in relation to the final design of the culverts.

5.2.5 Agricultural Material Assets

The proposed development will not have a significant impact on agricultural material assets on a national or regional scale. However, it will have an impact on a local scale due to loss of agricultural land. Development of the proposed sites would affect six landowners.

Noise can be an issue with certain types of livestock such as dairy cows and horses. Although noise can affect stock there are large numbers of drystock currently grazing alongside the M1 Motorway with no ill affects.

Impacts that could occur during the construction phase of the project include: generation of dust in the immediate vicinity; potential disruptions to local agricultural traffic; disruption or damage to *in situ* field drains with the potential for reductions in farm productivity due to wet or flooded fields during spells of wet weather; temporary impacts to access to adjacent residences; and accidental disruption to water supplies, sewers, or septic tanks. A suite of mitigation measures has been provided to address these construction related impacts.

5.2.6 Material Assets – Natural and Other Resources

Overall the proposal will have a minor negative impact on natural and other resources. In general, the construction impact of the proposed motorway service area is largely associated with possible disruption to services and existing transport networks. It is considered that these impacts will be of a temporary nature and can be adequately mitigated.

The construction of the Motorway Service Area will require construction of the service area buildings and internal and external roads. The external roads include upgrade of the M1 carriageways, north and south to facilitate the required diverge and merge lanes needed to enter and exit the Motorway Service Area within safe limits. Access to the construction site will only be permitted from the M1 motorway.

It is proposed that access to the Motorway Service Area, once in operation, will be via the M1 motorway only. The only exception to this will be staff vehicles, which will be able to access the sites via a controlled access point off the local road.

No conflicts have been identified with the ESB transmissions and distribution lines in the vicinity nor are any conflicts expected between the project and the overhead and underground cable network or any Bord Gáis services and facilities.

It will be necessary to relocate the ducting and cabling for the existing motorway communication services to facilitate the construction of the slip roads tapers for the proposed motorway service area. This will involve diverting existing services into the new verges adjacent to the slip road.

The proposed Motorway Service Area will include for the provision of the same lighting intensity along the full length of the internal road network to ensure that the vehicle routes are clear both during night and daytime. Lighting will also be provided in the parking area, to enhance safety of pedestrians and to give a secure environment for the parked vehicles. Lighting will also be required on the M1 motorway to achieve the appropriate safety standards.

5.2.7 Cultural Heritage

The proposed development is located just west of Dromiskin village, which has a rich historical background. There are still several relics and recorded monuments present within the town.

One Record of Monuments & Places (RMP) is located partially within the eastern site of the proposed development. This RMP is a crannóg site, which is a defensive habitation site constructed on a natural or artificial island in a lake, river, or marshy area. The majority of these sites have been dated to the early medieval period. The crannóg site encompasses a circular area approximately 50m in diameter. Approximately one third of this area is within the site in dry, undulating, possibly reclaimed pasture. The remaining two-thirds of the crannóg site are situated in low-lying, boggy ground, known locally as the Red Bog. No evidence of the crannóg was visible during the field inspection and records state that the last time traces of the crannóg were visible was during a dry summer in 1976 when some stakes could be seen protruding from the bog.

No sites of architectural heritage were noted during the field inspection. A 19th century railway bridge, heavily altered in the past 10 years, is located outside the confines of the proposed site.

The assessment noted one area of archaeological potential within the bogland area known as the Red Bog. Given the site of the crannóg and that, in general, low-lying boggy and marshy areas are considered archaeologically sensitive, this area would require further investigation.

The main impact on cultural heritage is largely associated with the construction phase. A construction impact is an impact where disturbance and potential damage to unknown subsurface remains or the removal and/or damage to known surface or subsurface remains may occur during construction activities. Various mitigation measures have been devised to further investigate in and around the areas previously identified to ensure that any existing and/or new developments are appropriately assessed, managed and protected prior to full construction activities of the proposed development.

5.3 INTERACTIONS

In addition to assessment of impacts outlined in the previous sections (human and natural environment, material assets and cultural heritage) the inter-relationship between these factors/impacts has also been taken into account as part of this EIS. Where a potential exists for interaction between two or more environmental topics, the relevant specialists have taken the potential interactions into account when making their assessment and where possible complementary mitigation measures have been proposed.

5.4 ENVIRONMENTAL RISK REVIEW

An Environmental Risk Review has been carried out as part of the Environmental Impact Assessment for the proposed M1 North Motorway Service Area near Dromiskin in Co. Louth. The Environmental Risk Review identifies potential and likely hazards, specifically in relation to the operation of the service fuel station, which may pose a risk to the environment and human health. Following the identification process, advised standard mitigation measures were outlined to address each identified environmental risk.

The potential sources of pollution or harm associated with this development are:

- Leaks and Spills
  - Underground tanks and piping
  - Above ground tanks and piping
  - Fuel dispensing equipment
  - Fuel delivery equipment
- Wastewater Runoff
  - Contaminated surface water runoff from paved surfaces
- Drainage
  - Failure of drainage system to prevent contaminated surface water from entering the groundwater and surface water environment without proper treatment
- Emissions to Air
  - VOCs from storage, fuel delivery and dispensing operations

These are the main risks associated with the construction and, to a lesser extent, operation of the project. These risks would be reduced to acceptable levels following implementation of the recommended mitigation measures.

6 WHAT HAPPENS NEXT?

6.1 INSPECTING AND PURCHASING THE EIS

Copies of the Environmental Impact Statement are available for examination at the locations which are detailed in published newspaper notices.

The Environmental Impact Statement is also available for purchase in hardcopy, on CD or DVD. Further information is detailed in published newspaper notices.

6.2 NEXT STEPS

Construction of the scheme is dependent on approval from An Bord Pleanála (the Board). Written submissions relating to the environmental effects of the proposals may be made to the Board prior to the date specified in the published newspaper notices.

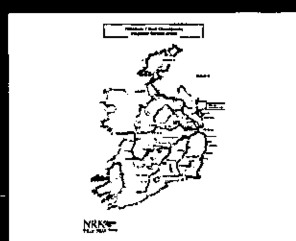
An Bord Pleanála, at its discretion, may hold an Oral Hearing.

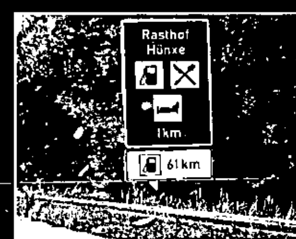
The written submissions, together with any representations made at the Oral Hearing, will be considered by the Board before making its decision on whether or not to approve the scheme (with or without modifications). The Board's decision shall be published in one or more newspapers circulating in the area. It will include, where appropriate, particulars of any modifications to the scheme.

NRA
National Roads Authority
An tÚdarás um Bóithre Náisiúnta

M1 North Motorway Service Area

Environmental Impact Statement



Volume 2

Main Report

FEBRUARY 2008

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

RPS

PREFACE

The structure of the Environmental Impact Statement (EIS) for the proposed M1 North Motorway Service Area, near Dromiskin, Co. Louth is laid out in the preface of each volume for clarity. The EIS consists of three volumes as follows:

Volume 1 – Non-Technical Summary

A non-technical summary of information contained in Volume 2.

Volume 2 – Environmental Impact Statement

This volume deals with the environmental impact of the proposed development including the structure, associated signage, access / egress points and associated auxiliary works to the proposed development.

Volume 3 – Technical Appendices

Specialist technical reports on which information in Volume 2 is based.

ACKNOWLEDGEMENTS

This EIS has been prepared by West Consult, a joint venture comprised of RPS Consulting Engineers and Roughan & O'Donovan Consulting Engineers and their specialist environmental sub-consultants.

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ABBREVIATIONS

µg/l	Micro-grams per litre
µg/m^3	Micro-grams per metre cubed
µm	Micrometres
AADT	Annual Average Daily Traffic
AMSL	Above Mean Sea Level
AOD	Above Ordnance Datum
CO	Carbon Monoxide
CO_2	Carbon Dioxide (a colourless, odourless, incombustible gas present as a minor constituent of the atmosphere, where it comprises 0.35% by volume)
cSAC	Candidate Special Area of Conservation
CSO	Central Statistics Office
DED	District Electoral Divisions
dB	Decibels (units for the measurement of sound intensity)
DO	Dissolved oxygen
DoEHLG	Department of the Environment, Heritage and Local Government
ERFB	Eastern Regional Fisheries Board
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ESB	Electricity Supply Board
GIS	Geographical Information System
GSI	Geological Survey of Ireland
GWP	Global warming potential
Ha	Hectare = 10,000 square metres or 2.47 acres
KCC	Kildare County Council
KV	Kilovolts
Kt	Kilotons
L_{Aeq}	The A-weighted equivalent continuous steady sound pressure level and effectively represents an average value

M	Metres
mbgl	Metres below ground level
mg/m^2	Milligrams per metre square
mg/m^3	Milligrams per metre cubed
MHWSL	Mean high water spring level
mm	Millimetres
NAQS	National Air Quality Standards
NDP	National Development Plan
NGR	National Grid Reference
NHA	Natural Heritage Area
NMI	National Museum of Ireland
NO_x	Nitrogen Oxides, usually includes the two pollutants nitrogen monoxide and nitrogen dioxide produced by high temperature combustion and some natural processes. Nitrogen dioxide is the most important form which can contribute to adverse health effects, ozone formation and acid deposition
NO_2	Nitrogen Dioxide
N_2O	Nitrous Oxide
NSS	National Spatial Strategy
OD	Ordnance Datum
OPW	Office of Public Works
OS	Ordnance Survey
pH	A measure of the strength of an acid or a base
Ou_E/m^3	Odour units per metre cubed
PM_{10}	Particulate Matter (fine airborne particles) less than 10 micrometers in diameter
pNHA	Proposed Natural Heritage Area
Ppm	Parts per million
RMP	Record of Monuments and Places
SAC	Special Area of Conservation
SO_2	Sulphur Dioxide
SPA	Special Protection Area
T/d	Tonnes per day

USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds (a compound which evaporate readily and contribute to air pollution mainly through the production of secondary pollutants such as ozone)
WHO	World Health Organisation
WTP	Water Treatment Plant

GLOSSARY OF TERMS

Below is a partial glossary of terms used in this report. The definitions herein are not to be taken as comprehensive, but solely as an aid to the non-technical reader.

Ambient Noise	The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far, i.e. the total noise level due to all noise sources.
Ancillary Works	Works additional to, but associated with the main project, similar to accommodation works
A-weighting	The process by which noise levels are corrected to account for the non-linearity of human hearing.
Biodiversity	The number, variety and variability of living organisms in a particular habitat
Borrow Pits	Excavation, usually outside the limits of the works, for producing materials necessary for its construction
Calcareous	Substance containing calcium carbonate
Clerestory	That part of a building rising clear of the roofs or other parts, whose walls contain windows for lighting the interior
Culvert	Structure or drain for the diversion of a stream or river
dB(A)	A logarithmic noise scale (decibel). The "A" indicates that a frequency weighting has been applied to take account of the variation in the sensitivity of the human ear as a function of frequency.
Dissolved Oxygen	A measure of the concentration of oxygen in a liquid, such as water or waste water, usually expressed in mg/l or per cent saturation
Enclosure	Any monument consisting of an enclosing feature such as a bank or a ditch, usually earthen, such as barrows or ringforts. In this report, enclosures are circular or oval unless otherwise stated.
Fauna	A collective term for the animals of a region
Fill	Material used for raising the level of the ground
Fines	Fine particle fractions
Flora	A collective term for the plants of a region
Glacial Till	A mixture of clay, silt, sand, gravel and boulders ranging widely in size and shape deposited by a glacier
Groundwater	Water stored in the soil and rock both above and below the water table
Habitat	The dwelling place of a species or community, providing a particular set of environmental conditions (e.g. forest floor)
L_{Aeq}	Is the A-weighted equivalent continuous sound level during a sample time period and effectively represents an average value i.e. the average level recorded over the sampling period and includes all noise events.

	The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of noise on the background. The L_{Aeq} value has been found to correlate well with human tolerance of noise, and is the value normally used in setting and monitoring industrial noise limits.
L_{AF10}	Refers to those levels in the top 10 percentile of the sampling interval; it is the level that is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise, i.e. the higher noise levels present in the ambient noise. The L_{A10} parameter is used in the U.K. traffic noise model (CRTN).
L_{AF90}	Refers to those levels in the lower 90 percentile of the sampling interval; it is the level that is exceeded for 90% of the measurement period. It is used to estimate a background level. It is used in BS 4142 as being representative of the steady background noise at a location. It tends to exclude short events such as cars passing, dogs barking, aircraft flyovers etc.
L_{AMax}	The L_{AMax} is the maximum reading measured at the sound level meter. It gives an indication of the highest noise produced by a varying noise source.
L_{AMin}	The L_{AMin} is the minimum reading measured at the sound level meter. It gives an indication of the highest noise produced by a varying noise source.
Leachate	Water containing contaminants, which leaks from a disposal site.
Landscape Character	The distinct and homogenous pattern that occurs in the landscape reflecting geology, landform, soils, vegetation and mans impact.
Landscape Quality	The assessment of the landscape quality assesses the value of the landscape in relation to its rarity, location and landscape character attributes. In general, the higher the quality of landscape the more sensitive it will be to change.
Landscape Resource	The combination of elements that contribute to landscape context, character and value.
Landscape Value	The relative value or importance attached to a landscape that expresses national, regional or local consensus because of intrinsic characteristics.
Mitigation Measures	Measures to ease or soothe the effect of something. Mitigation measures suggest ways to avoid or lessen the negative effects of a project on the environment
NPWS	National Parks and Wildlife Service of the Department of the Environment, Heritage & Local Government
Phreatic	The zone beneath the water-table, where the pores are full of groundwater.
Piezometer	An instrument used to measure the level of the water table
Pollution	The direct or indirect alteration of the physical, chemical, thermal biological, or radioactive properties of any part of the environment in such a way as to create a hazard or potential hazard to the health, safety or welfare of living species

Ringfort	Early Christian defended secular settlement consisting of a bank and external ditch defining a circular area that contained the dwelling structures of the occupants; also fairy fort, rath lios, or cashel (the latter constructed of stone as opposed to earth).
Runoff	The gravity flow of surface water.
Sewage	Liquid wastes from communities conveyed in sewers. Sewage may be a mixture of domestic sewage effluents from residential areas and industrial liquid waste
Slurry	Water or a liquid containing a high concentration of suspended solids.
Suspended Solids	Any particulate matter which is suspended in water
Sustainable Development	Defined by the Bruntland Commission (1987) as "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs"
Topographical Surveys	Mapping of land surface shape
Tower House	Small castle, usually of three storeys, dating from the fourteenth to sixteenth centuries.
Upstream	Toward the source of the flow, or located in the area from which the flow is coming
Visual Amenity	Visual amenity is the value of a particular area or view in terms of what is seen by the viewer. This value may be influenced by the physical condition of the landscape viewed and the contribution the characteristics of the view make to the local environment.
Visual Resources	Visual resources are the overall key elements/features/characteristics that combine to make a view.
Viewer Sensitivity	Viewer sensitivity is a combination of the sensitivity of the human receptor (i.e. resident; commuter; tourist; walker; recreationist; or worker) and the quality of view experienced by the viewer.

PART I GENERAL INFORMATION

This section of the Environmental Impact Statement (EIS) describes the proposed M1 North Motorway Service Area, which is comprised of two sites east and west of the motorway. The EIS also discusses design measures included to reduce the most significant adverse environmental impacts. All proposed works described in this EIS and/or illustrated on the drawings within the document are based on the preliminary design stage and may be revised during the detailed design process. Modifications may be made to avail of opportunities to improve the design in light of experience gained on the ground or other innovations, provided that these modifications do not result in additional adverse environmental effects.

1 INTRODUCTION

West Consult, a joint venture incorporating Roughan & O'Donovan Consulting Engineers and RPS, have been commissioned by the National Roads Authority (NRA) to prepare a Preliminary Design and Environmental Impact Assessment (EIA) of a motorway service area adjacent to the M1 Motorway near the village of Dromiskin. This motorway service area consists of two sites located on the eastern and western sides of the M1 motorway.

There are currently no dedicated motorway service areas along motorways in Ireland. Presently inter-county traffic such as HCVs travelling long distances must exit motorways in order to avail of service facilities that may be available at neighbouring towns or villages.

The NRA has put forward proposals and policies to provide service areas across the country. This includes the provision of such a service area on the M1 Motorway north of Castlebellingham, which is the primary focus of this EIS.

1.1 PURPOSE OF THE PROPOSED DEVELOPMENT

The primary purpose of the proposed motorway service area is to provide fuel and rest facilities on a 24-hour basis on the northern portion of the M1 Motorway in order to aid inter-county and long distance traffic. This will assist the road safety campaign put forward by the Road Safety Authority and the reduction of driver fatigue and accidents on the national primary road network by providing rest and refreshment facilities. It will also provide facilities for Heavy Commercial Vehicle (HCV) drivers to park up and take their required resting periods as outlined under the EU Directive further elaborated in **Chapter 2.**

The key objectives of the proposal are to:

- Provide a design for a dedicated motorway service area, which will incorporate, as a minimum, parking, toilets, Garda Enforcement Area, restaurant/food outlet (for a minimum of 16 hours each day) and fuel facilities; and
- Prepare an EIS in order to assess the environmental impacts associated with the proposed motorway service area. This shall be undertaken with regard to the relevant EIA legislation and guidelines.

This document shall entail the assessment of the environmental impacts of the proposed motorway service area. The design of this facility is discussed in further detail in **Chapter 3** of this EIS.

1.2 PUBLIC PRIVATE PARTNERSHIP APPROACH

It is proposed to develop the motorway service area described in this EIS under a Public Private Partnership (PPP) contract and to allow private commercial interests to provide and operate motorway service areas.

A PPP involves cooperation between the public and private sectors for the purpose of delivering a project or service, which in the past would have been the sole responsibility of the public sector. The approach accepts that the public sector and the private sector have advantages relative to each other in the performance of specific tasks. By allowing each sector to do what it does best public services and facilities can be provided in the most economically efficient manner. The development of PPP is a

key element of the National Development Plan (NDP) and reflects the need to find innovative ways to improve the efficiency and value for money for public infrastructure provision.

PPP schemes are developed on the basis of design / build / operate / finance contracts with a long-term concession period, in this case probably 15 years. As is the practice on design and build contracts, the appointed PPP concessionaire will develop the detailed design and use the appropriate construction methods. It is recognised that a certain degree of flexibility is required from the preliminary to the detailed design; however, it is important to note that the concessionaire will be contractually bound by the requirements and mitigation measures set out in this EIS, by the assessment decision of An Bord Pleanála and by the requirements of the Contract Documents provided by the NRA.

A contract notice was placed in the OJEC on the 1st of May 2007 seeking *Request to Participate* submissions from interested candidates for the first phase of Service Areas on the National Road Network. This competition and the awarded contracts will encompass the design, construction, operation, and financing of three service areas in total; this M1 North Motorway Service Area and two more, one on the M4 Motorway near Enfield and one on the M1 Motorway near Lusk (both the subject of separate EIAs).

1.3 REPORT STRUCTURE

The EIS has been divided into two sections Part I and Part II. Part I of the EIS discusses NRA policy with regard to the development and design of motorway service areas. It also provides a description of the proposed development with regard to engineering design including drainage, structures, lighting, earthworks and other details relating to the engineering layout of the M1 North Motorway Service Area. The latter chapters in Part I provide details on the EIA process and the legislative requirements associated with the proposed motorway service area. Part II of this EIS describes and assesses in greater detail the potential environmental impacts on the human environment, natural environment, material assets and cultural heritage associated with the proposed motorway service area.

2 BACKGROUND TO THE PROPOSED DEVELOPMENT

2.1 INTRODUCTION

In light of the extensive improvements made to the national road network in recent years and the programme of further infrastructural work planned throughout the country, the NRA has outlined a policy to provide service areas to cater for users of national roads.

Figure 2.1 shows the indicative distribution of service areas throughout the country as outlined by the NRA (www.nra.ie). The distribution has been developed with reference to international practices, geographic size of Ireland, the relative distances of inter-county and cross-country journeys, traffic volumes relative to other European countries and also public consultation held during 2005 (see **Chapter 4** for details).

International practice varies with regard to both the location of motorway service areas and the mechanisms used to provide such facilities. In the United Kingdom, service areas are located in approximately equal measure at motorway junctions and on-line between junctions. However, across continental Europe, best practice is to locate service areas with direct access on and off the mainline, as opposed to at junctions. The principal reasons for this are:

a) Access directly off the mainline is most convenient for road users, and the increased convenience for road users encourages greater use of the facilities,

b) The greater the level of usage of rest facilities by drivers the greater the safety benefits in terms of reduced fatigue related accidents. In this regard, it is to be noted that the Road Safety Strategy 2007-2012, published by the Road Safety Authority in October 2007, identified that driver fatigue is a factor in 20% of fatal accidents.

c) Access directly off the mainline ensures the separation of long-distance, high-speed motorway and dual carriageway traffic from traffic on the local roads network. Locating a service area at or in the vicinity of a grade separated junction inevitably results in the mixing of motorway traffic with local traffic, resulting in increased risk of accidents between users of the service area facility and other road users including pedestrians and cyclists as well as vehicular users.

2.2 NRA POLICY

The introduction of long lengths of motorways and high quality dual carriageways into the network of national roads in Ireland represents a new departure in Irish transport development. One of the consequences of this development is the requirement to cater for road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. Currently, drivers on motorways must exit the road to avail of local facilities in close by towns and villages. The European Transport Agency has estimated that 20% of all accidents are caused by driver fatigue and international guidance recommends that drivers should stop every two to three hours. The Road Safety Strategy 2007-2012 published in October 2007 indicated that up to 20% of fatal accidents were attributable to driver fatigue.

The EU legislation summarised below aims to increase the quantity and quality of roadside checks of professional drivers, promote greater cooperation between enforcement authorities and specify driving times and rest periods for professional drivers.

- The **EU Directive 2006/22/EC on Road Transport Activities** under Article 2.1 states that *Member States shall organize a system of appropriate and regular checks on correct and consistent implementation.... both at the roadside and at premises of undertakings of all transport categories*. This Directive also states under Article 4.2 that *sufficient provision is made for checkpoints on or nearby existing and planned roads and, if necessary, that service stations and other safe locations along motorways can function as checkpoints.*

- Furthermore, in **Chapter II of the EU Regulations 561/2006** details are provided on driving times, breaks and rest periods. It states that *the daily driving time shall not exceed nine hours* and that a *driver shall take daily and weekly rest periods.* A regular daily rest period is defined in the legislation as *any period of rest of at least 11 hours. Alternatively, this regular daily rest period may be taken in two periods, the first of which must be an uninterrupted period of at least 3 hours and the second an uninterrupted period of at least nine hours.*

In response, the NRA has developed a policy for the provision of service areas on the national road network. The full details of this policy are available from the NRA website (www.nra.ie).

2.2.1 Service Areas

Service Areas are described as:- A ***Service Area*** is defined as *a facility for motorists and their passengers, which provides parking, fuel station, toilets, convenience shop, restaurant/food outlet facilities. Motel/hotel type facilities catering for the needs of road users may also be included depending on the location of the proposed service area and the perceived need for such a facility. Operators of service areas will typically ensure that fuel and toilet facilities are permanently available to road users and food facilities are available over an extensive period for a minimum of 16 hours each day. A Garda enforcement area will also typically be included.*

2.2.2 Implementation of the Policy

The M1 North Motorway Service Area is one of three pilot service areas to be developed in the short term. The other two Motorway Service Areas include one on the M4 and a second one on the M1 in the vicinity of Lusk. All three are the subject of EIA and will be submitted to An Bord Pleanála for planning approval. The provision of the other areas shown on **Figure 2.1** will follow after the three service areas included in the pilot programme.

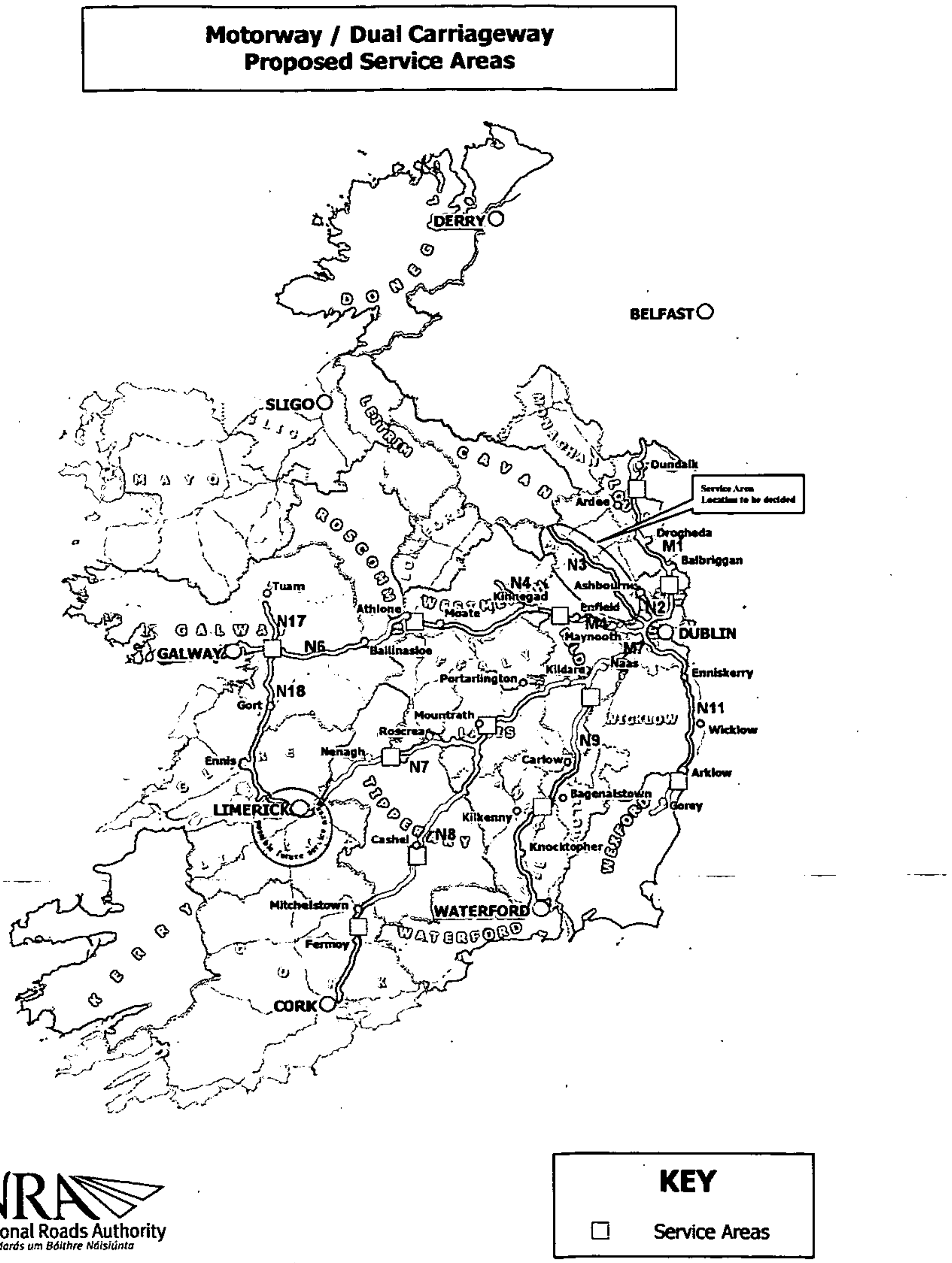


Figure 2.1: Indicative Distribution of Service Areas along Motorways and High Quality Dual Carriageways in Ireland.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 GENERAL

The proposed M1 North Motorway Service Area will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. The proposed development will be located within County Louth approximately 2.5km to the northwest of Castlebellingham and 1km to the west of Dromiskin on the M1 Motorway as shown on **Figure 3.1**. The Motorway Service Area comprises of two sites located on the eastern and western sides of the M1 motorway. Public access to the motorway service area will be restricted to direct access from the M1 Motorway.

Facilities will be provided on both sides of the road to cater separately for northbound and southbound traffic. The motorway service area will provide segregated parking areas for passenger cars, Heavy Commercial Vehicles (HCVs) and Coaches. Fuel facilities will be provided along with a convenience shop, restaurant, toilets, showers, indoor and outdoor children's play areas and a tourist information kiosk. Recreation and picnic areas will also be provided within a landscaped environment. A Garda enforcement area will also be provided within each site. Restricted access from the local road network into each site will be provided for employees only.

The design and layout of the proposed service area is based on the draft unpublished NRA standard TA 90/04 and all supplementary technical reports to that document. This draft standard and associated information will become a new NRA standard TA 70, which is to be published in early 2008. For ease of reference throughout this EIS the document is referred to as draft TA 90.

3.2 EXISTING CONDITIONS

The proposed M1 North Motorway Service Area is located within the Townland of Whiterath approximately 2 km to the northwest of Castlebellingham and 1km to the west of Dromiskin. Towns and villages in the vicinity of the proposed development include; Dunleer and Drogheda to the south; Dundalk to the north; Castlebellingham and Dromiskin to the east; and Mansfield Town and Ardee to the west.

The proposed development is divided into two sites, one to the west of the M1 Motorway and the other to the east of the M1 Motorway where the CR182 crosses over the M1 Motorway. The nearest motorway junctions to the proposed development are the Dundalk South junction, approximately 5 km to the north of the proposed development, and the Castlebellingham junction, approximately 2.5km to the south.

The western site is bounded by the M1 Motorway to the east, the CR 185 to the south, a field ditch to the west and by the CR184 to the north. The eastern site is bounded by the Dublin to Belfast Rail Line to the east, open fields and bogland to the south, the M1 Motorway to the west and by the CR182 to the north of the site.

The topography in the area consists of generally flat and undulating lands. The area is characterised by a combination of rural developments, townland and agricultural fields. Ribbon type development in the form of housing and buildings exists along the county roads while denser housing developments and facilities exist in the town and village of Castlebellingham and Dromiskin. Agricultural fields exist along the line of the M1 Motorway and Dublin Belfast Rail Line where the proposed motorway service area would be located. The proposed development will affect four separate landowners.

3.3 SITE LAYOUT

The indicative site boundary is shown in **Figure 3.2** and the indicative site layout is shown in **Figure 3.3.** The main elements of the motorway service area include:

- Roads including slip lanes to and from the service areas;
- Parking facilities for passenger car vehicles, coaches and HCVs;
- Building facilities;
- Fuel station facilities;
- Storm and Foul Drainage;
- Garda enforcement area;
- Lighting;
- Water Supply; and
- Earthworks.

The motorway service area design is based on the separation of the HCVs from light passenger vehicles, while minimising the conflict between vehicles and pedestrians.

The design takes into consideration the location and size of facilities that will be provided as part of the motorway service area including, but not limited to, the fuel filling forecourt areas for both passenger and HCVs, the amenity building, the passenger car parking, coach parking, HCV parking, staff parking and local access for staff.

Each facility has its own requirements in terms of relative location to the road layout and other facilities within the motorway service area. The combination of these requirements, land availability and compliance with the NRA technical advice note Draft TA 90 determines final site layout.

The design of the motorway service area takes into consideration the following requirements for each facility.

Fuel Filling Areas	Separate fuel filling areas will be provided for heavy commercial vehicles and passenger vehicles. The filling areas will be the first facility encountered when entering the motorway service area. This allows the drivers to complete tasks, such as fuelling, before parking up to rest and avail of the amenities.
Amenity Building	The amenity building must be located adjacent to the passenger car filling area with a direct line of sight from the convenience store counter to the passenger car fuel islands.
Passenger Car Parking	The passenger car parking area will be accessible to all passenger vehicles from the passenger car circulation road, beyond the fuel forecourt. The parking area will be located in close proximity to the amenity building such that the distance disabled people need to travel from the disabled parking spaces to the building is kept to a minimum.
Coach Parking	Coach parking will be accessible from the HCV circulation road beyond the HCV fuel forecourt. The coach parking will be located in close proximity to the amenity building to minimise the distance passengers will need to walk. The parking bays will be drive in drive out.
HCV Parking	HCV parking will be accessible from the HCV circulation road beyond the HCV fuel forecourt. The parking bays should be located within the circulation road, where possible, to minimise the number of pedestrian crossing points. The parking bays will be drive in drive out.
Staff Parking	Staff parking can be located anywhere within the proposed development as long as well-lit pedestrian footpaths are provided to the amenity building.
Local Access	Local access for staff will be provided for from the local road network.

3.3.1 Roads

The proposal for the internal and external road network for the proposed M1 North Motorway Service Area is discussed below.

3.3.1.1 Slip Road Design

Deceleration into the Motorway Service Area, as shown in **Figures 3.3a** and **3.3b** is provided by diverge slip lanes in the form of a taper diverge 4-metre wide single lane slip roads.

The length of the diverge slip roads, from the start of the nosing to the roundabout entry, is approximately 295 metres which equates to the desirable minimum stopping sight distance for the M1 Motorway design speed in accordance with TD22 of the NRA DMRB. The vertical profile of the diverge slip road for the western site falls away from the M1 Motorway such that it is approximately 1.25 metres below the M1 Motorway level at the entry into the southern roundabout. The vertical profile of the diverge slip road for the eastern site falls below the M1 Motorway such that it is approximately 0.75 metres below the M1 Motorway level at the entry into the roundabout.

Entry from the sites to the M1 Motorway is provided by merge slip lanes in the form of parallel merge 4-metre wide single lane slip roads.

The length of the merge slip roads, from the roundabout entry to the point of the nosing is approximately 230 metres. The length of merge road, between the roundabout exit and back of the nosing, is similar to the length of nosing, which together enables merging traffic to increase speed to match that of the M1 Motorway traffic. A 230 metre long auxiliary lane is also provided on each merge

The vertical profile of the merge slip road on the western site rises approximately 1.0 metre from the roundabout to match the elevation of the M1 Motorway. The vertical profile of the merge slip road on the eastern site also rises approximately 0.75 metres from the roundabout to match the elevation of the M1 Motorway. The design speed of the slip roads is 70kph.

The design of the at-grade roundabout is based on "moderate" sized roundabout geometry with an Inscribed Circle Diameter (ICD) of 50 metres. The elevation of both roundabouts on the western is approximately 4.0 metres AOD. For the southern roundabout this is approximately 1.0 metre below the level of the M1 Motorway, the northern roundabout is approximately 1.0 metre below the level of the M1 Motorway. The elevation of the roundabout on the eastern site is approximately 13.0 AOD, approximately 1.0 metre below the level of the M1 Motorway.

Generally, safety barriers on the slip roads will be provided where:

- A hazard is located within the clear zone, and
- Embankments are 2 metres or greater in height.

The provision of safety barriers within the verge may require widening of the nearside verge to provide for the working width of the barrier. A working width of W6 (i.e. <=2.1 metres with a 0.6 metre setback) is generally assumed in determining the nearside verge width. Widening of the verge is also required where the barrier intrudes into the sight lines required by the design.

3.3.1.2 Internal Road Network

The layout of the internal road network, shown in **Figure 3.3a** and **Figure 3.3b,** is largely determined by the requirements of each of the facilities provided within the motorway service area, as described earlier in this chapter. However, the layout of the road network must also comply with the following minimum standards.

The design speed for the Internal Road Network is 20 kph. Traffic speeds will be controlled by the curvature and vertical profile of in the internal road alignments and/or the introduction of traffic calming measures where sections of straight road cannot be avoided. Consideration will be given to the predominant vehicle use, for example it would not be expected that HCVs will reach as high speeds as the passenger vehicles; therefore, the HCV circulation carriageway could have longer straights than the passenger vehicle carriageways before the introduction of traffic calming measures.

The road network incorporates three classifications of road. The HCV circulation carriageway can accommodate all vehicle types within the motorway service area. The passenger car circulation carriageway accommodates only passenger cars and motorbikes. The service road accommodates light passenger vehicles and motorbikes only.

Horizontal Alignment

The following horizontal curvature requirements apply to all internal roads:

Design Speed	**20 kph**
Minimum horizontal radius without elimination of adverse camber	80m
Minimum horizontal radius with superelevation of 2.5%	60m
Minimum horizontal radius with superelevation of 3.5%	40m
Desirable minimum horizontal radius with superelevation of 5%	30m
One step below desirable minimum horizontal radius with superelevation of 5%	20m

The following stopping sight distance requirements apply to all internal roads:

Design Speed	**20 kph**
Desirable minimum stopping sight distance	35m
One step below desirable minimum stopping sight distance	30m

Cross-section

Both the HCV and passenger car circulation carriageways are one-way and have a 4.0m wide carriageway with a 1.0 metre-wide hard strip on either side. The service road is two-way and has a 2 x 3.0 metre-wide carriageway with a 1.5 metre wide verge on either side. Carriageway widening will be applied, where necessary.

3.3.1.3 Internal Road Network Layout

In consideration of the requirements for each of the motorway service area facilities and the principles of separating HCVs from the light passenger vehicles, as well as minimising conflict between vehicles and pedestrians, the internal road network layout, shown in **Figure 3.3a** and **Figure 3.3b** for both motorway service area sites is as follows.

After entering the motorway service area from the roundabout, vehicles are separated into two streams at a Y junction. HCVs and coaches are directed to the left, which is the main HCV circulation carriageway, and passenger cars move to the right which is the circulation carriageway restricted to light vehicles such as passenger cars and motorcycles.

Passenger Cars

- The passenger car circulation carriageway is designed to give passenger vehicles the shortest journey within the motorway service area in which they can avail of all facilities before exiting the proposed development.
- Passenger vehicles will have direct access into the fuel filling area and passenger car park from the circulation carriageway. Give way junctions will govern access back onto the carriageway.
- Through a combination of short straights and tight radii it is expected that the speed of the passenger vehicle traffic will be restricted, where this is not possible traffic calming measures will be implemented.
- The passenger vehicle will have priority over HCVs at junctions within the Motorway Service Area.

Heavy Commercial Vehicles and Coaches

- The HCV circulation carriageway is designed as an outer ring road encompassing the motorway service area and its facilities where possible.
- HCV and coach vehicles will have direct access into the HCV fuel filling area.
- Parking will be provided for coaches, adjacent to the amenity building, in a drive in drive out form, from the HCV carriageway avoiding the need for reversing. Coaches will then travel on an offset carriageway before rejoining the HCV carriageway at a give way junction.
- HCV parking is provided off the HCV carriageway in a drive in drive out form. As with the coaches, the HCVs will travel on an offset carriageway before rejoining the HCV carriageway.
- The layout restricts the speed of HCVs within the proposed development through a combination of tight radii and straights, which limit the opportunity for HCVs to build speed. Where necessary, traffic calming measures will be implemented.

Service Road Access

- Restricted employee only access into the proposed development will be gained via service roads onto the adjoining local road network.
- The western site will utilise an existing farm entrance, which will be improved to the appropriate standard. It will join the old CR185, which was severed by construction of the M1 Motorway.
- The eastern site will connect directly onto the existing local road.

3.3.1.4 CR182 and CR185

Traffic management will be required on the CR182 for the construction of the junction, which will form the staff access into the motorway service area from the local road network. Traffic management will also be required on the CR185 to accommodate infrastructure works. See **Section 3.3.15.1** for more details.

3.3.2 Parking Facilities

The indicative layout of the car parking bays is shown in **Figure 3.3.** The design of the motorway service area gives priority to passenger vehicles, with separate parking areas provided for passenger cars (LV), coaches, motorcycles and heavy commercial vehicles (HCVs).

The parking provision is determined by demand assessment for LVs, motorcycles, coaches and HCVs separately. LV, coach and motorcycle parking shall be based on a percentage of the total LV AADT flow, 15 years after opening of the service area. HCV parking shall be based on a percentage of the total HCV AADT flow, 15 years after opening of the service area. The traffic figures upon which the demand assessment is based are detailed in **Chapter 9**.

The parking provision assessment for LV, coach and motorcycles are shown in **Table 3.1**. The parking provision assessment for HCVs is shown in **Table 3.2**.

Table 3.1 Demand Assessments for LV, Coach and Motorcycle Parking Provision

Vehicle Type	% of LV AADT
Car	0.50%
Coach	0.03%
Motorcycle	0.04%

Table 3.2 Demand Assessments for HCV Parking Provision

Vehicle Type	% of HCV AADT
HCV	1.00%

When assessing the provision of parking within the service area, consideration should be given to local conditions including, but not limited to, the composition of traffic, the journey type such as commute or transit/tourist, and the proximity of the service area to large population bases. As a result the number of parking spaces provided may be adjusted either up or down to reflect these local conditions, to a maximum of 20% in either direction.

Notwithstanding the demand assessment for parking provision, the minimum number of parking bays for to be provided for each service area should be in accordance with **Table 3.3**.

Table 3.3: Car/Coach/Motorcycle/HCV Minimum Parking Provision

Vehicle Type	Minimum Number of Parking Bays to be Provided
Car	50
Coach	6
Motorcycle	6
HCV	20

Passenger Car

The design of the motorway service areas gives priority to passenger vehicles. The passenger parking areas are located beyond the fuel facilities giving drivers the opportunity to fuel up before driving to the parking area to avail of the facilities.

The parking areas are isolated from the arterial road network to avoid conflict between pedestrians and through traffic and are located adjacent to the amenity buildings to give direct access and minimise walking distance from vehicles to the amenity buildings.

The provision of car parking bays (inclusive of disabled parking) is likely to be:

- Western service area = 83
- Eastern service area = 83

Disabled parking bays are provided at the rate of 5%, and as such will number:

- Western service area = 5
- Eastern service area = 5

Disabled parking is located immediately adjacent to the amenity buildings.

The provision of motorcycle parking bays is likely to be:

- Western service area = 7
- Eastern service area = 7

Coach

Coach parking is provided directly off the HCV carriageway following on from the fuel facilities. In this way the coach parking will be immediately adjacent to the amenity buildings, which will reduce the distance passengers need to walk to the facilities.

The provision of the minimum number of coach parking bays is:

- Western service area = 6
- Eastern service area = 6

The parking bays are configured in such a way that coach drivers will not be required to perform reversing manoeuvres and pedestrians will always walk in front of the coaches, in full view of the driver, at all times.

Heavy Commercial Vehicle

Heavy commercial vehicle parking will be provided off the HCV carriageway. It is preferred that HCV parking is on the inside of the HCV carriageway to minimise the conflict points between the HCV drivers/passengers and vehicle movements.

The provision of the minimum number of HCV parking bays is:

- Western service area = 27
- Eastern service area = 27

The parking bays are configured in such a way that HCV drivers will not be required to perform reversing manoeuvres.

Staff

Separate parking provision has been made for staff. This is provided as close to the amenity building as the motorway service area layout would allow.

The provision of staff parking bays is likely to be:

- Western service area = 12
- Eastern service area = 12

Staff parking areas will be clearly marked to ensure use is restricted to staff only.

3.3.3 Building Facilities

The following facilities will be provided as part of the main building structures:

- Convenience shop with associated office, staff locker room and storeroom;
- Restaurant seating area with associated servery, kitchen facilities, storeroom, staff locker room and office;
- Toilet block with a minimum of 8 female toilets, 4 male toilets and 6 urinals and an individual disabled access toilet;
- A minimum of 3 lockable shower cubicles with adequate storage space;
- Baby changing room;
- Information kiosk;
- Staff Canteen;
- Children's indoor and outdoor play areas; and
- Outdoor picnic area.

As a public amenity being developed under the NDP, high standards of architectural planning and effective functional design will be provided in the facilities. General principles that will be incorporated in the design include:

- Selection of design and materials so as to present a high quality visual presence while using durable materials and low maintenance forms of construction.
- Accessibility for disabled persons will be provided to all public facilities following guidance given in "Building for Everyone" published by the National Disability Authority.
- Sustainability will be provided in all aspects of design where possible and appropriate including - by the choice of materials for construction, design of layout and servicing for minimum energy consumption, and effective waste management during construction and in operation of the facilities.
- Security will be addressed through a design that ensures appropriate passive overlooking of the forecourt and picnic / play areas, and by appropriate site lighting and CCTV coverage of the proposed development.
- Best practice safety and health principles will be incorporated in the design so as to minimise risk to builders, operational staff, maintenance staff, and the public users.
- All building works will meet the requirements of the building regulations.

3.3.3.1 Building Size

The overall size of the amenity buildings has been determined in two ways. Firstly, the restaurant seating capacity has been related to the total parking provision for passenger cars and heavy commercial vehicles. Secondly, the convenience shop size is related to the total vehicle turn-in ratio in terms of average annual daily traffic.

The overall size of each amenity building to be provided is approximately 1,200sqm, including approximately 250sqm for the convenience shop and restaurant seating for approximately 160 people. The overall height of the building will be approximately 7.5 metres.

3.3.3.2 Building Design and Layout

Concept

The proposed amenity building provides approximately 1,200sqm of floor space in each motorway service area that fulfils the requirements for the provision of public facilities and back of house facilities. The architectural form provides a suitable motif for a building serving the motorway traveller. The curved roofs are divided into two elements, each of which consists of a sinusoidal curve. These curved roof forms spring from low points at opposite sides of the building to a high point in the centre, allowing generous levels of clerestory lighting at the change of level between the roofs, and generous day-lighting from the extensive areas of glazing on the high side walls. The building design is shown in **Figure 3.4**.

Functional Layout

The cashier serving point is located inside the main entrance of the Amenity building from the passenger car forecourt. The payment point will be designed so that it can continue to take fuel payments if the rest of the complex is supplying a reduced service. Beyond this entrance lobby, the public area of the building is opened up, offering the services of a shop and up to two concession serveries with a large seating area. The public toilets and showers are set off to one side of the shop area and near to the building entrance, while also being readily accessible from the food hall. Staff

locker rooms, staff canteen and access to the back of the concession areas are accessed from a separate entrance adjacent to the serveries. This arrangement provides well-defined, convenient and separate accesses to staff and public areas. The forecourt is visible to the cash counter staff, and children's play areas are located where parents from the food hall can readily oversee them. Service and delivery areas are located suitably for their functions, while not impacting negatively on the public use of the facilities. An indicative layout has been shown in **Figure 3.5**.

Design Life

The design life of the Amenity Buildings will be designed to comply with BS 7543:1992, Table 1 'Categories for Design Life for Buildings'. The design life for components and assemblies within the Amenity Building should be categorized as in BS 7543:1992 Table 2 'Categories of Design Life for Components or Assemblies', in categories 1, 2 or 3.

Category 1 includes most floor finishes, internal finishes and service installation components, which will have a design life of between 5-15 years. As part of the PPP Contract a minimum residual design life will be provided at the end of concession period.

Category 2 includes most external claddings, doors and windows, which with periodic treatment will last for the life of the building. These should have a minimum life to first service of 15 years.

Category 3 includes foundations, main structural elements and also underground services and roof coverings, the service life of which should match the design life of the building, namely a minimum of 60 years.

Accessibility

The building will be fully accessible, following guidance given in "Building for Everyone" published by the National Disability Authority, and meeting the requirement of the Building Regulations 2000 Technical Guidance Document Part M. Wheelchair users will have ready access to all indoor and outdoor facilities.

Sustainability and Energy Performance

The Amenity building will demonstrate a commitment to tackling energy and sustainable development issues in the following ways:

- Maximum usage should be made of materials with low embodied energy characteristics and those using recycled materials;
- Natural lighting should be used to reduce dependence on artificial lighting and passive solar design principles should be used to reduce energy consumption;
- Systems to conserve water should be implemented at all water dispensing points;
- Mechanical air handing and cooling should be reduced to a minimum, natural ventilation should be employed, wherever possible;
- Building Energy Rating Certificate standards should achieve either an A or B label under the Energy Performance of Buildings Directive and should exceed current building regulation standards by a minimum of 10%;
- A minimum of 20% of the building's energy requirements should come from renewable sources; and
- Life cycle costs should be considered at all stages of the project.

Health & Safety

The building will be designed having full regard to the obligations arising under the relevant clauses of the Conditions of Contract consequent upon the Safety, Health and Welfare Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations 2006,and any amendment thereof ("the Regulations"). In particular the design will be reviewed at all stages to ensure safety in operation for the public user and the operating staff, and that design takes due account of future maintenance works.

Canopy

The canopy has been sized to protect both passenger and heavy commercial vehicle users from the elements. The dimensions of the canopy are based on a rain line of 30°.

The covered link between the passenger forecourt canopy and the Amenity building has the minimum width of the amenity building.

A separate canopy has been designed for the heavy commercial vehicle area, though a covered link to the amenity building will not be provided.

The canopies will have a minimum of 4.9 metres clearance and an approximate depth of 1 metre.

3.3.4 Fuel Station Facilities

The design of the Fuel Station will provide for split fuelling facilities for both HCV and cars, with a suitable payment facility in the same building as the motorway service area restaurant area.

The Fuel Station will be designed to comprise all or some of the following:

- Fuel sales forecourt;
- Canopy covering the pump islands and shop access;
- Underground storage tanks;
- Leak containment, leak detection systems and monitoring wells;
- Underground tank gauge system;
- Underground ducts for various services;
- Pipework installation, filling points, vents and vapour recovery;
- Electrical installation for lighting and power for the Canopy and Forecourt;
- Forecourt accessories, including air and water;
- Forecourt fuel pumps / dispensers;
- Point of sale equipment;
- Testing, commissioning and setting in operation all of the above equipment;
- Supply of fire fighting foam; and
- Supply of emergency fire fighting water, providing 2,250 litres per minute for 60 minutes.

3.3.4.1 Forecourt Design

In the fuel storage and fuel filling areas, the pavement construction is to be sealed from the underground strata using impermeable membranes. The pavement construction in these fuel storage/filling areas is likely to be concrete pavement as will the pavement in areas of the HCV parking.

The covered forecourt layout has been designed to accommodate separate fuelling facilities between passenger cars and HCVs / coaches. The design allows for one-way traffic flow only through the two forecourt areas.

The passenger car pump island layout is a two-tiered double-width starting gate arrangement, four islands wide, which can cater for up to 16 fuel dispensers. The first row of islands is set back 10 metres from the parking bays provided adjacent to the service building. These passenger car parking bays are provided adjacent to the service building to give customers the opportunity to avail of the convenience shop or toilet facilities without the need to park in the main parking area.

The HCV pump island layout is a single-tiered double-width starting gate arrangement, four islands wide, which can cater for up to 8 fuel dispensers. The HCV filling area is offset from the passenger car filling area to enable ease of ingress and egress from the main arterial road and minimise sharp turning movements for articulated vehicles and to provide clarity of paths for the different vehicle types.

The location of the passenger car pump islands has been designed to enable the operator clear view of the refuelling positions. In addition, the HCV area will be covered by CCTV surveillance.

Forecourt Surface

The forecourt area directly covering the fuel dispensing areas, tanker discharge area, underground fuel storage tanks, underground fuel pipelines and the petrol interceptor tanks will be constructed in reinforced concrete. The concrete slabs will be designed and reinforced to span the tanks, thereby limiting the surcharge pressure onto the tanks to within their design capacity.

Pump Islands

Pump islands will be installed to protect the dispensers and canopy stanchions against vehicle damage. The shape will give customers easy access to the dispensing hoses, while protecting front and back edge of the dispensing unit itself. The type of dispenser used will determine the final design of the pump island.

The passenger car pump island is likely to consist of a prefabricated concrete pump base, a sub-frame for mounting the dispenser and will be finished in either tiles, terrazzo or natural.

The HCV pump island is likely to be constructed with in situ impregnable concrete. The island will be finished with prefabricated concrete safety kerbs (or similar) for protection.

3.3.4.2 Underground Storage

Tank Design and Layout

The fuel storage tanks will be underground double-skinned steel tanks with a capacity of 40,000 litres each. The tank array, located within the HCV fuel forecourt area will contain up to 10 tanks. The final

configuration and size of the tank array will be determined by the operator and will be dependant on storage capacity, delivery period and product selection.

Minimum groundcover above the tanks will be 0.9 metres. Minimum separation between tanks will be 0.15 metres.

Vents for the fuel storage system will be located within the fuel delivery area and will be approximately 5 metres in height. It is anticipated that 20 vent pipes will be required.

Overfill Protection

Overfilling of tanks is prevented by an overfill protection installation. The overfill protector will allow a maximum fill of 97% of the tank capacity. It will be provided with an alarm facility for the operator and a bypass drain so that the hoses can be emptied. The alarm function will be controlled by the tank contents gauge system and will sound an audible alarm at a fill of 95%.

Leak Monitoring System

The double-skinned tanks will be equipped with leak-monitoring devices. The device detects changes in the level of the monitoring fluid and thus measures any leak in the inner or outer shell of the tank. Changes are indicated by way of a visible and audible alarm.

The alarm unit will be located in the amenity building and will be accessible to the attendant at all times.

Pipework

A specialist petroleum pipeline company will undertake the final design, construction and installation of the petroleum pipelines.

3.3.4.3 Fuel Delivery Area

A separate area for fuel delivery has been provided for each fuel station facility to minimise operational interference and enhance safety. They will be located opposite the HCV forecourt filling area on the opposite side of the main HCV carriageway.

3.3.5 Garda Síochána Requirements

The National Roads Authority has agreed with the Garda Síochána that Garda Enforcement Areas be incorporated into the design. The Garda Enforcement area will be designed in accordance with NRA Draft TA 90.

3.3.6 Surface Water Drainage

The proposed western and eastern motorway service area sites will each be provided with separate but similar surface water drainage systems. Further details of the drainage design can be found in **Chapter 16.**

3.3.7 Landscape and Fencing

During the detailed design stage, a Landscape Master Plan will be developed for the proposed development. This Landscape Master Plan will include works detailed below as well as any modifications that may improve and enhance the design with no additional adverse environmental effects.

Full details of the landscape and visual assessment of the project can be found in **Chapter 12**.

3.3.7.1 Earthwork Bunds

The NRA advice note Draft TA 90 suggests that the Motorway Service Area should be screened from the main carriageway by a shaped and landscaped earthworks bund with a maximum height of 2 metres.

The earthen bunds, shown in **Figure 3.6** and **3.7**, will be developed to reuse excess earthworks material on-site and will assist in the screening of visual, glare and noise effects on sensitive receptors. All bunds will have a natural profile with a maximum of 1:4 side slopes. Planting in and around bunds will be carried out, where practical.

Screening / noise bunds will generally be located adjacent to sensitive receptors. The bunds will be constructed from unsuitable material that cannot be used for engineering embankment works and topsoil excavated as part of the on-site works. The material will be subject to hydro-geological testing before use.

Should the height of the bunds be changed at detailed design stage, a re-assessment of the landscape, visual and noise impacts shall be undertaken and mitigated as necessary.

3.3.7.2 Fencing

The NRA advice note Draft TA 90 requires that the Motorway Service Area should be enclosed by a 2.0 metres high secure fence to prevent trespass to adjacent land. As such, a 2.0 metre high security fence will separate the proposed development from the adjoining properties. In addition, for safety reasons, the constructed wetlands will be fully enclosed with security fencing. The type of security fencing used will be in keeping with the local environment.

3.3.8 Earthworks

3.3.8.1 Existing Conditions

Subsurface ground conditions generally consist of made ground consisting of sandy slightly gravelly clay with occasional sub-rounded cobbles overlying firmer to stiffer slightly gravelly clay up to an approximate depth of 8 meters above boulder and rock materials.

The water table was encountered at variable depths (2.2 – >6.0 metres) during preliminary ground investigation works.

3.3.8.2 Cuttings

Cuttings are generally shallow (<1.5 metres depth). Due to the nature of the subsurface conditions the majority of the proposed development is located within a cut environment. This minimises the amount of imported material needed for construction and provides excess material for landscaping which can be utilised to aid in the mitigation of visual and noise intrusion on the local environment.

The only significant cutting within the proposed development is for the south bound diverge taper accessing into the eastern service area, where the slip road is likely to be in a cutting of approximately 4.0 to 5.0 metres. Within the main circulation carriageways of both sites the internal parking areas, amenity buildings and forecourt fuel facilities are elevated relative to the surrounding carriageways and as such are generally in cuttings as well.

Based on the findings of the Preliminary Ground Investigation the ground conditions are generally believed to be acceptable for forming the proposed earthworks at side slopes of one vertical to two horizontal with an adequate factor of safety.

3.3.8.3 Embankments

A small number of embankments are required within the proposed development. These embankments will generally not exceed 1.0 metre.

These embankments are generally only located on the merge and diverge slip roads to both sites and the local access road into the southern site.

Side slopes for embankment construction can depend on the quality of available fill material. It is expected that slopes of 1 vertical to 2 horizontal will be satisfactory given the likely materials excavated within the proposed development.

3.3.9 Materials Required

3.3.9.1 Earthworks

An estimated 38,000m^3 of earthworks capping material will be required for the proposed development. Due to the nature of the existing ground, it is likely that the capping material will be sourced from outside the site. This will result in some 7,600 lorry movements both ways assuming 10 cubic metres per lorry load. If the earthworks are completed over a six month period the daily traffic load will be in the order of 64 lorry movements both ways. Due to the access restrictions on the local roads all of this material will have to be hauled via the M1 Motorway.

3.3.9.2 Pavement

Apart from the import of earthworks fill material, the main road building materials that will be hauled to site in bulk include granular sub-base material, bituminous pavement materials, concrete and drainage filter material.

It has been calculated that the volume of pavement materials, excluding capping material, to be hauled to site will be approximately 250m^3/100m of internal arterial road and approximately 300m^3/100m of service road. In addition, the parking areas and hard standings total almost 35,000m^2

area of paving. The roads and the paved areas will require the importation of approximately 25,500m^3 of pavement material to site, which will involve some 5,100 lorry movements (both ways) assuming 10 cubic metres per lorry load. If the pavement works are spread over three months, the daily traffic load will be of the order of 86 lorry movements, both ways.

Due to the access restrictions on the local roads, all of this material will have to be hauled via the M1 Motorway.

3.3.9.3 Concrete Works

The proposed development includes concrete works for the raft/piling foundation for the amenity building and the pavement construction for the hard standings for the lorry parks and the fuel service stations. It is estimated that the construction of these structures will involve pouring some 1,000m^3 of concrete, which could involve up to 200 truckloads of concrete over a six month period.

Due to the access restrictions on the local road network, all concrete materials will have to be hauled via the M1 Motorway.

3.3.10 Bridges and Structures

There are no new significant bridge structures required for the proposed development.

3.3.11 Pedestrian Provision

Pedestrian flow within the motorway service area is designed to minimise the conflict points between pedestrian and vehicles throughout the proposed development. The passenger and motorcycle parking areas are isolated from the arterial road network to avoid conflict between pedestrians and through traffic and are located adjacent to the amenity buildings to give direct access and minimise walking distance from vehicles to the amenity buildings. Coach parking is provided with a clearly defined pedestrian route within the parking bay, which directs passengers in front of coaches to enable full visibility of pedestrians to departing coach drivers. Where staff and HCV drivers/passengers need to cross the arterial roads a footpath network will be provided with identified road crossing points.

As the Motorway Service Area are accessed via the motorway network, which does not cater for cyclists, no provision for cyclists will be made.

3.3.12 Signs and Markings

Mainline and Slip Road Directional Signs and Regulatory Signs shall be provided in accordance with the 'Traffic Signs Manual' as published by the Department of the Environment in 1996 and the 'Road Traffic (Signs) Regulation, 1997' and any subsequent amendments of these documents. The sign faces for the mainline will be designed with an 'X' height of 200mm for a design speed of 120kph, while the sign faces for the slip roads will be designed with an 'X' height of 100mm.

Internal Directional Signs shall be provided in accordance with the NRA Draft TA 90 'The Location and Layout of National Road Service Areas' and the 'Traffic Signs Manual' published by the Department of Environment.

Temporary Traffic Signs during construction will comply with Chapter 8 of the 'Traffic Signs Manual' published by the Department of Transport and the requirements of the 'Specification for Road Works' as published by the NRA.

Signage providing information about the approaching motorway service area will be provided in the motorway verges at approximately 10km, 1km and 0.5km in advance of the service area. This signage will include the distance to the approaching service area and symbols indicating the services that will be available i.e. toilets, food, fuel etc. In addition some of the signs may provide distance information to the subsequent service area along the route. The height of this signage will be no greater than 8 metres. The final dimensions and layout of the signage will be determined during the detailed design stage.

A concessionaire advertising sign will be provided adjacent to the diverge slip lane into each motorway service area close to the roundabout. The sign will be up to 12 metres in height and will accommodate advertising for the fuel pricing and amenities provided at the motorway service area. The final dimensions and layout of the sign will be determined during the detailed design stage.

3.3.13 Lighting

The proposed lighting layout is shown in **Figure 3.8.**

3.3.13.1 M1 Motorway

For the safety of road users, road lighting will be provided along the following lengths of the M1 Motorway in the vicinity of the motorway service area:

- Along the full length of the M1 Motorway between the diverge and merge slip roads on each carriageway;
- Along the merge / diverge taper, auxiliary lane and nosing; and
- Along the M1 Motorway over a minimum length of 150m in advance of and beyond the ends of the slip road tapers.

This is required for safety considerations.

For the purposes of the road lighting design, the proposed development shall be treated as an environmentally sensitive area as referred to in TD 30 and TD 34 of Volume 8 of the NRA DMRB, to minimise night time visual intrusion.

It is proposed to utilise lighting columns no higher than 14 metres and to use high-pressure sodium lanterns. The installation is to comply with the requirements of Series 1300 and 1400 of the 'Specification for Road Works' as published by the NRA and in accordance with the recommendations of BS 5489 and BS 5649.

In relation to road lighting, the Design shall include for all of the following:

- The level and uniformity of road luminance in the Design shall be in accordance with lighting Class ME3a of Table 1a of BS EN 13201-2;

- All lanterns in the Design shall be fully cut-off flat glass, high pressure sodium (SONP-T) Type;
- Lighting columns in the Design shall be of slim galvanised steel construction with tubular outreach brackets to support the lanterns and will have a mounting height of 12 or 14 metres; and
- The finished colour of the lighting columns in the Design will be grey.

3.3.13.2 Lighting Within Motorway Service Area

For the safety of road users and pedestrians, road lighting will be provided along the full length of the internal road network within the motorway service area to ensure that the vehicle routes are clearly visible both during night and daytime. Lighting will also be provided in the parking area, to enhance safety of pedestrians and to provide a secure environment for the parked vehicles.

For the purposes of the lighting design, the motorway service area shall be treated as an environmentally sensitive area as referred to in TD 30 of the NRA DMRB, to minimise night-time visual intrusion.

Different lighting intensities will be adopted within separate zones within the Motorway Service Area, to minimise light pollution to nearby communities. The different zones are shown on **Figure 3.8**.

Lighting levels on the slip roads in and out of the motorway service area, between the tapers on the M1 Motorway and the distribution roundabout, shall be consistent with lighting Class ME3a of Table 1a of BS EN 13201-2. A similar standard of lighting will be provided on the direct route for passenger cars travelling from the distribution roundabout to the fuel forecourt and back to the roundabout. The same standard of lighting will also be provided for HCV vehicles travelling from the distribution roundabout to the fuel forecourt.

Lighting levels of the fuel service stations will be consistent with Class CE2 in Table 2 of BS EN 13201-2 to provide a lighting level of 20 lux.

The lighting of other roads within the motorway service area will be to a level of 10 lux in accordance with Class CE4 in Table 2 of BS EN 13201-2. A similar standard of lighting will be provided within close proximity to the amenity buildings.

In addition road lighting is to be provided within the parking areas. The level of lighting that will be provided within the parking areas shall give an average illuminance of 10 lux, in accordance with Class CE4 in Table 2 of BS EN 13201-2.

3.3.13.3 Lighting Columns and Luminaires

It is proposed to utilise 10m high lighting columns along the internal roads and parking areas. High mast lighting shall not be adopted, to minimise visual intrusion at night.

All lighting provided within the Motorway Service Area will utilise high-pressure sodium lanterns, fully cut-off, to minimise night-time visual intrusion in accordance with British Standard BS 5489 – Road Lighting and Commission Internationale de l'eclairage C.I.E. 115-1995 Recommendations for lighting of Roads for Motor and Pedestrian Traffic.

3.3.13.4 Lighting of Fuel Service Stations

All lighting within the proximity of the fuel service stations will be sealed lighting installations designed to comply with BS EN 60079, and similar standards, to avoid possibility of lighting triggering an explosion.

3.3.14 Utilities

The provision of utilities to the proposed development is described below. In addition, **Chapter 18** of this report outlines the diversions required as part of the proposed development. The most significant of the diversions are also outlined below.

Electricity Supply

Electrical supply for the amenity buildings, public lighting and foul pumping station will be provided by ESB. It is anticipated that the western site will be supplied from the10kV overhead line, which passes through the western site. The eastern site will be by supplied, via the CR182, from the 10kV located on the terminated local road, which runs parallel to the M1 Motorway. This line will also provide a feed for the foul sewer pumping station.

A lead-in period of the order of three months is likely to be required in advance of the provision of electrical services for the proposed development.

Electricity Diversion

The western site conflicts with an existing overhead 10kV line which passes through the site. It crosses both proposed roundabouts and crosses the staff access road. ESB will be required to divert this line underground through the site.

A lead-in period of the order of 3 months is likely to be required in advance of the diversion of electrical services for the proposed development.

Telecommunications Supply

Telecommunications supply for the amenity buildings will be provided by Eircom from the existing telecommunication network located on the both the CR185 and CR182. The feeds will enter both sites from the staff access roads.

A lead-in period of the order of 3 months is likely to be required in advance of the provision of telecommunication services for the proposed development.

Motorway Communications

The ducting and cabling for the existing Motorway Communication services within the verges of the motorway will require to be relocated to facilitate the construction of the slip road tapers for the Motorway Service Area. This will involve diverting the existing services into the new verge adjacent to the slip road tapers and slip road nosings, from where they will cross under the slip road to reconnect to the existing ducts and cables.

Water Supply

The daily usage of water for restaurants, toilets and daily staff is expected to be approximately 34,000 litres/day (it is not proposed to install car-washing facilities). An existing 175mm diameter AC watermain with sufficient capacity to cater for the development is located at the junction of the CR185 (Commons Road) and Little Road, approximately 1000 metres to the east of the development.

It is proposed to install a new 200mm diameter watermain which runs from the existing 175mm AC watermain, as described above, down the CR185 to a location adjacent to the proposed foul sewer pumping station as shown on drawing PW-2601. From here the pipe will branch into two 200mm pipes, one of which will supply the eastern site by travelling the length of the terminated local road and passing under CR182, the other will supply the western service area by passing under the M1 Motorway and directly access the site.

Where the pipes pass under the M1 Motorway and the Dublin – Dundalk railway line they will be constructed by thrust boring.

This water supply will satisfy the minimum fire fighting requirements of 2,250 litres/minute for 1 hour.

Foul Water Drainage

The proposed site is located immediately west of the village of Dromiskin. Dromiskin is served by a foul sewer network which discharges to a wastewater treatment works in the north of the village. The treatment works is presently operating near to, or at, capacity; however, Louth County Council propose to increase the capacity of the works shortly in order to facilitate other development in the area. The Council will allow the contribution of wastewater from the service area to the system, subject to agreement.

To serve both service areas with waste water services it will be necessary to collect wastewater from both sites in a single collection point and pump the effluent to the nearest gravity system, with sufficient capacity, which will then transport it to the treatment works.

It is proposed to locate the pump house within the road corridor on the terminated local road. The eastern service area will connect to the pump house by a gravity sewer which crosses CR182 and follows the terminated local road. The western service area will connect into the pump house by gravity sewer under the M1 Motorway via a thrust bored pipe.

From the pump house the combined pump main will pass under the Dublin – Dundalk railway line, also by means of thrust boring, and discharge into an existing gravity sewer located at the junction of CR185 and CR184.

3.3.15 Construction Stage

The infrastructure for the eastern and western sites comprises approximately 4.5 kilometres of single carriageway road within the service areas and slip roads and associated tapers to be constructed adjacent to the live M1 Motorway. The pavement works also include some 23,500m^2 of vehicle parking and 11,500m^2 of hard standing at the fuel service station forecourts.

The amenity buildings and fuel service stations will form a significant element of the works to be executed. These works will require careful planning due to the lead in times for the delivery of the specialist materials.

The foul sewer drainage to service the proposed development areas will involve the construction of a foul sewer under the M1 Motorway, a gravity sewer along the local road for approximately 450 metres, the provision of a pumping station, and a foul sewer rising main from the proposed pumping station along the local road a distance of approximately 520 metres to the CR184/CR184 junction, passing under the Dublin to Belfast Railway Line by thrust bore.

3.3.15.1 Construction Traffic Management

It will not be permitted to use the existing CR182, CR184 and CR185 for haulage of plant and materials to and from the construction site, and consequently all haulage to and from the site and access to and from the site will have to be made from the M1 Motorway. It will also not be permitted to use the local road network to move construction materials between the eastern and western sites on each side of the motorway.

To minimise any impacts on other road users and to maximise safety, comprehensive traffic management measures will be required to ensure that construction traffic can be segregated onto the hardshoulder of the motorway. As new works commence adjacent to the M1 Motorway, within the motorway boundary fencing, the traffic management measures will need to be extended along the motorway to cover the area of work that is being undertaken. Whilst the length of the traffic management measures along the motorway will be subject to change as the works progress, it will be necessary to maintain traffic management measures in place along the motorway for the duration of the works.

Three aspects of the development will involve extensive works within the Motorway boundary. These are: 1) construction of site access; 2) works to construct the slip road tapers and slip road nosings adjacent to the live motorway carriageway; and 3) thrust boring underneath the M1 Motorway to provide a link for the foul sewage drainage network as well as other service connections.

Site Access

Initially, suitable traffic management arrangements will have to be implemented to permit the safe use of a temporary access from the edge of the M1 Motorway carriageway and to separate construction traffic from the general public. The traffic management measures will include the installation of appropriate barriers along the nearside edge of the left hand lane of the motorway to allow the hard shoulder to be closed off over a length of approximately 100 metres in advance of and approximately 100 metres beyond the access point, together with advance signage of the hard shoulder closure and signage for the direction of traffic. As part of the traffic management, reduced lane widths will be required to provide sufficient width for the site access along the hard shoulder. These traffic management measures will need to be in place for the duration of the works on the construction site of the Motorway Service Area.

CR182 and CR185

Traffic management will also need to be put in place on the CR182 for the junction works required to form the accesses into the motorway service area from this road. In addition, traffic management measures will be required during the construction of the foul sewer from the western and eastern sites along the local road and CR185.

3.3.15.2 Drainage

The Contractor / Concessionaire will need to construct certain temporary drainage measures to minimise the risk of pollution during earthworks construction and other elements of the work. In

particular, temporary silt traps will be required to minimise impacts on the local farm drainage ditch network. Temporary facilities to trap any accidental spillage will also be required.

The Contractor / Concessionaire will also need to construct and commission elements of the permanent drainage system as early as practicable. These will include the culverts required to carry the farm drainage network beneath the various roads within the motorway service area to assist access around the proposed development. Construction of the tanks needed for attenuation of the run-off from the proposed development will also need to be completed at an early stage.

The commissioning of these temporary and permanent measures at an early stage will limit the potential for drainage from the works polluting watercourses. Details regarding proposed mitigation measures for the prevention of pollution of watercourses are provided in **Chapters 14 and 16**.

3.3.15.3 Buildings

The amenity building and the fuel facilities are the only significant structures within each motorway service area. The programming of these works will be dependent on the supply chain for the structural components of the building and the in particular the roof, as well as the many bespoke items for fitting out the buildings. The construction of the buildings can only commence once earthworks operations in the vicinity have been completed.

3.4 GEOMETRIC DESIGN FEATURES

A number of measures have been incorporated into the geometric design process to mitigate against some of the more significant adverse affects associated with the construction of the M1 North Motorway Service Area as listed in the following sub-sections.

3.4.1 Traffic and Vehicle Movements

- The motorway service area has been designed to separate HCV and passenger cars on entry to the facility. The HCV fuel filling area is offset from the passenger car filling area to enable ease of ingress and egress from the main circulation carriageway and minimise sharp turning movements for articulated vehicles and to provide clarity of paths for the different vehicle types.
- The local service road will be a private controlled access that will only accommodate light passenger vehicles in order to restrict its use from the local road network to employees accessing the proposed development.

3.4.2 Parking Measures

- Segregated parking areas will be provided for passenger cars, motorbikes, HCVs and coaches.
- Passenger car parking areas are isolated from the arterial road network to avoid conflict between pedestrians and through traffic and are located adjacent to the amenity buildings to give direct access and minimise walking distance between vehicles and the amenity buildings.
- Coach parking will be segregated from the HCV parking and is provided directly off the HCV carriageway following on from the fuel facilities. The coach parking will be adjacent to the amenity buildings, reducing the distance passengers need to walk to reach the facilities. Also, the parking bays are configured so that coach drivers will not be required to perform reversing manoeuvres. Coach parking is provided with a clearly defined pedestrian route within the parking bay, which

directs passengers in front of coaches to enable full visibility of pedestrians to departing coach drivers.

- HCV parking will be provided off the HCV carriageway. The HCV parking is on the inside of the HCV carriageway to minimise conflict points between the HCV drivers/passengers and vehicle movements. The HCV parking bays are configured in such a way that HCV drivers will not be required to perform reversing manoeuvres. To minimise the crossing points of the arterial routes for HCV drivers and their passengers, footpaths are provided adjacent to the HCV parking bays.
- HCV parking has been sited at the greatest distance feasible from nearby sensitive receptors.

3.4.3 Motorway Service Area Layout (See Figures 3.3a and 3.3b)

- The layouts of the two forecourt areas (passenger vehicle and HCV/coach) will allow only for one-way traffic flow through the two forecourt areas. The two forecourts will be separated by a physical kerb/barrier to prevent vehicles passing from one forecourt to the other.
- The Motorway Service Area will be screened from the main carriageway by shaped and landscaped earthworks bunds to a minimum height of 2 metres. The earthen bunds will be designed to reflect the local environment and will assist with visual impact mitigation and noise mitigation.
- A 2.0 metre high secure fence will enclose the Motorway Service Area in order to prevent trespass to adjacent land. The fencing and landscaping will be integrated so as to minimise visual impact on the local environment.
- The drainage design follows the principles of Sustainable Drainage Systems (SuDS). This provides a 'management train' of treatment systems, which combine to ensure that surface water runoff entering the receiving watercourse is of a high level of water quality and unforeseen spillage events are suitably dealt with.

3.4.4 Building Design

- Environmental sustainability will be addressed with a high U-values envelope, a low CO_2 footprint, and using materials with low embodied energy. As part of the Building Energy Assessment appraisal, running costs will be set against the initial costs in use to provide a "whole life energy cost".
- Use of exterior light within building will be achieved through the curved roofs which allow ingress of exterior light at the change of level between the roofs, and generous day-lighting from the extensive areas of glazing on the high side walls.
- The air vents associated with the amenity buildings have been situated away from nearby sensitive receptors.
- A minimum of 20% of the building's energy requirements will come from renewable sources.

3.4.5 Fuel Facility Safety Measures

- Fuel storage tanks will have overfill protection systems installed which will allow a maximum fill of 97% of the tank capacity and will be provided with an alarm facility for the operator and a bypass drain so that the hoses can be emptied. The alarm function will be controlled by the tank contents gauge system and will sound an audible alarm at a fill of 95%.
- The fuel storage tanks will be double-skinned and will be equipped with leak-monitoring devices. The devices detect changes in the level of the monitoring fluid and thus measures any leak in the inner or outer shell of the tank. Changes are indicated by way of a visible and audible alarm.

- Pump islands will be designed and installed to protect the dispensers and canopy stanchions against vehicle damage.

3.4.6 Lighting

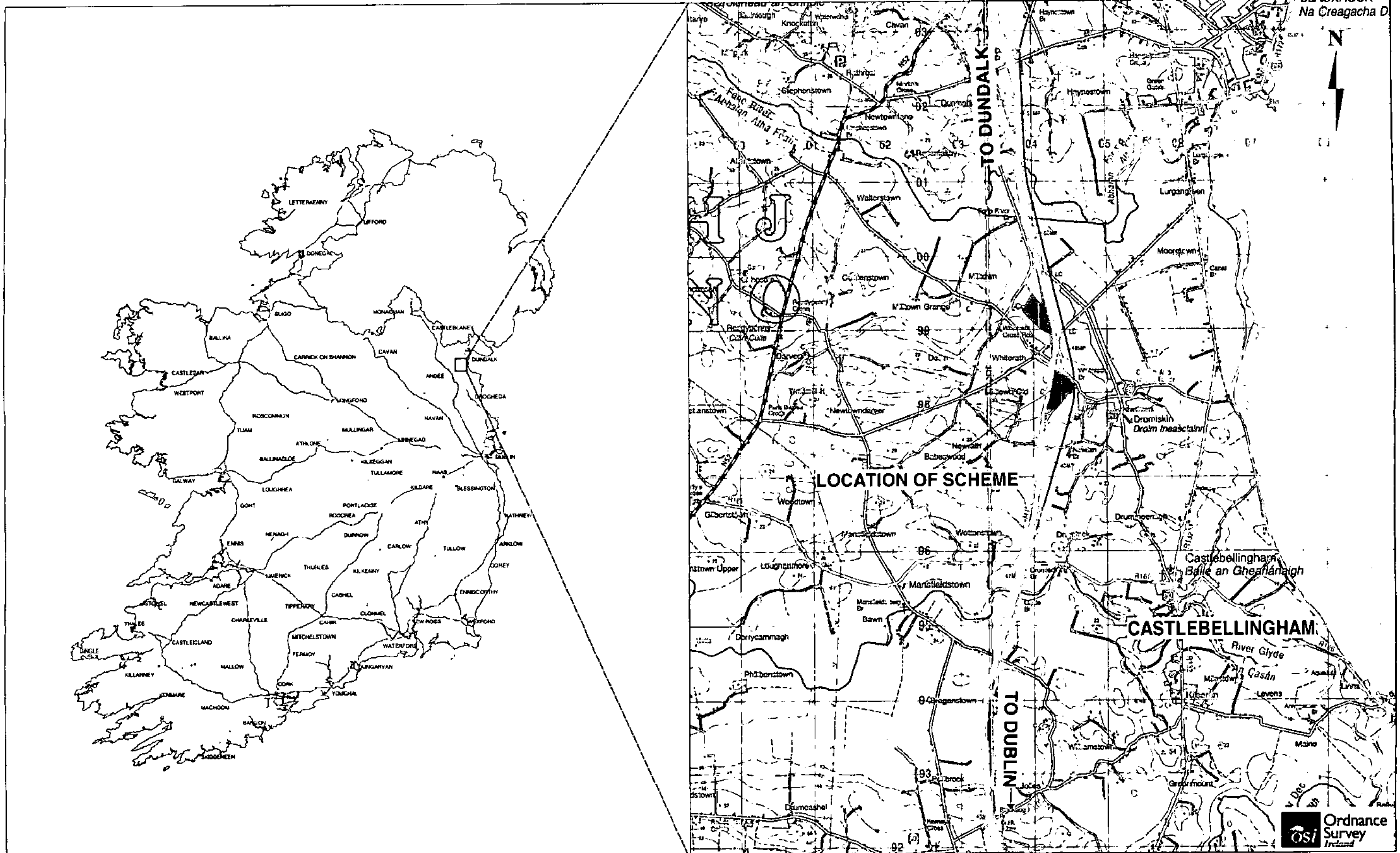
- As part of the internal lighting plan different lighting intensities will be adopted within separate zones of the Motorway Service Area, to minimise light pollution at nearby sensitive receptors. As part of this lighting columns no higher than 10 metres will be located along the internal roads within the motorway service area to minimise visual intrusion at night particularly for nearby sensitive receptors.

3.4.7 Construction

- The existing CR182 will not be used for haulage of imported plant and materials to and from the proposed development during construction activities. Instead all haulage to and from the construction site and access to and from the construction site will be made from the M1 Motorway.

3.5 MITIGATION OF OTHER MATTERS ARISING FROM THE EIA

Further measures arising from the various topics examined in the environmental study of the proposed development have been summarised in **Chapter 22.**



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Checked: L.C.	Scale: NOT TO SCALE		Figure No: 3.1	Rev: A01
Approved: A.G.	Date: 07/12/2007			

West consult
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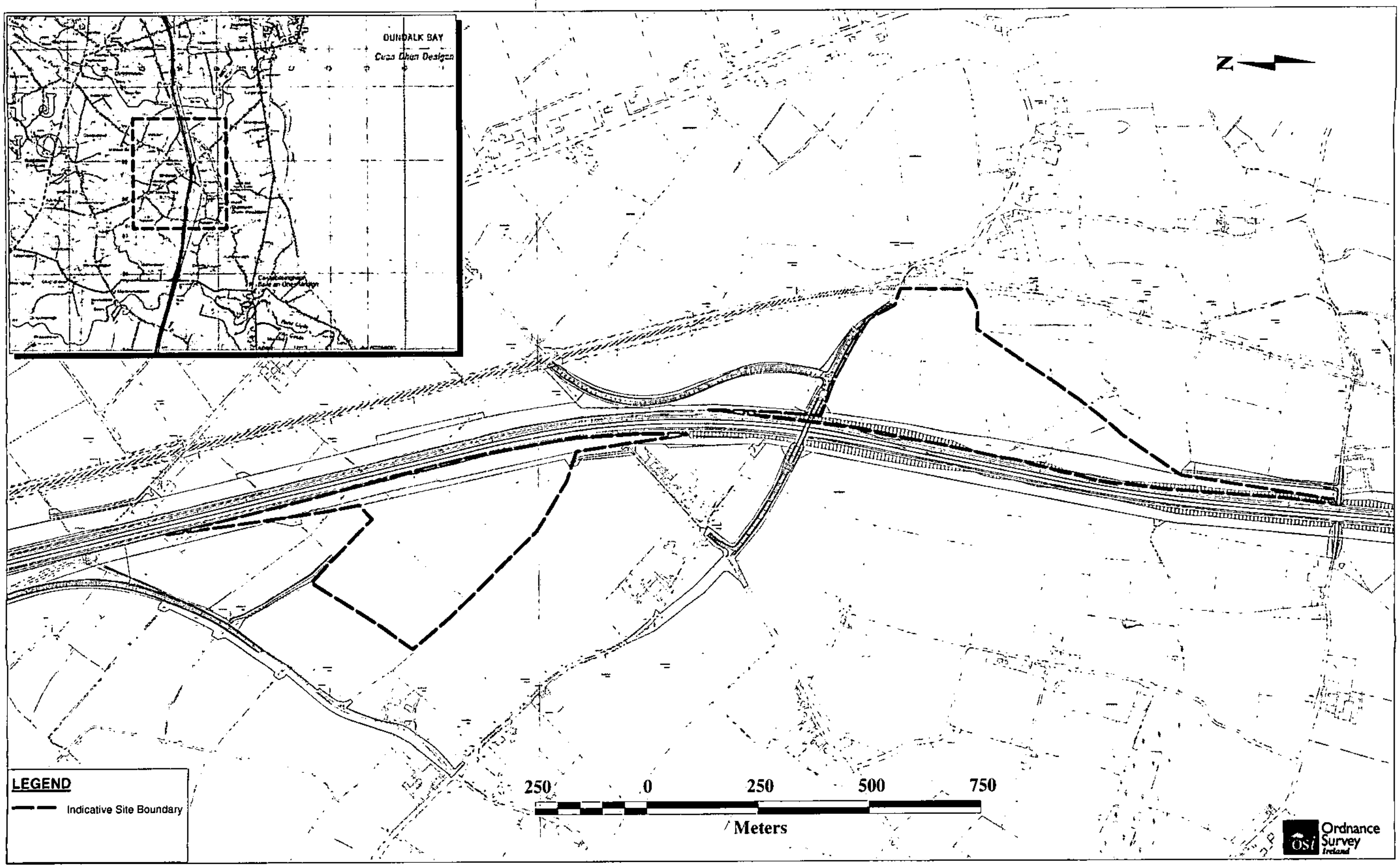
Transport 21

NDP NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority



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Approved: A.G.	Date: 29/11/2007	

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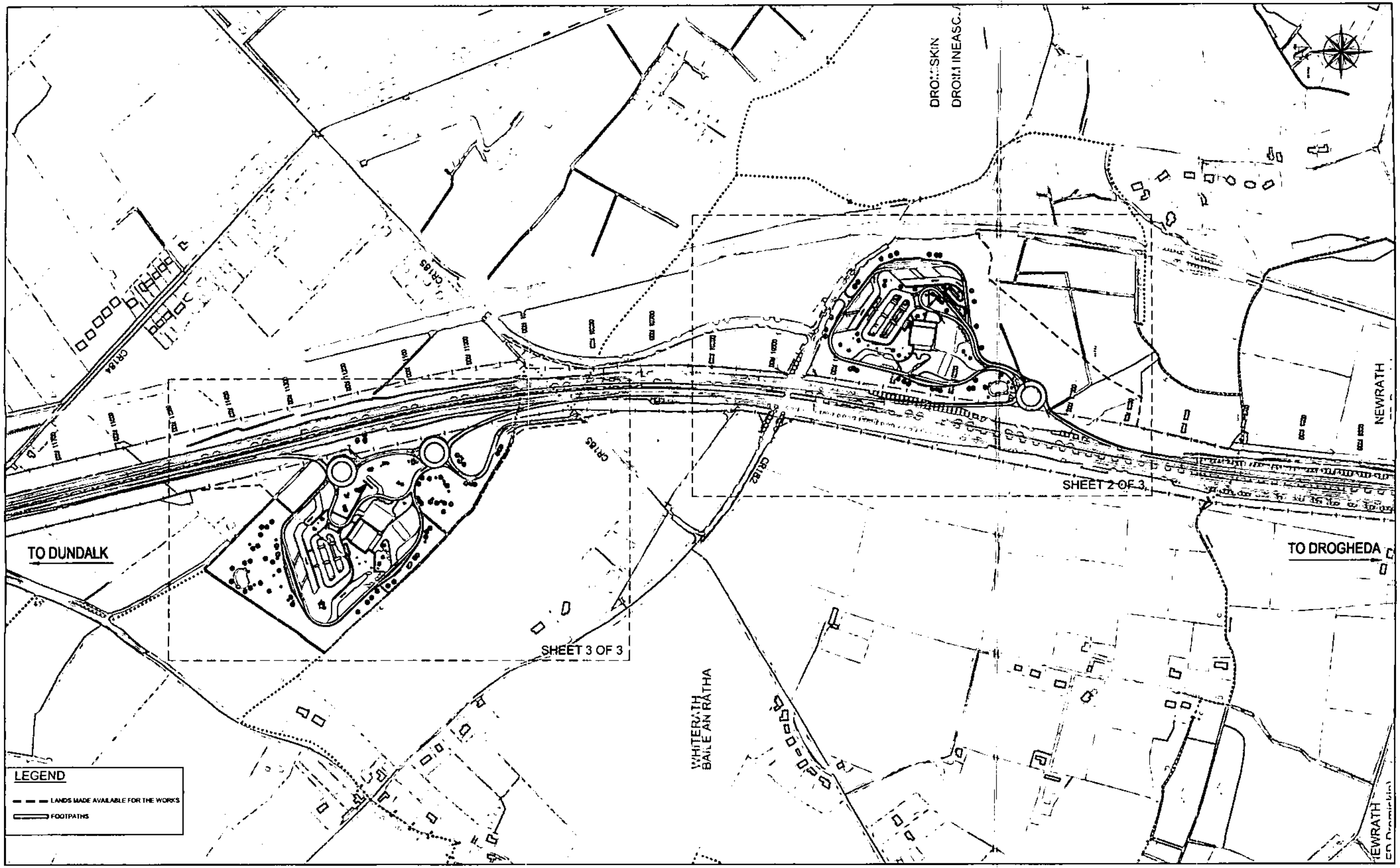

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M1 NORTH MOTORWAY
SERVICE AREAS

INDICATIVE SCHEMATIC LAYOUT
SHEET 1 OF 3

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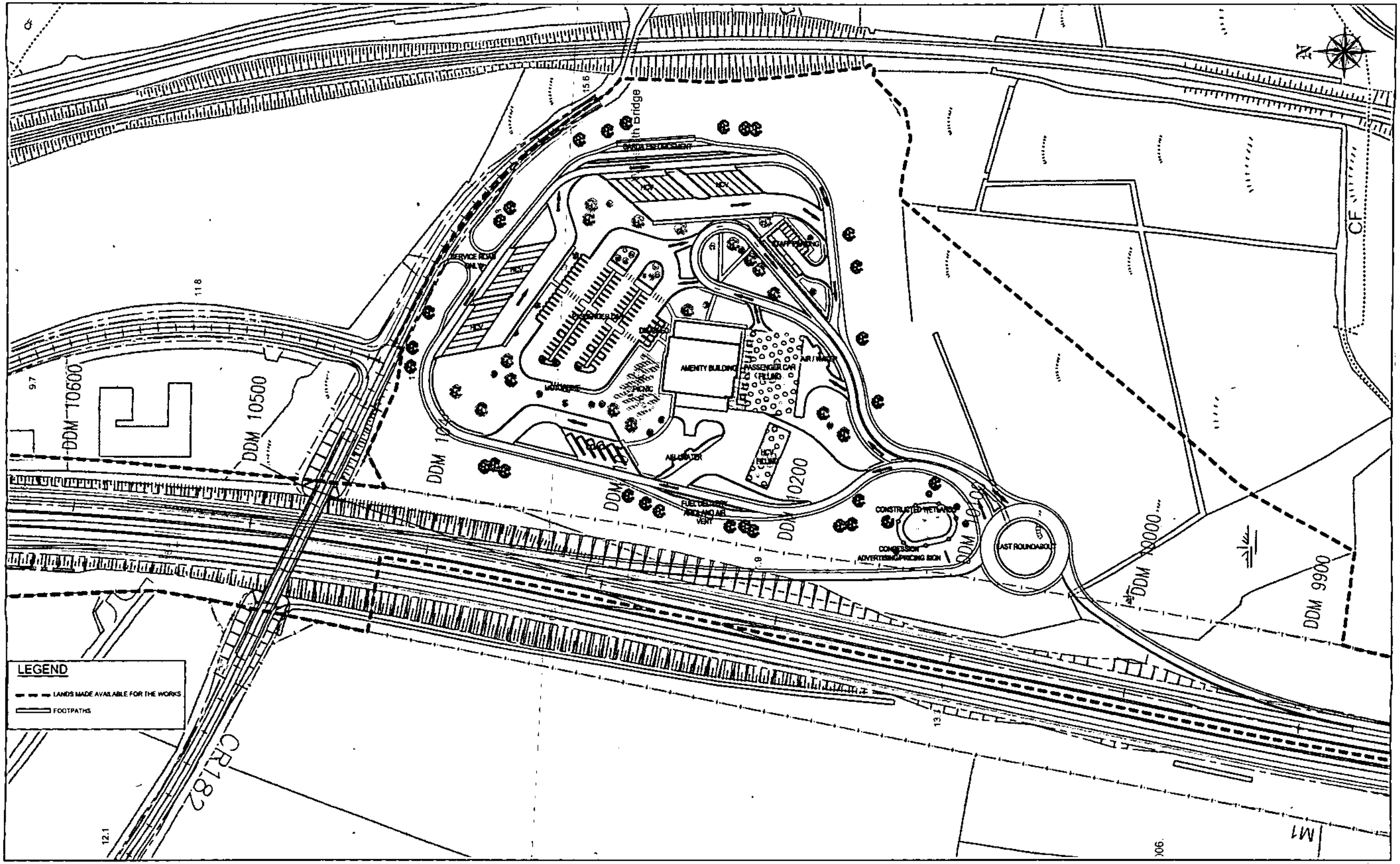

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Project Title: M1 NORTH MOTORWAY SERVICE AREAS

Drawing Title: INDICATIVE SCHEMATIC LAYOUT - EASTERN AREA SHEET 2 OF 3

Scale: 1:1000 @ A1 Size · Status: FINAL · Drawing No. 3.3a · Rev A01

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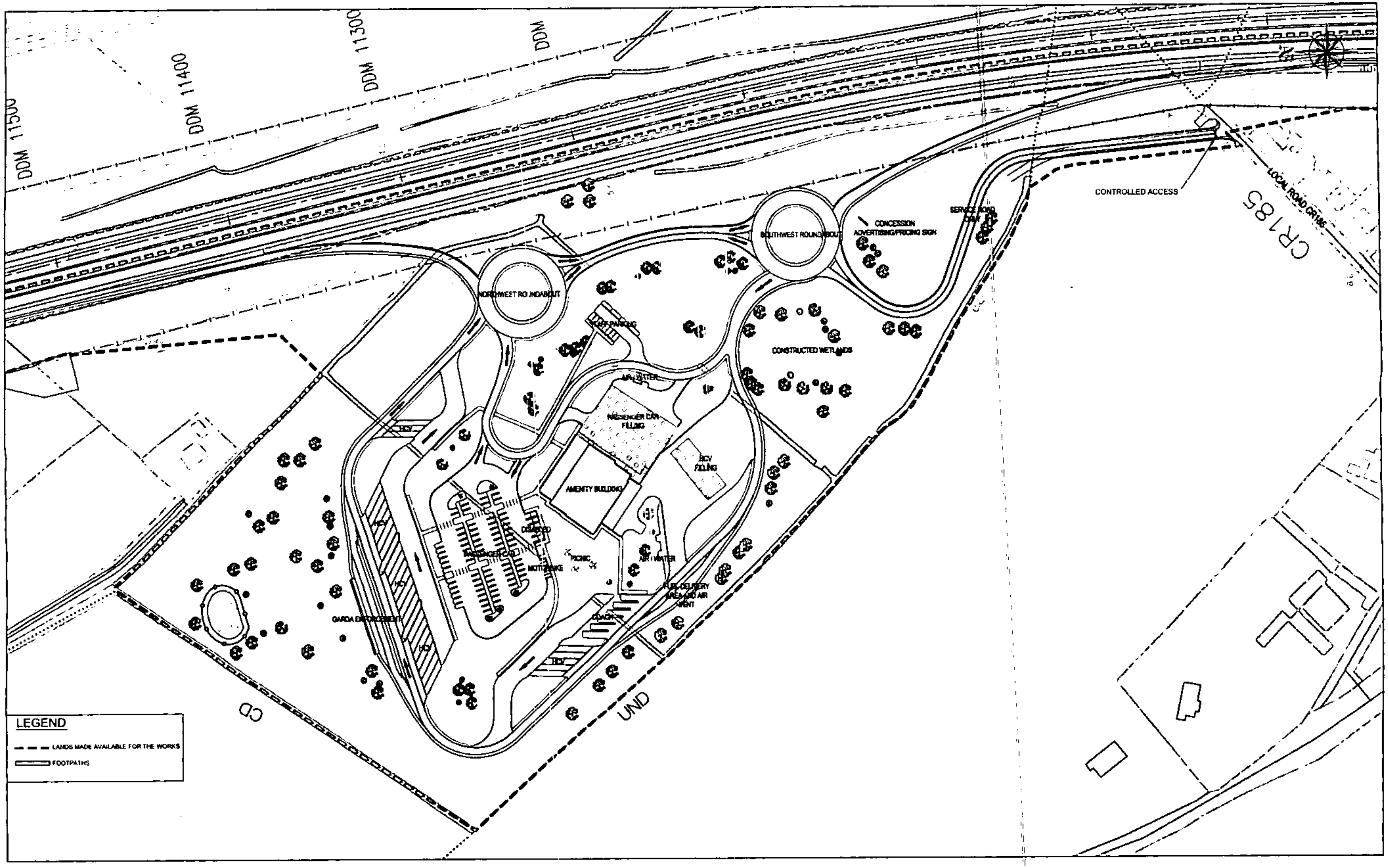

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NDP National Development Plan

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	INDICATIVE SCHEMATIC LAYOUT - WESTERN AREA SHEET 3 OF 3
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Drawing No.	3.3b
Rev	A01

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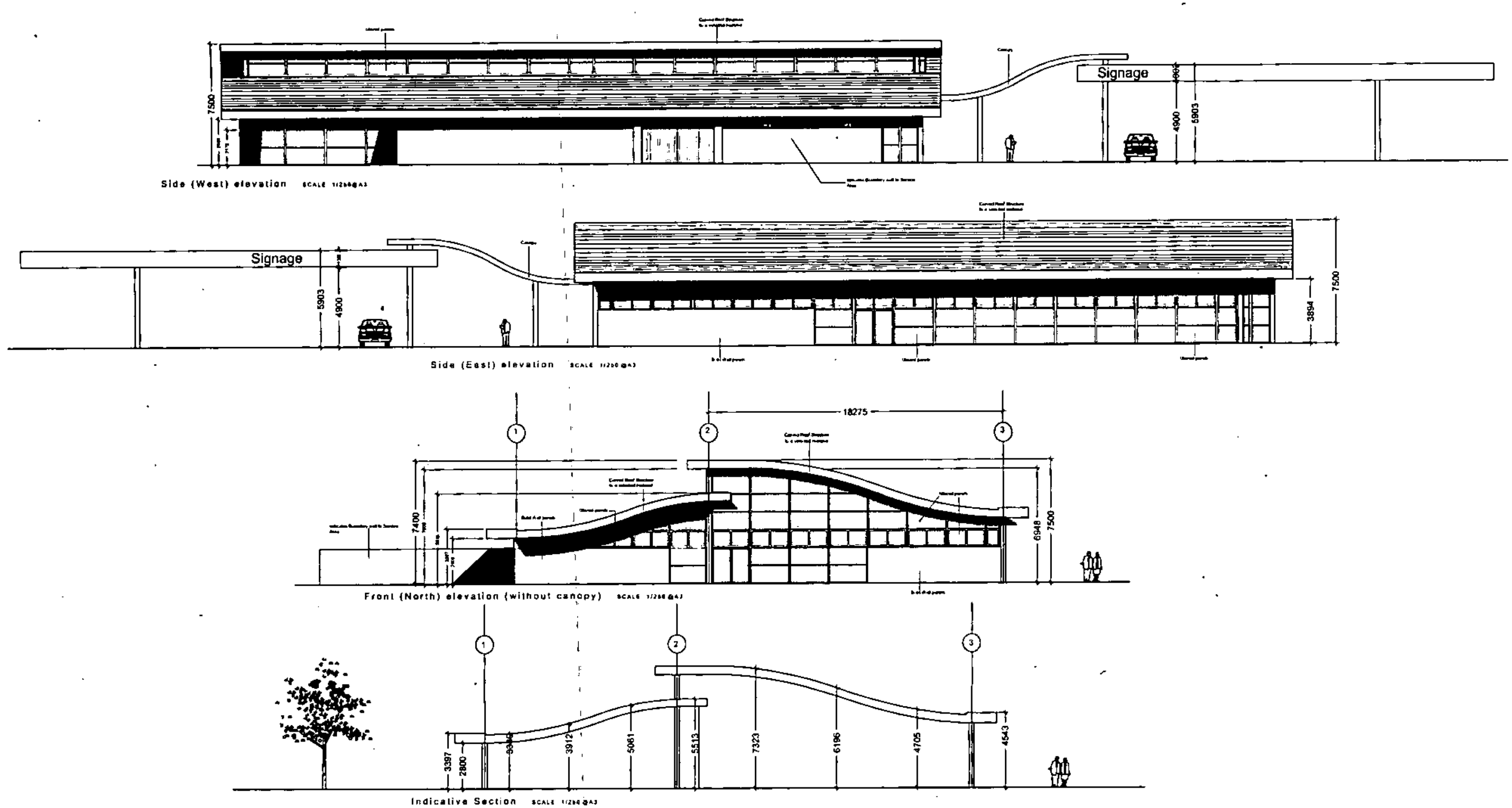

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	INDICATIVE ELEVATIONS AND SECTION		
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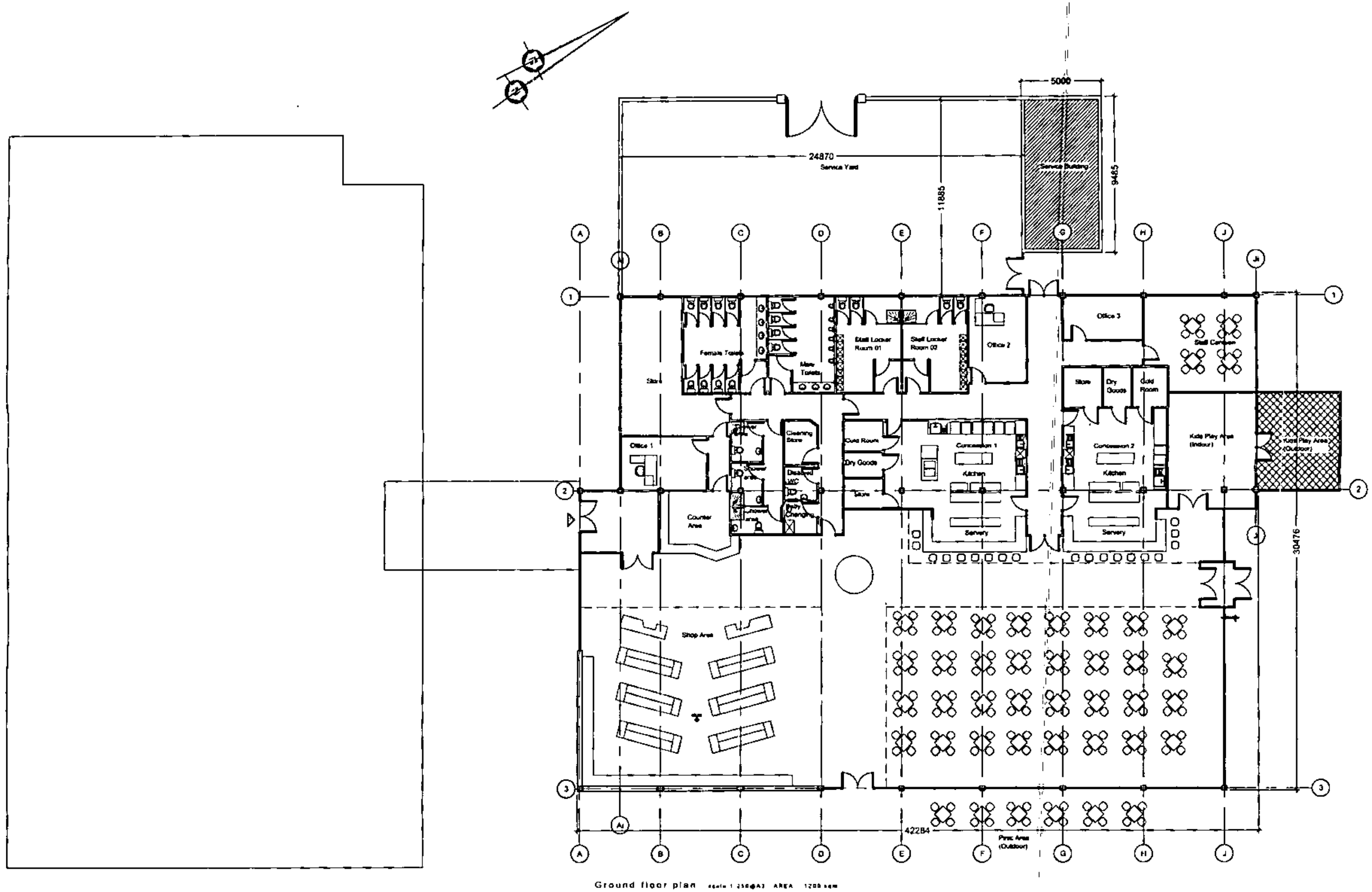

Ground floor plan scale 1:250@A3 AREA 1200 sqm

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Project Title: M1 NORTH MOTORWAY SERVICE AREAS

Drawing Title: INDICATIVE GROUND FLOOR PLAN

Status: FINAL

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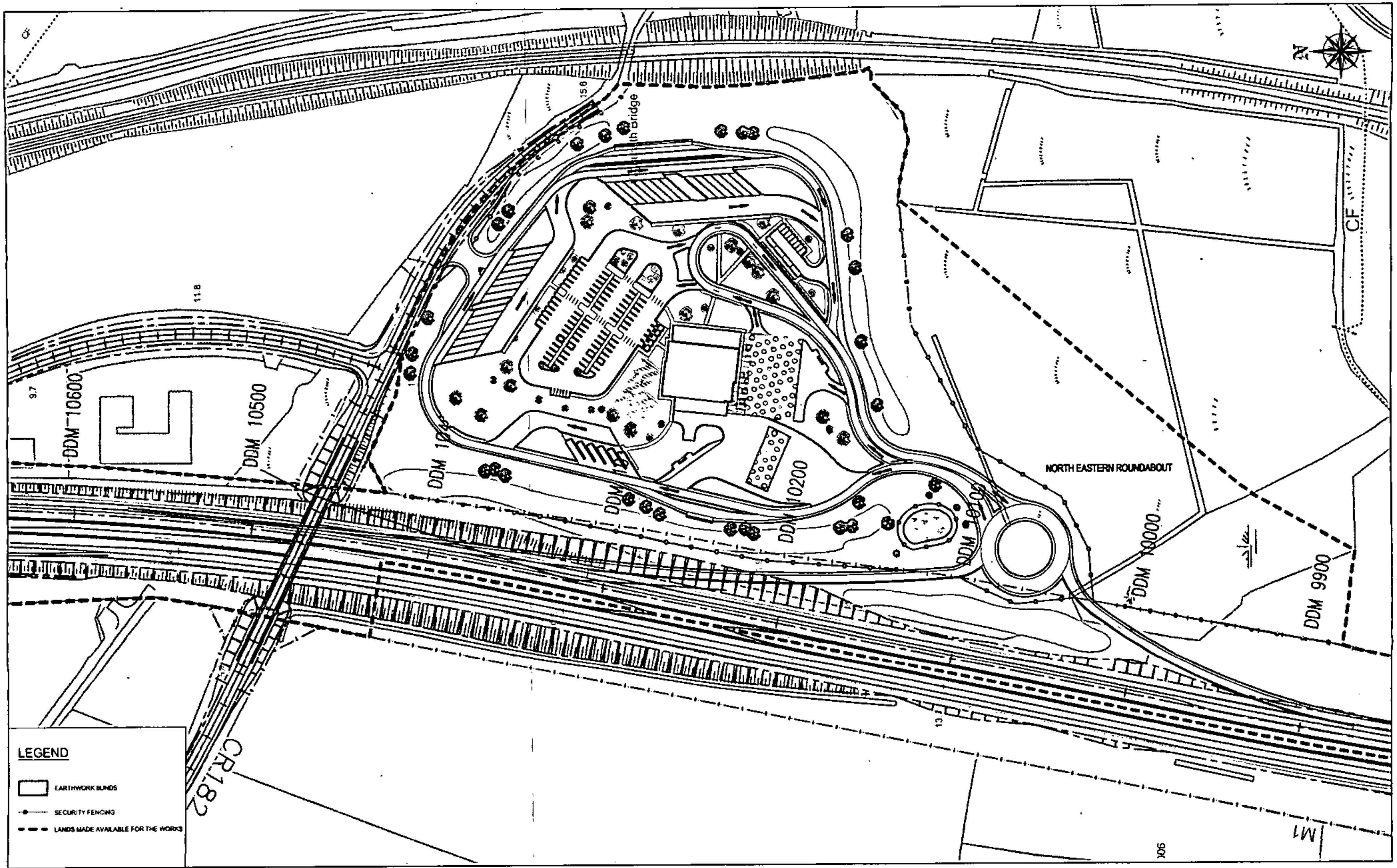
Drawing No: 35

Rev: A01



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M1 NORTH MOTORWAY
SERVICE AREAS

INDICATIVE EARTHEN BUNDS & FENCING
SHEET 1 OF 2

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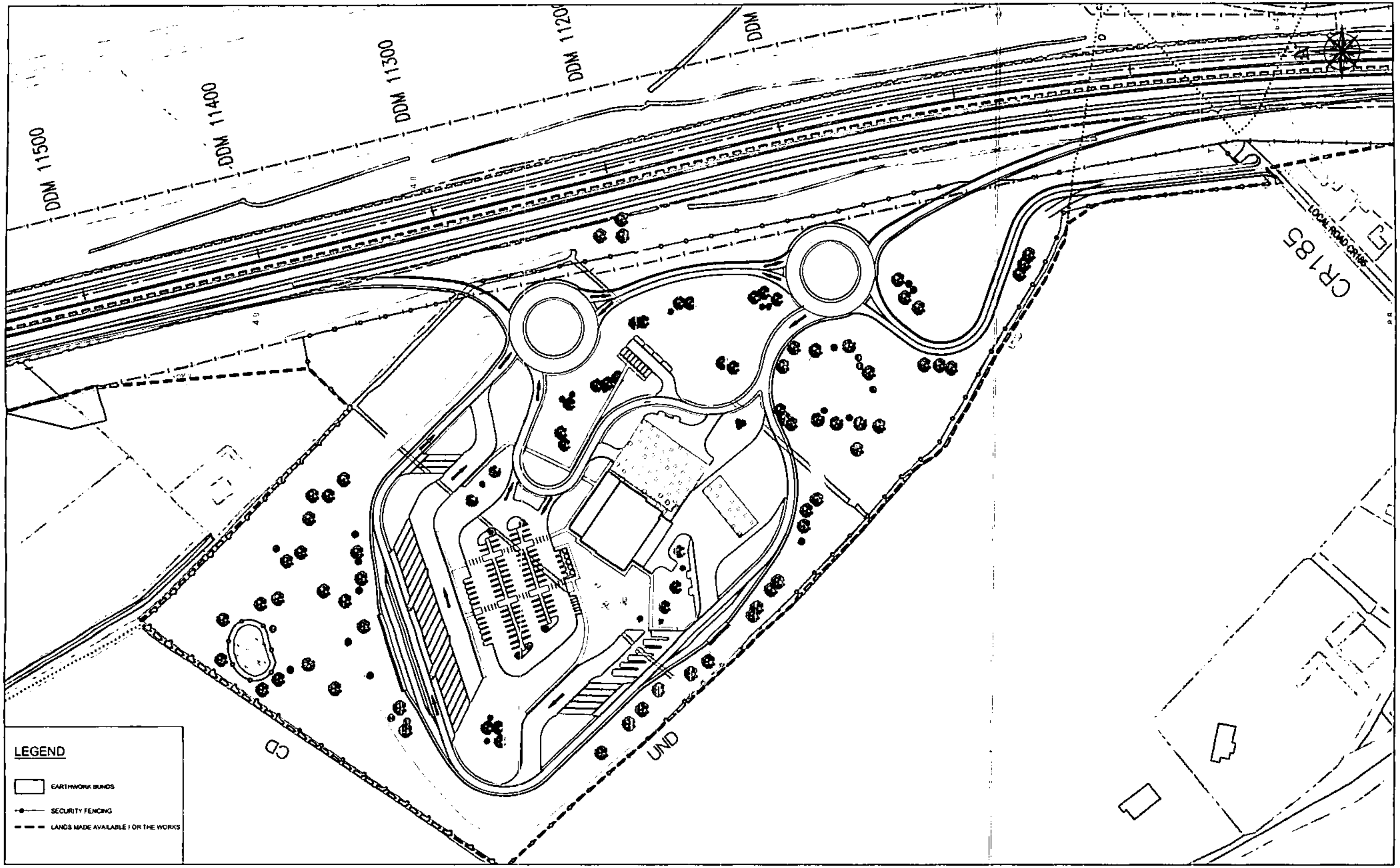

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	INDICATIVE EARTHEN BUNDS & FENCING SHEET 2 OF 2

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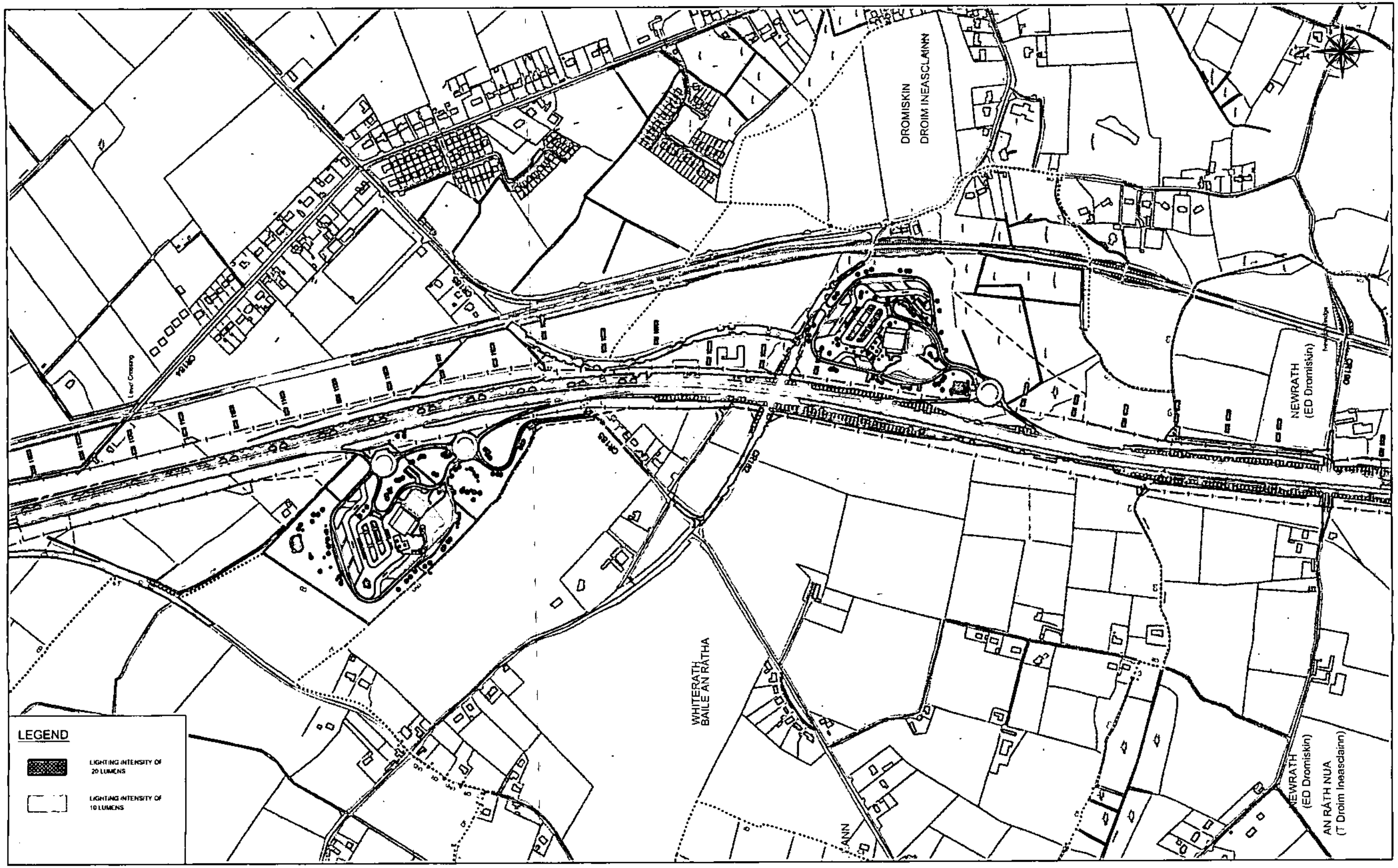

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	INDICATIVE LIGHTING LAYOUT
Status	FINAL
Drawing No.	3.8
Rev	A31

4 ALTERNATIVES CONSIDERED

In line with Section 50 (2) (e) of the Roads Act 1993 (as amended 2007) and the EIA Regulations 1989 to 2001, consideration has been given to alternatives taking into account the environmental effects. This chapter outlines the methodology used to identify suitable alternative locations and reasons for choosing the preferred site based on engineering, environmental, policy and economic grounds.

4.1 CONSULTATION

In 2005, the NRA undertook a policy review of Motorway service areas. The review included consultation with the public, Local Authorities and Government Departments. A total of 42 submissions (26 public and 16 Local Authority / Government Department) were received with a summary of the main points raised provided below. Consideration was given to these submissions in finalising the NRA Policy on provision of Motorway service areas.

4.1.1 Public

The main points raised in the public submissions included:

- Implications of NRA service areas on existing service stations;
- Need for service areas;
- Preferences regarding location of service areas, e.g. adjacent to motorways, on existing slip roads, on both sides of the road, at interchanges;
- Preferences regarding frequency of facilities, e.g. every hour, every 50 miles, not more than 30km;
- Quality of service area to protect the environment;
- Facilities should include overnight parking facilities;
- Facilities should remain in the control of the Government / NRA, rented out to the private sector;
- Suggestions for specific sites;
- Concerns regarding Retail Planning Guidelines limiting forecourt size; and
- Irish situation comparable with countries such as Portugal, Sweden, Greece, Denmark and Austria rather than UK or USA.

4.1.2 Local Authority / Government Department

The main points raised in the Local Authority / Government Department submissions included:

- Location of facilities close to interchanges welcomed;
- Location of facilities close to interchanges not welcomed as provision of facilities close to interchanges may have safety implications and may lead to through traffic in towns / villages nearby;
- Preferred frequency of facilities, e.g. 40km intervals;
- Provision of truck parks along national routes;
- Provision of a specific location may provide an impetus for the development of a motorway service area, which up to this point has been slow; and
- Should comply with requirements of An Foras Forbatha document RT 181 (relates to junctions).

4.2 METHODOLOGY

The methodology employed in the identification of alternative sites and selection of a preferred site followed four broad steps:

1. Identification of a study area for provision of facilities based on NRA Policy;
2. Identification of suitable stretches within the study area which satisfy broad engineering criteria;
3. Desktop review based on the Dunleer – Dundalk Motorway Project EIS, OS and vector mapping and a windshield survey of environmental constraints within each possible alternative site; and
4. Identification of preferred site.

4.2.1 NRA Policy

NRA Policy has identified approximately 50 - 60km as the optimal spacing between service areas on national primary routes. On the basis of a total route length between Dublin and the Border of approximately 100km the provision of two service areas was considered optimal. The first motorway service area is proposed to be located on the segment of motorway between Dublin and Balbriggan and a second on the segment of motorway between Castlebellingham and Dundalk. The distance between the two service areas is approximately 50km. For the M1 North service area, a study area broadly located between Junction 14 at Charleville and Junction 16 at Dundalk South was initially identified; however, after consideration of engineering constraints, as described below, an area between R166 (Newrath) overbridge and the point where the River Fane crosses the M1 Motorway was selected for further investigation (**Figure 4.1**).

It is also NRA policy to provide service areas on both sides of the road, where justified by traffic volumes. This can be opposite or staggered, subject to identification of suitable locations.

The NRA's advice note on Draft TA 90 *The Location and Layout of National Road Service Areas* identifies a number of criteria for consideration when siting on-line service areas. These include:

- Road category type;
- Projected AADT;
- Projected % HCVs;
- Spacing to adjacent on-line service areas or locally available amenities;
- Availability of services / utilities;
- Quality of site;
- Potential for environmental impacts;
- Road geometry;
- Land requirements;
- Availability of local staff; and
- Physical characteristics of the site.

These broad criteria were taken into account in assessing alternative possible locations for the proposed M1 North Motorway Service Area.

4.2.2 Engineering Criteria

Once a broad study area was identified based on policy, in this case between Castlebellingham and Dundalk, possible site locations within the study were determined based on broad engineering criteria. These criteria include:

1. Geometric design standards;
2. Location of existing structures;
3. Sufficient land area for the provision of slip lanes and service area;
4. Constraints associated with staff access roads;
5. Constraints relating to the existing topography; and

6. Existing services and utilities.

The engineering selection process begins with a broad analysis of geometric design constraints within the study area. These include a review of the existing horizontal and vertical curvature parameters to determine if the motorway service area diverge and merge lanes can be incorporated into the existing M1 Motorway alignment in such a way that they will not adversely affect the safety of existing road user. It also includes an assessment of the weaving length between possible sites and existing junctions such that vehicles will not be forced to perform potentially unsafe manoeuvres between the motorway service area and adjacent junctions. The next stage of the review is an assessment of existing structures which may restrict the construction of the merge/diverge lanes and development of the service area itself.

Once a number of stretches of land adjacent to the motorway are identified as possible locations for each of the service area sites, as described above, these areas are assessed with regard to; area of land available for development, the number of individual landowners affected, access to the local road network, existing topography and any limitations this may impose upon the development, and availability of existing utilities.

As a result of this assessment constrains were identified with regard to site selection to the east and to the west of the M1 Motorway. For sites to the east of the motorway, the location of the Dublin to Belfast Rail Line, located parallel and to the east of the existing M1 Motorway, represents the most significant engineering constraint within the study area. The space available between the existing rail corridor and the M1 Motorway is limited and therefore severely reduced the number of possible locations for a Motorway Service Area on the east side of the motorway. On the western side of the M1 Motorway possible site locations are restricted by the close proximity of County Road CR184 to the motorway. For sites, both to the east and west of the motorway, the location of the Drumleck Interchange to the south of the study area was identified as a constraint limiting the location of sites due to weaving length requirements between possible junctions.

Sites identified in the study area with sufficient space for a development of this nature, and which meet the remaining engineering criteria, are shown in **Figure 4.2.** A total of two locations were identified as suitable to the west of the M1 (W1 and W2) and one location to the east (E1). The extent of each area shown on the map refers to the length over which the relevant engineering criteria are met, not the extent of the service area.

4.2.3 Environmental Constraints

A desktop review of environmental constraints within an approximately 300m band of each location strip identified in **Figure 4.2** was undertaken. Reference was also made to the Dunleer to Dundalk Motorway Project EIS completed in 1993. A windshield survey was undertaken in summer 2007 to verify specific features on the ground.

The main environmental considerations included:

- Nearest towns and villages;
- Proximity of sensitive receptors;
- Number of landowners potentially impacted;
- Proximity to conservation sites / locally important ecological sites identified in the reviewed literature and in the National Parks and Wildlife Service database;

- Proximity to watercourses; and

- Proximity to Cultural Heritage features including archaeology and architecture.

4.2.4 Site Selection Assessment

Site selection typically involves a comparative evaluation of a number of sites. Each individual site will have its own advantages and disadvantages; however, the core aim is to compare the alternatives, taking into account environmental / engineering considerations and ensure that unacceptable levels of environmental impact are avoided.

The assessment stage presents all the information gathered, enabling the proposed site alternatives to be compared with each other with the objective of obtaining a preferred site for the proposed development. The factors included in the formulation of a framework assessment comprise quantitative criteria such as number of dwellings affected, roads impacts, policy objectives achieved and qualitative criteria which are assessed in a more subjective manner, e.g. community severance.

4.2.5 Framework Assessment

The various environmental, engineering and policy issues mentioned are combined with the various site alternatives to allow comparison of alternatives in a simple, concise and objective manner. This process assists the assimilation of the information in the framework assessment allowing the preferred option with the greatest benefits and least adverse impacts to be readily identified.

The alternative sites are considered with regard to environmental constraints and engineering criteria and the preferred site will be highlighted on the basis that it best serves its purpose with the least environmental impact.

4.3 SITE OPTIONS IDENTIFIED

A summary of sites identified as meeting the broad engineering criteria outlined in Section 4.2.2 and subsequently considered on environmental grounds is provided in **Table 4.1.**

Table 4.1: Western and Eastern M1 North Motorway Service Area Sites (Castlebellingham to Dundalk segment) as initially identified using the NRA Engineering Standards

Motorway Service Area	Townland	Ref. with regard to M1 Chainage (approx.)
Western Side of M1 Carriageway		
W1	Whiterath	12,000 to 11,000
W2	Whiterath	10,000
Eastern Side of M1 Carriageway		
E1	Whiterath	10,000

4.4 DESCRIPTION OF SITES

The following description of the sites considered for the M1 North Motorway Service Area is based on a desktop review of available mapping, the Dunleer – Dundalk Motorway Project EIS and a windshield survey conducted during the summer of 2007.

In line with NRA policy, it is intended to provide service facilities on both sides of the motorway. Given the limited number of sites available for consideration the combinations available for review are:

- W1 – E1
- W2 – E1

Due to the limited number of sites available for consideration and the general proximity of the sites to each other, characteristics that are similar for each of the sites considered have been described immediately below. Where there are differences between the sites, these are described in the following subsections.

The GSI Bedrock Geology of Meath, Sheet 13, indicates that all of the sites are underlain by the Clontail Formation, which consists of calcareous red mica greywacke. The Contail Formation has been classified by the G.S.I. as a locally important bedrock aquifer that is moderately productive only in local zones. Aquifer vulnerability at the sites is classified as High/Low (H/L) as only an interim study has been conducted (GSI webmapping, 2007). However, there are areas of Extreme groundwater vulnerability approximately 1.5 to 2km to the south, west and north of the study areas, due to the presence of rock close to or at the surface.

No designated Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Natural Heritage Areas (NHAs) lie within the study areas. The closest designated site is Dundalk Bay, located approximately 2.25km east of the M1, which is designated as a SAC, SPA and NHA. In addition, Rivercastle Woods, a proposed Natural Heritage Area (pNHA), is located approximately 3.5km west of the study areas. The Strabannan-Braganstown pNHA and SPA is located approximately 4km south of the study areas.

Unless otherwise stated the land cover is mixed agricultural. In addition, all of the sites are bounded by agricultural lands, which contain some hedgerow boundaries that may have some ecological interest.

Community facilities in the vicinity of the proposed sites include two schools and a church on the western edge of Dromiskin, a GAA club in the northern portion of Dromiskin, a crèche/preschool (potentially closed) to the east of the rail line near the crossroads at the entrance to the village of Dromiskin, an animal control centre on the east side of the M1, north of the Whiterath overbridge, and several large areas signposted as part of the Darver Dromiskin Game Club Land Preserve. Other areas may also be part of the land preserve but signposting was not obvious during the field survey of the area.

There are several monuments within the study areas. As listed in the Louth County Development Plan (July 2006) the village of Dromiskin is identified as an area of special Archaeological Potential (AR7). Protected Structures in the vicinity include LHS012-029 in Whiterath and LHS012-030 to – LHS012-034 in Dromiskin.

4.4.1 Site West 1 (W1)

The site is located in the Townland of Whiterath between the point where the River Fane crosses the M1 Motorway and CR182 (Whiterath) overbridge on the M1 motorway (i.e. Chainage 12,000 to 11,000

of the motorway). The nearest village is Dromiskin, the centre of which is located less than 1.5km from the site.

There are several sensitive receptors within 50m of the site, including existing linear residential development along the local roadways to the north, south and west of the site. All of these properties could experience potential dust, noise & vibration and landscape & visual impacts from the site.

The River Fane is located approximately 0.5km north of the site, with the closest stream an unnamed tributary of the River Fane, flowing in a northerly direction approximately 0.5km west of the site. In addition, several manmade drains, which are not listed on the EPA map, run through the site.

Minimal impact would be expected on the local road network while there are no requirements to alter the M1 geometry other than the construction of the required slip roads, markings, lighting and signage. A supply of electricity and communications is available from the local electricity supply grid and telephone network. Water for the site is available from a mains supply while for wastewater it would be necessary to gravity feed to the east of the M1 before pumping and discharging into the sewerage treatment works in Dromiskin.

4.4.2 Site West 2 (W2)

The site is located in the Townland of Whiterath between the CR182 (Whiterath) overbridge and the CR190 (Newrath) underpass on the M1 motorway (i.e. Chainage 10,500 to 9,500 of the motorway). The nearest village is Dromiskin, the centre of which is located less than 1km from the site.

Sensitive receptors within the vicinity of the site, include existing linear residential development along the CR 190 to the south and CR 182 to the north of the site as well as residences within 100m west of the site that are accessed from the CR 185. All of these properties could experience potential dust, noise & vibration and landscape & visual impacts from the site.

The River Glyde flows towards Dundalk Bay approximately 2.5km south of the site. A small unnamed tributary of the River Fane flows across the site from east to west. In addition, several manmade drains, which are not listed on the EPA map, run through the site.

Minimal impact would be expected on the local road network while there are no requirements to alter the M1 geometry other than the construction of the required slip roads, markings, lighting and signage. A departure from standard would be required for the weaving length between the required junction for this site and the Castlebellingham Interchange. A supply of electricity and communications is available from the local electricity supply grid and telephone network. Water for the site is available from a mains supply while wastewater would need to be pumped from the site before discharging into the sewerage treatment works in Dromiskin.

4.4.3 Site East 1 (E1)

The site is located in the Townland of Whiterath between the CR182 (Whiterath) overbridge and the CR190 (Newrath) underpass on the M1 Motorway (i.e. Chainage 10,500 to 9,500 of the motorway). The nearest village is Dromiskin, the centre of which is located less than 0.75km from the site.

Sensitive receptors within the vicinity of the site, include existing linear residential development along the CR184 directly east of the site and the CR 190 to the south of the site. All of these properties could experience potential dust, noise & vibration and landscape & visual impacts from the site.

The Dublin to Belfast Rail Line bounds this site to the east.

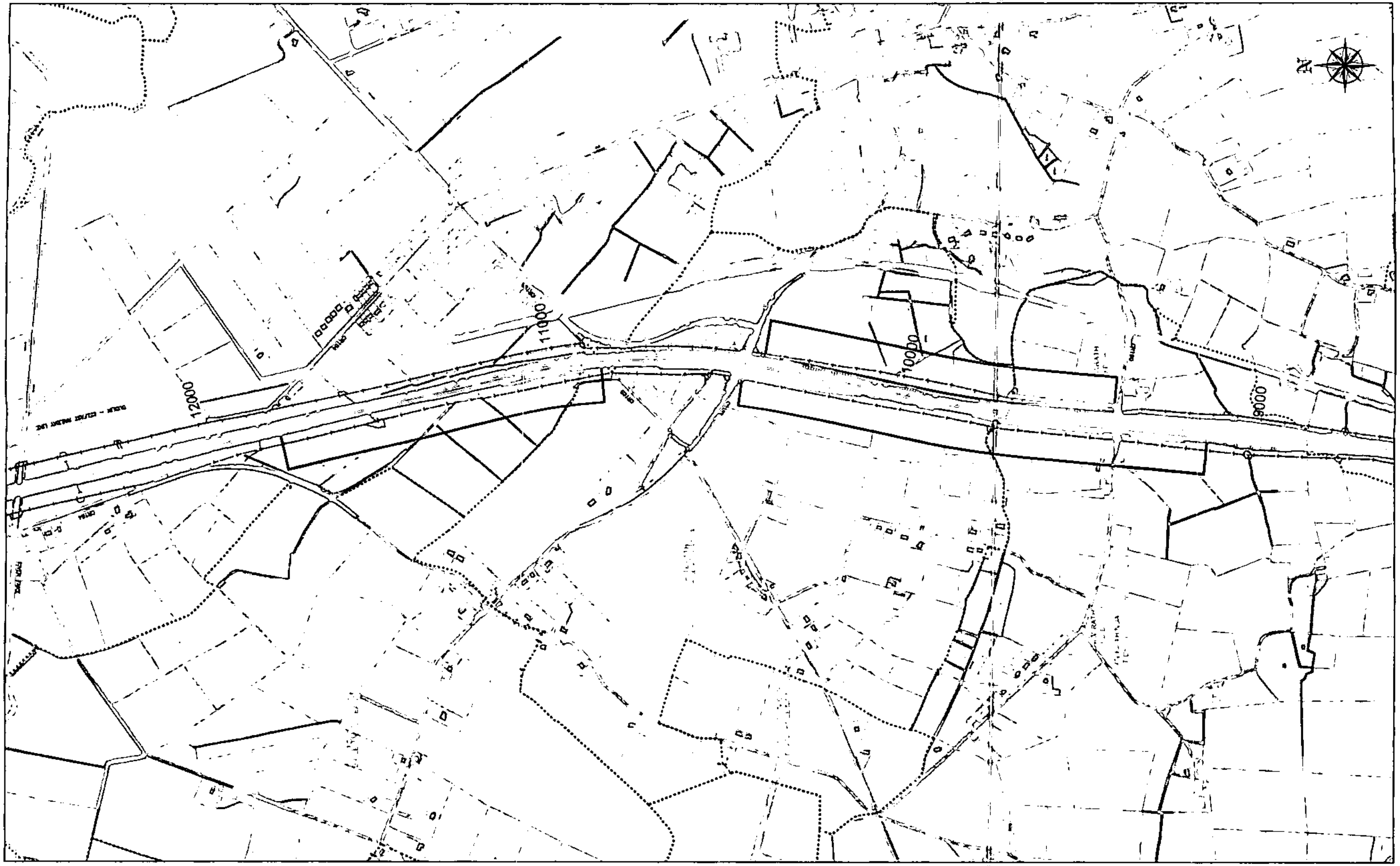
The River Glyde flows towards Dundalk Bay approximately 2.5km south of the site. A small-unnamed tributary of the River Fane flows across the site from east to west. In addition, several manmade drains, which are not listed on the EPA mapping database, run through the site.

In addition, to the area of Archaeological Potential in Dromiskin, an archaeological site known as the Red Bog, containing a crannóg and possible stone causeway, is located within the study area for Site East 1.

Minimal impact would be expected on the local road network while there are no requirements to alter the M1 geometry other than the construction of the required slip roads, markings, lighting and signage. A departure from standard would be required for the weaving length between the required junction for this site and the Castlebellingham Interchange. A supply of electricity and communications is available from the local electricity supply grid and telephone network. Water for the site is available from a mains supply, while wastewater would need to be pumped from the site before discharging into the sewerage treatment works in Dromiskin. In addition, ground conditions at the site include the low-lying Red Bog.

4.5 CONCLUSION

Following a review of the study area between Junction 16 and Junction 14, only one option was identified (which met policy and engineering criteria) on the east side of the motorway. On the west side of the motorway, no one site presented a clear environment/engineering choice. However, there are marginally fewer sensitive receptors within 300m of W1 (24) compared to W2 (27), while W2 would require crossing of a tributary of the River Fane and would have substandard geometry with regard to weaving length between junctions. As a result W1 was considered the marginally preferred site west of the motorway. Therefore, based on the site selection assessment, W1 and E1 are the preferred sites for the M1 North Motorway Service Area.



M1 NORTH MOTORWAY
SERVICE AREAS

SITES CONSIDERED

FINAL

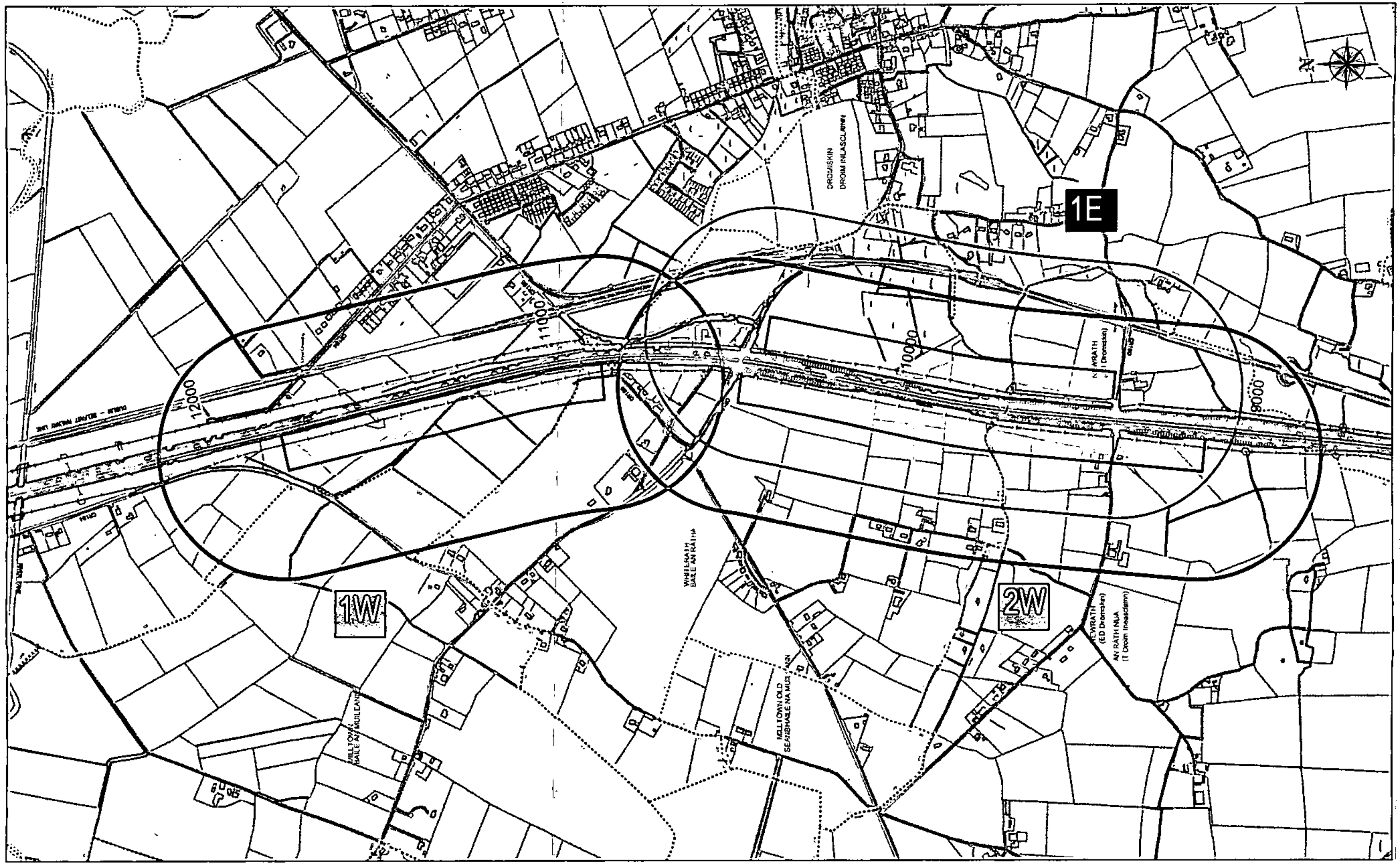
4.1

A01

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

NDP NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority



National Roads Authority
An tÚdarás um Bóithre Náisiúnta

NATIONAL DEVELOPMENT PLAN

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	ENVIRONMENTAL CONSTRAINTS ASSESSED WITHIN 300m
Status	FINAL
Drawing No	4.2
Rev	A01

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5 CONSULTATION

As part of the consultation strategy for the EIA, statutory and non-statutory organisations were contacted in October 2007 seeking comments on the proposed project. A total of 52 groups were contacted. **Table 5.1** summarises the main points raised in the submissions received and outlines responses to those comments. In addition, many of the same groups were contracted previously as part of the consultation process for the EIA of the proposed M4 KEK Motorway Service Area. General comments on the design and location of motorway service areas received during that consultation were also considered in the context of the proposed project. Further statutory consultation will take place once the EIS is submitted for planning consent.

Table 5.1: Comments Received During Consultation on the M1 North Motorway Service Area

ORGANISATION	MAIN POINTS RAISED	RESPONSE
An Taisce	Agree with the requirement for an EIA for the proposed project.	No response required.
	Not clear whether the assessment is being carried out in conjunction with existing landowners or whether a CPO will be sought.	The lands for the proposed development will be under a Compulsory Purchase Order (CPO).
	The provision and amount of perimeter landscaping to adjoining land is unclear. It is considered that substantial provision of buffer landscaping between the proposed development and adjoining land should be provided around the perimeters.	The requirement for, and extent of, perimeter landscaping has been addressed in **Chapter 12, Landscape and Visual**.
Bord Gais, Transmission	A drawing showing the BGE Gas Transmission Network in the vicinity of the proposed M1 Motorway Service Area was provided. BGE confirmed that the service area will be wholly outside the BGE determined 14m wide wayleave and as such there are no conflicts anticipated.	No response required.
DoEHLG, Development Applications Unit	A survey of flora and fauna should be carried out on the eastern and western sites and where protected species are impacted, mitigation measures should be detailed.	A survey of flora and fauna in both the terrestrial and aquatic environment has been carried out as part of this EIA, with appropriate mitigation measures recommended, where required. See **Chapters 13 and 14, Terrestrial Ecology** and **Aquatic Ecology**.

ORGANISATION	MAIN POINTS RAISED	RESPONSE
	Noted that due to the scale of the proposed service area, the likelihood of impact on known and previously unknown archaeological material is high.	An architectural, archaeological and cultural heritage assessment has been carried out as part of this EIA, with appropriate mitigation measures recommended, where required. See **Chapter 19, Cultural Heritage**.
	It is recommended that a thorough Archaeological Assessment be carried out, including a description of the known and potential archaeological remains on the site of the proposed development, description of impacts and recommended mitigation measures.	An archaeological assessment has been carried out as part of the EIA. This includes a description of the potential impacts on known and potential archaeological, architectural and cultural heritage sites and a list of mitigation measures in line with the code of practice agreed between the NRA and Minister for Environment, Heritage and Local Government. See **Chapter 19, Cultural Heritage**.
	It is recommended that the content of the NRA Guidelines for Assessment of Architectural Heritage Impact on National Road Schemes be taken into account in assessing the impact of the proposed development on the architectural heritage.	These guidelines have been taken into account during the architectural heritage assessment, as noted in **Chapter 19, Cultural Heritage**.
	It is recommended that the design of new structures have a quality of architectural design and construction which reflects the policies set out on the "Action in Architecture, 2002"	The policies set out in "Action in Architecture, 2002" were considered during the design of the proposed structures. See **Chapter 3, Description of the Proposed Development**, for details of the proposed building design.
Dublin Transport Organisation	The scale and range of facilities should be limited to the requirements of passing road users on the subject road.	It is intended to provide parking, fuel, convenience shop, snack and hot meal facilities as part of the proposal. A full Retail Health Check has been carried out as part of the EIA and is recorded in **Chapter 8.** Details of the full range and size of facilities is provided in **Chapter 3**.
	Other services such as hotel/conference facilities and non-convenience retail should not be permitted within or adjacent to service or rest areas;	The proposal does not include provision for a hotel / conference or non-convenience retail facilities. Any future development proposals would be subject to normal planning processes.

ORGANISATION	MAIN POINTS RAISED	RESPONSE
	The development of service and rest facilities in the vicinity of national road interchanges should not set a precedent for other forms of development in such locations.	Service areas may only be brought forward by local authorities/NRA and as a consequence, private developers may not independently provide motorway service area facilities. Private interests may, however, pursue proposals for off-line service areas, e.g. at or close to motorway interchanges. Such proposals would be subject to normal planning permission procedures.
	Services and rest areas should only be accessible from the motorway/high quality dual carriageway road in question. That is, only on-line service areas (as described in the NRA's Policy Statement) should be considered.	It is intended that the M1 North motorway service area shall only be accessible from the motorway. The only exception will be staff accessing the proposed development from the local road network at two locations, as shown on **Figure 3.3**. These secondary entrances will be fully regulated with barriers to prevent illicit use.
Dundalk Chamber of Commerce	An application for planning permission has been lodged with Louth County Council for development of an alternate service area at a site at the Ardee spur junction. This option should be investigated instead.	The comment has been noted.
	The M1 Service Area should offer accommodation and a range of eateries at the very least.	Snack and hot food facilities will be provided as part of the motorway service area; however, the proposal does not include provision for accommodation.
	Facilities to deal with a major motorway incident should be a part of the Service Area, including accommodation for emergency services to house equipment and accommodate the aftermath.	**Figure 3.3** shows an indicative layout for the proposed service area. This includes HCV parking adjacent to the service building, which will be suitable for emergency service vehicle parking and equipment storage during an incident. In addition, the restaurant facilities would be sufficient to accommodate 150 people (based on $2m^2$ per person), should its use as a holding centre be required in an emergency situation, such as during a major accident.
Geological Survey of Ireland	There are no geological heritage sites currently on the GSI database within the proposed development footprint. However, there is a geological heritage site located approximately 3km to the south.	Noted. A soils, geology and hydrogeology assessment has been carried out as part of the EIA and is provided in **Chapter 15.**

ORGANISATION	MAIN POINTS RAISED	RESPONSE
	A request for provision of any reports detailing any site investigations carried out for addition to the GSI's national database of site investigation boreholes.	Request has been forwarded to the NRA.
	Request for notification of ground investigations that provide good geological exposure. Significant bedrock cuttings should be designed to remain visible, not covered with vegetation and soil.	These requests have been included in the mitigation section of **Chapter 15, Soils, Geology and Hydrogeology.**
Louth County Council, Environment Section	Trade/sewage effluents will not be permitted to discharge to waters, save in accordance with Water Pollution Acts 1977 & 1990. A separate application for an effluent Discharge Licence will have to be made to the Environment Section, Louth County Council.	The comment has been noted. The design of the sewage system will take into account all applicable guideline and licence requirements. See **Chapter 3** for a description of the proposal for sewage conveyance and treatment from the proposed development.
	All proposed petrol/diesel storage tanks will have to be double skinned or encased in concrete to protect against any leakage of contents to soil and groundwater.	All petrol/diesel storage tanks will be double skinned or encased in concrete. See **Chapter 3** for descriptions.
	A Construction & Demolition Waste Management Plan is required.	This has been included as mitigation in **Chapter 18.**
	Adequately sized and designed oil/petrol interception must be located on surface water drainage pipework – isolating valves (or similar) shall be inspected on the outlet pipe therefrom.	See **Chapters 3**, **14**, **16** and **21** for details on the design of the drainage and surface water treatment system to be provided at the proposed development.
	Ground monitoring boreholes (location and number to be agreed with Planning Authority) shall be installed to monitor ground water quality.	This has been included as mitigation in **Chapter 15**.
	The development shall comply with the requirements of the Air Pollution (Petrol Vapour Emissions) Regulations (SI 375 of 1997).	The development will comply with the requirements of the Air Pollution (Petrol Vapour Emissions) Regulations (SI 375 of 1997).

ORGANISATION	MAIN POINTS RAISED	RESPONSE
Louth County Council, **Planning Department**	The proposed development is located within Development Control Zone 5 of the Louth County Development Plan 2003-2009 as amended in 2006. There are policies set out in the Development Plan regarding motorway services under Section 8.13. The provision of a shop and restaurant facility in addition to parking facilities, picnic area and toilets would be considered by the Planning Authority at this location.	The comment is noted.
	In terms of Landscape Area, the site to the east is located within Dundalk Bay Coast, whilst the site to the west is located on the Muirhevna Plains. In terms of Conservation, Option 1 is in the proximity of a NHA as identified in the CDP. Neither sites are affected by Areas of Outstanding Natural Beauty or High Scenic Quality nor are there viewing points or views and prospects to be protected.	Please see **Chapters 12** and **13** for a full assessment of the impacts from the proposed motorway service area in relation to these issues.
	It would appear from the Recorded Monuments that there is greater activity in the vicinity of the eastern site.	A thorough archaeological assessment has been carried out as part of the EIA. This includes a description of the potential impacts on known and potential archaeological, architectural and cultural heritage sites and a list of mitigation measures in line with the code of practice agreed between the NRA and Minister for Environment, Heritage and Local Government. See **Chapter 19, Cultural Heritage**.
	A matter for consideration is the proximity of the eastern and western sites to the village of Dromiskin and how such development might impact on the village.	The presence of Dromiskin village and the potential impacts that may result from the proposed motorway service area have been considered throughout the EIA, including impacts related to traffic, noise, air quality, landscape and cultural heritage. In addition, a full Retail Health Check has been carried out as part of the EIA and is recorded in **Chapter 8.**
	Information on granted planning permissions for service station facilities located in the project area was provided.	The presence of these granted planning permissions is noted.

ORGANISATION	MAIN POINTS RAISED	RESPONSE
Louth County Council, Roads Department	The main concerns are connection with water and sewage services, including the quantities of water required by the development and the demand for wastewater treatment. If on-site wastewater treatment is not provided, major expansion of the Dromiskin plant would be required.	Potable water supply will be from municipal sources. See **Chapter 3** for further details. Sewage will be conveyed from the proposed development using pumps and gravity flow to existing treatment works, which will be upgraded to accommodate the project. See **Chapter 3** for further details.
Road Safety Authority	The RSA has no further comments in addition to those already provided on the proposed M4 Motorway Service Area. These comments are summarised below: Particular care should be given to segregate pedestrians from vehicular traffic and also cars from commercial vehicles e.g. HCVs.	A Road Safety Audit will be carried out on the detailed design of the motorway service area.
	An area of the proposed development should be made available for An Garda Síochana and RSA enforcement purposes.	**Figure 3.3** provides an indicative layout of the proposed Service Area. This includes a Garda Enforcement Area on both sides of the motorway.
	Request for facilities within the service area to enable dissemination of information on road safety issues.	This request has been passed to the NRA for consideration as part of the Contract Document requirements for the PPP Concessionaire.

5.1 SUBMISSIONS IN RELATION TO THE EIS

Once the EIS has been submitted for approval, public notice will be given in the form of an advert placed in national and local newspapers informing the public of where the document can be viewed and purchased. Submissions can then be made in relation to the likely effects on the environment of the proposed development. Submissions for the proposed M1 North Motorway Service Area project should be made in writing to An Bord Pleanála on or before the date listed in the newspaper notices using the address listed in the advertisement.

PART II SIGNIFICANT ENVIRONMENTAL EFFECTS AND PROPOSED MITIGATION MEASURES

This section of the EIS describes the likely significant environmental impacts arising from the proposed M1 North Motorway Service Area. Where possible, design measures have been included to reduce or eliminate possible impacts but where this has not been possible, mitigation measures are suggested to reduce or eliminate the identified impacts of the proposal.

6 ENVIRONMENTAL IMPACT ASSESSMENT

The M1 Motorway is a major inter-urban route, which was fully completed in 2007. The various sections of the route have been subject to EIA under the Roads Act 1993. At that time, no service areas were proposed along the motorway. However, it is now NRA policy to provide service areas along motorways and national primary routes in order to improve safety and driver comfort on inter-county journeys.

6.1 LEGISLATIVE PROVISIONS

The Roads Act 2007 contains specific procedures regulating the provision of motorway service areas along motorways and high quality dual carriageways. Provision for such facilities may be made as part of Service Area Schemes (Roads Act 2007, Section 9(1)(a)(i)), i.e. the statutory procedure used to bring forward service area proposals, to seek approval from An Bord Pleanála and to provide the legal basis to acquire lands required for the development. In this way, the service area procedure ensures that only acceptable roadside development takes place and that the safety of road users and the operational efficiency of motorways are not compromised by multiple roadside developments and the traffic they would generate.

Service Area proposals may only be brought forward by local authorities/NRA and, as a consequence, private developers may not independently provide motorway service area facilities alongside such roads (Roads Act 2007, Section 10(1)). Private interests may, however, pursue proposals for off-line service areas, e.g. at or close to motorway interchanges. Such proposals would be subject to normal planning permission procedures.

This EIS examines the potential significant impacts of a proposed motorway service area to serve the segment of the M1 Motorway between Castlebellingham and Dundalk. The EIS is required under the Roads Act 1993, as amended by the Roads Act of 2007. Section 9 (d) of the 2007 Act amends Section 50 of the Principal Act of 1993 to include Service Areas in the list of developments requiring an EIS as follows;

"(*a*) A road authority or the Authority shall prepare a statement of the likely effects on the environment ('Environmental Impact Statement') of any proposed road development it proposes consisting of—

(i) The construction of a motorway,

(ii) The construction of a busway,

(iii) The construction of a service area, or

(iv) Any prescribed type of proposed road development consisting of the construction of a proposed public road or the improvement of an existing public road."

Sub-section 2 of Section 50 of the Principal Act of 1993 requires the following information to be included in an EIS;

(*a*) A description of the proposed development, comprising information about the location, design, size, physical characteristics and land-use requirements of the development;

(*b*) The data necessary to identify and assess the main effects, which the proposed road development is likely to have on the environment;

(*c*) a description of the likely significant effects,. direct and indirect, on the environment of the proposed road development, explained by reference to its possible impact on—

(i) Human beings, fauna and flora,

(ii) Soil, water, air, climate and the landscape,

(iii) The inter-action between any of the matters referred to in *subparagraphs (i)* and *(ii)*,

(iv) Material assets, and

(v) The cultural heritage;

(*d*) Where significant adverse effects are identified with respect to any of the matters referred to in *paragraph (c)*, a description of the measures envisaged in order to avoid, reduce and, if possible, remedy those effects;

(*e*) Where appropriate, an outline of the main alternatives (if any) studied and an indication of the main reasons for choosing the proposed alternative, taking into account the environmental effects; and

(*f*) a summary in non-technical language

An environmental impact statement may include, by way of explanation or amplification of any of the specified information referred to *above*, further information on any of the following matters:

(*a*) the estimated type and quantity of expected emissions resulting from the proposed road development when in operation;

(*b*) the likely significant direct and indirect effects (including secondary, cumulative, short, medium, and long term, permanent and temporary, positive and negative effects) on the environment of the development proposed which may result from—

(i) The use of natural resources,

(ii) The emission of pollutants, the creation of nuisances, and the elimination of waste;

(*c*) The forecasting methods used to assess any effects on the environment about which information is given under *subparagraph (b)*;

(*d*) Any difficulties, such as technical deficiencies or lack of knowledge, encountered in compiling any specified information.

6.2 SCOPE OF THE EIS

Scoping is an essential part of the preparation of an EIS as it ensures that all potential and important significant impacts on the receiving environment are taken into account, whilst eliminating those that are not, at the earliest possible time. Scoping by its very nature will evolve with the project as design changes are made and more detailed information on environmental issues and design comes to hand. However, as an early stage tool it provides relevant information on the most important potential impacts of the project, which will have to be addressed in the EIS. With regard to EPA criteria for

scoping, the environmental areas where impacts may occur as a result of the proposed motorway service area were identified and are as follows:

- Human Beings;
- Natural Environment;
- Material Assets; and
- Cultural Heritage.

6.2.1 Human Beings

During scoping particular attention was paid to the impact the proposed development could have on local community services off the line of the motorway. Also, the impacts of noise and lighting on surrounding properties from traffic moving within the proposed development and operation of the proposed buildings were considered important, particularly given the location of the proposed development between the existing motorway and surrounding rural landscape. Despite the presence of the motorway, there are a number of residences in the vicinity of the proposed site, east and west of the motorway, which would be potentially affected by the proposal.

6.2.2 Natural Environment

The site for the proposed M1 North Motorway Service Area is predominately agricultural with fields of improved grassland and arable crops. On the east site there is an area locally known as the Red Bog. There are no ecological designations within the proposed M1 North Motorway Service Area. Details of the ecology of the area can be found in **Chapters 13 and 14.**

6.2.3 Material Assets

The proposed development will be constructed on a Greenfield site adjacent to the M1 Motorway and it is intended to acquire the site of the proposed development under CPO procedures. Ribbon development is evident along the various local roads in the vicinity of the proposed development; however, landtake will not be required from these properties. It will be necessary to make modifications to the M1 on both sides of the carriageway to facilitate merge and diverge lanes for entry to and exit from the proposed development.

The material assets section will also look at natural resources, and utilities, both existing and required. Particular attention is given to the availability of a drinking water supply and to sewage.

6.2.4 Architecture, Archaeology and Cultural Heritage

Previous work carried out prior to and during construction of the M1 Motorway scheme has been thoroughly reviewed. Any issues not resolved as part of the M1 scheme are included in this EIS.

6.3 IDENTIFICATION OF LIKELY SIGNIFICANT IMPACTS

Section 50 of the Road Act 1993 requires that the EIS describe likely, direct and indirect significant impacts of a proposed development. Selection of the site for the proposed M1 North Motorway Service Area has taken into account the impacts on *human beings*, the *natural environment, material assets and architecture, archaeology and cultural heritage*.

The EPA Guidelines on the Information to be Contained in Environmental Impact Statements (2002) defines an impact as "the degree of change in an environment resulting from a development" and goes on to elaborate on impacts in terms of quality (positive, neutral or negative), significance (imperceptible, slight, moderate, significant or profound), duration (temporary, permanent, short-term, medium-term or long-term) and type (cumulative, 'do nothing', indeterminable, irreversible, residual, synergistic or 'worst case'). These impact parameters have been taken into account throughout this environmental assessment.

The EPA Guidelines have been consulted throughout the production of this EIS. The following factors were considered when determining the significance of the impacts, both positive and negative, of the proposed development on the various aspects of the receiving environment:

- The quality and sensitivity of the existing/baseline-receiving environment;
- The relative importance of the environment in terms of national, regional, or local importance;
- The degree to which the quality of the environment is enhanced or impaired;
- The scale of change in terms of land area, number of people affected and number and population of species affected, including the scale of change resulting from all types of impacts. This was determined based on:
    - The consequence of that impact/change occurring;
    - The certainty/risk of the impact/change occurring;
    - Whether the impact is temporary or permanent; and
    - The degree of mitigation that can be achieved.

The methodologies used to determine the magnitude of the impacts outlined in the following chapters take into account the guidelines given by the EPA and the NRA in their publications:

- *Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002)*
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA 2003)*
- *Environmental Assessment and Construction Guidelines (NRA 2005)*

Where mitigation measures in the form of design measures has been suggested during the EIA process, these have been incorporated into the proposed development design, where feasible, from an engineering perspective. It should also be noted that there are geometric design constraints for

access on and off a motorway, which ensure safety for drivers, and these constraints cannot always be reconciled with avoiding or reducing an impact.

6.4 STRUCTURE OF THE EIS

The structure of the EIS is laid out in the preface of each volume for clarity. It consists of three volumes as follows:

Volume 1 - Non-Technical Summary

A non-technical summary of the information contained within Volume 2.

Volume 2 - Environmental Impact Statement

This volume deals with the environmental impact of the proposed development including ancillary works arising from the proposed development. Information on the indicative design of the rest stop including a description of the traffic, alternatives considered and geometric drawings are also included.

Volume 3 - Technical Appendices

Specialist technical reports.

7 PLANNING

7.1 INTRODUCTION

This section of the EIS considers the strategic and statutory context governing planning and development at the proposed development. This includes an assessment of the national, regional and local strategic planning context, as well as an assessment of the Louth County Development Plan 2003 - 2009 and other relevant statutory planning context documents. This section also examines issues governing prospective trends in development.

7.2 METHODOLOGY

The methodology adopted assesses land use planning and development under three categories. These are:

- ***Strategic Planning Context*** – This category catalogues current national and strategic policies and objectives that are relevant to the proposed development on the M1 Motorway.
- ***Statutory Development Plan Context*** - This category catalogues the statutory land use planning and development policies and objectives as adopted by Louth County Council, that are relevant to the proposed development.
- ***Prospective Trends in Development*** - This category documents recent land use developments and considers prospective development trends along the M1 Motorway in the general vicinity of the proposed development.

7.2.1 Criteria for Rating of Impacts

The likelihood and significance of land use planning and development impacts due to the construction and operation of the M1 North Motorway Service Area can be rated as follows:

7.2.1.1 Strategic and Statutory Development Plan Context

It is relatively straightforward to assess whether a strategic/statutory development policy or objective is impacted upon by the M1 North Motorway Service Area. The rating of any such impact relates to the importance of that policy or objective in the national/local Development Plan. Thus if the impact of the proposed development is to achieve a strategic/statutory plan objective this is a significant positive impact. On the other hand if the effect of the M1 North Motorway Service Area is to mitigate against a small site-specific objective and where mitigation may be available to achieve that objective in another location or form, such as for example, re-siting of part of a small open area, then the scale of the impact would not be significant.

- *Significant impact:* Where the M1 North Motorway Service Area would have a major role in enabling/prohibiting achievement of national/local development policy or objective.
- *Moderate impact:* Where the M1 North Motorway Service Area would contribute to / mitigate against the achievement of national/local development plan policy or objective.
- *Slight impact:* Where the M1 North Motorway Service Area would have a token impact on a plan policy or objective.

7.2.1.2 Prospective Trends in Development

In this category the rating of impacts relate to the assessment of the M1 North Motorway Service Area's contribution to the achievement of development potential. For example the operation of the M1 North Motorway Service Area may serve as a catalyst for employment development, in certain areas.

- *Significant impact:* Where the M1 North Motorway Service Area would have a major role in reducing/augmenting the viability of development such that relocation of development proposals away from this area/into this area would occur.

- *Moderate impact:* Where the M1 North Motorway Service Area would limit/enhance development in an area to a limited degree.

- *Slight impact:* Where the M1 North Motorway Service Area would cause minor inconvenience/benefit to proposals for development in an area.

7.3 STRATEGIC PLANNING CONTEXT

7.3.1 National Development Plan 2007-2013

The National Development Plan, 2007-2013 (NDP) '*Transforming Ireland – A Better Quality of Life for All*', was published in January 2007 and notes that the Irish economy and society will undergo a transformation almost as radical as the changes experienced in the past decade of growth and development. This would be driven largely by the continuing increase in the population, which is projected to reach over five million people by 2021.

The NDP will invest some €32.9 billion in transport infrastructure over the Plan's lifetime. It estimates that €17.6 billion will be invested in improving Ireland's road network. Although the NDP emphasises the need to promote more sustainable forms of transport and the need to encourage the use of public transport, it also recognises the need for a high quality road network. The NDP notes that "*98.3% of internal merchandise trade is carried out on the road network and this underlines the need for a world-class roads system, especially between major urban centres.*"

The principal objectives of the NDP's Roads Sub-Programme include:

- *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 the main NSS Gateways;*

- *Ongoing development of the Atlantic Road 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;*

- *Improvement and maintenance of the non-national roads network; and*

- *Investment in strategic non-national roads which will complement the national roads investment.*

The NDP recognises the opportunities to be achieved through North/South co-operation. The Plan seeks to realise these opportunities by strengthening North/South co-operation across a wide range of areas including infrastructure provision and spatial planning. In seeking to prioritise more balanced regional development, the Government will continue to support improvements to the Dublin-Dundalk-Newry-Belfast corridor. In this regard the NDP states, that "*the upgrading of the entire Dublin-Belfast road to Motorway/Dual carriageway status in the coming years will ensure that this corridor will form a major axis for economic development on the island*". As such the development of the Dublin-Dundalk-Newry-Belfast road corridor is a key focus of the NDP. It is envisaged that "*this project will be completed in the early years of the Plan, allowing rapid movement of people and goods between the two cities*". Essentially, it will facilitate access to the motorway for the Northern cities connecting them to cities in the south and due for completion in 2010.

The M1 Motorway was fully completed in 2007. The final section from North of Dundalk to the Border was officially opened in August 2007 and links in with the Northern Ireland A1/M1 route to Belfast. This is the first of the 'major inter-urban link' to be completed and provides motorway standard road all the way from Dublin Port to the Border. It has served to dramatically reduce journey times between Dublin and Belfast and increase trade along the route. The M1 Motorway is recognised by the NDP as a 'major inter-urban link'. This corridor connects Dublin to the National Spatial Strategy's Gateway city of Dundalk and the city of Belfast in Northern Ireland. The construction and operation of the M1 North Motorway Service Area on this motorway would reinforce this road as a key transport corridor and enhance the overall quality and economic viability of this strategic link and ensure compliance with EU Directives as set out in **Chapter 2.**

7.3.1 Sustainable Development – A Strategy for Ireland, 1997

Sustainable Development – a Strategy for Ireland was published in 1997 by the Department of the Environment. The Strategy recognises the need for good spatial planning and the inclusion of sustainability concerns in urban and built environment policies. The Strategy identifies that the pattern and density of urban development has a major influence on travel patterns.

The Strategy sets out a more sustainable approach to urban development, outlining that such requires:

- *Closer co-ordination between transport and land use planning;*
- *The promotion of higher residential densities in appropriate locations; and*
- *Emphasis in the proposed new Guidelines on Development Plans on clear demarcation between urban and rural land use.*

The Strategy recognises that land use planning can support sustainable development in a number of ways. These include:

- *Efficiency in the use of energy, transport and natural resources may be encouraged through the careful location of residential, commercial and industrial development, and controls on the shape, structure and size of settlements;*
- *The planning process can also promote the most effective use of already developed areas;*
- *The protection and enhancement of the natural environment, including unique of outstanding features, landscapes and natural habitats can be secured; and*
- *New development needs to be accommodated in an environmentally sustainable and sensitive manner.*

The Strategy promotes a range of sustainable development principles, which support development that promotes multi-purpose trips as well as those that are located close to transport nodes and access points. The Strategy encourages a reduction in the growth in transport demand by locating high movement activities, such as retail, in areas of high accessibility to transport and other activities.

Ultimately, the Strategy identifies the fundamental link between transport policy, planning and land use policy and states that Planning Authorities will be encouraged to take a more strategic view of settlement patterns, development needs and major infrastructural services.

In reference to the provisions of the Strategy, the proposed development is considered to be well suited for a motorway service area as this land is adjacent to the M1 Motorway and would serve to enhance the quality and economic sustainability of this transport corridor. At present the nearest petrol filling station available to motorway users is situated in Dromiskin village.

7.3.2 National Spatial Strategy, 2002-2020

The National Spatial Strategy (NSS), published in 2002, is a twenty year planning framework designed to achieve a better balance of social, economic, physical development and population growth between regions. The NSS sets out a national context for spatial planning which will inform regional planning guidelines and strategies, as well as county and city development plans and strategies.

The NSS stresses that in order to achieve balanced regional development it is essential to provide high quality transport infrastructure between the designated Gateways and Hubs. The Strategy states:

"To support balanced regional development, Ireland's transport networks must build on Ireland's radial transport system of main roads and all rail lines connecting Dublin to other regions, by developing an improved mesh or network of roads or public transport services".

The NSS designates the M1 Motorway as a "*Strategic Radial Corridor*" which provides vital links between Dublin, the Gateway city of Dundalk, Newry and the city of Belfast in Northern Ireland. The proposed northern motorway service area on the M1 would add to the overall quality of this motorway and assist in maintaining the viability and sustainability of this transport corridor and ensure compliance with EU Directives as discussed in **Chapter 2**.

7.3.3 Regional Planning Guidelines for the Border Region, 2004-2016

The Regional Planning Guidelines for the Border Region 2004 – 2016 seek to provide a robust sustainable planning framework for the Border Region within the context of the Planning and Development Act 2000 and the National Spatial Strategy 2002 – 2020. The Guidelines provide a long-term strategic planning framework for the development of the Border Region in the twelve-year period up to 2016 and within the National Spatial Strategy's vision for 2020, to be reviewed after six years.

The "vision" of the Guidelines will principally be achieved through a number of objectives including the *"provision of a high quality built and physical environment, with essential infrastructure including housing, transport, water services, schools, healthcare, retail, community and recreational facilities".*

The Guidelines recognise the M1 Motorway as a *"key transport linkage of national and international importance".* The Guidelines include the following objectives with regard to transportation:

- *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 County, 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.*

It is envisaged that the proposed development will meet these objectives by providing essential services to motorway users and thus improving the overall quality of the M1 Motorway.

7.3.4 Dublin Transportation Office: A Platform for Change, 2000-2016

The Dublin Transportation Office (DTO) Strategy is the planning framework for the future development of the transportation network in the GDA. The Strategy aims to address and provide a framework for a more integrated approach to transportation and land use in a way that is complementary to the land use strategy of the Regional Planning Guidelines for the Greater Dublin Area 2004 – 2016. The Strategy is an integrated process based on two interdependent elements;

- *Infrastructure and Service Improvements to increase the supply of transport, including a substantial expansion of the public transport network, some strategic road construction and traffic management*
- *Demand management to reduce the growth in travel though the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking).*

The Strategy sets out several objectives including to "*improve accessibility to and from the Greater Dublin Area*" and to "*optimise the usage of existing infrastructure facilities*".

The M1 Motorway is recognised by the DTO Strategy as a major transportation corridor, which provides vital links between Dublin and other large urban centres including Dundalk, Newry and Belfast. The proposed northern motorway area along this motorway would strengthen the existing road network by providing essential services to motorway users.

7.3.5 Retail Planning Guidelines, 2000 (update in 2005)

The Retail Planning Guidelines for Planning Authorities (RPG) were published in 2000 and came into effect in January 2001. They were subsequently updated in February 2005. The RPG outlines a number of strategic policy objectives, which seek to accommodate additional retail development in a way that is efficient, equitable and sustainable. The RPG provides a comprehensive framework for dealing with retail development proposals. Central to the RPG is the importance of the statutory development plan process, the role of the town centre and the need to adhere to sustainable land use and transportation policies. Service Areas are a new innovation in Ireland, which serve only a select niche market, the motorway user. Thus, this category is not covered by the Guidelines and therefore must be assessed on its requirements to meet national objectives with respect to road users and EU Directives. However, the proposed development has ensured the practices indicated in the RPG have been undertaken. In this regard the reference to petrol filling stations and associated retail units outlined in the RPG states:

"Petrol filling stations can provide a wide range of retail goods in an associated shop. In rural areas, some function as the local shop or small supermarket. Whilst the important role of such provision is recognised, such shops should, in general, remain secondary to the use as a petrol filling station".

The RPG recommend that larger retail units associated with petrol stations should be assessed in the same way as would an application for a retail development without petrol filling facilities in the same location. For larger retail units associated with petrol stations, the RPG state:

"Where retail space in excess of 100 square metres of net retail sales area associated with petrol filling facilities is sought the sequential approach to retail development will apply".

As noted previously, the RPG's do not provide a definition of a motorway service area which is distinct from a Petrol Filling Station. Notwithstanding this it is considered that a Petrol Filling Station is generally located on the way out of a town rather than on a motorway. For the purposes of this EIS, and to ensure rigorous assessment the sequential approach to site selection for the retail element of the proposed M1 North Motorway Service Area has been adopted in this instance. This is discussed in greater detail in **Chapter 8** of this EIS.

The RPG's recommend that attention should be given to the following issues when dealing with applications for petrol stations with retail developments over 100sqm:

- *The potential disruption and queuing for those wishing to use the petrol pumps caused by large numbers of parked cars in station forecourts.*
- *Safety aspects of circulation and parking within the station forecourt.*
- *The additional custom, which can lead to additional car borne trips.*

Notwithstanding the fact that the proposed development is for a motorway service area as opposed to a Petrol Filling Station, the above design elements have been incorporated into the design of the proposed facility. The proposed M1 North Motorway Service Area is intended to provide a range of facilities for M1 road users (particularly long distance drivers) who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. The proposed design of the service areas as described in **Chapter 3** of this EIS, has evolved from the need to ensure the highest safety standards for circulation and parking within the station forecourt. In this regard the heavy commercial vehicles and the light passenger vehicles are segregated by the proposed internal road network and parking areas in order to minimise conflict between vehicles and pedestrians. Adequate parking facilities will be provided away from the forecourt area in order to remove potential disruption and queuing of customers wishing to use the petrol pumps. The number of parking spaces provided has been calculated in accordance with the National Roads Authority standards.

The proposed development on the M1 Motorway would provide an essential convenience-based retail unit and food service for motorway users. As recommended by the RPG, the retail unit proposed in this subject development will remain secondary to the use of this development as a petrol filling station.

Given the scale of this transport corridor, a retail unit in excess of 100 sq.m. can be justified to meet the increased demand found along such a major national route (Dublin to Dundalk c.85 km, Dublin to Newry c.180 km and Dublin to Belfast c.169 km). As the proposed retail unit is in excess of 100sqm, the sequential approach has been adopted. This is discussed in greater detail in **Chapter 8 and Volume 3, Appendix A of this EIS.**

7.4 STATUTORY PLANNING CONTEXT

The proposed location for the M1 North Motorway Service Area is within the administrative area of Louth County Council. The current statutory Development Plan for the subject lands is the Louth County Development Plan 2003 – 2009. This Section of the EIS examines and provides an assessment of various relevant objectives contained within the statutory plan.

7.4.1 Louth County Development Plan 2003 – 2009

A variation of the Louth County Development Plan 2003 – 2009 was adopted in July 2006. The Plan seeks to provide an overall strategy for the sustainable development of the County over this six year period and to provide a framework for the control and regulation of development and use of land.

The proposed development is on unzoned agricultural land adjacent to the existing M1 Motorway, which is recognised in the Plan as a key transportation corridor. The plan states that when the M1/EO1 Euro-route motorway is completed, *"it will strategically link the key ports and airports of Larne, Belfast, Dublin and Rosslare"*. The quality and vitality of this route is therefore of great importance. As noted above the M1 Motorway was completed in 2007.

Section 8.12 of the Plan states that when assessing service station proposals, the following factors shall be taken into consideration:

- Effect on amenities of other adjoining uses, particularly residential;
- Impact on built form and townscape;
- Quality of design, layout and materials used; and
- Compliance with the requirements of Dangerous Substances regulations (1979).

These factors are all considered in this report and will be discussed in greater detail in their appropriate chapters.

According to Section 8.12 of Louth County Development Plan *"it is the policy of the planning authority that generally all new service stations, **with the exception of motorway related services** be located at the edge of towns and villages within speed limit areas"*. As the current proposal is a motorway related service, the proposed location is in accordance with the stated policy.

With regard to motorway related service stations, the Plan states that *"an application for a motorway service station shall include proposals for advertisements, materials to be used in hard surface areas and boundaries, landscaping and screening, picnic area, toilets, restaurant facility"*. This information is included in the subject planning application and in the project description in **Chapter 3** of this EIS.

Louth County Development Plan also states in Section 8.12 that *"direct access onto the motorway will not be permitted"*. **Chapter 3** provides details of the proposed entrance / exit provisions to the motorway service area which includes slip lanes in accordance with the relevant design guidelines for a motorway type road.

7.4.2 Retail Strategy for County Louth

As required under the provision of the Retail Planning Guidelines 2000, a Retail Strategy for County Louth is included in the Louth County Development Plan 2003 - 2009. The strategic objectives of this Retail Strategy are as follows:

- *To protect and enhance the role of all towns and villages within the county as the primary location for retailing activity with particular emphasis on maintaining the vitality and viability of town and village centres.*
- *To protect the role of Dundalk, Drogheda and Ardee as the principal shopping towns in the county and to promote their roles as important county and regional retailing centres*
- *To protect and enhance the vitality and viability of small towns and villages and maintain their role as local shopping and service centres*
- *To ensure that adequate provision is made in new residential areas to meet the day to day shopping and service needs of residents.*

Section 7.7.4 of the Plan states that it is the policy of the Council *"to limit the net sales on the forecourt of petrol filling stations to 100sqm"*. However, as the proposed development is a *"Motorway Service Area"* it shall (according to Section 8.13 of the Development Plan) be considered on its individual merits. It should therefore be noted that the proposed development will have a large population catchment due to its direct relationship with the M1 Motorway which will justify its approximately 250sqm net retail area.

The Plan also states that it is a policy of the Council *"to carry out health checks to monitor the vitality and viability of town centres and require that all applications for major retail development be accompanied by an assessment of the likely impact of the development on the existing town centre"*. Such a health check was carried out for the proposed development in June 2007 and is included in **Chapter 8**.

7.5 IMPACTS

7.5.1 Strategic Planning Context

The proposed M1 North Motorway Service Area will operate along an established transportation corridor (M1 Motorway). The delivery and operation of the M1 North Motorway Service Area is anticipated to have significant positive impact on the strategic policies and objectives for the national road network and the economic development of both the county and the country, particularly given the M1's designation as a major inter-urban link.

7.5.2 Statutory Planning Context

The delivery and operation of the M1 North Motorway Service Area is anticipated to have significant positive impact on the statutory development plan policies and objectives for the national road network and the economic development of the county.

It is not anticipated that the M1 North Motorway Service Area would significantly alter the current land use structure within the surrounding environs. Rather it is likely that an effective continuation of rural activities such as agriculture will prevail.

The proposed M1 North Motorway Service Area will operate along an established transportation corridor (M1 Motorway). Notwithstanding the fact that the proposed development will introduce a new activity into this area, it will not create any additional traffic in the area. It is envisaged that the existing and future users of the M1 Motorway will constitute the prospective customers of the M1 North Motorway Service Area. In this regard, it is anticipated that the overall structure of land uses adjoining the proposed development will continue along a similar line to the present.

7.6 MITIGATION MEASURES

- The retail unit proposed in this subject development will remain secondary to the use of this development as a fuel filling station. It is intended to maintain a range of goods and services to cater solely for the needs of motorway users.
- Ensure character of the area is maintained by ongoing maintenance and monitoring of the proposed motorway service area.

7.7 CONSTRUCTION IMPACTS & MITIGATION MEASURES

The construction phase of the M1 North Motorway Service Area is not anticipated to have any material impact on the relevant strategic policies and objectives on transportation, land use etc. No mitigation measures are required for the construction phase.

7.8 RESIDUAL IMPACTS

No likely or significant impact is predicted in terms of strategic planning context.

On operation, in relation to the statutory planning context, the M1 North Motorway Service Area is predicted to have a significant positive impact on development plan policy as it relates to the national road network and supporting infrastructure for the Dublin-Belfast Economic Corridor. The M1 North Motorway Service Area works are predicted to consolidate established land use structure along the M1 Motorway within the Louth County Council area, rather than provide any significant change in direction for the land use structure.

8 SOCIO-ECONOMIC

8.1 INTRODUCTION

Human beings comprise the most important element of the environment; therefore any potential impact on the status of human beings by the proposed M1 North Motorway Service Area must be comprehensively addressed. The principal concern in this respect is that human beings experience no significant unacceptable diminution in an aspect, or aspects of 'quality of life' as a consequence of the construction and operation of the proposed development.

This section of the EIS comprises a socio-economic study of the population in the general vicinity of the proposed development. The purpose of the assessment is to estimate any likely and significant impact on the location, size and profile of the populations to be served by the M1 North Motorway Service Area. Relevant components of *"Human Beings"* in this Section of the EIS include Demography, Employment and Local Communities (including retail issues).

8.2 METHODOLOGY

8.2.1 Demography and Employment

8.2.1.1 Population

Demographic trends were analysed at state, county and local levels for the purposes of this EIS. The most recent census of population taken by the Central Statistics Office (CSO) was taken in 2006. The smallest geographical units identified by the CSO are Electoral Divisions (previously called District Electoral Divisions or Wards). A local area catchment was defined by selecting and aggregating Electoral Divisions (EDs) in which the designated M1 North Motorway Service Area is located.

An examination was made of the key demographic characteristics of the population within each catchment area, including population structure, age profile and household size. The combined population statistics for each of these EDs has been used to give an indication of population trends within the local area. Figures are based on 2002 and 2006 Census Data. In utilising census data for these EDs total populations for entire EDs within the local catchment area are utilised, even if only part of the ED falls within the defined radius. This is because no smaller breakdown of data is available. In any case, it reflects the likely overlap of patronage attraction at and around the edge of M1 North Motorway Service Area catchment.

8.2.1.2 Employment

The Census of Population 2002 and 2006, and the Quarterly National Household Survey were both used to measure the levels of employment and unemployment. The unemployment rate, as a percentage of the labour force, was calculated by adding the numbers of persons classified as unemployed to the number of first time job seekers. This figure was then added to the numbers of people at work to obtain the total labour force. The unemployment rate was then obtained by dividing the total numbers of persons unemployed by the total labour force.

The Live Register was not used because it is not designed to measure unemployment. It includes part-time workers (those who work up to three days a week), seasonal and casual workers entitled to

Unemployment Assistance or Benefit. Unemployment is best measured by the Quarterly National Household Survey (QNHS). The results of the QNHS provide the basis for the series of quarterly labour force estimates. Identical questions were used for both the Census of 2002, 2006 and the QNHS. Unemployment as a percentage of the labour force was used in tandem with the QNHS, which is based on a sample of the population. It was necessary to use unemployment calculated as a percentage of the labour force In order to gain information at ED and County level, information that the QNHS is not able to disseminate.

8.2.1.3 Sectoral composition of employment

The Census of Population, determines social class by the nature of employment, and provides a guide to the principal types of occupation in which the population is employed or in which the population is capable of being employed. Further details on population employment classifications can be found in **Volume 3, Appendix A.**

8.2.1.4 Criteria for rating of impacts

The impact on *Demography and Employment* was considered at a strategic level, in conjunction with other trends, using various socio-economic indicators. As such, the following system was adopted for the rating of demographic and employment impacts:

- *Profound impact*: Where the socio-economic character of a population would be acutely altered.
- *Significant impact*: Where the demographic structure of a population is fundamentally altered as a direct result of the M1 North Motorway Service Area. An example of this would be where one or more categories of population living or working in an area (e.g. young persons seeking first homes, middle sized family units, office workers) move into the area to live/work, or depart from there.
- *Moderate impact*: Where the demographic structure of an area is noticeably altered as a result of the M1 North Motorway Service Area. For example, where the workforce and number of households are predicted to be added to / taken from the current populations but without fundamental changes in demographic profile.
- *Slight impact*: Where any alteration to the demographic breakdown is incidental and no meaningful alteration to population and employment profiles is readily identifiable.

8.2.2 Community Aspects

Community issues addressed in this section include issues of severance and mobility. Severance can be defined as the sum of the divisive effects that a development project may impose on a community in terms of access to and movement between locations such as residences, workplaces, commercial / retail areas, schools, community facilities etc. Thus, using its widest definition, it is the impact that a development can have on the accessibility and mobility of the resident, working and visiting communities.

Severance may be experienced by pedestrians, cyclists and by those travelling in vehicles (particularly access and delivery traffic). It relates to the ability to move at, around and through the area where the motorway service area is proposed.

In deciding on a framework within which broad measurement of community severance can be undertaken, the most relevant way of looking at interrelationships that produce community movement is to categorise severance impacts to this movement by the type of users affected. Consideration was given to the motorway service area location, adjoining land uses, access nodes and general movements. Whilst assessing and rating the significance of severance, regard was also taken of the number of people who would be impacted upon; the presence of particularly vulnerable groups such as children, the aged or the disabled, among those likely to be impacted; the duration of impact (particular relevance during construction).

The methodology incorporated a visual survey of the proposed development location to establish typical patterns of movement in the various areas. This enabled an appraisal as to whether the M1 North Motorway Service Area would result in severance in a particular area, the extent of any such severance and, whether the change from the existing circumstance would be positive or negative in nature.

8.2.2.1 Criteria for rating of impacts

The following system for rating community severance during both construction and operation has been adopted.

- *Significant impact*: Where people are likely to be deterred from/encouraged into making trips to an extent that is sufficient to induce a re-organisation of their normal day-to-day habits. This would lead to a change in the location of centres of activity or in some cases to a permanent loss/addition to a particular community.
- *Moderate impact*: Where people are likely to be dissuaded from/encouraged into making some trips (e.g. trips are made longer or less attractive). A re-organisation of habits, but clearly understood to be temporary.
- *Slight impact*: The current journey pattern is likely to be maintained, but with some change.

8.2.3 Retail Assessment

The Retail Planning Guidelines for Planning Authorities (RPG) were published in 2000 and came into effect in January 2001. They were subsequently updated on the 1st February 2005. The RPG outlines a number of strategic policy objectives, which seek to accommodate additional retail development in a way that is efficient, equitable and sustainable (refer to **Chapter 7 of** this EIS). The RPG provides a comprehensive framework for dealing with retail development proposals. Central to the RPG is the importance of the statutory development plan process, the role of the town centre and the need to adhere to sustainable land use and transportation principles.

With regard to the location of new retail development, the RPG advocates the sequential approach. This states that the preferred location for new retail development where practicable and viable, is within a town centre. Where it is not possible to provide the form and scale of development that is required on a site within the town centre then consideration can be given to a site on the edge of the town centre so as to encourage the possibility of one journey serving several purposes. Paragraph 59 of the Guidelines state:

> *"Having assessed the size, availability, accessibility and feasibility of developing both sites and premises, firstly within a town centre and secondly on the edge of a town centre, alternative out of centre sites should be considered only where it can be demonstrated that there are no town centre or edge of town centre sites which are suitable, viable and available. This is commonly known as the sequential approach to the location of retail development."*

This retail assessment considers the impact of the retail element of the proposed development in the context of relevant retail planning policy and provides an assessment of the vitality and viability of the existing town. With regard to vitality and viability the RPG outlines that in order for town centres to achieve their full potential and to improve as retail destinations, it is appropriate for planning authorities to take a pro-active role in enhancing the vitality and viability of their centre(s). The concept of vitality and viability is central to sustaining and enhancing town centres. The RPG defines these terms as follows:

> *"Vitality is a measure of how active and buoyant a centre is, whilst viability refers to the commercial well-being of a town. In combination, they highlight the relative strength and success in the retail hierarchy. This will depend on many factors, including the range and quality of activities in a centre, its mix of uses, its accessibility to people living and working in the area and its general amenity, appearance and safety."*

A retail health check of all commercial/retail units within a 15-minute off peak drive time from the proposed development was carried out in June 2007. The study assessed every settlement within this catchment based on the criteria set out in Annex 2 of the Retail Planning Guidelines 2000.

The RPG includes the following as the most appropriate health check indicators:

- Diversity of uses and attractions;
- Vacant street level property;
- Accessibility and parking; and
- Environmental quality and amenity.

8.2.3.1 Criteria for Rating of Impacts

The following system for rating the impact on exiting town centres during both construction and operation has been adopted.

- *Significant impact:* Where people are likely to be encouraged into changing their retail habits to an extent that is sufficient to induce a re-organisation of their normal day to day habits. This would lead to a change in retail patterns or in some cases to a permanent loss of retail sales to a particular town centre.
- *Moderate impact:* Where people are likely to be encouraged into making some trips and availing of the new convenience facilities. A re-organisation of habits, but clearly understood to be temporary.
- *Slight impact:* The current retail pattern is likely to be maintained, but with some change.

8.3 EXISTING ENVIRONMENT

8.3.1 Demographics

The proposed development is located within the Electoral Division of Dromiskin. Census data for this Electoral Division has been used to identify trends with respect to the population in the immediate vicinity of the proposed development.

For the purposes of this assessment, the figures for County level relate to Louth while local level has been defined as those Electoral Divisions, which are located immediately adjacent to the Electoral Division of Dromiskin. These adjacent Electoral Divisions are as follows:

- Haggardstown;
- Drummullagh;
- Mansfieldtown;
- Stabannan; and
- Castlebellingham.

8.3.1.1 Population

Table 8.1 below summarises population trends within the catchment population of the proposed development between 2002 and 2006. For the purpose of comparison, population change within the State and Louth are also given.

Table 8.1: Total Population 2002 - 2006

Area	2002	2006	Change in Population 2002-2006 (%)
Dromiskin ED	949	992	4.5
Local	2,952	3,258	9.4
County	101,821	111,267	9.3
State	3,917,203	4,239,848	8.2

Source: Census of Population 2002, 2006

The population of the State increased by 8.2% between 2002 and 2006, while for the corresponding period for Louth recorded a higher increase of 9.3%. The local area recorded an increase of 9.4%, while Dromiskin ED experienced a lower growth of 4.5% between 2002 and 2006.

8.3.1.2 Age Profile

Table 8.2 below contains information on population according to age group for Louth and for the State for 2006. Louth's population is generally younger than that of the State with 36.6% of Louth's population 25 years of age or less in 2006 compared to the corresponding figure for the State of 35.3%. The proportion of people aged 65 or older accounted for 10.4% of Louth's population while the corresponding figure for the State was slightly higher at 11%. These statistics show that Louth had a younger population than that of the State in 2006. Those persons outside the working age cohort (15-65) accounted for 32.5% of Louth's population in 2006 while the corresponding figure for the State was lower at 31.4%.

Table 8.2: 2006 Population Classified by Age Profile

Age Group (Years)	Louth (persons)	%	State (persons)	%
0-14	24,568	22.1	864,449	20.4
15-24	16,092	14.5	632,732	14.9
25-44	35,570	32.0	1,345,873	31.8
45-64	23,432	21.0	928,868	21.9
65+	11,605	10.4	467,926	11.0
Total	**111,267**	**100**	**4,239,848**	**100**

Source: Census of Population 2002

8.3.1.3 Household Size

The results of the 2006 Census of Population indicate that the average number of persons per private household in Ireland is decreasing over time. Between 1996 and 2002 the average number of persons per private household in the State decreased from 3.14 to 2.94. Between 2002 and 2006, the number decreased from 2.94 to 2.82. The number of persons per private household in Louth showed a similar decrease over this period with the number decreasing from 2.99 to 2.83.

The number of private households in Louth in 2002 was 33,495. By 2006, this grew to 38,703 - representing a 15.5% increase. The corresponding percentage change over this period for the State was slightly lower at 14.1%.

8.3.2 Employment

Census of Population and Quarterly National Household Survey data indicate a general growth in employment in the study area. This data indicates a general growth in employment in the study area. The rate of unemployment in areas with higher populations was generally lower than that of lesser-populated areas. A similar geographical split is shown between rural and urban areas where the majority of population in rural areas were engaged in skilled, semi skilled and unskilled manual labour whereas in urban areas the majority were engaged in professional and non-manual occupations. Recent population increases in these urban areas may account for decline in unemployment and the increase in professional occupations. The proposed development is located within the Electoral Division of Dromiskin which experienced increases in the level of employment in the area, the data for this area indicated positive changes. For the purposes of this assessment, the figures for county level relate to Louth while local level has been defined as those Electoral Divisions, which are located immediately adjacent to the Electoral Division of Dromiskin as detailed in previous sections. Further information on employment can be found in **Volume 3, Appendix A.**

8.3.3 Community Issues

There are three principal elements to the community within the study area. These can be considered as:

- The Resident community;
- The Working community; and
- The Visiting community.

8.3.3.1 The Resident Community

The subject land consists of a green field site, which is currently in agricultural use. The local residential community consists mainly of one-off housing and has strong links with the agricultural usage of the surrounding area. The nearest village, Dromiskin, boasts several old and new residential dwellings which range from one-off houses on the outskirts of the village, to ribbon development on the road approaches, to housing estates of varying design and densities.

8.3.3.2 The Working Community

Local employment areas include the nearby towns and villages of Dromiskin, Castlebellingham and Blackrock. There are also several businesses located along the R132 (old N1) although these are relatively small businesses such as restaurant/bars or convenience-based retail units. There are a number of community and educational establishments in Dromiskin.

8.3.3.3 The Visiting Community

The M1 Motorway currently carries a significant number of visitors passing through the catchment area to other destinations both countrywide and nationwide. The visiting community comprises M1 motorists and people visiting the adjacent ED's.

Dromiskin historic remains would draw a small number of visitors to the town. For many years, Dromiskin was home to a monastery where a round tower was built and still remains. The top of the tower offers views of Dundalk bay and the surrounding countryside. The town was also home to the Archbishops of Armagh for some time.

Castlebellingham would draw a number of visitors in relation to its medieval remains. The castle of Castlebellingham was built in 1660 and has a rich history through fires and wars. The castle is currently used as a hotel. Castlebellingham is also home to a brewery, which was built in 1770 and now houses Smallwares Ltd. (also known as "the button factory").

The seaside town of Blackrock with its broad beach would also draw a number of visitors, albeit more so in the summer months. The beach and its promenade is the focal point of the town and offers views over Dundalk Bay toward the Cooley Mountains. As the beach has a small gradient, the sea retreats about 5km at low tide and provides an ideal habitat for a variety of birds. When exposed, the seabed is also a popular venue for sail-boarding and kite-surfing.

8.3.3.4 Vehicle Flow

A technical appraisal of traffic is set out in **Chapter 9** of this EIS. However, from the viewpoint of community severance the following is pertinent. The M1 Motorway is recognised by the NDP as a 'major inter-urban link'. The main routes of through traffic are from Dublin to Drogheda, Dundalk, Newry and Belfast.

8.3.3.5 Public Transport

The surrounding area of the proposed M1 North Motorway Service Area is served predominantly by bus. Bus Éireann and other private bus operators provide regular services from Dublin to Belfast and vice versa along the M1 corridor in close proximity to the proposed development.

Motorways are roads that help reduce journey times by separating traffic and removing road junctions. However, Section 11 of the rules of the road restricts both pedestrians and cyclists from using motorways. There are no cycling or pedestrian facilities available within the vicinity of the proposed M1 North Motorway Service Area.

The proposed development is approximately 10km from Dundalk railway station and approximately 24km from Drogheda railway station. These stations have regular services to and from Dublin City Centre and all major towns including Belfast. Between Dunleer and Dundalk, the railway line runs parallel to the M1 (between 5 and 40m to the east of the road).

8.3.4 Retail

The RPG suggest that *"development plans should provide an indication of the general scale and form of retail development that is required in the future and this will constitute the context for making decisions on planning applications."* With regard to Petrol Filling Stations that:

> *"where retail space in excess of 100 square metres of net retail sales area associated with petrol filling facilities is ought the sequential approach to retail development will apply....".*

The proposed development comprises a motorway service area with a net retail sales area of approx. 250sqm and although different from a Petrol Filling Station a "Retail Health Check" (an assessment of the vitality and viability) of existing towns and villages within a 10km radius/15 minute off peak drive time was carried out for the proposed motorway service area in June 2007 refer to **Figure 8.1**. The towns/villages included in the "Retail Health Check" are as follows:

- Dromiskin;
- Castlebellingham;
- Blackrock;
- Dunleer;
- Kilsaran;
- Knockbridge;
- Monasterboice; and
- Sporadically Located Units.

8.3.5 Retail Health Check

Full details of the Retail Health Check can be found in **Volume 3, Appendix A**.

8.3.5.1 Dromiskin

Dromiskin is located approximately 10km to the south of Dundalk town centre in County Louth and is approximately 3km north, north west of Castlebellingham. The village is located 1km to the east of the M1 Motorway that runs from Dublin to Belfast. The nearest M1 interchange to Dromiskin is located to the west of Castlebellingham where the R166Regional Road intersects the motorway (Drumleck

Bridge). The R132 Regional Road from Castlebellingham to Blackrock is just over 1km to the east of Dromiskin and follows the coast which is a further 0.5km to the east.

It is evident that the relatively small population of Dromiskin must travel to larger urban centres to satisfy their wider convenience shopping needs. The village's total of 10 no. existing commercial/retail units consists of: 2 no. convenience stores; 2 no. restaurant/pubs; 2 no. take away restaurants; 1 no. hairdresser; 1 no. antique furniture shop; 1 no. flower shop; and 1 no. credit union. Planning permission is also being sought for the development of a commercial unit on the lands of an existing restaurant/pub and there is a large green field site in the centre of the village that has recently been sold.

The retail provision in Dromiskin may be limited due to its low population and close proximity to higher order centres such as Castlebellingham. Dromiskin's diversity of uses suggest that it plays a supporting role to the higher order centres in the area.

The proportion of vacant street level property is low (8%). Furthermore, there is evidence of some renewal and redevelopment, which indicates that the village is economically active. A new commercial unit is proposed as part of renovation to an existing restaurant/pub.

The M1 Motorway provides access to the general area whilst preventing potential congestion caused by through traffic. The motorway can be exited at Drumleck Bridge which is located approximately 3km south of the village. From here, the R166 and R132 Regional Roads and several local roads can be used to access Dromiskin. The two local roads that cross in the centre of the village are small, but are of good quality. Due to the rural location of Dromiskin, the levels of traffic in the village are relatively light.

As traffic levels are low, informal on-street parking is generally accepted.

Dromiskin is generally an attractive village with a prominent round tower located to the east of the main cross roads that contributes to the village's historical and cultural amenity. Its proximity to higher order urban centres (including Dundalk) and to the sea, makes this village a practical and attractive place to live.

8.3.5.2 Castlebellingham

Castlebellingham is located approximately 12km to the south of Dundalk town centre in County Louth. The village is located 2km to the east of the M1 Motorway and approximately 3km to the south of Dromiskin. The village has developed around the intersection of the R166 and R132 Regional Roads which is located approximately 1.5km to the west of the coast.

The diversity of uses found in Castlebellingham are relatively high. Of a total of 34 no. units there are 14 no. Commercial units that are either under construction/renovation, for sale/to let or pending planning permission. This suggests that the village is growing and has a strong local economy. There are 5 no. units which can be either classified as restaurants, pubs, cafes, or bakeries. In addition to this, the 'Bellingham Castle Hotel' provides another restaurant and bar. The village also has 2 no. hairdressers, 2 no. bookmakers, 1 no. insurance company, 1 no. estate agents, 1 no. take away, 1 no. convenience store, 1 no. butchers, 1 no. pharmacy, 1 no. off licence, 1 no. shop selling fireplaces, 1 no. plumbers' offices, and 1 no. shop servicing and supplying domestic gas.

12% of Castlebellingham's commercial/retail units can be classified as "vacant, for sale or under renovation". The majority of these units are either for sale or available to let. Very few are abandoned/vacant without any intention for renovation or sale etc.

In addition to these vacant units, there are 9 no. proposed commercial units which are currently seeking planning permission. If granted, these new shops will represent 22% of Castlebellingham's total commercial/retail units.

The M1 Motorway provides access to the general area whilst preventing potential congestion caused by through traffic. From the Drumleck Bridge exit, the R166 regional road leads into Castlebellingham. The regional and local roads which run through the village are generally of good quality. The R132 and R166 Regional Roads are the primary access roads to the village with the R132 making up the main retail street.

For some of the larger units, customer car parking is provided off-street, but the majority of parking takes place at kerbside in designated indented bays. Informal kerbside parking is also generally accepted as traffic levels are modest.

Castlebellingham is a pleasant and active village. There are several attractions including the 'Bellingham Castle Hotel' and 'The Malthouse' - a recently renovated building that was first built in 1866. 'The Malthouse' provides 4 no. commercial units in a unique setting that respects the village's historical context. Natural amenities for Castlebellingham include the nearby River Glyde and, of course, the sea which is less than 2km to the east.

8.3.5.3 Kilsaran

Kilsaran is located approximately 1km to the south of Castlebellingham along the R132 Regional Road.

There are 4 no. commercial/retail units located in Kilsaran which include 1 no. convenience store, 1 no. restaurant/bar, 1 no. credit union and 1 no. vacant unit. Due to its close proximity to Castlebellingham and its low amount and diversity of uses, it is evident that this village is dependant on Castlebellingham for the majority of its convenience and comparison shopping needs. Kilsaran therefore plays a supportive role to Castlebellingham and other nearby urban centres.

The is 1 no. vacant unit in Kilsaran. There is no current planning applications for the building or the site and there are also no signs of renovation/renewal.

Kilsaran is located along the R132 Regional Road which serves as the village's primary access road. This road runs parallel to the M1 Motorway and is intersected by 2 no. local roads – one which leads to Annagasan (located on the east coast) and the other which leads to Stabannan (to the west of the M1 Motorway). Off-street car parking is provided outside 'Bell's Newsagents', 'Kilsaran Credit Union', and the 'Crowing Cock Inn'. Some formal on-street car parking is provided in indented bays, but kerbside parking is generally accepted.

8.3.5.4 Blackrock

Blackrock is located on the east coast approximately 4.6km to the south of Dundalk town centre. The village is just over 7km to the east of the M1 Motorway and is approximately 5.5km to the north of Dromiskin. Blackrock is served by the R172 Regional Road that runs through the centre of the village where the majority of the commercial/retail units are located. The R132 Regional Road runs parallel to this, along the west side of the village where an additional 4 no. units are located.

Blackrock has a rich diversity of uses. Twenty-three percent of the commercial/retail units are restaurant/bars or cafés and 15% are convenience stores or supermarkets. A total of 18% of these units are either vacant, for sale, or under renovation. Although the village has a large range of unit

types to offer, its proximity to Dundalk allows Blackrock to play a supporting role to this larger urban centre.

There are 8 no. units which are either vacant, for sale, or under renovation. Only 1 no. of these units appears to be completely abandoned /vacant – it is envisaged that the rest should all be in use within a few years. These 8 no. units represent 18% of Blackrock's total commercial/retail units and suggest that the village is changing in response to an active and healthy economy.

Blackrock is located along the R172 Regional Road which serves the majority of the retail units in the village. This road continues north towards Dundalk where 3 no. commercial units are served along the way ('Family Value' convenience store, 'The Violet Bar and Lounge' and a vacant warehouse with petrol pumps). These roads are of good quality and are well maintained. The M1 Motorway and several national roads which serve Dundalk all add to the high level of accessibility that Blackrock has.

The R132 Regional Road runs parallel to this and serves as the access road to 4 no. units including the 'Felda Health and Fitness Spa', an 'Esso' petrol station served by a convenience store ('Mace'), the 'Fairways Hotel' and another convenience store ('Kelly's Gala'). The primary car parking for all units in Blackrock village is located along the east side of the R172 Regional Road in indented bays. Some of the larger units provide off-street car parking on their individual sites – including the 4 no. units located on the R132 Regional Road.

Blackrock is a quaint and attractive village that is clean. The village has a very pleasant setting. Its seaside location and proximity to the Dundalk makes it an ideal place to live or visit.

8.3.5.5 Dunleer

Dunleer is located approximately 7.5km to the south of Castlebellingham and 1km to the east of the M1 Motorway at the junction of the R132 and R170 Regional Roads. The village is approximately 9km from the east coast and 11km from Clogherhead.

The diversity of uses in Dunleer is quite high. Although 19% of the total commercial/retail units are restaurant/bars or cafés, there are also several insurance companies, solicitors, and property agents (16% altogether) which generally require a higher critical mass of population to be economically viable. The village is fairly self-reliant in terms of convenience shopping but is dependant on larger urban centres for the majority of its comparison shopping needs.

There are 3 no. vacant properties in Dunleer. One is currently under renovation/construction and two are for sale/to let. There are no units that are completely abandoned/vacant– indicating that property is at a premium here and the village's economy is strong.
The M1 Motorway is located to the west of Dunleer and has an interchange with the R169 Regional Road to the south west of the village. The R169 Regional Road joins the R132 Regional Road which runs through the village. Dunleer can also be accessed by the R170 Regional Road which meet with the R132 Regional Road in the village centre. Formal car parking spaces are hard to find forcing most customers parking at the kerbside. There are very few designated on-street spaces and even less off-street spaces. Some of the larger units provide off-street car parking spaces on their sites, but these are few and far between.

The White River provides an attractive natural amenity to the north and the village's proximity to larger urban centres such as Ardee makes Dunleer an ideal place to live.

8.3.5.6 Knockbridge

Knockbridge is located approximately 7.5km to the south west of Dundalk and 8.2km to the east of Blackrock. The nearest M1 interchange is with the N52 and the N1 and is approximately 4km to the east. The R171 Regional Road runs through the town and is intersected by local roads which connect to the R178 Regional Road and N52 national road. The Fane River runs to the south west of the village.

There are 3 no. commercial/retail units in Knockbridge which include a petrol station, a convenience store, and a restaurant/bar with an off licence. There is also a small coffee and craft shop that is located on a local road which connects Knockbridge to the N52 National Road.

Knockbridge is located on the R171 Regional Road which runs parallel to the R178 Regional Road and N52 National Road. The N52 joins the M1 Motorway approximately 4km to the east of the town. The 3 no. units provide off-street parking in addition to a large surface car park located across from the church. The coffee shop located along the local road to the south east also provides off-street car parking.

8.3.5.7 Sporadically Located Units

There are a few individual commercial/retail units that are sporadically located throughout the area which include the following:

- 'P.S. Donegan's Bar/Lounge' is located just off the M1 Motorway at the interchange with the R132 Regional Road at Monasterboice. There are a few off-street car parking spaces provided on the site.
- Vacant Unit: A large vacant commercial unit which has recently been sold is located to the east of Dromiskin along the R132 Regional Road. There are a few off-street car parking spaces provided on the site.
- 'Statoil' Petrol Station and 'L.S. Doran's Bar/Lounge': A 'Statoil' petrol station and 'L.S. Doran's Bar/Lounge' are located along the R132 near the Drumcar turn off. Both have ample off-street car parking on site.

8.3.6 The Sequential Approach

As noted previously the proposed motorway service area is a completely different retail offer from a petrol filling station. However, the RPG recommend that larger retail units associated with petrol stations should be assessed similarly to an application for a retail development without petrol filing facilities in the same location. For larger retail units associated with petrol filling stations, the RPG state:

> *"Where retail space in excess of 100 square metres of net retail sales area associated with petrol filling stations is sought the sequential approach to retail development will apply."*

The sequential approach requires that locations are considered in the following order:

- *First locations in appropriate existing centres where suitable sites or building for conversion, and or likely to become, available within the development plan document period, taking account of an appropriate scale of development in relation to the role and function of the centre, then*

- *Edge of centre locations, with preference given to sites which are or will be well-connected to the centre; and then*
- *Out-of-town centres, with preference given to sites which are or will be well served by a choice of means of transport and which are close to the centre and have a high likelihood of forming links with the centre.*

Having regard to the above the preferred location for new retail development is within a Town Centre. Where this is not possible, due consideration must be given to a site on the edge of Town Centre, and then to an Out-of-Town centre location, so as to encourage the possibility of one journey serving several purposes.

Given the nature and function of a motorway service area, the lack of alternative sites available and having regard to the Sequential Test recommended in the RPG's, it is considered that the proposed development presents an ideal opportunity for the delivery and adequate provision of motorway service areas at appropriate locations in the county.

8.4 POTENTIAL IMPACTS

8.4.1 Demography & Employment

The delivery of a motorway service area at this location will constitute an asset for this area and will deliver significantly enhanced facilities for M1 Motorway road users, both local and national, who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. In terms of likely and significant impact on population and employment, it is more likely that the proposed development will catalyse employment levels as it secures an increased attractiveness to employers and employees alike. There will be no impact on the resident population or population change as the proposed motorway service area will not catalyse further resident population increases in the motorway service area catchments.

8.4.2 Community Aspects

8.4.2.1 Resident Population

The resident population who use the M1 Motorway will share in the beneficial impacts of the proposed development in terms of enhanced service facilities along the existing M1 Motorway. This is moderate and positive.

8.4.2.2 Working Population

The working population located in the local area will have access to good quality service facilities during their motorway journeys as a result of this project. In addition, the wider working community including long distance drivers will experience positive impacts during the operational phase of the proposed development. The physical insertion of the M1 North Motorway Service Area along the existing (already segregated) transport corridor, will not materially impact on the operating environment of this working community by reference to issues of severance.

8.4.2.3 Visiting Community

The visiting population will have access to good quality service facilities during their motorway journeys as a result of this proposal. Similar to the Working Population detailed above, the Visiting Community, generally comprising long distance drivers, will experience positive impacts during the operation phase of the proposed development. The proposed M1 North Motorway Service Area will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. In addition to the service facilities the current proposal includes inter alia a retail unit, restaurant and tourist information kiosk, which will provide information for visitors to the area.

8.4.3 Retail Aspects

The proposed development comprises a motorway service area with an ancillary net retail sales area of approximately 250sqm and other associated uses. Given that the proposed motorway service area is located on the motorway and aimed solely at motorway users it is not envisaged that the retail element will impact materially on surrounding commercial/retail development.

Each motorway service area will primarily provide fuel and service facilities with ancillary retail and restaurant uses to motorway users. The proposed development should not be considered as a convenience store similar to that located within a town centre. Given the location of the proposed development on the existing M1 Motorway it will not serve local retail needs but rather the needs of the long distance traveller.

The delivery of a motorway service area at this location will constitute an important national asset for this area and will deliver significantly enhanced facilities for M1 Motorway road users, both local and national, who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. As access by customers will be restricted from the motorway only, local custom will not be diverted to the facility. The proposed development should not be considered as a convenience store similar to that located within a town centre. Given the location of the proposed development on the existing M1 Motorway it will not serve local retail need. Therefore, the impact on local retail development within the surrounding environs will be slight.

8.5 MITIGATION MEASURES

The proposed development will not result in any adverse potential impacts on population, employment and community during operation. However, the following mitigation measures shall be implemented in order to have regard to the An Garda Siochana recommendations.

- CCTV cameras shall be installed and full time presence of security staff will be available during night time hours typically between 11pm and 6am.
- Proper management of facilities in line with requirements of the NRA as the Contracting Authority.

8.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

8.6.1 Impacts

8.6.1.1 Demography & Employment

It is anticipated that the construction phase of the subject development proposal, will have no material impact on the existing population and employment structure of the area.

The workforce required to construct the proposed M1 North Motorway Service Area will most likely travel from their existing places of residence outside the study area to the construction site, rather than temporarily reside in the area during the construction phase. The proposed construction works will entail a sizeable workforce. In this context it is reasonable to assume that members of the local labour force may have the opportunity to secure employment in these works.

8.6.1.2 Community Aspects

Resident Community

There will be no construction traffic, i.e. HCV traffic, permitted on adjacent regional and local roads. Construction traffic, i.e. HCV traffic, will only be permitted to access the proposed development from the M1 Motorway. The wider resident population of the study area may experience some inconvenience due to construction traffic movements and lane management on the M1 during construction. However, these impacts will be temporary in nature. . Further information on construction traffic impacts has been detailed in **Chapter 9.**

Working Community

There will be no construction traffic, i.e. HCV traffic, permitted on adjacent regional and local roads. Construction traffic, i.e. HCV traffic, will only be permitted to access the proposed development from the M1 Motorway. The working population in the local area is located predominantly in Castlebellingham and Dundalk. Users of the motorway may experience some inconvenience due to construction traffic movements and lane management on the M1 during construction; however, these impacts will be temporary in nature. Further information on construction traffic impacts is provided in **Chapter 9.**

Visiting Community

There will be no construction traffic, i.e. HCV traffic, permitted on adjacent regional and local roads. Construction traffic, i.e. HCV traffic, will only be permitted to access the proposed development from the M1 Motorway. The visiting community, i.e. motorway users, may experience some inconvenience due to construction traffic movements and lane management on the M1 during construction; however, these impacts will be temporary in nature. Further information on construction traffic impacts has been detailed in **Chapter 9.**

8.6.1.3 Vehicle Flows

Once construction of the access/slip roads to the proposed development at either side of the motorway is complete, minimal practical disruption to M1 Motorway traffic will occur although traffic management measures will need to remain in place.

There is no impact anticipated in terms of public transport and pedestrian / cyclist flows.

8.6.2 Mitigation Measures

The following mitigation measures have been proposed to minimise the impact during construction:

- The hours of operation of construction machinery on the proposed development shall comply with NRA requirements/guidelines and the mitigation measures listed in **Chapter 11** to limit any potential short-term noise impact on adjacent residential properties associated with the proposed works.
- The Concessionaire/Contractor shall develop and implement a *Construction Traffic Management Plan* in consultation with the Contracting Authority.
- The Concessionaire/Contractor shall develop and implement a *Construction Environmental Management Plan* in consultation with the Contracting Authority. This plan will include the provision of reasonable and safe facilities for all road users during the construction period.
- Advance warning shall be given of any necessary route diversions. Alternative routes/accesses will be clearly signed.
- Construction compounds will not be sited within 250m of residential locations.
- Suitable warning signs will be provided on all roads used by construction traffic to alert other drivers to the potential hazards and any appropriate temporary speed restrictions.

8.7 RESIDUAL IMPACTS

8.7.1 Demography & Employment

There will be a slight positive benefit in that proposed construction works will provide employment opportunities for both local residents as well as across the region and state. It is expected that the construction phase of the subject development proposal will likely have no significant impact on the population and employment profile of the study area.

The operation of the M1 North Motorway Service Area will provide a small number of new employment opportunities as a result of the new services. In particular the operation of the M1 North Motorway Service Area will contribute to the viability and sustainability of this key transport corridor by connecting communities, promoting employment and prosperity and enhancing the quality of life.

8.7.2 Community

8.7.2.1 Resident Population

The resident population using the M1 will share in the beneficial impacts of the proposed development in terms of enhanced service facilities along the existing M1 Motorway and the creation of long-term employment opportunities. This is a significant and positive long-term residual impact.

8.7.2.2 Working Population

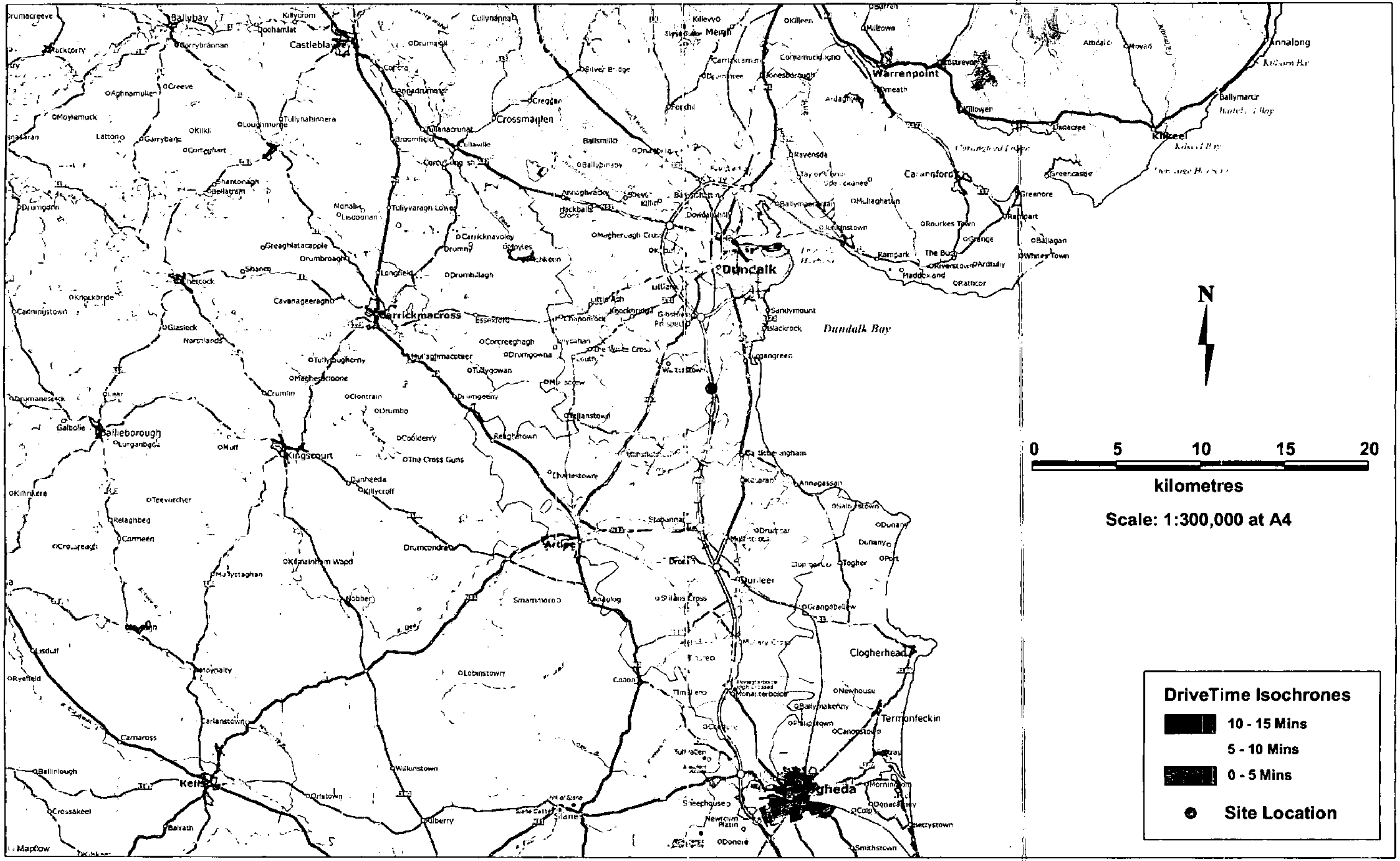
The long distance road users working population will have a high quality and readily accessible motorway service area as a result of this project. Existing employment locations predominantly to the east of the proposed development are some distance from the new motorway service area itself, and as a result are not likely to experience a benefit in association with the new services.

8.7.2.3 Visiting Population

The project will result in a positive long-term residual impact to users of the motorway due to the provision of high quality services along this nationally important transport corridor.

8.7.3 Retail Aspects

There will be no long-term residual impact on existing retail developments in the area.



Transport 21	NDP National Development Plan	NRA National Roads Authority	West consult RPS • ROUGHAN & O'DONOVAN CONSULTING ENGINEERS

Project Title: M1 NORTH MOTORWAY SERVICE AREAS

Drawing Title: OFF-PEAK DRIVE TIME ISOCHRONES

Designed	n/a	File Ref	P007133M0019A01	Status	n/a
Drawn	H Steenberg	Job No	P207133		
Checked	C Mogensen	Scale	1:300,000 @ A4	Figure No	8.1
Approved	C Hodgers	Date	13/12/2007	Rev	A01

9 TRAFFIC IMPACT

9.1 INTRODUCTION

RPS carried out a Traffic Impact Assessment (TIA) as part of the Environmental Impact Statement for the proposed motorway service area on the Dunleer to Dundalk section of the M1 Motorway. The proposed motorway service area, is located within the boundaries of Louth County Council approximately 3.0km to the north of the Drumleck interchange in a predominately rural area of south County Louth.

The main purpose of this assessment is to consider the traffic implications of the proposed development. This TIA assesses the impact of the proposed development on the local road network and deals with the traffic and highway considerations of the development proposals. This will include an assessment of the existing traffic conditions and of the future traffic conditions with and without the proposed development in place. In addition, mitigation measures are proposed in order to alleviate any significant negative impacts that may arise from the proposed development.

A full technical report is provided in **Volume 3 Appendix B.**

9.2 METHODOLOGY

9.2.1 Study Area

The traffic study area, shown in **Figure 3.1,** included the Dunleer to Dundalk section of the M1, two local roads (CR182 and CR185), which are located between both sites, the two internal roundabouts within the motorway service area and the two proposed priority junctions onto the CR182 and the CR185.

9.2.2 Assessment Criteria

This Traffic Impact Assessment looked at several criteria of the proposed development and associated construction techniques. The potential impact of the operational and construction phases of this development has been assessed with regard to the local road network in the study area. This assessment has included:

- **Comparable Site Surveys:** Traffic surveys were undertaken at appropriate developments on or near national primary routes to assess the percentage turnoff from the mainline traffic into these developments.
- **Registration Plate Surveys:** These surveys were undertaken at two M1 interchanges to assess the current levels of vehicles leaving the motorway to enter the local road network but returning within a one-hour period.
- **Link Flows Capacity Assessment:** An assessment was then carried out to measure the impact the development would have on the road network in the surrounding area and whether the road network has the capacity to cater for the traffic associated with the development.
- **Junction Capacity Assessment:** Junctions within the motorway service area were modelled and tested using PICADY (Priority Intersection Capacity and Delay Version 5), for priority junctions, and ARCADY (Assessment of Roundabout Capacity and Delay Version 6), for roundabout junctions, computer programmes for predicting capacities, queues and delay. These junctions

were tested to determine if there would any queuing and delay during the opening and design years.

- **Junction Accommodation of HCV movements:** The adequacy of the road network in the vicinity of the proposed development to cater for the associated HCV movements to and from the development were assessed using AutoTrack. AutoTrack analysis consists of a computer simulation of various vehicle movements at specific junctions.
- **Review of Guidelines & International Research:** A review of various guidelines and international research documentation on motorway service areas was undertaken.

9.2.3 Forecasting Methods

The road network within the study area for this project consists of a National Primary Road and Non National Roads. Using the NRA traffic growth factors (*NRA Future Traffic Forecasts 2002 – 2040, August 2003*) as provided in **Volume 3 Appendix B,** together with existing traffic flows, the future year scenarios were forecasted for all roads in the study network. This is deemed to be robust for the future year traffic assessment.

9.2.4 Comparable Sites

Motorway service areas on the road network are a new feature to Ireland. There is no published data available for developments like this in Ireland. In order to determine appropriate traffic parameters/assumptions for the proposed motorway service area, traffic surveys were carried out at several petrol stations and one road side restaurant. These are located on or near national primary routes across the country and deemed to be appropriate comparison locations. These locations listed **(Table 9.1)** as follows are shown in **Figures 9.1 (a-d).**

Table 9.1: Comparable Sites

Location	Description
Texaco Petrol Station located north of Castledermot (single carriageway, western side of N9)	This is located on the N9 is approximately 12.5km north of Castledermot. It has the following facilities available: ATM, two types of car wash, 8 car parking spaces, 4 HCV parking spaces, toilets, shop with deli and coffee dock, seating for 8 people, 8 petrol/diesel pumps and car cleaning area. Also located in the vicinity of the development are Lily O'Brian's Chocolate Shop, Garage, The Railway Store and The Crookstown Store but these do not share an entrance with the petrol station.
Apple Green Petrol Station located on the N7 (multi-lane carriageway, southern side of N7)	This is located on the N7 approximately 11km northeast of Naas Town. It has the following facilities available: ATM, car wash, 24 car parking spaces, toilets, shop with deli and coffee dock, seating for 5 people inside and 12 people outside and 14 petrol/diesel pumps. There is no HCV parking available within the station but it was noted, during a site visit, that trucks park in the lay by of the N7 in order to use the facility.
Esso Petrol Station located on the N7 (multi-lane carriageway, southern side of N7)	This is located on the N7 approximately 3km northeast of Naas Town. It has the following facilities available: ATM, car wash, 20 car parking spaces, 4 HCVs parking spaces, shop including 911 coffee dock serving sandwiches and pizzas, seating for 22 people and 10 petrol/diesel pumps.
Statoil Petrol Station located on the N7 (multi-lane carriageway, southern side of N7)	This is located on the N7 approximately 6km northeast of Naas Town. It has the following facilities available: 2 diesel pumps for HCVs, 16 standard petrol/diesel pumps, unsigned parking for approximately 10 HCVs and 20 cars and a shop including small coffee dock.
Top Petrol Station located on the N2 (single carriageway, eastern side of N2)	The Top Petrol Station is located on the N2 approximately 7km south of Castleblayney. It has the following facilities available: 8 petrol/diesel pumps, unsigned parking for approximately 10 HCVs and 20 cars and a shop including small coffee dock..
Mother Hubbard's	The Mother Hubbard's Restaurant is located on the R148 (old N4) approximately

Location	Description
Restaurant located on the R148 (single carriageway, southern side of R148)	8.5km west of Enfield. There are two restaurants in this development although one is currently closed and is to let. The restaurant that is operating on the site has seating for approximately 60 people and is opened throughout the day. The parking available at the site is extensive with approximately 94 car parking spaces or 20 HCV parking spaces. There was also a sign for a barbershop in the development but it was not opened during the site visit and could not be confirmed whether it is still operating here.

The surveys undertaken at each of these sites included a 7 day automatic traffic count (ATC) on the main routes adjacent to the sites and AM, PM and off peak surveys of the inward movements to each of the comparable locations. This data was assessed to give the percentage inward movements from the main route and the percentage of HCVs turning in. Further information on the assumptions and analysis is provided later in this chapter.

9.2.5 Registration Plate Traffic Surveys

To determine the current traffic patterns on the M1, registration plate traffic surveys were carried out at two interchanges on the M1. These interchanges are located near towns in which people could avail of services similar to that in the motorway service area. These locations listed as follows are shown in **Figure 9.2.**

- Hammondstown located approximately 1.5km to the southwest of Dunleer; and
- Drumleck located approximately 2km to the west of Castlebellingham.

The surveys undertaken at each of these sites included a 12 hour registration plate survey on the off and on ramps to the motorway. This data was assessed to give the percentage of the vehicles turnoff the motorway but returning within a one-hour period.

9.2.6 Scenarios Tested

The following summarises each scenario tested:-

- ***Do Nothing 2009*** (i.e. without the motorway service area in place). This includes the 2007 traffic flows factored to 2009 using the NRA growth rates.

- ***Do Something 2009*** (i.e. with the motorway service area in place). This includes the 2007 traffic flows factored to 2009 using the NRA growth rates and the traffic associated with the motorway service area

- ***Do Nothing 2024*** (i.e. without the motorway service area in place). This includes the 2007 traffic flows factored to 2024 using the NRA growth rates

- ***Do Something 2024*** (i.e. with the motorway service area in place). This includes the 2007 traffic flows factored to 2024 using the NRA growth and the traffic associated with the motorway service area.

9.2.7 Existing Research Documentation

A review of policy documents from both Ireland and the UK was undertaken by West Consult to identify the key policy objectives, which informed our assessment of an appropriate level of patronage for the proposed motorway service area. The following is an overview of key documentation examined. Note that further detailed information on the documentation is provided in **Volume 3 Appendix B.**

9.2.7.1 Transport Research Laboratory (TRL) document 'Turning flows at Motorway Service Areas', 2000

TRL undertook a major research project for the Highways Agency entitled 'Motorway junction layout to increase capacity and safety at low cost'. As part of this project TRL were requested to look at the factors affecting turning flows at motorway service areas in the United Kingdom.

9.2.7.2 NRA Policy Statement on the Provision of Service Areas on Motorways and High Quality Dual Carriageways

Given the development of motorway and high quality dual carriageway road network in Ireland, the need for resting facilities, i.e. availability of fuel, toilet and food facilities, has been identified. The NRA put forward the above policy document, which outlines the provision of Motorway Service Areas to cater for users on national roads in Ireland. This takes into account the extensive improvements made and future works planned to the Irish road network.

9.2.7.3 NRA Document Draft TA 90 "The Location and Layout of National Road Service Areas"

The NRA document Draft TA 90 gives the general principles to be followed for the siting and layout of service areas on national roads. These principles have been followed in the development of the design for the proposed motorway service area.

The document also provides technical advice with regard to the sizing of service areas. The document requires that the development provide adequate parking within the site to ensure that vehicles do not park on the carriageway of any internal or approach roads where they may impede traffic and create a safety hazard. The extent of parking facilities associated with the service areas is based on an estimate of demand. Demand is affected by factors such as traffic flows, traffic composition, service area spacing, proximity to junctions, and proximity to areas of population and other local facilities.

The number and detail of parking bays provided as part of the scheme are included in Chapter 3.

9.2.8 Existing Guidelines

This TIA has been undertaken in accordance with the EPA document *Guidelines for Information to be contained in Environmental Impact Statements* and the Institute of Highways and Transportation document *Guidelines for Traffic Impact Assessment*. Other sources referred to included:

- EPA, 2003 *Advice Notes on Current Practices (in the preparation of Environmental Impact Statements);*

- National Roads Authority, Design Manual for Roads & Bridges;
- Highways Agency (UK), Design Manual for Roads & Bridges;
- National Roads Authority, June 2005, Draft Traffic and Transport Assessment Guidelines;
- Dublin Transportation Office, May 2003, Traffic Management Guidelines Manual;
- Scottish Executive, January 2003, Guide to Transport Assessment in Scotland Consultation Paper; and
- Expansion Factors for Short Period Traffic Counts 1978 by J Delvin.

9.3 EXISTING ENVIRONMENT

9.3.1 Existing Road Network

9.3.1.1 M1 Motorway

The proposed development will have direct access to/from the M1 Motorway. This section of the M1 Motorway was opened in 2001 as part of the Dunleer-Dundalk Motorway scheme. The M1 is a two-lane motorway standard road and links the N1 south of Dundalk to Dublin City. It is a main interurban route linking Belfast to Dublin. The M1 is tolled with the toll located approximately 27km to the south of the proposed development on the Drogheda bypass. In the vicinity of the proposed development the nearest interchanges are the Drumleck interchange, which is approximately 3km to the south, and the Dundalk interchange, which is approximately 8km to the north.

9.3.1.2 CR182 Local Road

The CR182 is classed as a local road and is a link between Dromiskin Village and the N52, via Whiterath Cross Roads, with an approximate length of 5km. The road width is an average of 6m and has a good road surface condition. A section of this road was upgraded as part of the M1 Motorway scheme. The road was realigned and a bridge was constructed over the M1. This upgraded section of road is of high quality and is approximately 500m long.

9.3.1.3 CR185

The CR185 is classed as a local road and was severed by the M1 Motorway scheme. The western section of this road runs from the cul-de-sac near the M1 to the N52 and is approximately 4.5km in length. This road forms a crossroad junction with the CR182. The road width is an average of 6m but narrows on the approach to the cul-de-sac to approximately 4.5m. The road has a generally good road surface condition.

9.3.2 Existing traffic flows within the study area

9.3.2.1 M1 Motorway Traffic Flows

The NRA traffic counter "Drumleck M01-08A", which is located on the road section between the Dundalk and Drumleck interchanges on the M1, was used to estimate the Annual Average Daily

Traffic (AADT) on the M1 in 2007. This counter estimates the 2007 two way AADT flow on the M1 on this section of road is currently 27,202 vehicles. The composition of HCV was 13.6% (3,699 vehicles).

9.3.2.2 Traffic Flows on the CR182

ATC surveys were undertaken on 13th to the 14th November 2007 at the M1 over bridge on the CR182. This traffic data was converted to Annual Average Daily Traffic (AADT) flows. The AADT on the CR182 for 2007 was calculated to be 1,595 vehicles with the composition of HCVs being 5% (80 vehicles). Junction turning movements surveys were also undertaken on Wednesday 21 November 2007 at the CR182 and the CR185 stagger priority junction during the AM and PM peak periods.

9.3.2.3 Traffic Flows on the CR185

Junction turning movements surveys, as stated previously, were undertaken on Wednesday 21 November 2007 at the CR182 and the CR185 stagger priority junction during the AM and PM peak periods. This traffic data was converted to Annual Average Daily Traffic (AADT). The AADT on the CR185 for 2007 was calculated to be 1,327 with the composition of HCVs being 2% (28 vehicles).

9.3.3 Comparable Sites

The surveys undertaken at each of these sites included seven day Automatic Traffic Count (ATC) on the main route adjacent to the proposed development and AM, PM and off peak surveys of the inward movements to the eastern and western sites. Three of the service stations were located close together on the N7 between Rathcoole and Johnstown, and therefore only one ATC survey was required for the mainline.

9.3.3.1 Automatic Traffic Counts (ATC)

Independent ATCs were undertaken at four sites over a one-week period between the 13th and 19th of June 2007. The N7 site required to be resurveyed due to a technical fault. This was undertaken between the 19th and 25th of July 2007. The traffic data was also converted to AADT flows as summarised in **Table 9.3.**

Table 9.3: Existing AADTs on mainline routes adjacent to Comparison Sites

Comparable Site Surveys			
Location Number	**ATC Site Location**	**AADT**	**% HCV**
1	Texaco Petrol Station located on the N9, approximately 12.5km north of Castledermot	15,702	6.8
2	Top Petrol Station located on the N2, approximately 7km south of Castleblayney	7,664	9.4
3	Mother Hubbard's Restaurant located on the R148 (old N4), approximately 8.5km west of Enfield	6,608	13.4
4	N7 Westbound, 500 metres west of Applegreen Petrol Filling Station	28,616	8.6

9.3.3.2 Turn In Surveys

The comparable sites also had the inward movements to the service areas surveyed during the AM, PM and off peaks on a midweek day, during the same period as the ATC surveys were undertaken. This data was assessed, together with the ATC surveys, to give the percentage inward movements from the main route to the service area and the percentage of HCVs using the service areas. **Table 9.4** summarises the findings for the comparable sites.

Table 9.4: Comparison Sites Surveys Summary

Comparable Site Surveys			
Location Number	**Site Description**	**% Turn In Movements**	**% HCV**
1	Texaco Petrol Station - N9	8.8%	5.1%
2	Top Petrol Station - N2	11.7%	17.2%
3	Mother Hubbard's Restaurant - R148	4.9%	27.8%
4A	Apple Green Petrol Station - N7	7.2%	3.8%
4B	Esso Petrol Station - N7	5.0%	8.4%
4C	Statoil Petrol Station - N7	4.3%	33.5%
Average	All Sites	7.0%	16.0%

The range in the percentage turn in movements can be seen in **Table 9.4**. The lowest % turn in movements was seen a the Statoil petrol station on the N7, with 4.3%, and the highest was at the Top petrol station on the N2 near Castleblayney, with 11.7%. The overall turn in percentage of all the sites over the three different time periods was 7.01% with the average HCV % calculated as 16.04%.

9.3.4 Registration Plate Surveys

To determine the current traffic patterns on the M1, registration plate traffic surveys were carried out at two interchanges on the M1. These interchanges are located near towns in which people could avail of services similar to that in the motorway service area. These locations are shown in **Figure 9.2.** The surveys undertaken at each of these sites included a 12 hour registration plate survey on the off and on ramps to the motorway. This data was assessed to give the percentage of the vehicles turnoff the motorway but return within a one-hour period. The results from these surveys are summarised in **Tables 9.5** and **9.6.**

Table 9.5: Hammondstown Interchange Survey Results

	Destination		
Origin	**Northbound On slip**	**Southbound On slip**	**Total**
Northbound Off slip	48	56	104
Southbound Off slip	60	55	115
Total	**108**	**111**	**219**

Table 9.6: Drumleck Interchange Survey Results

	Destination		
Origin	**Northbound On slip**	**Southbound On slip**	**Total**
Northbound Off slip	32	40	72
Southbound Off slip	29	42	71
Total	**61**	**82**	**143**

It can be seen that 219 vehicles at the Hammondstown interchange and 143 vehicles at the Drumleck interchange left the motorway and returned within an hour. These figures correspond to AADTs of 271 and 177 for the Hammondstown interchange and the Drumleck interchange respectively. When these turn off AADTs are compared with the mainline flow on the M1 Motorway at each location, the turn off percentage is 0.81% for the Hammondstown interchange and 0.65% for the Drumleck interchange. The results indicate that a very low number vehicles would use local services surrounding these interchanges.

9.3.5 Accident Data

An assessment of accident data within the Study Area was undertaken to determine if there were any existing problems on the road network. The NRA accident data for an eight year period (1996– 2004) was extracted for the sections of road in the vicinity of the proposed development. The available accident data information has been summarised in **Table 9.7**. The results of the accident data were divided into different categories of 'Fatal', 'Serious' or 'Minor'. The accidents are also shown in **Figure 9.3**, the recorded accident data does not include "material damage only" accidents, or accidents which were not reported to or recorded by the Gárda Síochana.

Table 9.7: Accident Statistics for adjacent road network.

Road Section	Fatal Injury	Serious Injury (Number of Incidents)	Minor Injury (Number of Incidents)
M1	0	0	3
CR182	1	1	5
CR185	0	0	6

The results show that there have been a number of accidents recorded on the CR182 including one fatal accident near the M1 over-bridge. There were only three minor accidents noted on the M1 and six minor accidents on the CR185.

9.3.6 Public Transport

The area of the proposed motorway service area is served predominately by bus. Bus Éireann and other private bus operators provide regular services from Dublin to Belfast and Dundalk and vice versa, which pass in the vicinity proposed development. These services operate extensively throughout the day. The proposed development is located to the west of the Dublin to Belfast railway line. The nearest railway station is over 10km away in Dundalk. This station has regular services to and from Dublin City Centre and all major towns including Belfast and Drogheda. There are no cycling or pedestrian facilities currently available within the proposed motorway service area. It should be noted that given the nature of the development and that the only public access is from the M1 Motorway, there will be no pedestrian and cyclist movements to or from the proposed development.

9.3.7 Committed development

A review of relevant planning applications submitted to Louth County Council over the past five years was undertaken to establish the committed development within the vicinity of the proposed development. This information would determine if the committed development would result in increased traffic levels within the vicinity of the proposed development. The committed developments were assessed to determine whether the traffic flows generated by these developments would have been accounted for in the traffic surveys undertaken. The granted planning permissions examined relate to a housing development for approximately 18 houses, one-off houses or amendments to existing dwellings, which would not add a significant traffic contribution to the road network in this locality. They have therefore been discounted in terms of the traffic assessment for the M1 motorway service area.

9.4 POTENTIAL IMPACTS

9.4.1 Characteristics of the Proposed Development

The proposed development is split into two sites one west and one east of the M1 Motorway. The west site is bound to the north, south and west by agricultural lands. The east site is bound to the north by the CR182, to the south is bound by agricultural lands and to the east by the Dublin/Belfast rail line. The proposed development consists of the construction of a motorway service area including fuel facilities, retail units and restaurants to be provided on both sides of the motorway. For a full description of the proposed facilities at the motorway service area the reader is directed to **Chapter 3**.

9.4.2 Future Background Traffic Flows

A summary of the existing traffic flows and the proposed traffic flows are shown below in **Table 9.8**.

Table 9.8: Future Traffic Flows

Assessment Year	Year	M1 (Drumleck section) Predicted AADT	CR182 Predicted AADT	CR185 Predicted AADT
Base Year	2007	27,202	1,595	1,327
Construction Year	2008	28,098	1,616	1,345
Opening Year	2009	28,977	1,645	1,369
Design year	2024	38,482	1,935	1,611

The future traffic volumes combined with the traffic associated with the proposed development were inputted into the Excel Spreadsheet model. Further details of which are provided in **Volume 3 Appendix B**. A number of scenarios, described later, were tested to assess the impact of the proposed development on the surrounding road network. These scenarios included the comparison of *Do Nothing*, that is without the development in place, and *Do Something*, that is with the development in place.

9.4.3 Trip Generation

The proposed motorway service area is expected to be open 24 hours a day everyday of the year. Given the nature of this development it was assumed that the motorway service area will not generate additional trips onto the road network, instead the trips to the motorway service area will be 100%

bypass trips. It was also assumed there would be a link between the number of vehicles entering the Motorway Service Area and the number of vehicles on the M1 Motorway. The estimated number of vehicles entering and exiting the proposed motorway service area is based on traffic activities at the comparable sites surveyed and available international research.

The comparable sites surveyed showed an average of 7.0% vehicles turning off the mainline into the sites with 16% of these vehicles being HCVs. TRL undertook 12 surveys, 4 in 1994, 2 in 1997 and 6 in1998 on six different sites when producing the research document on the turning flows at motorway service area. These surveys showed an average of 12.6% vehicles turning off the mainline in the sites.

Taking into account the comparable site surveys undertaken in Ireland and the results from the TRL document it was deemed appropriate to take an average of 12% turn off to produce a robust assessment and to allow for additional trip generation to a development of this type. This turnoff percentage is total vehicles and it was further assumed of the 12% figure, 16% would be HCVs, based on the comparable site surveys.

The following **Table 9.9** summarises the predicted trips to the motorway service area for the 'Opening Year', 2009, and the 'Design Year', 2024 scenarios.

Table 9.9: Predicted Motorway Service Area Daily Traffic Flows

Year	AADT (vehicles)	HCVs (vehicles)
2009	1,739	282
2024	2,309	375

The local service access will be restricted to employees only. It is anticipated that these accesses could generate a number of new trips on the local roads surrounding the proposed development. It is considered that the maximum daily two-way flow on this road is estimated to be approximately 120 vehicles.

9.4.4 Trip Distribution

The main traffic to and from the Motorway Service Area will use the M1 Motorway. Therefore, the traffic using the Motorway Service Area will continue their journey once they leave the Motorway Service Area site and there will be no impact on the trip distribution around the development.

However, there will be a small percentage of vehicles using the local road to the Motorway Service Area. These will be restricted to 120 two-way movements per day for the two local motorway service area accesses. It is anticipated that 50% will arrive from/ depart to the CR182 East, 25% will arrive from/ depart to the CR182 West? and 25% will arrive from/ depart to the CR185 south, this is based on current traffic flows on the local road.

9.4.5 Design Year Junction Capacity Analysis

The existing traffic flows, taken from the traffic counts carried out in 2007 and the traffic data from the M1, together with the motorway service area have been used to put together the predicted traffic flows for the future design years. The future scenarios described below were analysed for both AM peak (08:00 – 09:00) and PM peak (17:00 – 18:00) hours and the turning movements for these scenarios are contained in **Volume 3 Appendix B**.

The following junctions were tested:

- CR182 Local Road and CR185 Local Road Staggered Priority Junciton (No1);
- CR182 Local Road and East Motorway Service Area Site Access Junction (No 2);
- East Motorway Service Area Roundabout (No 3);
- West Motorway Service Area South Roundabout (No 4); and
- West Motorway Service Area North Roundabout (No 5).

9.4.5.1 CR182 Local Road and CR185 Local Road Staggered Priority Junction (No 1)

The results indicate that the priority junction is significantly under capacity during the weekday peaks for all test years with the proposed motorway service area development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

9.4.5.2 CR182 Local Road and East Motorway Service Area Site Access Junction (No 2)

The results show that the priority junction is significantly under capacity during the weekday peaks for all test years with the proposed motorway service area development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

9.4.5.3 East Motorway Service Area Roundabout (No 3)

This junction is significantly under capacity during the weekday peaks when tested for all scenarios. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

9.4.5.4 West Motorway Service Area South Roundabout (No 4)

The results indicate that the roundabout junction is significantly under capacity during the weekday peaks for all test years with the proposed motorway service area development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

9.4.5.5 West Motorway Service Area North Roundabout (No 5)

The results indicate that the roundabout junction is significantly under capacity during the weekday peaks for all test years with the proposed motorway service area development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

9.4.6 Link Capacity

A link capacity assessment was undertaken of the road network in the study area. The assessment indicated that the road network surrounding the development is significantly under capacity with the

proposed motorway service area development in place. It is considered that queuing and delays would be unlikely to occur on the road network. The road network is therefore expected to perform satisfactorily with the proposed development in place.

9.4.7 Summary of Traffic Impacts during the Operational Phase

The Motorway Service Area will not result in traffic congestion or operational problems on the road network. All junctions have been proven to operate satisfactorily in the Opening Year 2009 and the Design Year 2024. The sensitivity testing has showed the road network has sufficient reserve capacity to accommodate a Motorway Service Area satisfactorily.

The overall impact of a Motorway Service Area in terms of traffic impact will be imperceptible (as defined under the EPA *Guidelines for Information to be Contained in Environmental Impact Statements*

9.5 MITIGATION MEASURES

The following measures shall be incorporated into the final design of the proposed development:

- The local service access for the motorway service area on the CR182 and the CR185 for the western and eastern sites shall be a private controlled access and shall be restricted to staff cars. All other vehicles shall access the motorway service area via the M1 Motorway.

- Advanced signage shall be devised and implemented for the motorway service area and local service access roads as part of the detailed design phase of the project.

The results of the traffic assessment, which included the above measures, showed that no operational difficulties are anticipated. Mitigation measures as a result are not required for any of the junctions affected by the motorway service area.

9.6 CONSTRUCTION IMPACTS AND MITIGATION

9.6.1 Construction Impacts

This section assesses the impact of the construction phase on the road network in the vicinity of the proposed development. For detailed information the reader is referred to **Chapter 3**.

9.6.1.1 Description of construction process and phasing

The proposed M1 North Motorway Service Area will involve the construction of two service areas on both sides of the M1 with a resting area and fuel, toilet and food facilities. The construction of the proposed development is expected to take 12 months in total. The western and eastern sites are expected to be built simultaneously. Public access to the Motorway Service Area will be restricted to direct access from the M1 Motorway via slip roads and at-grade roundabouts.

The construction of the infrastructure for the proposed development will comprise of 4.5 kilometres of single carriageway road within the proposed development and four slip roads and associated tapers to

be constructed adjacent to the live M1 Motorway. The pavement works also include some 23,500 sq m of vehicle parking and 11,500 sq m of hard standing at the fuel service station forecourts.

It will not be permitted to use the existing local road network for any construction traffic, including personnel movements, and consequently all haulage and access to and from the construction site will have to be made from the M1 Motorway. To minimise any impacts on other road users and to maximise safety, comprehensive traffic management measures will be required to ensure that construction traffic can be segregated onto the hardshoulder of the motorway.

9.6.1.2 Construction Traffic Generation

It is assumed that construction will take approximately 12 months to undertake however this period could be extended depending on when earthworks for the proposed development could be organised. It is considered that first six months will have the highest level of traffic activity with the majority of the construction HGVs traffic movements occurring during this time. This has been used as the worst-case scenario of traffic levels during the construction period. A breakdown of the construction movements has been summarised in **Table 9.11.**

In addition to the earthworks fill material, the main road building material, the main road building materials that will be hauled to site in bulk include capping materials, granular sub-base material, bituminous pavement materials, concrete and drainage filter material. It was calculated that the roads and paved areas within the proposed development would, in total, require the importation of approximately 25,500m^3 of material.

Concreting operations will include the raft foundation for amenity building and the pavement construction for the hard standings for the lorry parks and the fuel service stations. It is estimated that the construction of these structures will involve pouring some 1,000m^3 of concrete, which could involve up to 200 truckloads of concrete.

In addition, material will also be required for the construction of the amenity buildings of the Motorway Service Area. It is envisaged that trips associated with this is likely to be considerably less than that previously described.

Table 9.10: Average Number of HGVs during the busiest Construction Period

Material Movement	Volume (cubic meter)	Total HGVs Required Deliveries	HGVs in the highest Month of Construction Stage	Maximum Daily HGVs**
Earthworks*				
Fill Material***	38,000	3,800	633	32
Pavement Material****	25,500	2,550	850	43
Concrete Works***		200	33	2
Total				77

*Assuming 10 cubic meter per lorry load
** Assuming 20 working days per month
***Movements over 6
****Movements over 3

It is estimated that an average of 76 HGVs (one way) trips would be expected on a daily basis during the peak construction period of the motorway service area. There will be approximately 152 HGVs (two way) trips anticipated on a daily basis using the M1 Motorway during the construction stage.

9.6.1.3 Construction Staff Movements

In addition to those vehicles construction material to the proposed development, there will also be construction site personnel movements. It is estimated by the Project Engineers that the highest number of construction staff will be in the last 6 months of the project with in the order of 50 workers per site.

9.6.1.4 Trip Distribution

The haulage route for all construction traffic travelling to and from the proposed development must travel via the M1, as it will not be permitted to use the existing local road network. Exception maybe made with local authority approval.

9.6.1.5 Link Capacity

A link capacity assessment was undertaken of the road network in the study area during the construction period. The results indicate that the road network surrounding the development is significantly under capacity during the construction stage of the proposed development. It is considered that queuing and delays would be unlikely to occur on the road network during this period. The road network is therefore expected to perform satisfactorily during the construction stage.

9.6.1.6 Summary of Construction Impacts

The construction of the Motorway Service Area is expected to be undertaken simultaneously and take 12 months. The use of local road network will not be allowed for any construction traffic, including site personnel movements, consequently all movements to and from the site will be made via the M1 Motorway. It is estimated that an average of 152 HGVs (two way) trips and 200 site personnel (two way) trips would be expected on a daily basis during the peak construction period of the motorway service area. The link capacity assessment showed that the road network surrounding the proposed development can adequately cater for the projected traffic levels during the construction stage.

9.6.2 Construction Mitigation Measures

While there are no requirements to improve existing junction layouts, the following restrictions are recommended to provide for an ordered and regulated system of traffic management for this operation. A number of measures have been proposed as follows:

- A Construction Traffic Management Plan shall be prepared and implemented by the Contractor to minimise any impacts on other road users and to maximise safety.

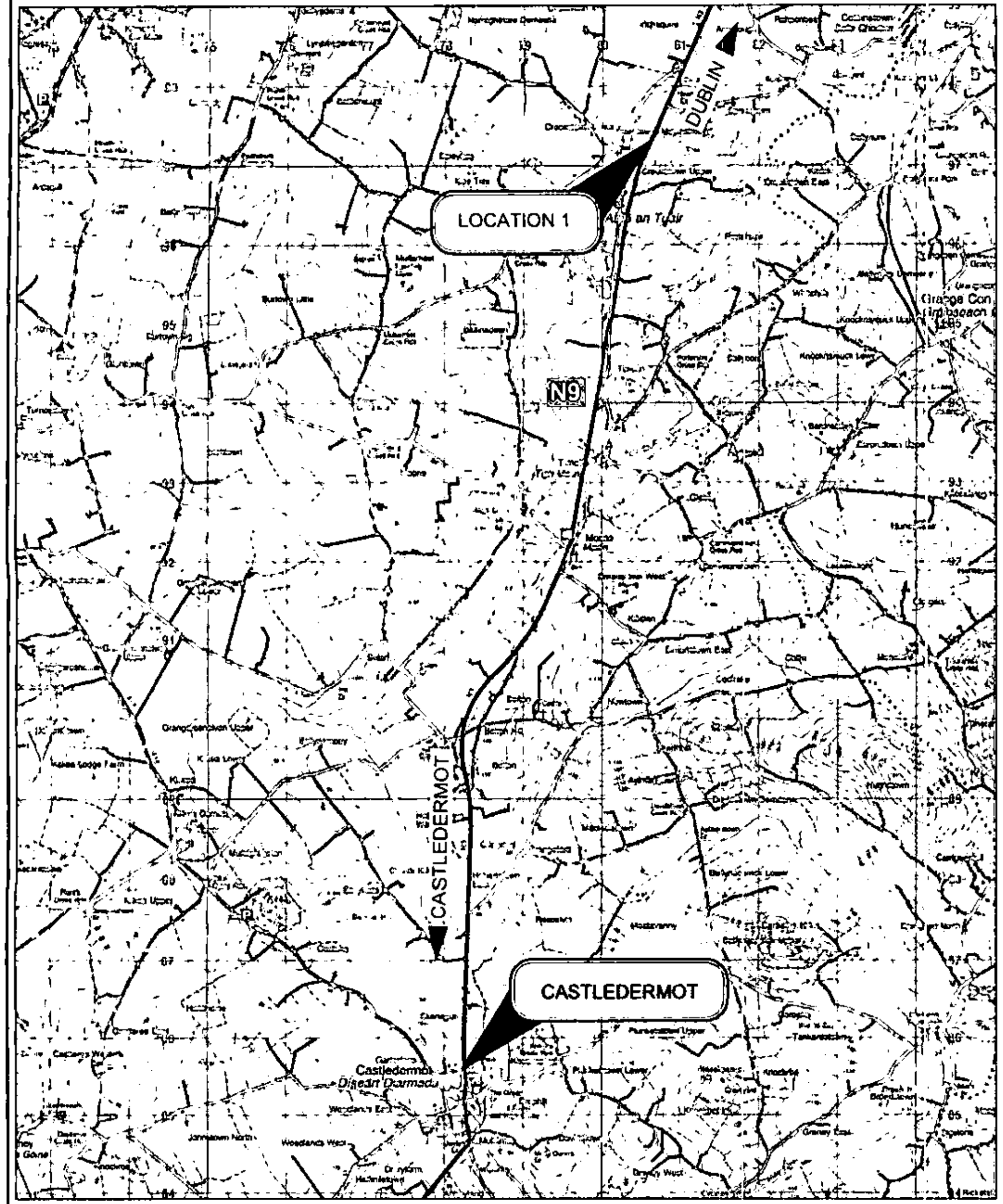
- All construction traffic, including light vehicles, travelling to and from the proposed development will travel via the M1, as they will not be permitted to use the existing local road network for haulage of plant and materials to and from the site, due to the loading restrictions that are in place.

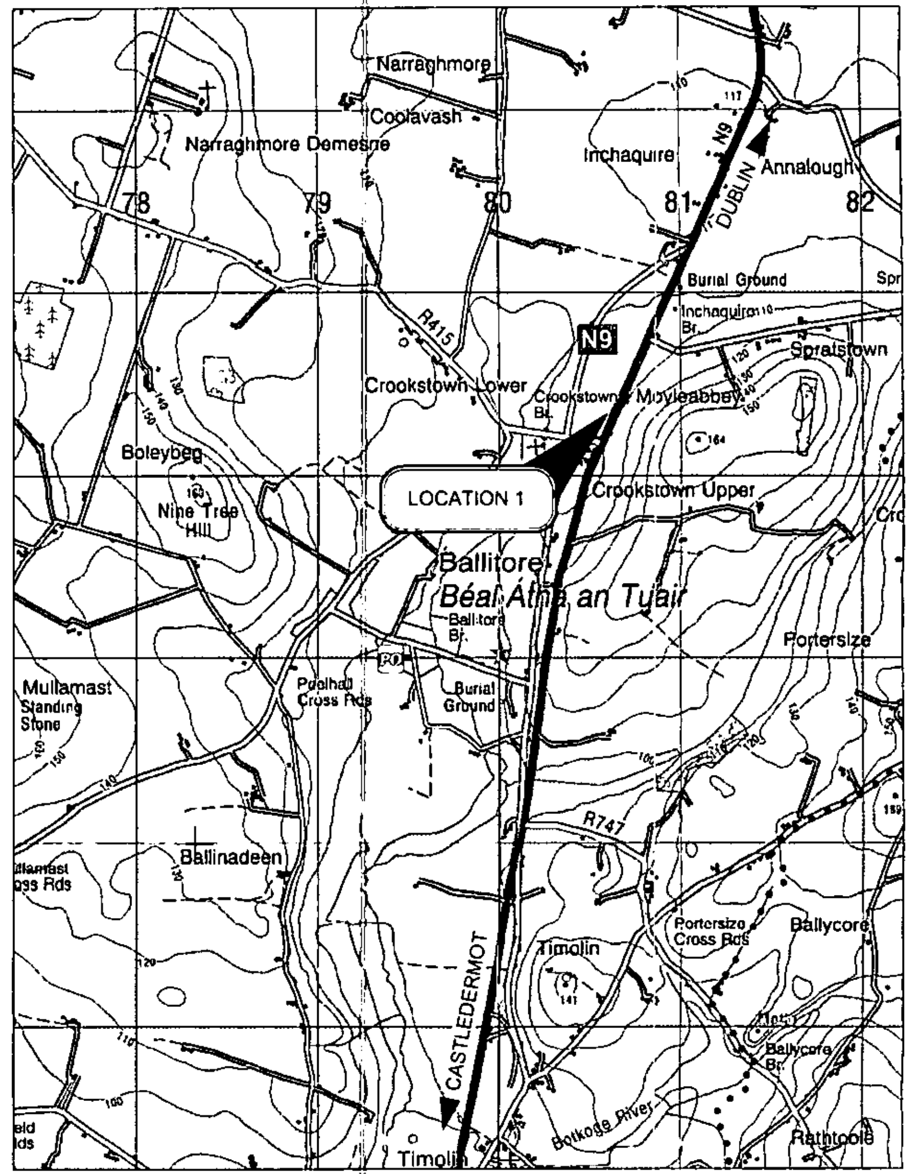
- Wheel wash facilities will be provided on site to ensure that construction debris will not have an impact on the quality of roads in the surrounding area

- Construction vehicles shall not be permitted to park on the local road network or on the hard shoulder of the M1 Motorway. Parking will be provided on the construction site for both employees and visitors.

9.7 RESIDUAL IMPACTS

No residual impacts are anticipated from the proposed development.





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Status	FINAL
Drawn	PH
Checked	TD
Approved	LC
Scale	NTS
Date	OCT 97
Drawing No	9.1a
Rev	A01

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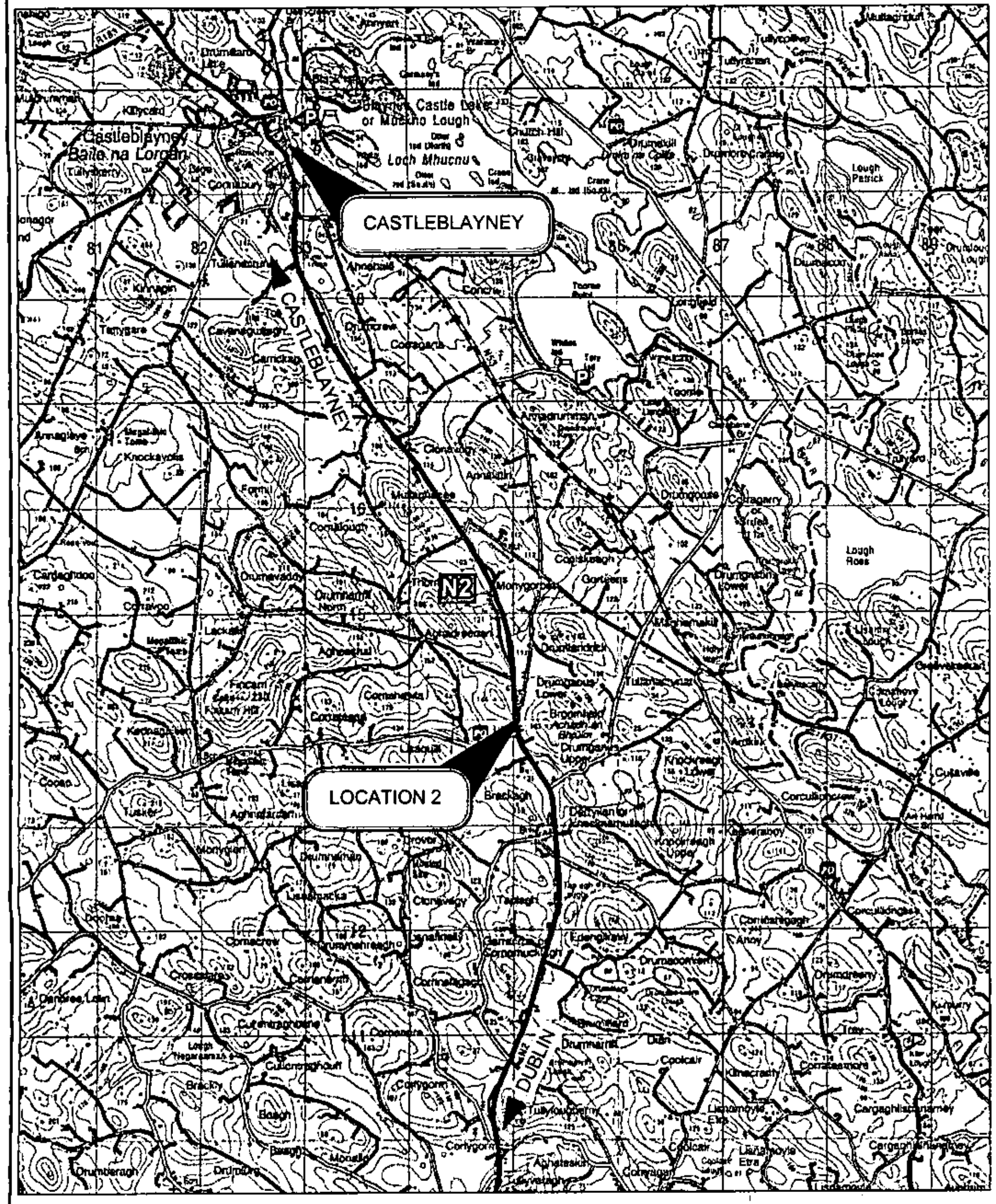

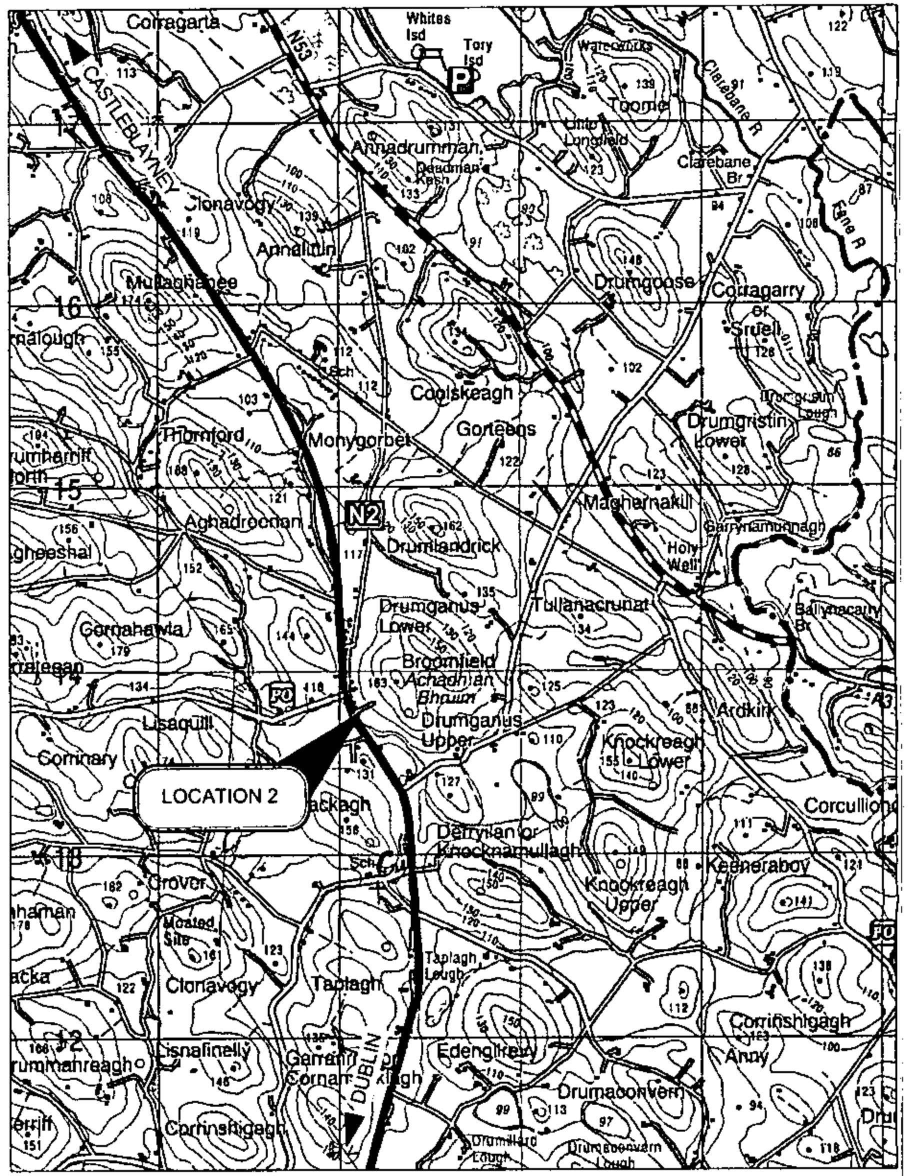

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Drawing Title	TEXACO PETROL STATION - N2 LOCATION PLAN
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Checked	TD
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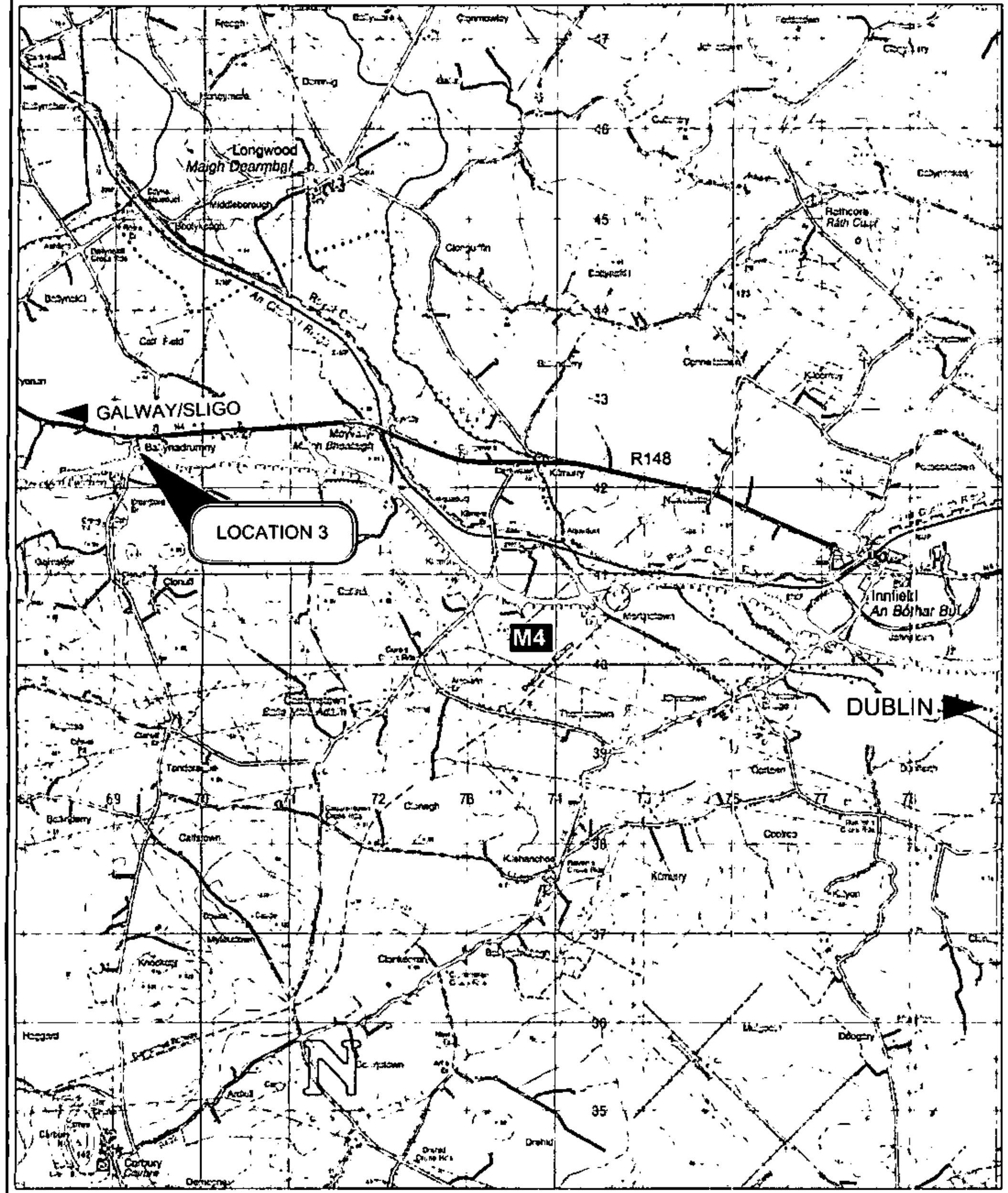
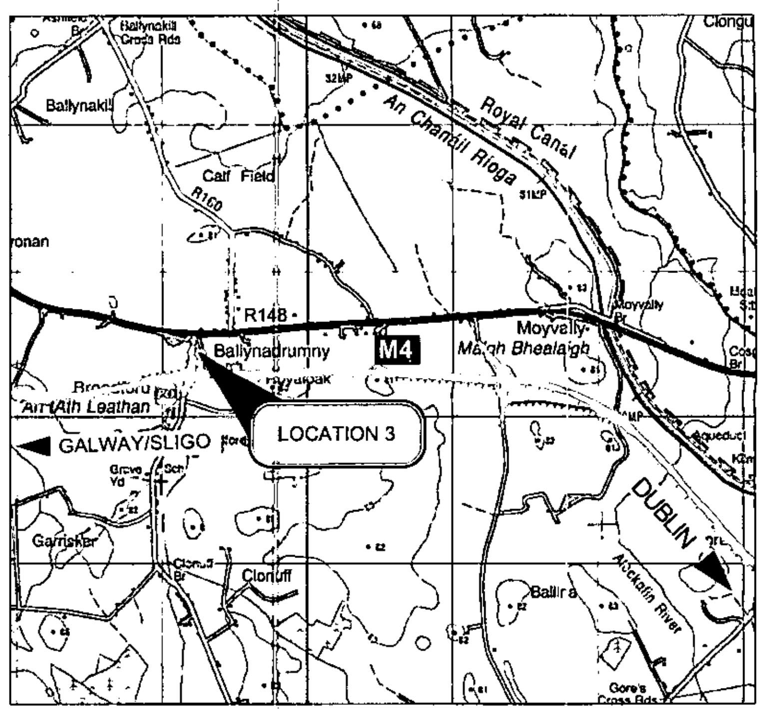
Status	FINAL
Drawing No.	9 1b
Size	A01





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Drawing Title	MOTHER HUBBARD'S RESTAURANT SERVICE AREA LOCATION PLAN
Status	FINAL
Checked	TD
Approved	LC
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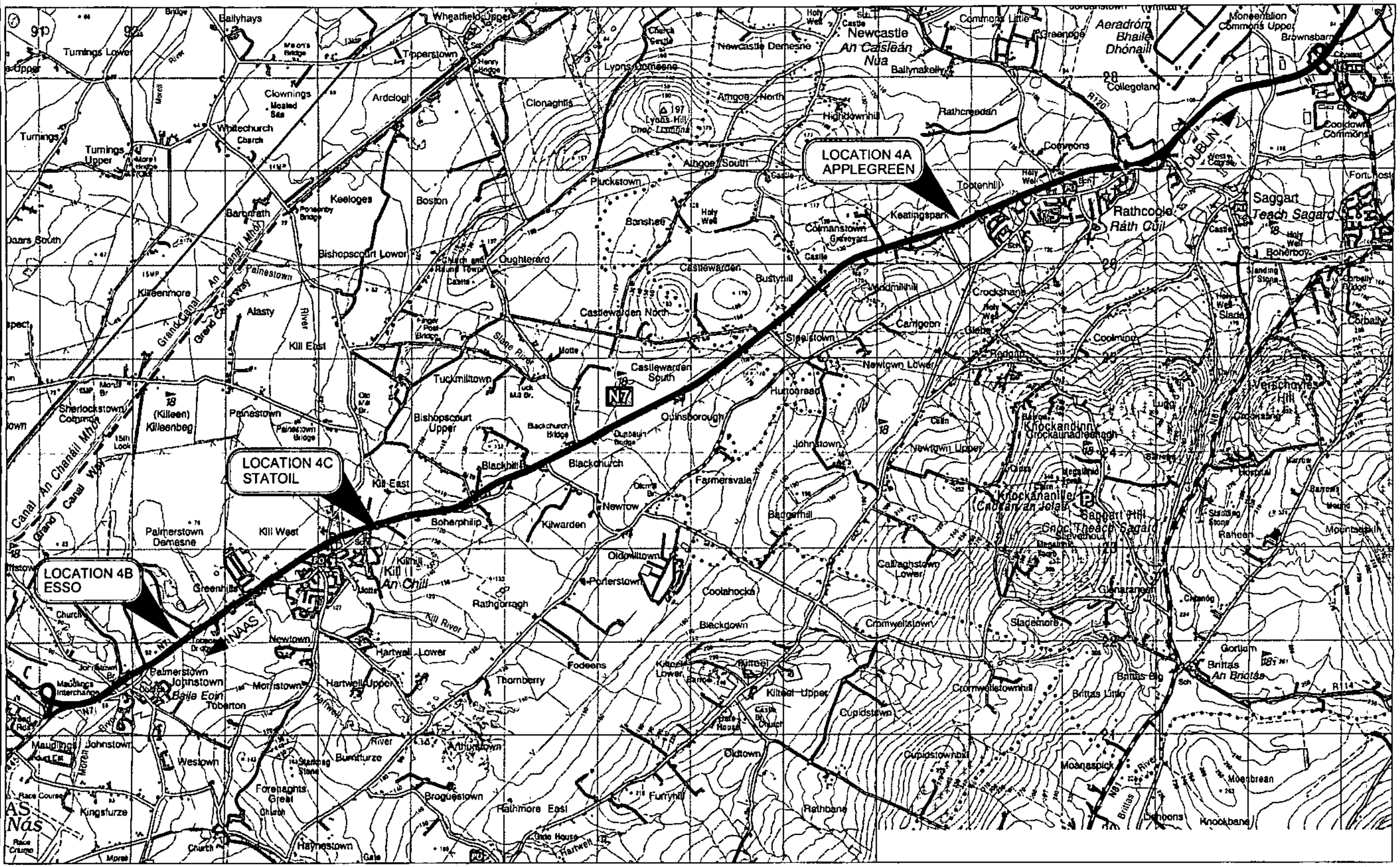
Rev	A01



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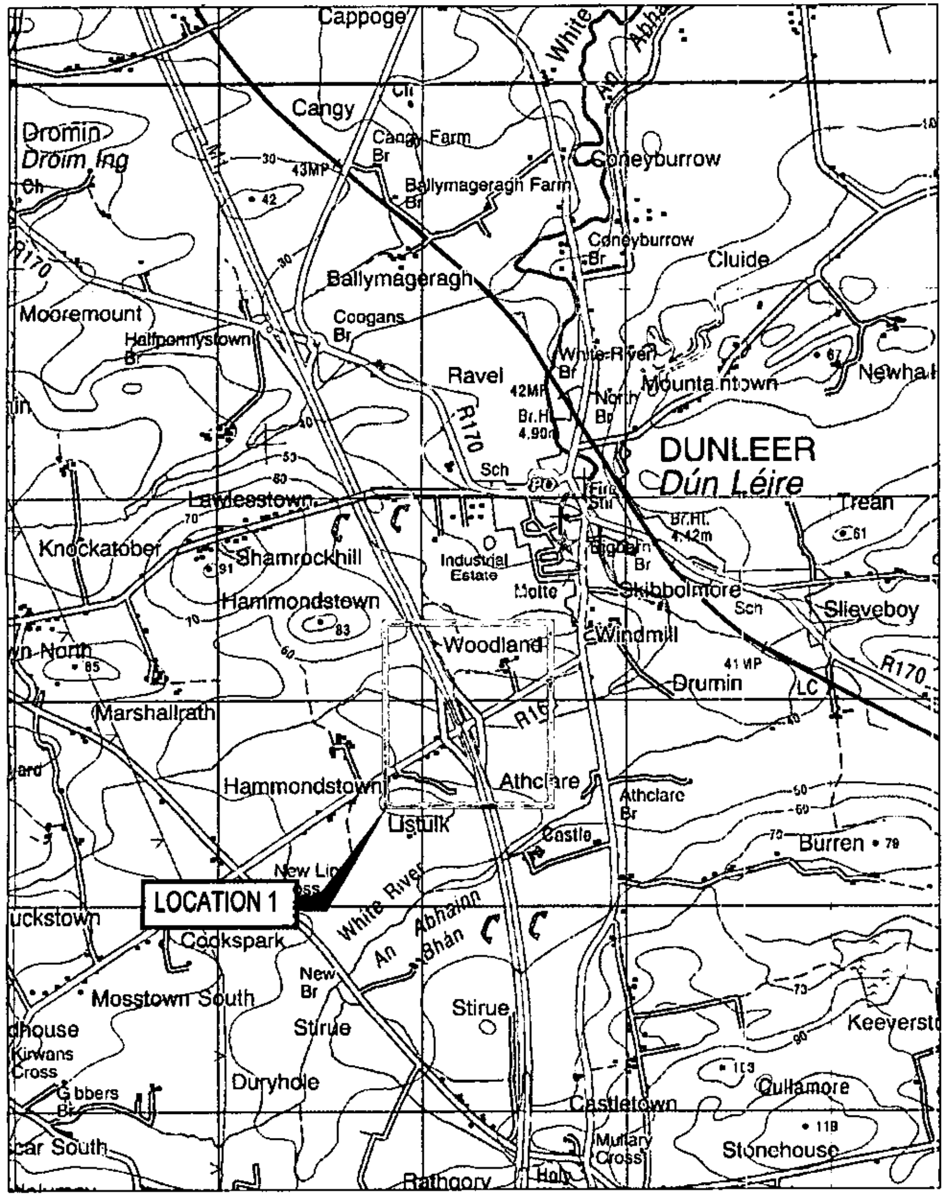
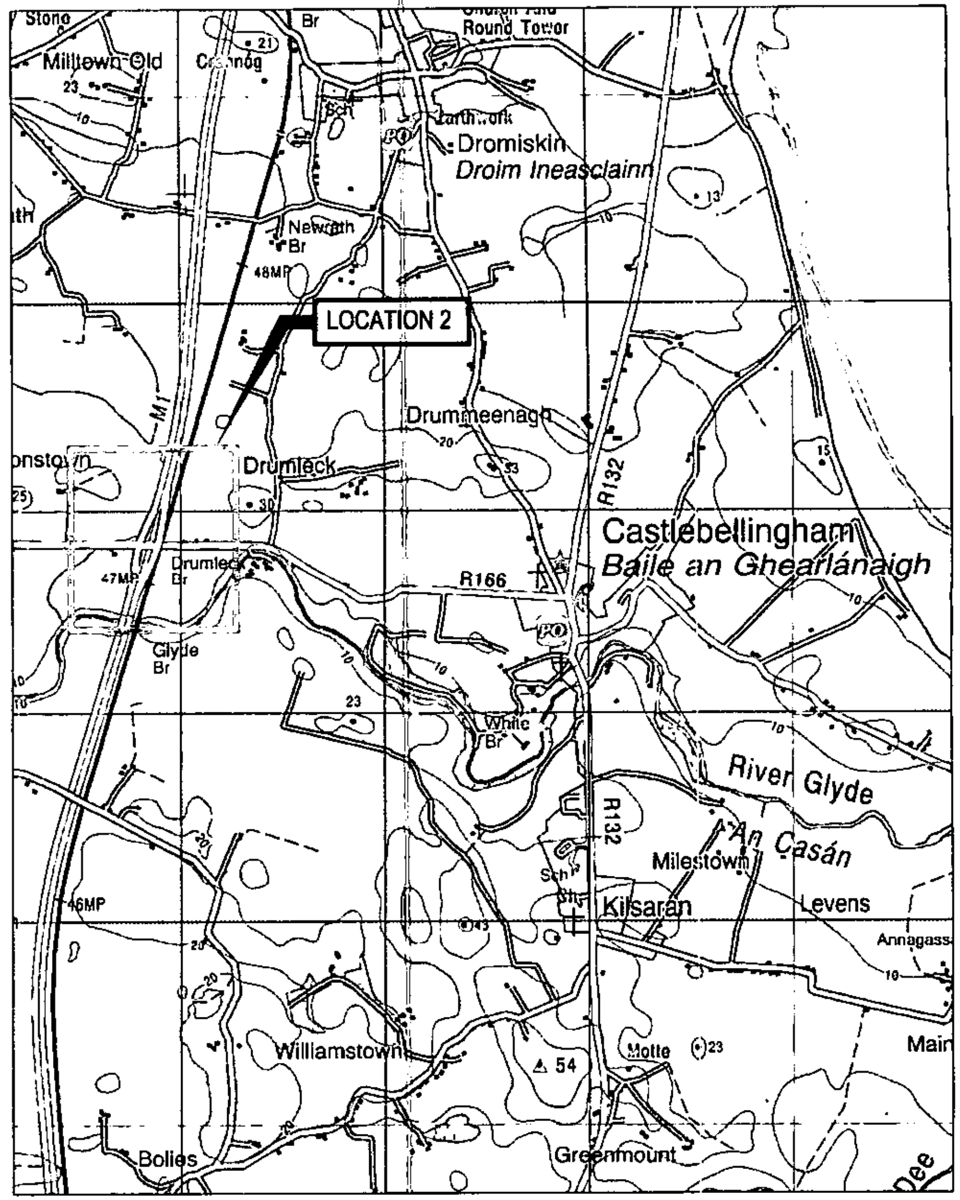
M1 NORTH MOTORWAY
SERVICE AREAS

N7 SERVICE STATIONS
LOCATION PLAN

FINAL





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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	12 HOUR REGISTRATION PLATE SURVEY LOCATIONS
Checked	TD
Approved	LC
Date	OCT '07
Status	FINAL
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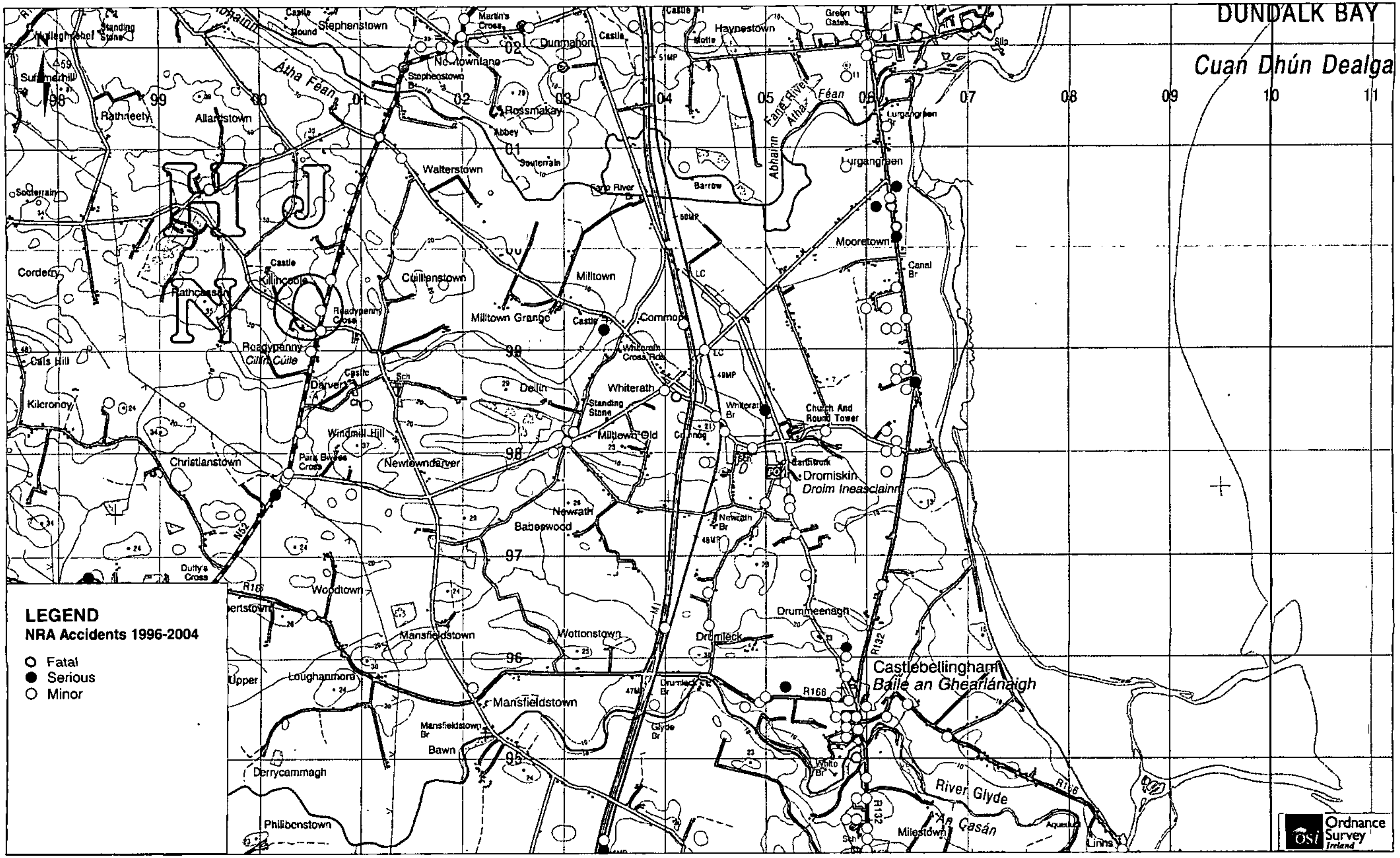
Rev	A01



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Checked: T.D.	Scale: 1:50,000	Figure No: 9.3	Rev A01
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Transport 21

10 AIR QUALITY AND CLIMATE

10.1 INTRODUCTION

This section of the Environmental Impact Statement assesses the impact to air quality from the proposed M1 North Motorway Service Area. This section should be read in conjunction with the site layout plans, construction strategy and project description sections of this EIS. This assessment was prepared in accordance with the relevant legislation and having regard for the Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002). Though the project is not a road scheme, the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes were also considered.

This study identifies the existing pollutant trends in the area and establishes spatial information and pollutant concentrations for comparison with Air Quality Standards Regulations (SI No. 271 of 2002). The Air Quality Standards are presented in **Appendix C, Volume 3** of this document. Future air quality trends as a result of traffic variations with and without the proposed development in place have been predicted using the screening air quality assessment from the UK Highway Agency Design Manual for Roads and Bridges (DMRBB), Air Quality Assessment. Detailed mitigation measures for the Construction Phase of the proposed development are also presented.

10.2 METHODOLOGY

10.2.1 Air Quality Surveys

A baseline air quality assessment was carried out in the vicinity of the proposed development, with particular focus on existing sensitive receptors. Air quality data available from the Environmental Protection Agency (EPA) monitoring network was also assessed.

Passive diffusion tubes were used to assess the existing ground level concentrations of nitrogen dioxide (NO_2) and benzene in the vicinity of the proposal. Monitoring was carried out over a one-month period at two locations.

Nitrogen Dioxide (NO_2)

At each of the monitoring locations, levels of NO_2 were measured using a specially prepared diffusion tube with adsorbent material. The tubes were then analysed using UV spectrophotometry, at a UKAS accredited laboratory (Gradko International, Winchester), giving an average concentration over the exposure period.

Benzene

At each of the monitoring locations benzene concentrations were assessed using chemosorb benzene diffusion tubes. The sample tubes were analysed for benzene using gas chromatography at a UKAS accredited laboratory (Gradko International, Winchester).

10.2.2 Legislation and Policy Context

The relevant Irish ambient air standards have been adopted from the European Commission Framework Directive (96/62/EC) and the associated Daughter Directives on air quality (1999/30/EC, 2000/69/EC, 2002/3/EC) and are cited as the Air Quality Standards Regulations, which came into force on 17th June 2002 (SI No. 271 of 2002). These regulations are presented in **Appendix C, Volume 3** as Tables A1 and A2.

The Air Quality Standards Regulations specify limit values in ambient air for sulphur dioxide (SO_2), lead, particulate matter (PM_{10}) (Stage I) and carbon monoxide (CO). For oxides of nitrogen (NO_x), particulate matter (PM_{10} and PM_{25}) and benzene the effective date is 1st January 2010. Alert thresholds for SO_2 and NO_2 are specified. The Regulations also specify margins of tolerance for exceedance of the new limit values in the period prior to their entry into force, which have relevance to the air quality assessment responsibilities assigned to the EPA in the Regulations.

The Regulations provide for advice by the EPA to local authorities about the need for air quality management plans where the limit values, plus margins of tolerance, will be or may be exceeded, and the preparation of such plans by local authorities. Provision is also made for air pollution action plans for short-term risks of exceedances of the limit values and alert thresholds. Existing pollutant concentrations and pollutant concentrations as a result of the proposed development are compared to these limit values.

10.2.3 Assessment

The DMRB screening air dispersion model was used to assess the impact of the M1 North Motorway Service Area on local air quality. The traffic figures associated with the development were used to predict the concentrations of traffic-derived pollutants in future years, with and without the development in place. Details of the traffic figure used in the assessment can be found in **Chapter 9** (Traffic) of this EIS.

Pollutant concentrations with and without the proposed development in place in 2009 (opening year) and 2024 (design year) were predicted at a number of sensitive receptors adjacent to the proposed development.

10.3 EXISTING ENVIRONMENT

10.3.1 Site Specific Monitoring

Passive diffusion tubes were used to assess the existing ground level concentrations of nitrogen dioxide (NO_2) and benzene in the vicinity of the proposed development. The monitoring locations are shown in **Figure 10.1** and described in **Table 10.1**. Results of the monitoring are presented in **Table 10.2** and **Table 10.3** and compared with the relevant air quality limits contained in the Air Quality Standards (**Volume 3, Appendix C**).

Table 10.1: Description of diffusion tube monitoring locations

Location	Dates	Description
A1	14/06/07-27/07/07	Outside residential receptor on local road at south perimeter of proposed eastern site. Approx. 50m from M1.
A2	14/06/07-27/07/07	Outside residential receptor on local road at M1 slip road. Adjacent to south perimeter of proposed western site. Approx 70m from M1.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide is classed as both a primary pollutant and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants. Long-term exposure to high concentrations of NO_2 can cause a range of effects, primarily in the lungs, but also in the liver and blood.

Nitrogen oxides (NO_x) are also one of the precursors for ground level ozone formation. Elevated ozone concentrations affect the respiratory system and cause damage to vegetation.

NO_x concentrations also impact directly on ecosystems. Nitrate containing particles and nitric acid contribute to wet and dry deposition of nitrogen in areas both close to and remote from sources. Deleterious effects of deposited nitrogen on natural nitrogen-limited terrestrial ecosystems have been reported from across Europe.

Table 10.2: Results of NO2 diffusion tube monitoring

Location	NO2 Concentration (µg/m3)
A1	10.82
A2	7.44
Limit Value(1)	40

(1) SI No 271 of 2002 (as an annual average)

The concentration of NO_2 is highest at A1. Both locations are along a local road in the vicinity of the M1, which is the major source of traffic in the area. The monitoring locations were between 50 and 70m from the M1, with A1 located slightly closer to M1. These results suggest that the main source of nitrogen dioxide in the area is from motor vehicle exhausts. The results indicate that at both locations the levels determined are below the relevant annual air quality limit value for nitrogen dioxide (40µg/m^3).

Benzene

Benzene is a Volatile Organic Compound (VOC) and is an ingredient of petrol. Benzene is a known carcinogen, and poisonous by inhalation and a severe eye and moderate skin irritant. VOCs also play a role in the formation of ground level ozone and are thus known as ozone precursors.

Table 10.3: Results of Benzene diffusion tube monitoring

Location	Benzene Concentration ($\mu g/m^3$)
A1	0.48
A2	0.26
Limit Value[1]	5

(1) S.I No 271 of 2002 (as an annual average).

The locations A1 and A2 show similar concentrations of benzene. Again, these results suggest that the main source of benzene in the area is from vehicle exhausts. The results indicate that at both locations the levels determined are well below the relevant annual air quality limit value for benzene ($5\mu g/m^3$).

10.3.2 EPA Monitoring

The EU Air Framework Directive deals with each EU Member State in terms of Zones and Agglomerations. For Ireland, four zones, A, B, C and D, are defined in the Air Quality Regulations (2002). The Zones are defined in **Table 10.4**.

Table 10.4: Zones for air quality assessment as defined by Air Quality Regulation 2002

Zone	Area
Zone A	Dublin Conurbation
Zone B	Cork Conurbation
Zone C	15 urban areas with populations greater than 15,000. Includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee and Dundalk
Zone D	Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C

The proposed development is located in Zone D. The EPA is the designated body with responsibility for monitoring ambient air quality in Ireland. In general, the EPA operates the mobile monitoring stations, while the local authorities operate the fixed stations in their area.

There is no EPA continuous monitoring station in the subject area. There are a number of monitoring stations in Zone D locations, which can be used as an indication of annual air quality for the proposed development. The EPA monitoring station results for Zone D locations in 2006 are presented in **Table 10.5**.

Table 10.5: Results of NO_2 and PM_{10} monitoring at Zone D locations in 2006.

Location	Mean annual NO_2 ($\mu g/m^3$)	Mean annual PM_{10} ($\mu g/m^3$)
Ferbane, Co. Offaly	4	17
Glashaboy, Co. Cork	10	-
Killkitt, Co. Monaghan	3	10
Drogheda	-	18
Limit value (1)	40	40

(1) S.I No 271 of 2002 (as an annual average).

The results of the EPA monitoring at Zone D locations in 2006 indicate that ambient concentrations of nitrogen dioxide and PM_{10} are well within the relevant air quality limit values. There are no results of benzene at Zone D locations in 2006.

In general the results from the site-specific baseline survey carried out in the vicinity of the proposed development indicate that concentrations of NO_2 at these rural locations are similar to those experienced in Glashaboy, Co Cork. In general, the results are typical of Zone D rural concentrations with higher concentrations recorded in the vicinity of major traffic sources.

10.4 IMPACTS

10.4.1 Impact on Residential Receptors

As stated previously, the DMRB screening air dispersion model was used to assess the impact of traffic associated with the Motorway Service Area on air quality at sensitive local receptors. The residential receptors assessed were:

- R1. Residential property north of eastern site, adjacent to rail line. Approximately 100m north of HCV parking area.
- R2. Residential property southwest of western site. Approximately 70m from HCV parking area.

The traffic figures associated with the development were used to predict the concentrations of traffic-derived pollutants in future years, with and without the development in place. Then, using the DMRB local assessment spreadsheet, the pollutant concentrations with and without the proposed development in place in 2009 (opening year) and 2024 (design year) were predicted at the sensitive receptors described previously.

Background concentrations of pollutants are included in the predicted concentrations from the M1 Motorway and the Motorway Service Area. For NO_2 the background concentrations used are from the baseline diffusion tube survey. For PM_{10}, the rural background concentrations used were obtained from the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, Appendix 2.

The impact of traffic associated with the Motorway Service Area was then assessed at the residential receptors. Increases in NO_2 and PM_{10} concentrations with the Motorway Service Area in place (do-something) are compared with the concentrations without the Motorway Service Area in place (do-minimum).

In order to quantify the magnitude of change in pollutant concentrations, the descriptors in **Table 10.6** are used. **Table 10.7** is then used to describe the significance of the impact. These descriptor tables are from the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes and are based on the descriptors from the UK NSCA, Development Control, Planning for Air Quality, 2006.

Table 10.6: Descriptors for changes in nitrogen dioxide and particulate matter concentrations

Magnitude of change (Negative/positive)	Annual Average Nitrogen Dioxide/Particulates (PM_{10}) ($\mu g/m^3$)
Very large	Increase/decrease >25%
Large	Increase/decrease >15<25%
Medium	Increase/decrease >10<15%
Small	Increase/decrease >5<10%
Very Small	Increase/decrease >1<5%
Extremely Small	Increase/decrease <1%

Table 10.7: Descriptors for Impact Significance for NO_2 and PM_{10}

Absolute concentration in relation to Standard	Change in Concentration					
	Extremely small	**Very small**	**Small**	**Medium**	**Large**	**Very large**
Above Standard without proposed development	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below Standard without proposed development Above with proposed development	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below Standard with proposed development, but not well below	Negligible	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
Well below Standard with proposed development	Negligible	Negligible	Slight adverse	Slight adverse	Slight adverse	Moderate adverse

Well below the standard= <75% of standard level.

The results of the screening assessment for each receptor are presented in **Tables 10.8** and **10.9**.

Table 10.8: Screening Air Quality Assessment for R1

Scenarios	Nitrogen Dioxide (μg/m³)		Particulates (PM_{10}) (μg/m³)	
	Annual Average	Increase/decrease (%)	Annual Average	Increase/decrease (%)
2007 existing	7.15	-	17.06	
2009 Do minimum	6.77	3.2	16.37	0.30
2009 Do something	6.96		16.42	
2024 Do minimum	6.13	2.1	15.68	0.20
2024 Do something	6.26		15.71	
Air Quality Limit Values	**40**		**40**	

R1 = Residential property north of eastern site, adjacent to rail line

Table 10.9: Screening Air Quality Assessment for R2

Scenarios	Nitrogen Dioxide (μg/m³)		Particulates (PM_{10}) (μg/m³)	
	Annual Average	Increase/decrease (%)	Annual Average	Increase/decrease (%)
2007 existing	7.82	-	17.22	
2009 Do minimum	7.35	4.8	16.50	0.60
2009 Do something	7.70		16.60	
2024 Do minimum	6.52	4.0	15.77	0.38
2024 Do something	6.78		15.83	
Air Quality Limit Values	**40**		**40**	

R2 = Residential property southwest of western site

The results of this assessment indicate that at receptor R1 (north of eastern site), the increase in NO_2 concentrations is very small, with a negligible impact on NO_2 concentrations with the proposed development in place in 2009 and 2024. The increase in PM_{10} concentrations is also extremely small with the proposed development in place in 2009 and 2024 and there is a negligible impact on air quality at R1. It should be noted that this assessment is a worst-case scenario as it assumes that all traffic using the east side of the motorway service area passes the HCV parking area (area closest to R1) at 20km/hr. In reality, the traffic will be spread out over the Motorway Service Area and not all traffic will pass as close to R1 as defined in the screening model.

For receptor R2, the approximate distance to the motorway service area is 70m. The primary source of traffic-derived pollutants in the area is the M1. As distance increases from the M1, pollutant concentrations tend to return to background levels. For R2, the impact on NO_2 concentrations in 2009 and 2024 with the proposed development in place is negligible. R2 is closer to the proposed motorway service area than R1, hence the higher absolute concentrations and increase in concentrations as compared to R1. The M1 is the dominant source of traffic-derived pollutants and the contribution to the absolute concentration from the proposed development is very small to extremely small.

Due to the distances between source and receptor the cumulative effect of the traffic on the M1 and the traffic using the proposed M1 North Motorway Service Area will have a negligible adverse impact on ambient air quality at the local residential receptors.

The predicted pollutant concentrations at all receptors with and without the Service Area in place are well below the annual mean limit values (AQS) for NO_2 and PM_{10}. Table 10.10 summarises the predicted air quality at the sensitive receptors.

Table 10.10: Summary table of predicted air quality impacts at selected receptors (R1, R2)

Receptor	NO_2 2009 with Service Area in place	PM_{10} 2009 with Service Area in place	NO_2 2024 with Service Area in place	PM_{10} 2024 with Service Area in place
R1	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible

The increase in concentrations of nitrogen oxides and resultant nitrogen deposition as a result of the proposed development are extremely small and very small, and are very unlikely to impact on vegetation at the proposed development. The ecology section of this EIS deals in detail with impacts on vegetation.

10.4.2 Impact on Climate

The measures designed to reduce Ireland's greenhouse gas emissions from road transport are detailed in the National Climate Change Strategy 2007. The Strategy lists measures for reduction in transport emissions, which include modal shift, fuel efficiency, VRT changes, biofuels use, etc. Climate change issues and the mitigation measures planned are the subject of specific policies and strategies as set out in the Climate Change Strategy and no scheme specific measures are recommended.

The proposed motorway service area will not result in greater numbers of vehicles using the existing M1. Therefore, the potential impact on climate through additional CO_2 emissions will not be significant.

With regard to microclimate, no mitigation measures are considered necessary although care should be taken in landscape and structure design to minimise any impacts on the local microclimate.

10.5 MITIGATION MEASURES

The operational effects of the proposed development on local air quality are predicted to be negligible to slightly adverse. The predicted increase in pollutant concentrations is very small to extremely small and absolute concentrations are well within current air quality limits and additional mitigation measures are not required.

10.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

In order to mitigate construction dust emissions during the construction phase, a dust minimisation plan will be prepared as part of the Environmental Management Plan. The dust minimisation plan will be cognisant of the industry guidelines such as the Building Research Establishment document entitled 'Control of Dust from Construction and Demolition Activities' and the Construction Industry Research and Information Association (CIRIA) 'Environmental Good Practice on Site' as well as the NRA Environmental Construction Guidelines.

The NRA recommends a semi-quantitative approach to determine the likelihood of a significant impact. The assessment criteria for this approach are presented in **Table 10.11**.

Table 10.11: Assessment criteria for the impact of dust from construction, with mitigation in place

Source		Potential distance for significant effects (distance from source)		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation effects**
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

From the Assessment Criteria it is clear that for a project of this scale, with major use of haul roads, the potential for soiling extends up to 100m from the source. Therefore, the following mitigation measures shall be implemented:

- A dust minimisation plan shall be prepared as part of the Construction Environmental Management Plan. This plan shall adhere to the industry guidelines including the Building Research Establishment document entitled 'Control of Dust from Construction and Demolition Activities' and the Construction Industry Research and Information Association (CIRIA) 'Environmental Good Practice on Site' as well as the NRA Environmental Construction Guidelines.

- The dust minimisation plan shall also include, as a minimum, the following mitigation measures:

    - Site roads will be regularly cleaned and maintained, as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only;

    - Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential);

    - All vehicles exiting the construction site will make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Wheel washes will be self-contained systems that do not require discharge of the wastewater to water bodies;

    - Public roads outside the construction site (used as part of the haulage route) shall be regularly inspected for cleanliness, and cleaned as necessary;

    - Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind;

    - Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;

- The contractor shall be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum; and

- The transport of soils should be undertaken in vehicles covered with tarpaulin.

- Stock piling with the exception of materials for bunding will not take place within a minimum of 100m from local receptors and will have regard to air, noise and visual mitigation provided in this EIS. The prevailing wind direction shall be taken into account when locating stockpiles, with the preferred stockpile location upwind of nearest sensitive receptor. Where the minimum setback distance is not achievable or the location relative to prevailing wind is unfavourable, then additional mitigation measures must be employed, e.g. screening.

- The construction contractor shall be required to maintain monthly dust levels below the guideline of $350mg/m^2/day$ (as stated in the German VDI Guidelines TA Luft "*Technical Instructions on Air Quality*") as an annual average at sensitive receptors. Where dust levels are measured to be above this guideline the mitigation measures in the area must be reviewed as part of the dust minimisation plan.

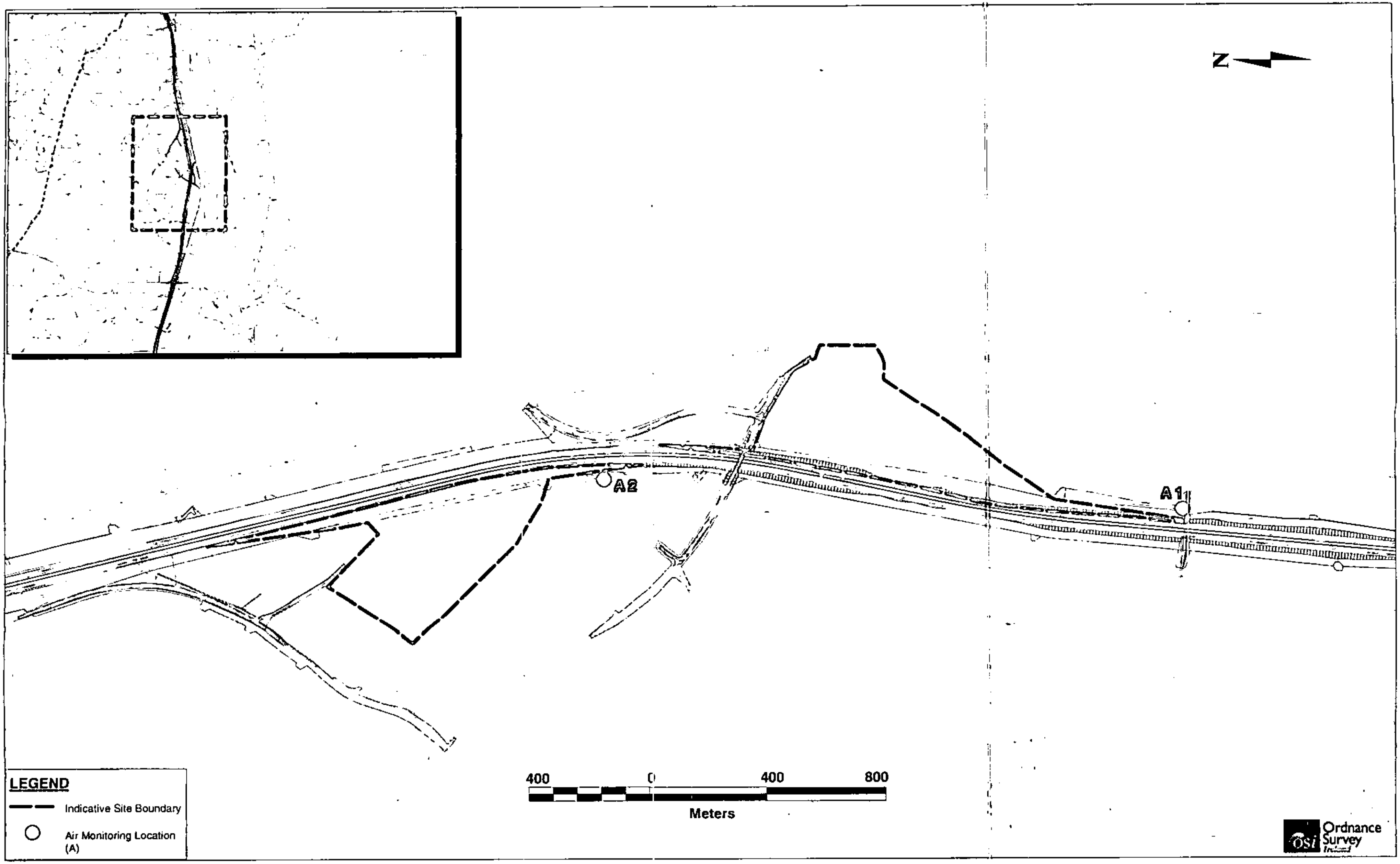
In order to ensure that any dust nuisance is minimised, a series of mitigation measures have been listed above. If the construction contractor adheres to good working practices and dust mitigation measures, the levels of dust generated are assessed to be minimal and are unlikely to cause an environmental nuisance.

10.7 RESIDUAL IMPACTS

Table 10.12 summarises the potential residual impact after the mitigation measures outlined above have been implemented.

Table 10.12: Summary of Residual Impacts for Air Quality and Climate

Description of impact	Significance of residual impact
Construction Phase	
Following the implementation of appropriate environmental management controls, only minor, localised and temporary adverse effects are anticipated, at worst (during dry conditions), from construction related dust. Appropriate mitigation measures will be implemented where significant stockpiling of material is planned	Negligible to short term minor adverse impact
Operational Phase	
A total of two representative receptors were assessed for future air quality. The operational effects of the proposed development on local air quality are predicted to be negligible. The predicted increase in pollutant concentrations is very small to extremely small and absolute concentrations are well within current air quality limits and additional mitigation measures are not required.	Negligible impact on air quality
Additional CO_2 emissions are unlikely to be significant with the proposed development in place. The impact on climate will be negligible	Negligible impact on climate



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NRA National Roads Authority

Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	AIR MONITORING LOCATIONS		
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Drawn: F.L.	Job No: MOT0146		
Checked: L.C.	Scale: 1:12,000 @ A4	Figure No. 10.1	Rev A01
Approved: A.G.	Date: 13/12/2007		

11 NOISE AND VIBRATION

11.1 INTRODUCTION

This chapter of the Environmental Impact Statement will assess the potential noise and vibration impacts associated with development of the proposed M1 North Motorway Service Area. Particular attention has been given to noise sensitive receptors within 300m of the proposed development, in accordance with the National Roads Authority (NRA) Guidelines for the Treatment of Noise and Vibration in National Road Schemes.

Noise is a feature of most infrastructural developments. Noise will be generated during the operational phase of the development by vehicles moving within the proposed development as well as by equipment running during day-to-day operation of this 24-hour development. In addition, construction activities, such as earth moving, excavation, etc., will generate noise.

11.2 METHODOLOGY

The following describes the methodology used during the assessment of noise and vibration impacts during both the construction and operational phases of the proposed development.

11.2.1 Definitions

Noise is typically defined as "unwanted sound"; sound being the human sensation of pressure fluctuations in the air. Sound levels are expressed in decibels (dB) on a logarithmic scale, where 0dB is nominally the "threshold of hearing" and 120dB is nominally the "threshold of pain". Depending upon the circumstances and characteristics of the sound in question, a change in level of 3dB is just perceptible, whereas an increase of 10dB is perceived as a subjective doubling of loudness (NRA Guidelines).

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250 Hz. A mechanism known as "A-weighting" has been adopted in order to account for this non-linearity of the human ear. Sound levels expressed using "A-weighting" are typically denoted dB(A). An indication of the level of common sounds on the dB(A) scale is presented in **Figure 11.1**.

The parameter most commonly used for the assessment of noise impact is L_{Aeq}, which is defined as being the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value. In other words the L_{Aeq} is a good measure of the average ambient noise level. The L_{A10} index is considered a good measure of road traffic noise, whilst the L_{A90} index is considered a good measure of the background noise level. Further explanation of the terminology used to describe noise throughout this chapter can be found in **Volume 3, Appendix D**.

11.2.2 Baseline Survey

A noise survey was conducted on 11th and 12th of December 2007. The survey was conducted in accordance with the NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes. During the baseline survey, noise levels at six locations were measured (see **Figure 11.2** for monitoring locations). The measurement equipment used was a Bruel and Kjaer 2238 Type 1

sound level meter. All measurement equipment was checked and calibrated before and after each group of measurements. Weather conditions during the surveys were in line with the required conditions described within ISO 1996, Acoustics 'Description and Measurements of Environmental Noise' for noise measurements. Wind speeds were less than 5m/sec during the noise survey.

11.2.2.1 Measurement Parameters

The noise parameters recorded during the baseline noise assessment were the:

- L_{Aeq} - A-weighted equivalent continuous sound level;
- L_{A10} - A-weighted percentile noise level exceeded for 10% of the measurement period; and
- L_{A90} - A-weighted percentile noise level exceeded for 90% of the measurement period.

The L_{A10}, L_{A90} and L_{Aeq} measurement parameters are used in this report to describe noise levels from traffic flows. In addition, these parameters have been used to calculate the L_{den} levels, using the method described in the NRA Guidelines. The term L_{den} refers to the "day, evening, night" noise level. L_{den} is a 24-hour average noise level (L_{Aeq}), but with penalty weightings of +5dB applied to the evening noise level, and +10 dB applied to the night-time noise levels. L_{den} is the new EU environmental noise measurement parameter, as defined in the EU Environmental Noise Directive (2002/49/EC), and is considered to generally reflect noise levels from traffic, but is not an exclusive measure of traffic noise levels.

11.2.2.2 Attended surveys

As part of the baseline assessment six attended noise surveys were carried out. All attended noise surveys were conducted in accordance with the shortened measurement procedure as described in the Department of Transport (Welsh Office) document 'Calculation of Road Traffic Noise' (CRTN) 1988. A set of three 15-minute measurements was conducted at each monitoring location. These were conducted on a cyclical basis (i.e. a set of six measurements was carried out, then the cycle was repeated) between the hours of 09:00 to 18:00h, for a total of 18 measurements. All measurements were free field, measured >2m from reflecting façades with the microphone positioned at a height of 1.5m above ground level.

The measurement results were noted onto survey record sheets immediately following each measurement and also stored in the instrument's internal memory for subsequent analysis. Notes were taken in relation to the primary contributors to the noise environment at each location.

11.2.2.3 Unattended surveys

In addition to the six attended surveys, an unattended 24h survey was carried out at monitoring location NSL2 (**Figure 11.2**). For the unattended measurement, a Bruel & Kjaer 2260 Type 1 Sound Level Meter with outdoor microphone protection was set to log over 1h periods for 24h. The microphone was placed at a height of 1.5m outside a single storey property.

11.2.3 Noise Modelling

The Bruel & Kjaer Type 7810 Predictor Noise Modelling Package was used to predict noise levels at sensitive receptors in close proximity to the proposed development. Noise levels at nearby sensitive

receptors were predicted for the opening year (2009) and design year (2024) of the proposed development. Two types of noise prediction modelling were undertaken for the operational phase of the proposed development, as outlined below.

1. The prediction of "traffic-generated" noise levels caused by vehicle movements within the proposed development (e.g. on the internal road network and merge and diverge lanes) at nearby sensitive locations were undertaken using the calculation method based on the CRTN 1988.

2. "Other noise" sources from the proposed development include mechanical or electrical equipment utilised in building services (e.g. air conditioning units, extractor fans, refrigeration units on parked trucks, air compressors, etc.) and constitute individual and distinct sources of noise and are best described as industrial in nature. Noise generated by these sources was predicted in a similar manner to industrial noise using noise prediction software applying the ISO 9613-2 standard "Acoustics - Attenuation of Sound During Propagation Outdoors".

11.2.4 Noise Assessment Criteria

11.2.4.1 Operational Noise

The assessment criteria for noise associated with the proposed development during the operational phase follows the principles of the NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes. It should be noted that other than the NRA Guidelines, there are no Irish standards or limits governing the assessment of noise and/or vibration associated with either new or existing roads. While, it is acknowledged that the proposed development is not linear in nature, it is an ancillary development to an existing road scheme (M1 Motorway). As such the most appropriate noise assessment criteria were considered to be the NRA Guidelines.

The NRA guidelines propose a design target of 60 dB(A) L_{den} for new national road schemes. While these guidelines are not directly applicable to the assessment of noise associated with the motorway service area, they follow best practice principles. Therefore, noise associated with the merge and diverge lanes of the proposed development as well as from the internal road network and from operational point sources has been compared to this design target.

As noted above, in the absence of Irish standards or limits governing the assessment of noise and/or vibration associated with a development of this type, the NRA Guideline criteria were used to determine whether any of the modelled noise sensitive locations would require mitigation of noise, should the proposed development be built. Noise levels at the sensitive receptors must satisfy the following conditions to require mitigation of project-generated noise:

(a) "The combined expected maximum traffic noise level, i.e. the relevant noise level, from the proposed road scheme together with other traffic in the vicinity is greater than the design goal"; and

(b) "The relevant noise level is at least 1dB more than the expected traffic noise level without the proposed road in place", and

(c) "The contribution to the increase in the relevant noise level from the proposed road scheme is at least 1dB".

Reference: NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes

It should be noted that the purpose of this evaluation is to assess the impact of noise generated by the proposed motorway service area and not noise generated by the existing M1 Motorway mainline. The M1 Motorway is an existing noise source in the area and was subject to an EIS in 1993 as part of the Dunleer – Dundalk Motorway Project. At the time the noise assessment for the EIS was carried out, best practice in Ireland required a design standard of 68 dB(A) $L_{A10\ (18hour)}$. This value was taken to be equivalent to the threshold of 65 dB(A) $L_{eq\ (12\ hour)}$, which was used in the original EIS. The 68 dB(A) $L_{A10\ (18\ hour)}$ design standard was based on the Noise Insulation Regulations 1975 (UK), which preceded the introduction of the NRA Guidelines for New National Road Schemes. The design goal of 60dB(A) L_{den} included in the current NRA Guidelines is more onerous than the 68dB(A) $L_{10\ (18\ hour)}$ value previously employed on national road schemes.

11.2.4.2 Construction Noise

BS 5228, "Noise and Vibration Control on Construction and Open Sites", has been used to predict likely construction noise levels during the construction phase of the proposed development. This takes account of noise emissions from construction plant and machinery likely to be used during construction.

With regard to the construction phase, the only published Irish guidance relating to the permissible noise level that may be generated during construction is that for national road schemes. Therefore, limits from the NRA Guidelines (**Table 11.1**) were considered to represent a reasonable compromise between the practical limitations in a construction project, and the need to ensure an acceptable ambient noise level for nearby residents.

Table 11.1: Recommended Maximum Permissible Noise Levels at the Façade of Dwellings During Construction

Days and Times	$L_{Aeq\ (1hr)}$ dB	L_{Amax} dB
Monday to Friday 07:00 to 19:00 hours	70	80*
Monday to Friday 19:00 to 22:00 hours	60*	65*
Saturday 08:00 to 16:00 hours	65	75
Sundays and Bank Holidays 08:00 to 16:30 hours	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.

Reference: NRA Guidelines for the Treatment of Noise and Vibration on National Road Schemes (Table 1).

11.2.5 Rating of Noise Impacts

The significance that can be attached to changes in noise levels (perceptible to human beings) can be described as listed in **Table 11.2**. It should be noted that these changes in significance are subjective and will vary among individuals.

Table 11.2: Significance Scale for Changes in Noise Levels (perceptible to human beings)

Change in Noise Level	Impact Rating	EPA Glossary of Impacts	Subjective Reaction	Subjective Change	% Change in Loudness
0	No change	n/a	n/a	No change	0%
<3 dB(A)	Not Significant	Neutral, Imperceptible or Slight Impact	Barely perceptible	Negligible	10%
3 – 5 dB(A)	Minor	Significant Impact: Positive or Negative	Perceptible	Noticeable	30%
6 – 10 dB(A)	Moderate	Significant Impact: Positive or Negative	Up to a doubling of loudness	Clearly Noticeable	70%
11–15 dB(A)	Major		Over a doubling of loudness	Substantial	100%
>15 dB(A)	Severe	Profound Significant Impact: Negative only	—	Very Substantial	>100%

It should be noted that the subjective scale outlined in **Table 11.2** applies to relatively continuous traffic noise. However, it can be used as likely indicative responses to changes in ambient noise levels resulting from the introduction of noise point sources as well.

The Guidance Document BS4142:1997 Method for Rating Industrial Noise affecting mixed residential and industrial areas, outlines changes in noise levels that can be used to assess the potential impact of industrial noise sources on residential receptors. The likelihood of complaints is assessed by comparing measured background noise levels (L_{A90}) with the predicted (rating) noise level, allowing for consideration of the nature of the noise source (rated L_{Aeq} allowing for tonal or impulsive characteristics). The ranges are outlined as follows:

- A difference of around +10dB or more indicates that complaints are likely.
- A difference of around +5dB is of marginal significance.
- If the rating level is more than 10dB below the measured background noise level, then this is a positive indication that complaints are unlikely.

It should be noted that BS 4142 is not a statutory document and the levels specified in the standard are given only as guidelines, used to assess the likelihood of noise complaints due to noises within mixed residential and industrial areas, rather than noise limit levels.

When the expected level of traffic-related noise sources on the approaches to/from and within the proposed development is compared to the expected levels of industrial type noise associated with the relatively small number of industrial type noise sources (e.g. air conditioning units, extractor fans, refrigeration units on parked trucks, air compressors, etc.), it is anticipated that traffic noise will generally mask these industrial-type noise sources. Therefore, the noise impact assessment for the proposed development, while considering the BS4142:1997 criteria outlined above, is based on the significance criteria outlined in **Table 11.2**.

11.2.6 Vibration

In respect of vibration, as a vehicle travels along a road, vibration can be generated in the road and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of a

vehicle's wheels and the road surface and by direct transmission through the air of energy waves. Some of these waves arise as a function of the size, shape and speed of the vehicle, and others from pressure fluctuations due to engine, exhaust and other noises generated by the vehicle.

There are various vibration guidelines to protect individuals and properties during operational and construction phases of a development. Common practice in Ireland has been to use guidance from internationally recognised standards, which address vibration standards in two varieties, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. The generally accepted criteria for vibration levels are:

- Vibration that would be likely to lead to complaints (BS6472: 1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz); and
- Vibration levels that would be likely to lead to structural damage (BS7385: Part 2 1990: Evaluation and Measurement for Vibration in Buildings - Guide to Damage Levels from Ground-Borne Vibration and Building Research Establishment (BRE) Digest 353 (July 1990): Damage to structures from ground borne vibration).

11.2.6.1 Construction Vibration Criteria

Measurements of vibration from construction sites have shown that, even from piling works, levels typically become imperceptible at relatively short distances from the vibration source.

The potential damaging effects of ground vibration on buildings are greatest at low frequencies. At higher frequencies, greater vibration levels can be tolerated. This is acknowledged in British Standard 7385, which specifies a guide value of 15mm/s (peak vibration velocity) at low frequencies, rising to 50mm/s at frequencies in excess of 40Hz (referred to as "Line 2" in BS 7385). These guideline values are set to protect against cosmetic damage in residential buildings.

Due to the high sensitivity of human response to ground vibration, complaints could be expected at vibrations levels lower than the cosmetic building damage limits of BS 7385. Human response to vibration in buildings is addressed in BS 6472 "*Evaluation of human exposure to vibration in buildings*".

In BS 6472, a base value of 0.15 mm/s is given, which corresponds approximately to the threshold of human perception. Guidelines for human exposure are expressed as multiples of this base value, depending on the duration of exposure and the nature of the building (home, office, etc.). For infrequent vibration events in residential areas a multiplying factor of 60 to 90 is recommended. This would result in a vibration level of 9 to 14 mm/s (rounded from 13.5mm/s), which according to the standard constitutes a satisfactory vibration magnitude with respect to human response. Taking the lower exposure criterion from BS 6472, gives an assessment criterion of 9mm/s, above which adverse reactions could be expected.

During the construction phase of the proposed development, vibration levels are likely to be higher and associated with single events or events of short duration. For example, piling, which is one of the primary sources of vibration during construction, is typically tolerated at vibration levels up to 2.5 mm/s due to its temporary nature/short duration. The NRA Guidelines identify 2.5mm/s as the vibration level that may be considered tolerable due to piling works. This limit provides for protection against vibration nuisance. In addition, this level is substantially below the NRA limits for protection of properties against cosmetic damage, which are given as a function of vibration frequency and are outlined in **Table 11.3.**

Table 11.3: Allowable Vibration During Road Construction in Order to Minimise the Risk to 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 50 Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Reference: NRA Guidelines for the Treatment of Noise and Vibration on National Road Schemes (Table 2).

11.2.6.2 Operational Vibration Criteria

In the case of nominally continuous sources of vibration, such as traffic, vibration is perceptible at a peak particle velocity of 0.5 mm/s and may become disturbing at higher magnitudes. The operational phase of the proposed development will be assessed against this vibration level.

11.2.7 Difficulties Encountered

It was not possible to gain access to the grounds of the property designated in this assessment as R28, which is the closest residential property to the western site of the proposed development. As such, baseline monitoring was carried out at the entrance gate to the property off the public road (NSL3), rather than approximately 225m closer to the site, which would have been adjacent to the property in question.

11.3 EXISTING ENVIRONMENT

11.3.1 Background

The M1 Motorway is an existing noise source in the area. As stated previously, the segment of the M1 Motorway in the vicinity of the proposed development was part of the Dunleer – Dundalk Motorway Project and was the subject of an EIS prepared in 1993. At the time the noise assessment for the EIS was carried out, best practice in Ireland required a design standard of 68 dB(A) $L_{eq\ (18\ hour)}$, which compares with a design standard of 65 db(A) $L_{eq\ (12hour)}$. This design standard was based on the Noise Insulation Regulations 1975 (UK), which preceded the introduction of the NRA Guidelines for New National Road Schemes. This section of the M1 Motorway opened in 1994 as part of the aforementioned scheme.

At the time the EIS was carried out, most of the sensitive receptors falling within the study area met the design criteria of 65 dB(A) $L_{eq\ (12hour)}$. Therefore, with the exception of two modelled properties along the CR185, no mitigation measures with regard to noise were required. At the two properties requiring mitigation, the EIS recommended construction of a 3.3m berm and wall. The location of this barrier was verified during the attended baseline noise survey.

The NRA has since published noise guidelines setting a more onerous design goal of 60 dB(A) L_{den} for road traffic noise for all new national roads to comply with the EU Environmental Noise Directive (2002/49/EC). See Section 11.2.1.1 above for a further description of the L_{den} parameter.

Given that vehicles travelling on the M1 Motorway will avail of the proposed development, noise generated by operation of the motorway service area has been assessed using the 60 dB(A) L_{den} criteria, as specified in the NRA Guidelines, and discussed previously.

11.3.2 Measurement Locations

The baseline assessment included six monitoring locations. The monitoring locations are described in **Table 11.4** and are shown on **Figure 11.2.**

Table 11.4: Summary of Noise Monitoring Locations during Baseline Survey

Location Number	Description
NSL1	Residential property (single storey) along west of site, west of the existing M1, along the cul-de-sac of CR185.
NSL2	Residential property (single storey) along west of site, west of the existing M1, along private road. Also 24 hour monitoring location.
NSL3	Residential property (2 storey) along north of site, along rural road, west of the existing M1
NSL4	Residential property (single storey) along west of site, along rural road, west of the existing M1.
NSI5	Residential property (single storey) along east of site, along CR182 to Dromiskin Village, after junction with Whiterath Bridge, east of the existing M1.
NSL6	Residential property (single storey) along south of site, along CR182 to Dromiskin Village, east of the existing M1.

11.3.3 Survey Results

11.3.3.1 Attended Surveys

Table 11.5 summarises the noise levels recorded during the attended baseline survey. Notes taken during the baseline assessment of dominant noise sources are included in the comments section of each table.

As mentioned previously, prior to the adoption of the NRA Guidelines the design standard for traffic noise was 68 dB(A) $L_{A10\ 18hour}$ (equivalent to 65 dB(A) $L_{eq\ (12\ hour)}$). Therefore, for comparison **Table 11.5** also includes the baseline $L_{A10\ (18\ hour)}$ values for each location, which are calculated from the formula below (Reference: CRTN).

$$L_{A10\ (18\ hour)} = L_{A10\ (3\text{-}hour)} - 1dB(A)$$

$$\text{Where } L_{A10\ (3\ hour)} = \frac{\Sigma\ L_{A10}\ (\text{hourly})}{3}$$

The baseline L_{den} value is also given in **Table 11.5** and has been calculated using the following formula, as outlined in the NRA Guidelines:

$$L_{den} = 0.86 \times L_{A10(18hr)} + 9.86\ dB$$

The NRA design goal of 60 dB(A) L_{den} is essentially a long term L_{Aeq} value. As stated previously, L_{den} is a 24-hour average noise level (L_{Aeq}), with penalty weightings of +5dB applied to the evening noise level, and +10 dB applied to the night-time noise level.

Table 11.5: Results of Baseline Noise Assessment (Attended Surveys)

ML	Date	Time	Measured Noise Levels (dB(A))					Notes/Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
NSL1	12/12/07	09:57	60.7	72.5	51.4	63.1	53.6	Traffic on M1audible in distance, dominant noise source. Short terms events: two aircrafts overhead, passed at high altitude.
		12:22	60.5	71.6	50.9	62.8	57.0	As above. Short events: vehicle stopping within the vicinity of the meter.
		14:38	60.4	74.6	48.0	63.1	55.8	As above. Short events: vehicle passing along the vicinity of the meter.
	Calculated $L_{A10\ (18\ hour)}$					62.0 dB(A)		
	Calculated L_{den}					63.2 dB(A)		
NSL2	12/12/07	10:17	59.1	83.1	52.8	60.3	56.0	Traffic on M1audible in distance was the dominant noise source and birdsong as background. Short events: HGV parking within the vicinity of the meter and occasional passing traffic along the local road.
		12:42	56.9	71.9	49.3	58.4	52.6	As above. Short events: HGV's passing within the vicinity of the meter and occasional passing traffic along the local road.
		14:58	56.3	68.2	51.7	58.1	54.1	As above. Short events: HGV's passing within the vicinity of the meter, occasional passing traffic along the local road and construction noise from neighbouring dwelling (concrete mixer).
	Calculated $L_{A10\ (18\ hour)}$					57.9 dB(A)		
	Calculated L_{den}					59.7 dB(A)		
NSL3*	12/12/07	10:43	60.8	78.3	53.5	62.5	57.2	Traffic on M1audible in distance is the dominant noise source. Short events: occasional passing traffic along the local road, a few HGV's.
		13:03	61.1	82.5	50.9	62.5	55.9	As above.
		15:20	61.9	80.3	51.5	63.2	57.1	As above.
	Calculated $L_{A10\ (18\ hour)}$					61.7 dB(A)		
	Calculated L_{den}					63.0 dB(A)		
NSL4	12/12/07	11:11	64.3	88.2	48.3	56.5	51.3	Traffic on M1audible in distance and farm vehicle from neighbouring dwelling, constant during measurement are the dominant noise sources. Background birdsong. Short events: occasional passing traffic along the local road, a few HGV's.
		13:22	59.5	82.6	43.5	53.4	47.3	Traffic on M1 audible in distance is the dominant noise. Background birdsong. Short events: occasional passing traffic along the local road, a few HGV's, and aircraft overhead, which passed at high altitude.

ML	Date	Time	Measured Noise Levels (dB(A))					Notes/Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
		15:39	62.9	86.2	49.4	58.6	52.2	As above. Short events: occasional passing traffic along the local road, a few HGV's.
	Calculated $L_{A10\ (18\ hour)}$					55.2 dB(A)		
	Calculated L_{den}					57.3 dB(A)		
NSL5	12/12/07	11:32	63.0	85.9	45.3	63.6	47.6	Traffic on M1audible in distance is the dominant noise source. Short events: occasional passing traffic along the local road, a few HGV's.
		13:41	67.1	93.7	45.8	65.4	50.9	As above. Short events: people speaking within the vicinity of the meter and occasional passing traffic along the local road, a few HGV's.
		15:58	64.6	94.2	48.3	64.7	51.6	As above. Short events: occasional passing traffic along the local road, a few HGV's.
	Calculated $L_{A10\ (18\ hour)}$					63.6 dB(A)		
	Calculated L_{den}					64.5 dB(A)		
NSL6	12/12/07	11:56	56.6	75.4	45.5	58.3	48.0	Traffic on M1audible in distance is the dominant noise source. Background birdsong. Short events: people speaking within the vicinity of the meter, kids from playground (school) and occasional passing traffic along the local road.
		14:01	56.3	72.2	44.3	59.9	48.0	As above. Short events: people speaking within the vicinity of the meter and occasional passing traffic along the local road.
		16:17	55.2	73.3	46.2	57.0	49.1	As above. Short events: occasional passing traffic along the local road.
	Calculated $L_{A10\ (18\ hour)}$					57.4 dB(A)		
	Calculated L_{den}					59.2 dB(A)		

Survey Details:
Instrumentation Used : Bruel & Kjaer Type 2260 and 2238, calibrated with B&K 4231.
L_{Aeq} - Time-averaged noise level. L_{A90} - Noise level exceeded for 90% of measurement period (steady underlying noise level).
L_{A10} - Noise level exceeded for 10 % of measurement period. L_{AMax} and L_{AMin} – Maximum and Minimum noise levels.

* The baseline attended noise surveys were attended by personnel to determine the existing ambient noise environment at receptors in the vicinity of the proposed motorway service area.

Results of the survey indicate that the noise levels in the vicinity of the proposed development are dominated by traffic noise from the existing M1 Motorway. Measured noise levels at the monitored locations range between 55.2 to 67.1 dB(A) L_{Aeq} and 53.4 to 65.4dB(A) L_{A10}. The lowest L_{Aeq} and L_{A10} values were recorded at location NSL6 and NSL4, respectively, which were the furthest locations from the existing M1 Motorway. NSL5 had the highest recorded L_{Aeq} and L_{A10} noise levels during the survey and is located along the CR182 to the east of the existing M1 Motorway and the Dublin-Belfast Railway line.

The calculated $L_{A10\ 18\text{-}hour}$ values at the monitoring locations range between 55.2 to 63.6dB(A), while the calculated L_{den} values range between 57.3 to 64.5 dB(A).

11.3.3.2 Unattended Surveys

An unattended 24-hr noise survey was carried out at monitoring location NSL2 between 11/12/07 and 12/12/07, the results of which are given in **Table 11.6**. The average measurement (L_{den}) was calculated from the results of the 24-hour survey using the formula below:

$$L_{den}=10x\log_{10}(1/24)(12x10^{(Lday/10)}+4x10^{(5+Levening)/10)}+8x10^{(10+Lnight)/10)})dB(A)$$

Table 11.6: Results of Baseline Unattended Noise Survey at NSL2

Date	Time	Duration	dB(A)				
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
11/12/2007	16:14:47	1 hour	61.3	76.5	55.3	62.8	59.4
11/12/2007	17:14:47	1 hour	61.1	69.3	54.6	62.8	59.0
11/12/2007	18:14:47	1 hour	60.6	68.1	52.3	62.8	57.2
11/12/2007	19:14:47	1 hour	60.0	73.0	52.2	61.9	57.1
11/12/2007	20:14:47	1 hour	58.6	68.3	48.9	60.7	55.4
11/12/2007	21:14:47	1 hour	57.7	70.1	43.9	60.1	53.2
11/12/2007	22:14:47	1 hour	56.2	65.8	44.7	58.7	51.6
11/12/2007	23:14:47	1 hour	54.7	65.3	40.3	57.6	48.7
12/12/2007	00:14:47	1 hour	51.9	65.3	30.7	55.4	42.0
12/12/2007	01:14:47	1 hour	50.0	67.5	31.9	53.8	39.9
12/12/2007	02:14:47	1 hour	49.3	62.6	—	53.4	35.4
12/12/2007	03:14:47	1 hour	50.9	62.7	33.1	54.8	40.5
12/12/2007	04:14:47	1 hour	53.6	65.3	37.0	57.1	44.9
12/12/2007	05:14:47	1 hour	57.5	67.1	46.0	59.9	53.6
12/12/2007	06:14:47	1 hour	59.8	66.8	49.6	61.8	57.0
12/12/2007	07:14:47	1 hour	62.2	67.8	53.9	64.0	59.6
12/12/2007	08:14:47	1 hour	63.4	71.2	56.7	65.0	61.2
12/12/2007	09:14:47	1 hour	62.8	74.5	56.9	64.5	60.5
12/12/2007	10:14:47	1 hour	61.4	75.1	54.7	63.0	59.1
12/12/2007	11:14:47	1 hour	60.7	69.0	54.0	62.3	58.5
12/12/2007	12:14:47	1 hour	59.1	68.6	51.5	61.0	56.4
12/12/2007	13:14:47	1 hour	58.2	66.6	50.8	60.2	55.2
12/12/2007	14:14:47	1 hour	58.9	65.6	51.2	60.7	56.2
12/12/2007	15:14:47	1 hour	60.1	67.7	53.1	61.9	57.5
Calculated L_{den}			63 dB(A)				

11.3.3.3 Vibration

It is normal practice to monitor vibration only when traffic associated vibration is observed or when other specific sources are noted. During the noise survey, no vibration was noted at any of the measurement positions and no appreciable sources of vibration were identified.

11.3.4 Calibration of Noise Model

In order to calibrate the noise output from the traffic flow assessment, a road model was created for the base year, 2007. L_{den} values for this year were calculated from the model and compared to L_{den} values derived from L_{Aeq} data obtained during the baseline survey.

Calibration of the road model is limited to traffic flow information, traffic speeds assumptions and the availability of background mapping of the surrounding area. The influence of noise levels from sources other than road traffic noise during the baseline survey can also create problems in calibrating the noise model against L_{Aeq} derived parameters. Flows for surrounding rural roads were not available for the year 2007 in some cases, which may have resulted in lower predicted values for modelled locations compared to the measured data.

As a general rule, a difference of +/-3dB(A) between measured levels and predicted values is considered to represent good correlation between actual conditions and the model. Differences between 4 to 6dB(A) are considered to be of moderate correlation. Differences above 6dB(A) show poor correlation between actual levels and modelled levels.

Table 11.7: Summary of Results for Calibration of Noise Model

Monitoring Location	Modelled Receptor	L_{den} Derived from Measured Values (dB(A))	L_{den} Calculated by Model (dB(A))	Difference (dB)	Agreement	Notes
NSL1	R14	63.2	66.8	0-3	Good	
NSL2	R18	59.7	59.5	0-3	Good	
NSL3*	--	63.0	57.9	3-6	Moderate	Other external sources in baseline survey
NSL4	R21	57.3	58.2	0-3	Good	
NSL5	R1	64.5	63.7	0-3	Good	
NSL6	R4	59.2	57.0	0-3	Good	

* NSL3 is located at the gate to Receptor R28, which is the closest residential property to the proposed development.

Note: Precise replication of the acoustic environment in rural areas is not always achievable in the calibration of a road model due to contribution from non-traffic sources and other factors. In relation to properties in rural locations the model will only attribute noise from roads for which traffic has been input. Passing traffic that contributed to the baseline levels during measurement is not accounted for in the model, as traffic values for these contributions are not within the remit of the traffic report used to build the model. Agricultural machinery, farm practices and other extraneous noise sources measured in addition to traffic noise in the baseline survey at these locations cannot be replicated in the model output.

With reference to **Table 11.7** above it is evident that there is generally a good to moderate agreement between predicted traffic-generated noise levels for the year 2007 and those measured during the baseline survey.

11.4 POTENTIAL IMPACTS

11.4.1 Characteristics of the Proposal

The proposed development may result in potential impacts on existing ambient noise levels in the area due to noise generated by the following:

- Vehicle movements during the operational phase on the internal road network and on the merge/diverge slips. This includes heavy and light goods vehicles delivering materials/goods and road users availing of the facilities.
- Increased traffic flows on the local road network (CR182 and the CR185) associated with employees travelling to and from the sites during operation of the proposed development. There will be no increase in traffic on the motorway associated with operation of the proposed development. Traffic volumes, and their future growth, will be same on the M1 Motorway with or without the development in place.
- Noise emissions from the site associated with day-to-day operations. These would include additional noise sources such as mechanical or electrical equipment utilised in the shop and restaurant facilities (e.g. air conditioning systems). Other point sources of noise include extractor fans and air compressors.
- There is provision for trucks to park overnight as part of the motorway service area design; therefore, noise from chiller units on cold trailers has also been included in the assessment. Noise associated with braking by trucks arriving at the motorway service area is difficult to predict accurately within a proprietary noise model; however, truck braking would not be expected to generate noise levels in excess of those generated by vehicles moving within the sites or from passing vehicles on the M1 Motorway. Noise associated with trucks changing gear and accelerating upon departure from the service area has been incorporated into the noise predictions.
- Construction activities and associated noise emissions from earth moving equipment, and construction plant/machinery, which are discussed in Section 11.6.

The noise impact assessment has considered the effects of the proposed development based upon the following information:

- Indicative layout designs illustrating the location of fuel facilities, HGV parking, passenger car parking, amenity buildings and access roads within the sites;
- Traffic data and information provided by the traffic consultants; and
- A description of the construction works and proposed sequence of development.

11.4.2 Potential Noise Impacts during the Operational Phase

11.4.2.1 Impacts from Traffic Noise

Noise predictions are based on traffic data predicting the volumes of motorway and local traffic expected to access the proposed development during the operational phase.

The majority of vehicles travelling to and from the proposed development will access the sites via the access ramps off the motorway. A local access road would be provided at each site to allow access by employees only. It is estimated that employees accessing the sites could result in a maximum daily two-way flow on each of these access roads of approximately 60 vehicles, as outlined in **Chapter 9 (Traffic)**. These traffic movements on the local road network would generally be limited to set times of

the day associated with employees arriving at and leaving the sites. All other vehicles shall access the sites via the M1 Motorway. Volumes of traffic travelling to and from the proposed development would vary during the day and night but would generally be expected to match day and night traffic profiles on the motorway, albeit at a small percentage of the overall traffic volumes.

A detailed assessment of the existing traffic volumes on the road network in the vicinity of the site and the predicted traffic flows to and from the site during the operational phase of the proposed development has been undertaken and is outlined in **Chapter 9 (Traffic)** of the EIS. Details of the traffic data used in the noise predictions for the operational phase of the proposed development are provided in **Table 11.8.**

Table 11.8: Traffic Flow Information used in Noise Model

Link	2007 AADT		2009 AADT Do Nothing Scenario		2009 AADT Do Something Scenario		2024 AADT Do Nothing Scenario		2024 AADT Do Something Scenario	
Motorway Service Area	-		-		1739		-		2309	
					% HGV	16.25			% HGV	16.25
Local Road, Overbridge	1595		1645		1785		1935		2075	
	% HGV	5	% HGV	5	% HGV	5	% HGV	5	% HGV	5
M1	27,202		28,977				38,482			
	% HGV	13.60	% HGV	13.6	% HGV	13.6	% HGV	13.6	% HGV	13.6

(AADT: Annual Average Daily Traffic)

The nearest noise sensitive properties to the proposed development have been assessed with regard to noise impacts. These represent a worst-case scenario with regards to noise impacts, and are considered representative of properties within the area that may potentially be impacted by the proposed development. The receptor height for single storey properties was modelled at 1.5m and at 4m for two storey properties, to assess a worst-case scenario. In addition, a bituminous pavement road surface with no sound reducing properties was assumed for all roads.

As part of the engineering design for the proposed development, earthen bunds have been integrated into the design. Existing ground levels were determined from a topographical survey of the area. In addition, all base heights of the modelled bunds were determined from the topographical survey and the maximum heights of the bunds were integrated into the noise model. The heights of the bunds are shown in **Table 11.9** below.

Table 11.9: Details of Modelled (Indicative) Bund Locations

West Site				East Site			
Bund Location	**Bund Type**	**Ground Height (AOD)**	**Modelled Height* (AOD)**	**Bund Location**	**Bund Type**	**Ground Height (AOD)**	**Modelled Height* (AOD)**
Bund NW1	Landscaping Bund	4.3m	6.3m	Bund NE1	Landscaping Bund	13.0m	15.0m
				Bund NE2	Landscaping Bund	12.5m	14.5m
Bund NW2	Landscaping Bund	3.5m	5.5m	Bund NE3	Landscaping Bund	12.0m	14.0m
				Bund NE4	Landscaping Bund	13.5m	15.5m

* Modelled bund height is indicative and takes into account the existing ground level plus an additional 2.0m

Noise modelling was carried out for the following scenarios during the operational phase of the proposed development:

- Model 1 Operational Phase - 2009 (traffic noise for Do-Nothing and Do-Something scenarios).
- Model 2 Operational Phase - 2024 (traffic noise for Do-Nothing and Do-Something scenarios).

The predicted noise levels at the nearby sensitive receptors for the 'do-nothing' and 'do-something' traffic scenarios for the year 2009 and 2024 are presented in **Table 11.10 (columns 3 to 6)**, with the receptor locations shown on **Figure 11.2**.

Table 11.10: Predicted Noise Levels for the 'Do-Nothing' and 'Do-Something' Scenarios for 2009 and 2024

Receptor	Base Year 2007 (L_{den})	Do Nothing 2009 (L_{den})	Do Nothing 2024 (L_{den})	Do Something 2009 Do Nothing + Project Traffic* (L_{den})	Do Something 2024 Do Nothing + Project Traffic* (L_{den})	Do Something 2009 Do Nothing + Project Traffic + Industrial Sources** (L_{den})	Do Something 2024 Do Nothing + Project Traffic + Industrial Sources** (L_{den})	Overall Cumulative Impact (Difference between 2024 Do Nothing and Do Something)	Mitigation Required
R1	63.7	63.8	64.4	64.2	64.8	64.2	64.8	Imperceptible (+0.4dB)	No : Condition B not satisfied
R2	60.6	60.7	61.3	61.1	61.7	61.2	61.8	Imperceptible (+0.5dB)	No : Condition B not satisfied
R3	60.0	60.1	60.7	60.4	61.0	60.5	61.1	Imperceptible (+0.4dB)	No : Condition B not *satisfied*
R4	57.0	57.1	57.7	57.3	57.9	57.4	58.0	Imperceptible (+0.3dB)	No : Condition A not satisfied
R5	59.0	59.1	59.7	59.4	60.0	59.4	60.0	Imperceptible (+0.3dB)	No : Condition B not satisfied
R6	51.2	51.2	52.1	51.0	52.1	51.1	52.2	Imperceptible (+0.1dB)	No : Condition A not satisfied
R7	55.2	55.3	55.9	55.5	56.1	55.5	56.1	Imperceptible (+0.2dB)	No : Condition A not satisfied
R8	56.5	56.5	57.1	56.8	57.4	56.8	57.4	Imperceptible (+0.3dB)	No : Condition A not satisfied
R9	60.5	60.6	61.2	60.9	61.4	60.9	61.5	Imperceptible (+0.3dB)	No : Condition B not satisfied
R10	57.7	57.7	58.3	58.0	58.6	58.0	58.6	Imperceptible (+0.3dB)	No : Condition A not satisfied
R11	55.9	56.0	56.6	56.3	56.8	56.3	56.9	Imperceptible (+0.3dB)	No : Condition A not satisfied
R12	58.3	58.2	59.2	58.2	59.4	58.3	59.4	Imperceptible (+0.2dB)	No : Condition A not satisfied

Receptor	Base Year 2007 (L_{den})	Do Nothing 2009 (L_{den})	Do Nothing 2024 (L_{den})	Do Something 2009 Do Nothing + Project Traffic* (L_{den})	Do Something 2024 Do Nothing + Project Traffic* (L_{den})	Do Something 2009 Do Nothing + Project Traffic + Industrial Sources** (L_{den})	Do Something 2024 Do Nothing + Project Traffic + Industrial Sources** (L_{den})	Overall Cumulative Impact (Difference between 2024 Do Nothing and Do Something)	Mitigation Required
R13	59.9	59.8	60.7	59.8	60.9	59.8	60.9	Imperceptible (+0.2dB)	No : Condition B not satisfied
R14	66.8	66.8	67.8	67.0	68.1	67.0	68.1	Imperceptible (+0.3dB)	No : Condition B not satisfied
R15	64.0	64.0	64.9	64.2	65.3	64.2	65.3	Imperceptible (+0.4dB)	No : Condition B not satisfied
R16A	65.3	65.4	66.1	65.8	66.5	65.8	66.5	Imperceptible (+0.4dB)	No : Condition B not satisfied
R16B	62.1	62.2	62.9	62.5	63.3	62.5	63.4	Imperceptible (+0.5dB)	No : Condition B not satisfied
R17	59.4	59.4	60.2	59.8	60.7	59.8	60.7	Imperceptible (+0.5dB)	No : Condition B not satisfied
R18	59.5	59.5	60.3	59.9	60.8	59.9	60.8	Imperceptible (+0.5dB)	No : Condition B not satisfied
R19	60.9	60.9	61.6	61.3	62.0	61.3	62.0	Imperceptible (+0.4dB)	No : Condition B not satisfied
R20	56.8	56.8	57.6	57.4	58.3	57.5	58.4	Imperceptible (+0.8dB)	No : Condition A not satisfied
R21	58.2	58.3	59.0	58.9	59.6	59.0	59.7	Imperceptible (+0.7dB)	No : Condition A not satisfied
R22	64.7	64.8	65.3	65.2	65.7	65.2	65.7	Imperceptible (+0.4dB)	No : Condition B not satisfied
R23	59.4	59.5	60.1	60.0	60.6	60.0	60.7	Imperceptible (+0.6dB)	No : Condition B not satisfied
R24	61.3	61.4	62.0	61.8	62.4	61.9	62.4	Imperceptible (+0.4dB)	No : Condition B not satisfied

Receptor	Base Year 2007 (L_{den})	Do Nothing 2009 (L_{den})	Do Nothing 2024 (L_{den})	Do Something 2009 Do Nothing + Project Traffic* (L_{den})	Do Something 2024 Do Nothing + Project Traffic* (L_{den})	Do Something 2009 Do Nothing + Project Traffic + Industrial Sources** (L_{den})	Do Something 2024 Do Nothing + Project Traffic + Industrial Sources** (L_{den})	Overall Cumulative Impact (Difference between 2024 Do Nothing and Do Something)	Mitigation Required
R25	60.4	60.1	60.9	60.6	61.2	60.7	61.2	Imperceptible (+0.3dB)	No : Condition B not satisfied
R26	54.0	54.0	54.6	54.7	55.6	54.9	55.7	Imperceptible (+1.1dB)	No : Condition A not satisfied
R27	53.9	54.0	54.6	54.8	55.6	54.9	55.7	Imperceptible (+1.1dB)	No : Condition A not satisfied
R28	61.0	61.3	62.3	61.4	62.7	61.6	62.7	Imperceptible (+0.4dB)	No : Condition B not satisfied

* Project Traffic refers to vehicles on the internal roadway network and on the merge and diverge lanes

** Industrial Sources refers to stationary point sources, such as chillers, air conditioners, etc.

11.4.2.2 Other Noise Sources

Noise generated by stationary point sources, (described in Section 11.4.1), within the proposed motorway service area was also included in the assessment. The predicted point source noise levels at the noise sensitive locations in the vicinity of the site were calculated using standard equations for the propagation of noise outdoors in accordance with BS 5228 and ISO 9613-2 standards. It should be noted that the numbers and types of mechanical and electrical equipment considered in this assessment are estimates and are considered to represent a worst-case scenario. The noise modelling included:

- Model 3 Operational Phase - 2009 (results of Model 1 'Do Something' scenario plus industrial noise sources); and
- Model 4 Operational Phase - 2024 (results of Model 2 'Do Something' scenario plus industrial noise sources).
- Model 5 Operational Phase – 2009 and 2024 (Industrial-type (mechanical and electrical) noise sources only, i.e. exclusive of both baseline and project-traffic noise sources). The industrial noise sources at the development in 2009 will be the same as in 2024.

The results of the stationary point source noise Models 3 and 4 are provided in **Table 11.10 (columns 7 and 8)**, above. The results of Model 5 are shown in **Table 11.11**.

Table 11.11 summarises the predicted stationary point (mechanical and electrical sources) noise levels during the operational phase at the sensitive receptors included in the baseline noise monitoring survey as well as at R28. The predicted noise levels associated with air conditioning units, extractor fans, refrigeration units on parked trucks, air compressors, etc at the proposed development are compared with the derived nighttime background (L_{night}) levels at these locations.

Table 11.11: Predicted Industrial-Type Noise Levels from the Proposed Development

Receptor	2007 Calculated Nighttime Noise Level (L_{night})	Modelled Noise Levels from Industrial-Type Sources (L_{Aeq})	Difference between Predicted Industrial-Type Sources and Calculated Nighttime levels (dB(A))	BS4142:1997 Rating
R14 (NSL1)	58.5	30.8	-27.7	Complaints unlikely
R18 (NSL2)	51.4	32.4	-19.0	Complaints unlikely
R28	52.5	38.2	-14.3	Complaints unlikely
R21 (NSL4)	50.4	34.8	-15.6	Complaints unlikely
R1 (NSL5)	56.6	37.3	-19.3	Complaints unlikely
R4 (NSL6)	49.3	31.4	-17.9	Complaints unlikely

11.4.2.3 Overall Impact from Operational Noise

Table 11.10 presents the predicted baseline (i.e. 'Do Nothing' Scenario) noise levels at the modelled receptors in 2007, 2009 and 2024 (columns 2 – 4). These predicted baseline noise levels are primarily a result of noise generated by vehicles travelling along the M1 Motorway with some input

from vehicles on the local road network. The table also includes the predicted noise levels resulting from the addition of project-generated traffic to the baseline noise levels (columns 5 – 6) as well as the predicted noise levels when all three noise sources (baseline traffic, project-traffic and industrial sources) are combined (columns 7 and 8). The cumulative impact rating included in the table (column 9) is based on the significance scale included in **Table 11.2**, while the determination of whether mitigation is required is based on NRA Guideline criteria presented in Section 11.2.41.

As shown in **Table 11.10** the overall impact ratings show that the majority of modelled locations would experience a negligible/imperceptible impact when compared to the significance scale in **Table 11.2**, with the changes in noise levels attributable to the project ranging from an increase of 0.1 to 1.1 dB(A) at the modelled receptors.

The predicted levels in **Table 11.10** have also been compared to the NRA Guideline criteria, as outlined previously and reiterated below, to determine whether mitigation is required.

A. "The combined expected maximum traffic noise level, i.e. the relevant noise level, from the proposed road scheme together with other traffic in the vicinity is greater than the design goal"; and

B. "The relevant noise level is at least 1dB more than the expected traffic noise level without the proposed road in place", and

C. "The contribution to the increase in the relevant noise level from the proposed road scheme is at least 1dB".

Reference: NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes

Application of the three NRA Guideline criteria shows that noise levels attributable to the project do not meet all three of the criteria at any of the modelled receptors. Therefore, no mitigation measures are required.

Table 11.11 illustrates the difference between the existing nighttime noise levels and the predicted noise levels generated by the mechanical and electrical sources, which will be in use during the operation of this 24-hour facility. The purpose of this assessment is to determine whether the industrial sources would result in a nighttime noise nuisance given that the levels of traffic on the M1 Motorway would be expected to drop at night, with a commensurate reduction in the masking effect provided by motorway traffic. As shown, complaints resulting from operation of industrial-type noise sources are unlikely, due to the fact that the noise levels predicted to result from the industrial sources are below the calculated nighttime noise levels.

It should be noted that noise levels at a number of properties in the vicinity of the proposed development are predicted to exceed the 60 dB(A) L_{den} design criteria both with and without the project in place, as shown in **Table 11.10**. It should also be noted that the predicted noise levels for the 2024 'Do Something' scenario are based on traffic data which includes future increases in traffic along the M1 Motorway as well as future increases in traffic on the local road network resulting from committed development in the area. Therefore, this scenario essentially represents the potential cumulative noise impact within the study area.

Should the proposed motorway service area not be developed, (i.e. the "Do Nothing Scenario" prevailed), it is considered that there would be no change in the existing noise environment in the vicinity of the site. The two sites (eastern and western) are currently comprised of agricultural lands and existing ambient noise levels in the area are dominated by traffic noise on the existing M1 Motorway. Therefore, should the "Do Nothing Scenario" continue, there would be no predicted change in noise levels at the site with the exception of variations in external noise sources due to the expected increases in traffic on the M1 Motorway.

11.4.3 Vibration Impacts during the Operational Phase

It has been found that ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. Problems attributable to road traffic vibration can therefore be largely avoided by maintenance of the road surface. Furthermore, the UK Design Manual for Roads and Bridges refers to the percentage of people bothered by vibration as being 10% less than those bothered by noise. Therefore, it is reasonable to assume that there will be negligible impact with regard to vibration, as it is not anticipated that there will be any appreciable sources of vibration at the proposed development.

11.5 MITIGATION MEASURES

No mitigation measures are required to reduce noise impacts from the proposed development. However, should significant changes be proposed at detailed design stage, a noise expert will be required to re-evaluate whether mitigation would be required for the proposed development in order to ensure that the stated criterion is met, as a minimum.

11.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

11.6.1 Construction Noise Impacts

As stated in **Section 11.2.4.2,** the only published Irish guidance relating to the permissible noise level that may be generated during the construction phase of a project is that for national road schemes, as laid out in **Table 11.1**. While, it is acknowledged that the proposed development is not linear in nature, it is an ancillary development to an existing road scheme (M1 Motorway) and as such the most appropriate construction noise assessment criteria are those included in the NRA Guidelines.

During the construction phase of the proposed development, the main potential noise sources would be:

- Heavy plant/machinery and mechanical equipment used to strip and stockpile topsoil/overburden material at the site (e.g. excavators and dump trucks);
- Excavators and earth mover trucks used for haulage of topsoil and excavated material;
- Trucks used for internal/external haulage and delivery of construction materials (e.g. HGVs);
- Plant and machinery used to construct the motorway service area, i.e. main civil and structural engineering phases, concrete mixers, the use of cranes and hoists as well as miscellaneous equipment such as compressors; and
- Traffic associated with construction employees working at the site.

The predicted construction noise levels at the nearby noise sensitive locations were calculated using standard equations for the propagation of noise outdoors in accordance with BS 5228, and ISO 9613-2 standards. It should be noted that the numbers and types of construction phase plant and machinery considered in this assessment have been assumed and represent a worst-case scenario. The predicted construction noise levels include noise emissions for all of the construction equipment listed below, combined with noise emissions from workers travelling to and from the site. In order to predict the likely noise emissions from the site during the construction phase, noise data (sound power levels L_w) for the plant and machinery listed below has been sourced from BS 5228 "*Noise and Vibration Control on Construction and Open Sites*".

East Site	West Site
3 Tracked Excavators	3 Tracked Excavators
2 Wheeled Loaders/Dump Trucks	2 Wheeled Loaders/Dump Trucks
2 Mobile Cranes	2 Mobile Cranes
1 road sweeper	1 road sweeper
1 concrete mixer	1 concrete mixer

The on-site mobile construction plant and machinery, (i.e. excavators, dump trucks, mobile cranes, road sweeper and concrete mixers) and movement of cars, vans and HGVs associated with the construction phase, have been positioned within the site at the representative areas of development, as construction works progress. This will result in changes to the construction noise emission characteristics, as the various elements of the proposed development are constructed.

The following has been assumed for the assessment of construction noise:

- The construction phase will take place over an approximate 12-month period, with the majority of the construction HGV traffic movements occurring during the first 6 months. This has been used as the worst-case scenario traffic levels during the construction period.
- It is expected that a daily average of 77 HGV one-way/154 two-way trips would access the sites during the first 6 months (peak period) of the construction stage for the delivery of construction materials. This is expected to be a steady source of noise emissions during the daytime on the roads approaching and within the site.
- The maximum numbers of construction plant and machinery will be onsite during the initial phases of construction (earthworks, pavement and concrete works, etc.).
- The highest number of construction staff on site will be in the last 6 months of the project, with an estimated 50 cars/vans accessing each site per day, for a total of 200 vehicle movements.
- Cars and vans travelling to and from the site during the construction phase would be expected to peak during the morning (arrival of contractors at the site) and evening (departure of contractors from the site), and would not be a continuous source of noise emissions from the site during a typical working day.
- All construction traffic, including haulage to and from the site as well as personnel movements, will be made via the M1 Motorway, as it will not be permitted to use the existing local road network. The additional traffic generated during the construction phase of the proposed development equates to a 1.8% increase on current traffic volumes on the M1 Motorway.
- The predicted noise levels from the site during construction have been calculated allowing for a 100% level of activity for mobile sources during the working day, to estimate the construction noise level at the nearest sensitive receptors. This represents a worst-case scenario, as it is unlikely that any of the sources will operate continuously throughout the working day.

The following table summarises the predicted noise levels during the construction phase at sensitive receptors included in the baseline noise monitoring survey as well as at R28.

Table 11.12: Predicted Construction Noise Levels

Measured Location	Predicted Noise Level (L_{Aeq} dB(A))	NRA Daytime Guideline Value ($L_{Aeq\,(1hr)}$ dB(A))	
		Monday – Friday	Saturday
NSL1	61.7	70	65
NSL2	59.2	70	65
NSL3	61.8	70	65

Measured Location	Predicted Noise Level (L_{Aeq} dB(A))	NRA Daytime Guideline Value ($L_{Aeq\,(1hr)}$ dB(A))	
		Monday – Friday	Saturday
R28	62.7	70	65
NSL4	63.6	70	65
NSL5	**65.7**	70	65
NSL6	58.2	70	65

Construction works will temporarily increase the noise levels in the immediate vicinity during the early construction phases of the project, due to the use of excavation and soil removal equipment. The predicted noise level at the baseline measurement locations (NSL 1 - 6) for the worst-case construction scenario indicates that all predicted increases are within the NRA recommended construction noise guidelines, with the exception of NSL 5, which would be just above the guideline noise value for Saturday.

Receptor 28 represents is located approximately 75m from the boundary of the western site. The nearest measured location to this receptor is NSL 3, which was located near the gate to the property and is approximately 300m from the site. As a baseline measurement was not available at R28, the predicted baseline noise level at this property was used in this assessment. The estimated construction noise level at this property would be 62.7 dB(A). This estimated construction noise level would be under the NRA's weekday and Saturday guideline values.

As stated above, these estimates represent a worst-case scenario as deliveries to the site and use of heavy plant machinery are expected to reduce as the construction phase progresses. Also, as the earthen bunds included in the project design are completed construction noise levels at the nearby sensitive receptors would be expected to reduce further. Nevertheless, as the increase in noise at NSL5 is expected to result in construction noise levels in excess of the NRA Guideline values this is considered a significant, albeit short-term, negative impact at this receptor. Mitigation to address this impact is provided below.

11.6.2 Construction Vibration Impacts

There is currently no published Irish legislation relating to vibration during construction activities, with the NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes being the only published Irish guidance document regarding road construction activities. However common practice in Ireland is to use guidance from internationally recognised standards, which address vibration standards in two varieties, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings:

- BS6472: 1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz); and
- BS7385: Part 2 1993: Evaluation and Measurement for Vibration in Buildings - Guide to Damage Levels from Ground-Borne Vibration and
- Building Research Establishment (BRE) Digest 353 (July 1990): Damage to structures from ground borne vibration.

In order to ensure that there is no potential vibration damage during construction, the NRA Guidelines recommend that vibration from road construction activities be limited to the values set out in **Table 11.13**. While, it is acknowledged that the proposed development is not linear in nature, it is an ancillary development to an existing road scheme (M1 Motorway). As such the most appropriate

vibration assessment criteria are those included in the NRA Guidelines. These allowable vibration values have been derived through consideration of the various standards outlined above.

Table 11.13: Allowable Vibration During Road Construction in Order to Minimise the Risk to 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 50 Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Reference: NRA Guidelines for the Treatment of Noise and Vibration on National Road Schemes (Table 2).

Piling is a construction activity that can both startle people and animals and give rise to vibration of light building elements (e.g. windows and doors). The magnitude of ground vibration depends on the distance from the piling activity, the size of the pile and the transmission properties of the intervening rock and subsoil. It is expected that there will be a requirement to undertake piling during the construction of the proposed development. As such, the contractor will be required to adhere to the guideline values included in **Table 11.13** as well as prepare and implement a detailed method statement on these works. Further guidelines are provided in **Appendix D.**

11.6.3 Mitigation Measures During Construction

The following mitigation measures shall be implemented to reduce impacts related to construction noise and vibration:

- British Standard BS 5228 "Noise Control on Construction and Demolition Sites" shall be implemented. This includes best practice measures to reduce noise and vibration impacts.

- Normal working hours shall be as per the NRA Guidelines for the Treatment of Noise on National Road Schemes, i.e. within the period 07:00 – 19:00 Monday to Friday and 08:00 – 16:30 on Saturday. (Note that times outside normal working hours include evenings (19:00 – 23:00) and nighttimes (23:00 – 07:00) as well as Sundays and Bank Holidays). Works outside normal working hours shall only take place with the express written agreement from the Relevant Local Authority. This permission, if granted, can be withdrawn at any time should the working hours regulations be breached or should excessive noise be generated during the respective periods.

- Construction compounds will not be sited within 250m of any sensitive receptors.

- The contractor shall be required to produce a method statement to ensure that the safety and the noise and vibration impacts associated with piling activities are minimised. See **Appendix D** for guidelines.

- The maximum allowable vibration levels during general construction (particularly with regard to piling activities) shall be as specified in the NRA Guidelines for the Treatment of Noise on National Road Schemes, as outlined in **Table 11.13.**

- The following guidelines shall be followed and adhered to with regard to vibration impacts during construction:
  - BS6472: 1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz); and
  - BS7385: Part 2 1993: Evaluation and Measurement for Vibration in Buildings - Guide to Damage Levels from Ground-Borne Vibration and

- Building Research Establishment (BRE) Digest 353 (July 1990): Damage to structures from ground borne vibration.

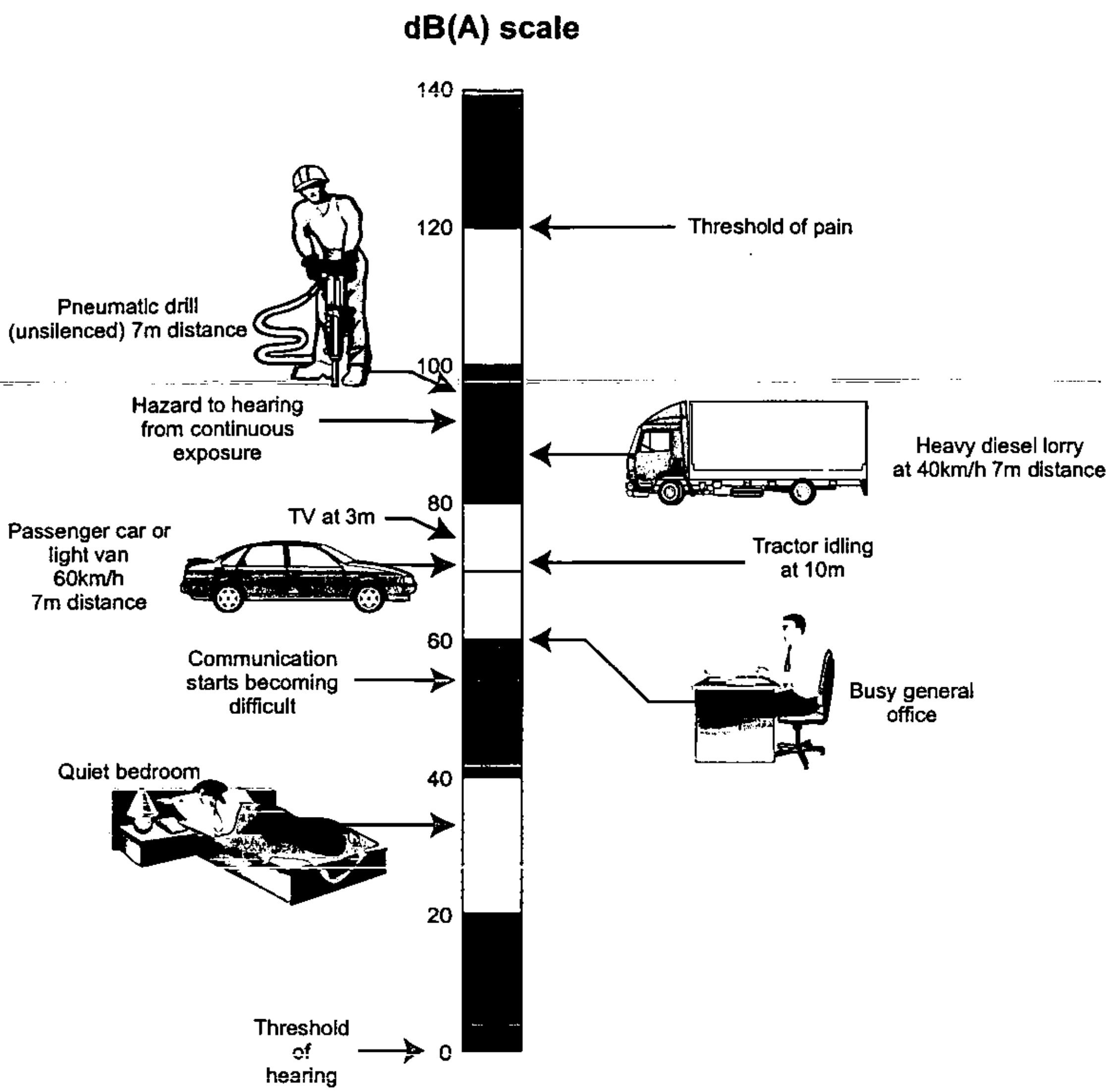
- In terms of allowable levels of noise during the construction phase, there is no published Irish guidance relating to the permissible noise level that may be generated during the construction phase of a project. In general local authorities detail either permissible construction noise levels or limited hours of operation whereby construction activities may be carried out. These values have been obtained with reference to the NRA's guidance document for noise and vibration in national road schemes.

11.7 RESIDUAL IMPACTS

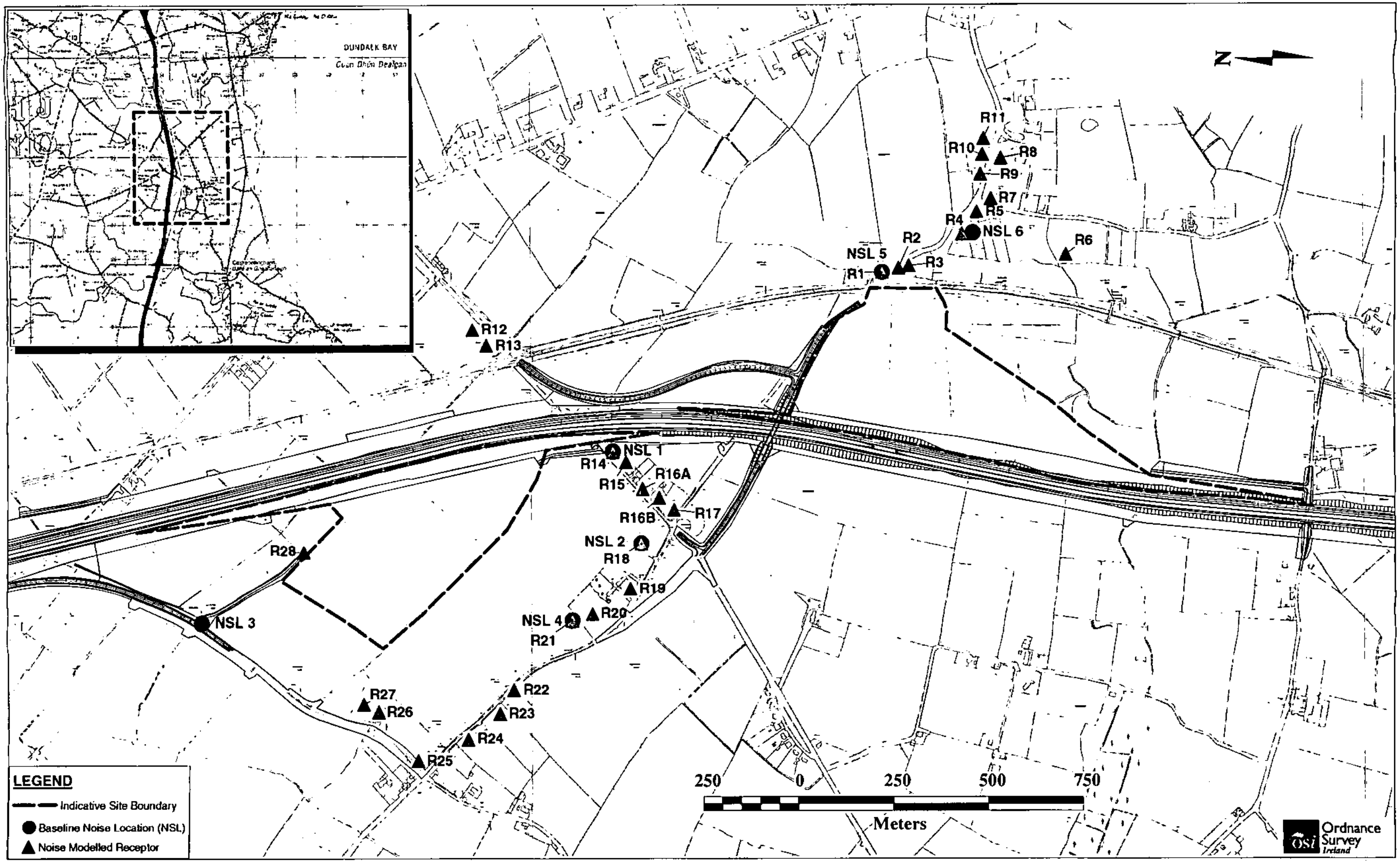
In summary, with implementation of the required mitigation measures, the proposed development would result in a short-term negative impact at sensitive receptors within the vicinity of the proposed development as a result of construction activities; however, it should be noted that the estimated construction noise levels are expected to be below the guideline levels at most of the receptors, as outlined in the NRA Guidelines.

With regard to operational noise, a negligible/imperceptible residual impact on existing noise levels in the area is expected to occur as a result of the proposed development.

Figure 11.1: Level of Typical Common Sounds on the dB(A) Scale



(Source: NRA Guidelines for the Treatment of Noise & Vibration on National Road Schemes)



NDP NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	NOISE MONITORING LOCATIONS		
Designed: xxx	File Ref.: MDT0146MN1015A01	Status: Final	
Drawn: E.L.	Job No: MDT0146		
Checked: L.C.	Scale: 1:10,000 @ A4	Figure No: 11.2	Rev: A01
Approved: A.G.	Date: 13/12/2007		

12 LANDSCAPE AND VISUAL

12.1 INTRODUCTION

This section of the EIS assesses the landscape and visual impacts associated with the construction and operation of the proposed M1 North Motorway Service Area. The assessment begins with a description of the existing landscape setting and visual resources to establish baseline conditions. The proposed M1 North Motorway Service Area is then applied to the baseline and the impacts of the proposed development upon the existing landscape setting and visual resources are predicted.

The full Landscape and Visual Assessment Report is contained in **Volume 3** of this EIS.

12.2 METHODOLOGY

12.2.1 General Approach

The landscape and visual assessment methods are derived from the following guidance:

- Design Manual for Roads and Bridges (DMRB);
- A Guide to Landscape Treatment for National Road Schemes in Ireland (NRA Environmental Assessment and Construction Guidelines, 2005);
- Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute and Institute of Environmental Management & Assessment, 2002); and
- Landscape and Landscape Assessment Guidelines (DOEHLG, 2000).

The assessment was undertaken through analysis of up-to-date digital copies of OSI Discovery Series raster and OSI vector maps and aerial photography, in conjunction with preliminary design details of the proposed development. Site visits were undertaken during summer 2007 to assess the existing environment and the landscape and visual impacts associated with the proposed motorway service area.

Existing visual resources were established along with sensitive receptors, i.e. residential properties, scenic viewpoints and visitor amenity areas. The proposed development was then applied to this landscape and visual baseline, followed by prediction of potential impacts.

12.2.2 Landscape Assessment Methodology

Landscape quality is the value of the landscape in relation to its rarity, location and landscape character attributes. In general, the higher the quality of landscape the more sensitive it will be to change. Based on information gathered as part of the classification of the landscape, it is possible to assess the landscape quality of the study area using the methodology described in the DMRB. This has been completed using the 5-point scale as presented in **Table 12.1**.

Table 12.1: Landscape Quality Assessment

Category	Description
Highest quality	The landscapes of highest quality are, by definition, landscapes of an 'awe inspiring' or 'sublime' nature and are important on an international and national level.
Very attractive	This definition relates to landscapes which are still of high value nationally and can be defined as highly scenic.
Good landscape	This category contains areas that, although still attractive, have less significant and more common landscape features.
Ordinary landscape	This category contains areas that have only common landscape features and some intrusive elements such as conspicuous infrastructure with scope for improvement in management.
Poor landscape	This category includes areas that contain frequent detracting aspects and/or lack of management results in a degraded landscape with very few valued features.

The **landscape sensitivity** is used to establish the capacity of the landscape to accommodate the type of development proposed. This is defined in **Table 12.2**.

Table 12.2: Landscape Sensitivity Assessment

Classification	Description
High	Highest/Very Attractive landscape quality with highly valued or unique characteristics susceptible to relatively small changes.
Medium	Good landscape quality with moderately valued characteristics reasonably tolerant of changes
Low	Ordinary/Poor landscape quality with common characteristics capable of absorbing substantial change.

The **magnitude of landscape resource change** is where direct resource changes on the landscape character of the study area are brought about by the introduction of the proposal and its effects on the key landscape characteristics. The categories and criteria provided in **Table 12.3** have been used to determine the magnitude of resource change.

Table 12.3: Landscape Resource Change Assessment

Classification	Description
High	Total loss or alteration to key elements of the landscape character, which result in fundamental and / or permanent long-term change.
Medium	Partial or noticeable loss of elements of the landscape character and / or medium-term change.
Low	Minor alteration to elements of the landscape character and / or short-term/ temporary change.

The level of significance of impact on landscape character is a product of landscape sensitivity and the magnitude of change in landscape resource, as indicated in **Table 12.4**.

Table 12.4: Landscape Resource Change Assessment

Magnitude of Landscape Resource Change	Landscape Sensitivity		
	Low	Medium	High
No Change	No Change	No Change	No Change
Low	Slight	Slight / Moderate	Moderate
Medium	Slight / Moderate	Moderate	Moderate / Substantial
High	Moderate	Moderate / Substantial	Substantial

12.2.3 Visual Assessment Methodology

Visual sensitivity is a combination of the sensitivity of the human receptor (i.e. resident; commuter; tourist; walker; recreationist; or worker) and the quality of view experienced by the viewer.

Table 12.5: Visual Sensitivity Assessment

Category	Typical Criteria
High Sensitivity	e.g. users of an outdoor recreation feature which focuses on the landscape; valued views enjoyed by the community; tourist visitors to scenic viewpoint; occupiers of residential properties with a high level of visual amenity.
Medium Sensitivity	e.g. users of outdoor sport or recreation, which does not offer or focus attention on landscape; occupiers of residential properties with a medium level of visual amenity.
Low Sensitivity	e.g. regular commuters, people at place of work; occupiers of residential properties with a low level of visual amenity.

The **magnitude of visual resource change** or amenity results from the scale of change in the view with respect to the loss or addition of features in the view and changes in the view composition, including proportion of the view occupied by the proposed development. Distance and duration of view must be considered. Other infrastructure features in the landscape and the backdrop to the development will all influence resource change. **Table 12.6** describes the criteria with regard to the magnitude of visual resource change.

Table 12.6: Magnitude of Visual Resource Change

Category	Criteria
High	Total loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements considered totally uncharacteristic when set within the attributes of the receiving landscape or view.
Medium	Partial loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic when set within the attributes of the receiving landscape/view.
Low	Minor loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape/view.
No Change	Very minor loss or alteration to key elements/ features/ characteristics of the

Category	Criteria
	existing landscape or view and/or introduction of elements that are not be uncharacteristic when set within the attributes of the receiving landscape/view.

The **significance of visual impact** can only be defined on a project-by-project basis responding to the type of development proposed and its location. The principal criteria for determining significance are magnitude of visual resource change and viewer sensitivity. **Table 12.7** illustrates significance of visual impact as a correlation between viewer sensitivity and magnitude of visual resource change.

Table 12.7: Significance of Visual Impact

Magnitude of Visual Resource Change	Visual Sensitivity		
	Low	Medium	High
No Change	No Change	No Change	No Change
Low	Slight	Slight / Moderate	Moderate
Medium	Slight / Moderate	Moderate	Moderate / Substantial
High	Moderate	Moderate / Substantial	Substantial

The visual assessment is assisted by the production of a Zone of Visual Influence (ZVI). The ZVI is the area within which views of the proposed development and associated works during construction and operation can be obtained. The extent of the ZVI is determined primarily by the topography of the area. The ZVI is then refined by field studies to indicate where relevant buildings, woodlands, hedges or other local features obscure visibility from the main roads, local viewpoints/landmarks and settlement, etc. and it is through such field studies that prediction of visual impacts takes place. The ZVI for the proposed motorway service area is illustrated in **Figure 12.1**.

12.3 EXISTING ENVIRONMENT

The proposed M1 North Motorway Service Area is located immediately east and west of the M1 Motorway, approximately 1km west of the village of Dromiskin. The M1 Motorway extends from Dundalk to Dublin along a north south axis. The motorway is a recognised feature of the existing landscape. The R132 (old N1) roadway is located 2km east of the motorway extending from Dundalk through Castelbellingham and onwards towards Dublin. The Belfast to Dublin railway line also crosses this landscape in a north south direction. Existing local roads cross the motorway via overbridges at various locations along its length allowing elevated views across the surrounding agricultural landscape at these locations.

The predominantly agricultural landscape consists of gently undulating fields located on a broad plain that extends inland from the County Louth coastline as far as Tallanstown. The Rivers Glyde and Fane meander from west to east on the south and north side of Dromiskin, respectively. Views north to the Cooley Mountains are available at slightly elevated locations on the M1 Motorway; however, there are no significantly elevated hills in close proximity to the proposed development.

The distinctiveness of the landscapes in the study area can be sub-divided into two landscape character areas (**Figure 12.2** Landscape Character Areas) as follows:

- Muirhevna Plain; and
- Dundalk Bay Coastline.

12.3.1 Landscape Character

12.3.1.1 Muirhevna Plain

This landscape character area covers an extensive part of County Louth from the Boyne Valley to Dundalk. Its key feature is the flat nature of the topography with meandering rivers (Fane, Glyde, White and Dee) flowing eastwards to Dundalk Bay. Man has exploited the fertile soil and the agricultural landscape has a well-kept appearance with large pastoral and arable fields with strong mature hedgerows with trees. The motorway and railway are prominent features crossing this landscape. The area is rich in archaeological features illustrating man's influence over this landscape for centuries. The area is associated with the mythological events of Cuchulainn. Occasional wooded areas occur, particularly associated with demesnes and estate houses such as at Glyde Court. Hedgerow removal has taken place and is evident in fields that run along the M1 Motorway. Rural houses are scattered throughout this landscape with particular concentrations around the environs of Dromiskin.

This landscape has been assessed as of "Good" Landscape Quality as it contains some features worthy of conservation but contains intrusive and common elements. The Muirhevna Plain landscape character area has a medium sensitivity to change.

12.3.1.2 Dundalk Bay Coastline Landscape

This flat landscape extends 1-2km inland from the County Louth coast and barely rises above 20m OD. The fertile soils are used for large-scale arable and pastoral uses. The coast consists of expansive salt marshes and sandy bays. The fields are bounded by well-defined hedgerows and occasional country house estates, where broadleaf woodlands occur. The amount of traffic on the R132 (old N1) roadway has greatly reduced with the opening of the M1 Motorway, which has added to the landscape quality of the area, particularly at Castlebellingham. Scattered rural housing is frequent and conspicuous in this landscape.

This landscape has been assessed as of "Good" Landscape Quality as it contains some features worthy of conservation but contains intrusive and common elements. The Dundalk Bay Coastline landscape character area has a medium sensitivity to change.

12.3.2 Landscape Designations

A review of the Louth County Development Plan 2003-2009 took place to ascertain any relevant landscape designations to assist in the appraisal of important landscape and visual features and landscape quality.

12.3.2.1 The Natural Environment

The proposed development is not located within 10 km of any Areas of Outstanding Natural Beauty or Areas of High Scenic Quality. Policy 2.2 of the Louth County Development Plan 2003-2009 states

> *"it is the policy of the council to afford protection to the landscapes and natural environments of the county by permitting only those forms of development that are considered sustainable in rural areas and do not irreparably damage or unduly detract from the character of the landscape or natural environment".*

12.3.2.2 Scenic Routes

The proposed development is approximately 2km west of the Seabank, Castlebellingham Scenic route (SR8) running south along the Coastline. It is an objective of the Louth County Development Plan 2003-2009 to continue to protect views and prospects of special and amenity value.

12.3.2.3 Views & Prospects of Special Amenity Value

The proposed development is approximately 2.5 km west of Seabank View (VP9). It is an objective of the Louth County Development Plan 2003-2009 to prevent development that would block or otherwise interfere with a view or prospect, considered to be of special amenity value or interest and to preserve prominent landscapes of similar significance.

12.3.2.4 Trees and Woodlands

There are no trees protected by Tree Preservation Orders or Trees and Woodlands of Special Amenity Value within the vicinity of the proposals. Darver Castle Woods (TP13) is approximately 3km to the west. Corderry House, Readypenny (TP26) is approximately 3.5 km to the west.

12.4 POTENTIAL IMPACTS

12.4.1 Potential Sources of Impact

The proposed M1 North Motorway Service Area will result in new built elements in the local landscape. The principal sources of impact of such a development include:

- Disturbance from construction and during operation;
- Imposition of new features in the landscape; and
- Movement in a static landscape.

The following features have been taken into account during the prediction of impacts: the level of new roads, buildings and car parks; slip roads; junctions or structures; gantries and road signs; lighting; traffic on the associated roads, including headlight glare; loss of trees and open space.

12.4.2 Landscape Character Impact Assessment

An assessment of the significance of the impact of the proposed development on the landscape character has been completed and summarised below.

12.4.2.1 Muirhevna Plain

The proposed M1 North Motorway Service Area is located directly within this landscape character area immediately west of the railway line. The impact of the proposed development is limited to the landscape in close proximity to the proposed development due to the flat nature of the topography combined with well-defined hedgerows and trees in the wider landscape. The fields west of the M1 have been enlarged with hedgerows removed resulting in a localised open landscape, with the M1 and its associated traffic a prominent feature. East of the M1 the hedgerows are stronger and trees also occur that restrict the influence of the proposed development eastwards towards Dromiskin. In part, the proposed development will read with the M1 and its traffic; however, the new buildings will be prominent features at a local level.

The landscape quality of this landscape has been identified as *Good*. This landscape character has been identified as having a *medium sensitivity*. The predicted magnitude of change in landscape resource is *high*. Therefore, using the criteria in **Table 12.4**, the predicted significance of landscape impact at a local level for this landscape is *substantial/moderate negative*. The wider Muirhevna Plain landscape will experience no significant landscape impacts.

12.4.2.2 Dundalk Bay Coastline Landscape

The proposed M1 North Motorway Service Area is not located within this landscape character area and therefore would not result in a direct impact on the Dundalk Bay Coastline landscape. The proposed development is located on the western edge of this landscape character area, but due to its location on the western side of the railway and the combination of low hills and trees around Dromiskin, no indirect impacts on this landscape character area are expected. The motorway and its associated traffic, lights and overbridges are an existing feature of the low-lying lands west of the coastline.

The landscape quality of this landscape has been identified as *Good*. This landscape character has been identified as having a *medium sensitivity*. The predicted magnitude of change in landscape resource is *No Change*. Therefore, using the criteria in **Table 12.4**, the predicted significance of landscape impact for this landscape is *No Change*.

12.4.2.3 Summary of Landscape Character Impact Assessment

The following table summarises the Landscape Character Impact Assessment.

Table 12.8: Summary of Landscape Character Impact Assessment

Key Landscape Character	Impact Assessment
Muirhevna Plain	Substantial/Moderate Negative
Dundalk Bay Coastline Landscape	No Change

12.4.3 Visual Impact Assessment

The assessment of the existing environment and the impact of the proposed development on visual receptors established that there would be no important views from visitor amenity areas or tourist sites

affected by the proposed motorway service area. Further there are no protected views or prospects affected by the proposal.

Table 12.9 summarises the number of residential properties that will experience a visual impact from the proposed road. The locations of all properties affected are illustrated in **Figure 12.3** and details are provided in **Table 12.10**. Specific Landscape Mitigation (SLM) has been identified in **Section 12.5** to address the significant impacts established. The residual impact column assumes that the SLM has been implemented and attained 10 years growth.

Table 12.9: Summary of Visual Impact (without mitigation)

Degree of Visual Impact	Number of properties
Substantial negative impact	20
Moderate negative impact	6
Slight negative impact	18
No change	50
Slight positive impact	0
Moderate positive impact	0
Substantial positive impact	0

Table 12.10: Visual Impact Table

Ref	Qty	Existing View	Proposed View	Visual Impact (without mitigation)	Residual Impact (with mitigation)
1	1	Rear view to across open fields to motorway.	Intervening topography and hedgerows limit views.	Slight	No Change (NC)
2	2	Rear view to across open fields to motorway.	Intervening topography and hedgerows limit views.	Slight	NC
3	1	Rear view to across open fields to motorway.	Intervening topography and hedgerows limit views.	Slight	NC
4	3	Front view across local road to trees and hedgerows.	No direct view to proposals.	NC	NC
5	3	Front view across existing road with hedgerows to adjacent houses	No direct view to proposals.	NC	NC
6	1	Front view across existing road with hedgerows to adjacent houses	No direct view to proposals.	NC	NC
7	1	Front view across existing road with hedgerows to adjacent houses	No direct view to proposals.	NC	NC
8	1	Front and side view through hedgerow and trees to fields and motorway.	Partial view to east service area with night-time visibility occurring.	Moderate	Slight
9	9	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC

Ref	Qty	Existing View	Proposed View	Visual Impact (without mitigation)	Residual Impact (with mitigation)
10	5	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
11	7	Front and rear view through hedgerows to fields and motorway and overbridge.	Direct front views to west service area across fields.	Substantial	Moderate
12	5	Elevated rear view through hedgerows/trees to fields and motorway.	Direct front views to west service area across fields.	Substantial	Moderate
13	2	Slightly elevated view across road to agricultural landscape with motorway.	Direct front views to west service area across fields.	Substantial	Moderate
14	2	Front and side view across road to existing houses and fields through hedgerows.	Views to proposal restricted by adjacent buildings and vegetation.	Slight	NC
15	3	Front and side view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
16	2	Rear and side view through garden vegetation, hedgerows and trees to fields and motorway.	Direct front views through vegetation to west service area across fields.	Substantial	Moderate
17	1	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
18	1	Rear and side view through garden vegetation, hedgerows and trees to fields and motorway.	Direct views to west service area. Direct impact from lighting proposed for service area.	Substantial	Substantial
19	10	Rear views across countryside to M1.	Partial view to east service area across motorway with night-time visibility occurring.	Slight	NC
20	12	Front and side views across road towards railway line.	No direct view to proposals.	NC	NC
21	3	Rear views to existing garden vegetation.	No view to buildings but lights and HGVs visible.	Substantial	Moderate
22	4	Rear views to existing garden vegetation.	No direct view to proposals.	NC	NC
23	2	Rear views across countryside to M1.	Partial view to east service area across motorway with night-time visibility occurring.	Moderate	Slight
24	3	Rear views across countryside to M1.	Partial view to east service area across motorway with night-time visibility occurring.	Moderate	Slight
25	5	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
26	1	Front view through hedgerows to open fields.	No direct view to proposals.	NC	NC
27	1	Front view through hedgerows to strong roadside vegetation.	No direct view to proposals.	NC	NC

Ref	Qty	Existing View	Proposed View	Visual Impact (without mitigation)	Residual Impact (with mitigation)
28	1	Front view through hedgerows to strong roadside vegetation.	No direct view to proposals.	NC	NC
29	2	Rear views through hedgerows to motorway.	Partial view to east service area across motorway with night-time visibility occurring.	Slight	NC
30	1	Front view through hedgerows to strong roadside vegetation.	No direct view to proposals.	NC	NC

12.4.4 Earthen Bunds

As described in **Chapter 3** of this EIS, there will be earthworks and excavated material that will be re-used on site. Some of this material is likely to be classified as unsuitable for reuse in engineering embankment construction. This material, subject to hydrogeological testing, will be deposited as earthen bunds within the Motorway Service Area, as shown in **Figure 3.5** and **3.6**, or shall be removed from site for appropriate disposal. The earthen bunds will be developed in sympathy with the local environment and as such will have a natural profile with a maximum of 1:4 side slopes. The maximum height of the bunds will be a maximum of 2 metres above the existing ground level.

12.5 MITIGATION MEASURES

In line with the NRA Guide to landscape treatments of National Road Schemes in Ireland it is a core objective of the landscape mitigation to use native plants and seed from indigenous sources. The implementation of the landscape mitigation measures shall be in accordance with the NRA Guide to landscape treatments.

12.5.1 Landscape Planting

An objective of the landscape planting at the proposed development is that it provides as diverse a woodland habitat structure as practicable and endeavours to establish species of trees that are beneficial to wildlife. The **General Landscape Planting Mitigation Measures** required to achieve this objective shall include the following.

- The landscaping shall only use native plants and seed from indigenous sources.
- The retention of the existing hedgerows and trees will be undertaken, as far as possible.
- The use of larger size trees and evergreen shrubs will be required to reduce visual impacts at significantly affected properties, i.e. locations where substantial or moderate/substantial negative impacts have been predicted (See Specific Landscape Mitigation later in this chapter).
- Tall upright growing trees (of *Fastigiata* varieties) shall be placed near adjacent roadways to prevent spread of foliage horizontally and shall achieve the required visual mitigation.

- During the detailed design stage, a Landscape Master Plan for the motorway service area shall be devised by suitably qualified landscape architect, in consultation with the Project Ecologist and Design Project Engineer. The Project Ecologist shall ensure that the ecological mitigation measures reflected in **Chapter 13** have been incorporated into the Master Plan. The Master Plan will take into account the following:
  - That an equivalent amount of hedgerows and tree line removed by the proposed development will be replaced by similar indigenous species at appropriate locations in the landscape where hedgerows are a feature;
  - The use of plant species shall be appropriate to the angle of slope, soil characteristics, etc. of the proposed development; and
  - The landscape design shall integrate the re-use of site-excavated material (subject to hydrogeological testing).
- Lighting columns in proximity to sensitive receptors shall be restricted to a height of 10 metres within the motorway service area. The lighting design specifications shall follow that described in **Chapter 3** of this EIS.

The **Specific Landscape Mitigation Measures (SLMs)** summarised in **Table 12.11** shall be implemented as part of the proposed development.

Table 12.11: Specific Landscape Measures

Location	Description of SLM to be Implemented
SLM 01 Along eastern and southern boundary of the east service area and within the development (semi mature tree planting)	Minimum 10 metres wide belt of woodland planting with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property references; 8 and 21, 23 and 24 (See Figure 12.3 for location of properties)
SLM 02 Along southern eastern and western boundary of the western service area and within the development (semi mature tree planting)	Minimum 10 metres wide belt of woodland planting with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property references; 11, 12, 13, 16 and18 (See Figure 12.3 for location of properties)
SLM 03 Around remaining site boundaries of both east and west service areas	Minimum 10 metres wide belt of woodland planting to form a woodland framework with a high proportion of evergreen species and semi mature trees, as well as semi mature trees planted around and within proposed car parks necessary to mitigate significant landscape impacts on the surrounding Muirhevna Plain Landscape.
SLM 04 Along the lands adjacent to the merge lane of the western service area	Minimum 10 metres wide belt of woodland planting to form a woodland framework with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property reference 18. (See Figure 12.3 for location of properties)

The SLMs in **Table 12.11** shall incorporate the following:

- The woodland screening mix shall be composed of strong growing native species that reflect the species found in adjacent hedgerows in this part of the County Louth landscape. Suitable woodland species within the mix shall include – *Fraxinus excelsior*, *Quercus robur*, *Betula pendula*; *Alnus glutinosa* and *Corylus avellana*. Suitable evergreen species shall include *Ligustrum vulgare*; *Ilex aquilfolium* and *Ulex europaeus*.

- Individual native woodland trees shall be planted as semi mature trees within the woodland screening mix for additional screening at densities that will reflect the distribution of scattered trees within woodland and hedgerows in the surrounding landscape. The woodland shall be such that it establishes a closed canopy within five years. The woodland trees and shrubs shall be managed and monitored by the PPP Concessionaire as it develops.

- In line with the recommendations of the terrestrial ecology assessment (see **Chapter 13**), non-native trees or shrub species such as sycamore, beech, red osier and non-native willow shall not be used for landscaping purposes. Where landscaping is proposed, appropriate native trees and shrubs shall be used such as those outlined in **Table 13.6**.

12.5.2 Earthen Bunds

- Should the design of the earthen bunds change during the detailed design stage from that described in this EIS the Project Engineer shall consult with the Landscape Architect to ensure no adverse visual impact.

- The material to be re-used for earthen bunds shall only be used if deemed appropriate subject to hydrogeological testing.

- The earthen bunds shall be developed in sympathy with the local environment and shall have a natural profile of 1:4 side slopes.

- The maximum height of the bunds shall be restricted to a height of 2 metres above the existing ground level, which will be designed during the detailed design stage in consultation with the Project Engineer and the Landscape Architect.

12.5.3 Monitoring and Maintenance

Maintenance of the landscape works will be an integral part of the on-going site management. The contractor/concessionaire shall prepare and implement a landscape maintenance plan after the construction of the proposed development. This shall include the following:

- A defects liability period during which any defective plant material is to be replaced to insure the healthy establishment of mitigation planting;

- Weed and litter control, including monitoring, particularly during the early growing seasons of the landscape maintenance contract;

- Grass cutting and replacement of failed plants;

- Compliance with all health and safety standards, in particular with regard to maintenance works during the operational phase of the project; and

- Measures to be taken to ensure that there is no detrimental impact on adjacent ground/surface water bodies or adjacent vegetation or fauna.

12.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

The construction of the proposed motorway service area will necessitate the removal of existing trees and hedgerows along with earth moving activities, creation of stockpiles, construction traffic and erection of cranes and structures. The construction stage impacts have been included in the predicted impacts outlined in **Section 12.4** above for both landscape character and visual receptors. The impacts caused by construction activities (movement of construction traffic, creation of stockpiles and erection of cranes) will be temporary in nature and duration. Despite their temporary nature the following mitigation measures shall be implemented:

- Construction compounds will not be located within 250m of residential properties; and
- If construction activities take place during dry weather, dust control measures shall be implemented to avoid dust arising that may draw attention to construction activities. The mitigation measures provided in **Chapter 10 Air Quality** shall be implemented to minimise these impacts.

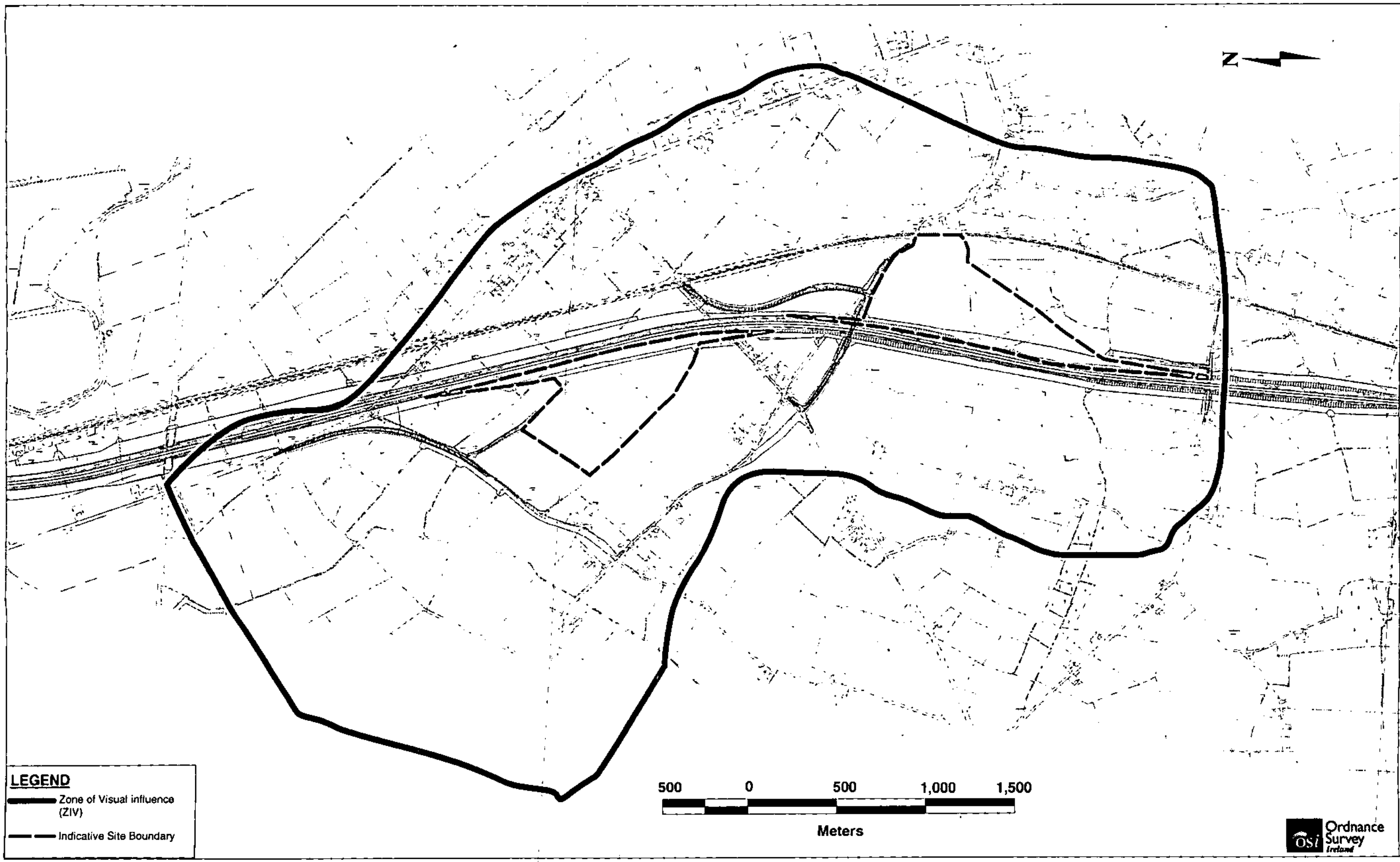
12.7 RESIDUAL IMPACTS

After 10 years of growth the proposed planting will help to integrate the development into the existing landscape. The woodland framework will limit the extent of the influence of the facilities associated with the motorway service area on the Muirhevna Plain Landscape with a resultant reduction in impact from Substantial/Moderate Negative Impact to Moderate Negative Impact.

With regards to visual impact on sensitive receptors a loss of existing views will remain for one property. In general the visual impacts are significantly reduced. The predicted residual visual impacts for all properties are provided in detail in **Table 12.10** and summarised in **Table 12.12**.

Table 12.12: Summary of Visual Impact (after mitigation)

Degree of Visual Impact	Number of properties (before mitigation)	Number of properties (after mitigation)
Substantial negative impact	20	1
Moderate negative impact	6	19
Slight negative impact	18	6
No change	50	69



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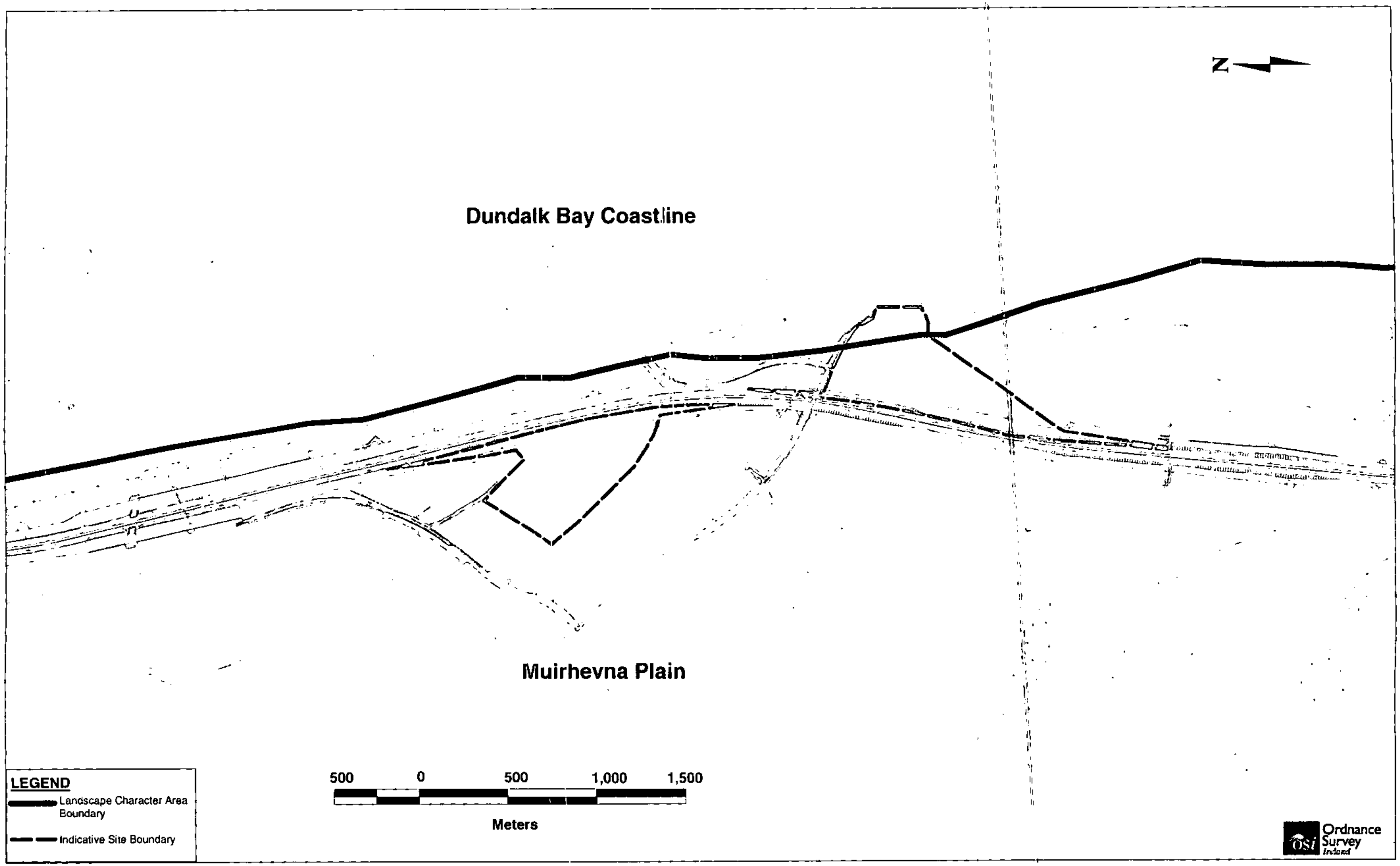
Project Title: M1 NORTH MOTORWAY SERVICE AREAS

Drawing Title: ZONE OF VISUAL INFLUENCE

Designed: xxx	File Ref: MDT0146M/N100BA01	Status: Final	
Drawn: F.L.	Job No: MDT0146		
Checked: L.C.	Scale: 1:15,000 @ A4	Figure No: 12.1	Rev: A01
Approved: A.G.	Date: 07/12/2007		



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Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	LANDSCAPE CHARACTER AREAS
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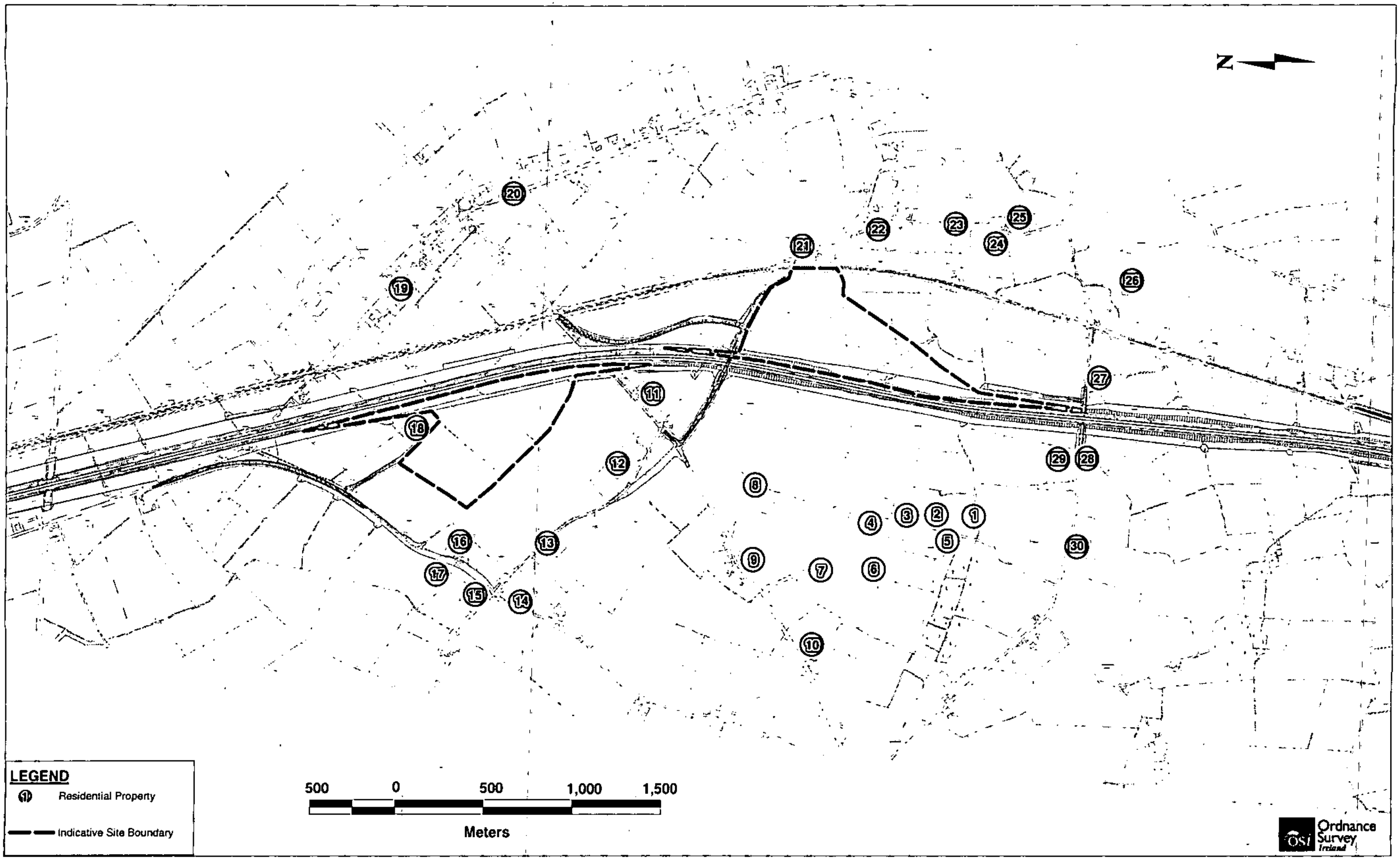

Project Title: M1 NORTH MOTORWAY SERVICE AREAS

Drawing Title: VISUAL IMPACTS

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Transport 21

13 TERRESTRIAL ECOLOGY

13.1 INTRODUCTION

This section of the Environmental Impact Statement provides a description of the existing flora and fauna (terrestrial ecology) at the site of the proposed M1 North Motorway Service Area and assesses the potential impacts to ecology arising from the construction and operation of the proposed development.

The proposed development is located along the existing M1 Motorway in the vicinity of Dromiskin. The motorway, which was completed in 2001, is a significant linear feature dividing the environment in that area. The site of the proposed development is mainly open agricultural Greenfield with hedgerows and tree lines providing some habitat diversity.

13.2 METHODOLOGY

13.2.1 Legislation and Policy Context

In preparing the Ecological Impact Assessment, reference has been made to the following guidance;

- Environmental Protection Agency: Guidelines on the information to be contained in Environmental Impact Statements (2002),
- Environmental Protection Agency: Advice Notes on current practice in the preparation of Environmental Impact Statements (2003).
- National Road Authority: Environmental Assessment and Construction Guidelines (2004-2007).

13.2.2 Desktop Review

A desktop review was carried out to identify features of ecological importance and interest within the proposed development and immediate surroundings. Designated sites of nature conservation interest in the surrounding environment of the study area were reviewed. The National Parks and Wildlife Service Database of Rare Plants and Mammal species was reviewed to determine whether any records of protected plants or animals existed for the area. The original EIS for the M1 Motorway (Dunleer – Dundalk Motorway Project EIS, Louth Co. Co. 1993) was also reviewed. A consultation letter was also sent to the DoEHLG.

13.2.3 Field Survey

The site of the proposed development was surveyed in November 2007. Habitats were classified using habitat descriptions and codes published in *A Guide to Habitats in Ireland* (Fossitt, 2000). The criteria used for assessing the significance of effects of the proposed development is presented in **Table 13.1** and **Table 13.2** and is based on the *Guidelines for the Assessment of Ecological Impacts of National Road Schemes* (NRA, 2006). Latin names for all species mentioned in the text are provided in **Tables 13.5 and 13.6**.

Table 13.1: The ecological importance of sites

Rating	Importance of site
A	Internationally important Site qualifying for designation as SAC or SPA under EU Habitats or Birds Directives
B	Nationally or regionally important Site proposed for designation as NHA or containing habitats or populations of species that are nationally or regionally significant
C	High value, locally important Sites containing semi-natural habitat types with high biodiversity or significant populations of locally rare species
D	Moderate value, locally important Sites containing some semi-natural habitat or locally important for wildlife
E	Low value Widely found habitats with typical but relatively low species diversity and low wildlife value

Source: *National Roads Authority, Environmental Assessment and Construction guidelines (2004-2007)*

Table 13.2: Rating of impacts on sites/features of ecological interest

Impact	Value A	Value B	Value C	Value D	Value E
Severe	Any permanent impact	Permanent impact on large part of site			
Major	Temporary impacts on large part of site	Permanent impacts on small part of site	Permanent impacts on large part of site		
Moderate	Temporary impact on small part of site	Temporary impact on large part of site	Permanent impact on small part of site	Permanent impact on large part of site	
Minor		Temporary impact on small part of site	Temporary impact on large part of site	Permanent impact on small part of site	Permanent impact on large part of site
Not significant			Temporary impact on small part of site	Temporary impact on part of site	Permanent impact on part of site

Source: *National Roads Authority, Environmental Assessment and Construction guidelines (2004-2007)*

13.2.4 Limitations of Study

The field survey took place during November 2007. This is outside the flowering time of many common species of Irish flora, which means that some flowering plants may not have been recorded. Access to the Red Bog was also restricted due to the very wet nature of this habitat.

13.3 EXISTING ENVIRONMENT

The M1 North Motorway Service Area development is located adjacent to the M1 Motorway near the village of Dromiskin in Co. Louth. Two areas will be developed: one on the eastern side of the motorway and one on the western side of the motorway. For the purposes of the terrestrial ecology assessment, the area on the eastern side of the motorway is referred to as Site A, while the area to the west of the motorway is referred to as Site B. Habitats identified during the field survey are listed in **Table13.3**. Note that the Latin names of flora and fauna species have been provided in **Tables 13.4 and 13.5.**

Table 13.3: Habitats and Codes according to Fossitt 2000

Habitat	Code	Habitat	Code
Drainage ditches	FW4	Hedgerows	WL1
Wet grassland/marsh	GS4	Improved agricultural grassland	GA1
Arable crops	BC1	Scrub	WS1
Grassy Verge	GS2		

13.3.1 Habitat Description

13.3.1.1 Site A – East of the M1 Motorway

The main habitat types found at Site A include a large field of arable crops (**Figure 13.1**), which had been harvested by the time of the field survey. This field is bounded on the southern and eastern sides by a well-developed hedgerow, made up of shrub species such as gorse, bramble, dogrose, hawthorn and willow, with the occasional sycamore on the eastern boundary. The herbaceous layer contains grasses such as meadow grass and brome, bush vetch, cow parsley, goose grass and red dead-nettle.

To the south of this area of arable land is an area known locally as the Red Bog (**Figure 13.1, Plate 1**). This is an area of very wet marshy grassland that has developed in a poorly drained basin surrounded by drier habitats. The vegetation is dominated by rushes, mainly hard rush, soft rush and sharp-flowered rush with the occasional bulrush, and grasses such as floating sweet-grass and sweet vernal grass. Other abundant plants typical of this type of wet habitat include horsetail, hoary willow herb, marsh bedstraw, flag iris and meadowsweet. Common duckweed is also abundant, particularly in patches of standing water. Occasional plants include marsh cinquefoil and fools watercress, along with lesser stitchwort and celery-leaved buttercup in the drier areas. A strip of scrub woodland, comprising gorse and willow has developed through the centre of this wet grassland.

At the western edge of the Red Bog, the ground rises and dries out near the motorway. Here the habitat changes to a dry, grassy verge. The abundant grass species present include Yorkshire fog, creeping bent grass, brome and clumps of cocks foot. Herbaceous plants include marsh thistle, hawk bit, clover, tufted vetch, black medic, creeping buttercup and dock.

To the south of the Red Bog, the ground again rises and dries out. This area comprises fields of improved agricultural grassland, where the dominant grass species is ryegrass accompanied by clover, creeping buttercup and the occasional ragwort. These fields are separated by thin hawthorn hedgerows.

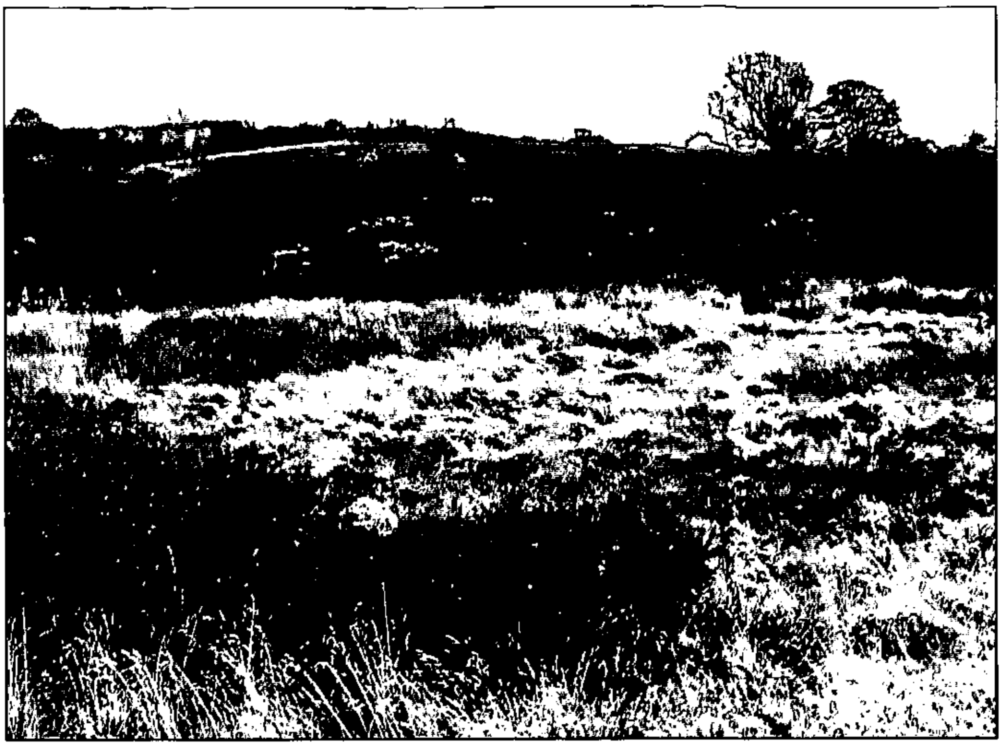


Plate 1: The Red Bog

13.3.1.2 Site B – West of the M1 Motorway

Site B is made up of three fields of recently sown arable crops (labelled Fields A, B and C, **Figure 13.1**) and one field of improved agricultural grassland (Field D, **Figure 13.1**). Between these fields and the M1 Motorway is a dry grassy verge. The grassy verge is dominated by grass species such as meadow grass, creeping bent and Yorkshire fog. Other grass species occasionally found include crested dog's tail, sweet vernal grass and timothy. Part of the motorway drainage system is located along this verge and these wetter areas have abundant soft rush associated within them. The herbaceous component includes red clover, hoary willow herb, bush vetch, hairy tare hop trefoil, curled dock, lesser stitchwort, silverweed, hawk bit, dandelion, sow thistle, purple loosestrife and creeping buttercup.

The three fields of arable crops are bordered by deep, water filled drains. The most abundant species associated with these drains include common reed and flag iris, along with duckweed and fool's watercress. Bulrush and horsetail also occasionally occur. Along the grassy margins of the drains, dock, nettle, bramble, meadowsweet, goosegrass, creeping buttercup, common vetch and grasses are dominant. Other occasional plants include angelica cow parsley and woody nightshade. The most northerly drain (Field C) borders a field of improved agricultural grassland and here, the vegetation includes some hawthorn and ivy. Dyer's rocket is also found along this drain. Other drains bordering this field support abundant willow and some hawthorn.

Table 13.4: Latin Names of Plant Species Mentioned in the Text

Common name	Latin Name	Common name	Latin Name
Gorse	*Ulex europaeus*	Marsh thistle	*Cirsium palustre*
Bramble	*Rubus fruticosus agg.*	Hawkbit	*Leontodon sp*
Dogrose	*Rosa canina*	Clover	*Trifolium sp*
Hawthorn	*Crataegus monogyna*	Trufted vetch	*Vicia cracca*
Willow	*Salix sp.*	Black medic	*Medicago lupulina*
Sycamore	*Acer pseudoplatanus*	Dock	*Rumex sp.*
Meadow grass	*Poa sp.*	Ryegrass	*Lolium sp.*
Brome	*Bromus sp*	Creeping buttercup	*Ranunculus repens*
Bush vetch	*Vicia sepium*	Ragwort	*Senecio sp.*
Cow parsley	*Anthriscus sylvestris*	Crested dog's tail	*Cynosurus cristatus*
Goosegrass	*Galium aparine*	Timothy	*Phleum pratensis*
Red dead-nettle	*Lamium purpureum*	Red clover	*Trifolium pratense*
Hard rush	*Juncus inflexus*	Bush vetch	*Vicia sepium*
Soft rush	*Juncus effusus*	Hairy tare	*Vicia hirsuta*
Sharp-flowered rush	*Juncus acutiflorus*	Hop trefoil	*Trifolium campestre*
Bulrush	*Typha latifolia*	Curled dock	*Rumex crispus*
Floating sweet-grass	*Glyceria fluitans*	Lesser stitchwort	*Stellaria graminea*
Sweet vernal grass	*Anthoxanthum odoratum*	Silverweed	*Potentilla anserina*
Horsetail	*Equisetum sp.*	Dandelion	*Taraxacum spp*
Hoary willowherb	*Epilobium parviflorum*	Sowthistle	*Sonchus sp*
Marsh bedstraw	*Galium palustre*	Purple loosestrife	*Lythrum salicaria*
Flag iris	*Iris pseudacorus*	Common reed	*Phragmites australis*
Meadowsweet	*Filipendula ulmaria*	Duckweed	*Lemma minor*
Common duckweed	*Lemma minor*	Nettle	*Urtica dioica*
Marsh cinquefoil	*Potentilla palustre*	Bramble	*Rubus fruticosus agg.*
Fools watercress	*Apium nodiflorum*	Common vetch	*Vicia sativa*
Lesser stitchwort	*Stellaria graminea*	Angelica	*Angelica sylvestris*
Celery-leaved buttercup	*Ranunculus sceleratus*	Woody nightshade	*Solanum dulcamara*
Yorkshire fog	*Holcus lanatus*	Hawthorn	*Crataegus monogyna*
Creeping bent	*Agrostis stolonifera*	Ivy	*Hedera helix*
Cocks foot	*Dactylis glomerata*	Dyer's rocket	*Reseda luteola*

13.3.2 Designated Conservation Areas

Designated conservation areas are areas containing habitats or species of national or international conservation importance. Candidate Special Areas of Conservation (cSAC) are protected under the European Union (EU) Habitats Directive (92/43/EEC), as implemented in Ireland by the European Communities (Natural Habitats) Regulations, 1997. Special Protection Areas (SPA) are designated under Directive 79/409/EEC, The Directive on the Conservation of Wild Birds ('The Birds Directive'),

and this is now included under the EU Habitats Directive. Proposed Natural Heritage Areas (pNHAs), are protected under the Wildlife Act 1976 and 2000.

The nearest designated site is Dundalk Bay (Site Code 00455/04026), which is designated as a cSAC, pNHA and SPA. Dundalk Bay is located approximately 2.5km due east of the proposed development. Stabannan-Braganstown SPA/pNHA, an area of high ornithological importance as a feeding area for wintering waterfowl, is located approximately 3.5 km to the south west of the proposed development (**Figure 13.2**).

13.3.3 Rare Plants

A review of the National Parks and Wildlife Rare Plant Database shows that no listed rare species of plant, including those on the current Flora Protection Order are known to occur on the site of the proposed development at present. In addition, no protected plants were identified during the original fieldwork conducted along the motorway during the preparation of the original M1 Motorway EIS (Louth Co. Co. 1993).

13.3.4 Fauna

A review of the NPWS database indicates that there is no record of any species of fauna subject to Irish or EU legislative protection identified within the proposed development. It is likely that common species such as rabbit, hare, hedgehog, fox, pygmy shrew and wood mouse, which are ubiquitous through much of the Irish countryside, are present in the area. There were obvious signs of badger activity, including badger paths and droppings at both Site A and Site B, particularly along the grassy verges adjacent to the M1 Motorway (**Plate 2**). Badgers are protected under the Wildlife Act 1976 (as amended in 2000).

It is highly likely that the Red Bog and the drains at Site B are utilised for breeding by the common frog and a dead frog was observed in the grassy verge adjacent to Site B. The common frog and its breeding sites are protected under the Wildlife Act 1976 (as amended in 2000).

Although a separate bat survey was not carried out, there is little or no habitat suitable for bats present within the proposed development. The nearest habitat suitable for bats would be the treelines and hedgerows associated with the railway line, adjacent to the eastern boundary of Site A. All Irish bat species are protected under the Wildlife Act 1976 (as amended in 2000) and EU Habitats Directive (92/43/EEC).

The birdlife associated with the area is typical of agricultural land and included wood pigeon, rook and blackbird, with wren heard in the adjoining hedgerows.

Table 13.5: Latin Names of Animal Species Mentioned in the Text

Common name	Latin Name	Common name	Latin Name
Rabbit	*Oryctolagus cuniculus*	Badger	*Meles meles*
Hare	*Lepus timidus hibernicus*	Common frog	*Rana temporaria*
Hedgehog	*Erinaceus europaeus*	Wood pigeon	*Columba palumbus*
Fox	*Vulpes vulpes*	Rook	*Corvus frugilegus*
Pygmy shrew	*Sorex minutus*	Blackbird	*Turdus merula*
Wood mouse	*Apodemus sylvaticus*	Wren	*Troglodytes troglodytes*

Plate 2: Mammal track along grassy verge

13.3.5 Evaluation of Ecological Importance

13.3.5.1 Habitats

The vast majority of the proposed M1 North Motorway Service Area is made up of arable land that is of little or no ecological value. This habitat has a low species diversity and low wildlife value and is given a rating of 'E' under the classification scheme outlined in **Table 13.1**. The grassy verges that run adjacent to the M1 Motorway have some wildlife value, particularly within the context of the adjacent low value arable land. Therefore they are given a 'D' rating under the classification scheme outlined in **Table 13.1**, as they are of moderate value though of local importance only. In the context of the surrounding agricultural land, the Red Bog area is of high value and is locally important as it adds to the biodiversity of the area. This habitat is given a 'C' rating under the classification scheme outlined in **Table 13.1**.

13.3.5.2 Species

No rare or threatened plant species were encountered within the study area. All of the bird and animal species that are likely to occur within the study area would be widespread in the region. Two protected species, badger and common frog were identified as potentially using the site of the proposed development.

13.4 IMPACTS

The activities associated with the proposed development that have the potential to affect the ecology of the site and surrounding area include:

- Direct Habitat loss;
- Disturbance;
- Fragmentation; and
- Water Pollution.

13.4.1 Direct Habitat Loss

The main impact from construction of the M1 North Motorway Service Area on terrestrial ecosystems will be habitat loss. Most of the habitats that will be lost are of low ecological value but the grassy verges and Red Bog marshy grassland have some importance as feeding and breeding territory for common species of birds and mammals. The animal and bird species directly affected by habitat loss in this way will simply disperse and establish new territory in the surrounding countryside. Overall, habitat loss will be mainly confined to arable land and improved agricultural grassland, which is of low ecological value. As such, loss of this habitat type will not be significant. A small part of the Red Bog area will potentially be directly impacted by the construction of a roundabout and attenuation pond. As this site has been identified as being of high local value, this will be a permanent negative impact of moderate significance, in accordance with the NRA Guidelines.

13.4.2 Disturbance

Increased activity during the operational stage may cause disturbance impacts to birds and mammals in the area through the effect of traffic noise and increased human activity. However, in the context of the existing disturbance from the presence of the motorway, this will not have a significant impact.

13.4.3 Fragmentation

Fragmentation is the breaking up of habitats resulting in interference with existing ecological units. Its impact is related to the territory size and mobility of animals that live in the area in question. Animals with large ranges are the most susceptible and, in particular badgers, can be affected by new roads. These animals attempt to use their pre-existing territory on each side of the new road and may suffer mortality from traffic as a result.

Field surveys have identified that badgers are using the grassy verges adjacent to the M1 as a corridor to access the surrounding agricultural land. The proposed development will see these established corridors bisected by access roads and will result in potentially moderate negative impact on this protected species.

Fragmentation may result in important wildlife corridors being disturbed. This type of disruption may occur to bats that require tree lines and hedges to move along and may be confined by the removal of hedgerows and the creation of open space in the proposed development.

13.4.4 Impacts on Surface water

Pollution of watercourses and wetland areas may occur during the operational phase from run off from hard standing areas or accidental spillages of fuels. This has the potential to negatively impact on the diversity of floral species and water dependant fauna such as the common frog. The pollution of watercourses is looked at in further detail in **Aquatic Ecology** chapter of this EIS.

13.5 MITIGATION MEASURES

13.5.1 General mitigation

The following are general mitigation measures for the terrestrial environment:

- Where hedgerows and treelines are to be removed for the proposed development an equivalent amount of hedgerow and treeline shall be replaced by similar indigenous species. This will be agreed with the Project Ecologist and Landscape Architect during the preparation of the Landscape Master Plan.

- Non-native trees or shrub species such as sycamore, beech, red osier and non-native willow will not be used for landscaping purposes. Where landscaping is proposed, appropriate native trees and shrubs shall be used as per **Table 13.6**.

Table 13.6: Suggested plant species for landscaping purposes

Common Name	Scientific Name	Common Name	Scientific Name
Ash	*Fraxinus excelsior*	Hawthorn	*Crategeus monogyna*
Alder	*Alnus glutinosa*	Blackthorn	*Prunus spinosa*
Hazel	*Corylus avellana*	Elder	*Sambucus nigra*
Holly	*Ilex aquifolium*	Dog Rose	*Rosa canina*
		Willow	*Salix spp*

- The development of the Landscape Master Plan for the proposed development will be carried out in consultation with a qualified ecologist to ensure the final landscape design incorporates habitat and structural diversity and uses plant species, which have a positive benefit for biodiversity.

- Reference shall be made to mitigation in relation to watercourses as included in **Aquatic Ecology** chapter.

13.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

13.6.1 Construction Impacts

Construction consists of a number of activities that have the potential to affect flora and fauna, e.g. site clearance, disturbance, excavation / infill and drainage.

Site clearance has the largest impacts on ecology, involving the removal of pre-existing habitats and soil disturbance.

Increased activity during the construction phase may cause **disturbance** impacts to birds and mammals in the area through the effect of construction traffic, noise, dust and increased human activity.

Excavation and infill require the use of heavy machinery which has to be stored and maintained on-site, but also has to gain access to the working area. This may cause damage to a wider zone of vegetation, and in particular to the pond located to the south of the proposed development, especially in wet weather when compaction and physical damage is likely.

Excavation activities may also impact on trees that are to be retained on-site, particularly if their root systems are undermined.

Overall, the impacts from construction will be temporary in nature, and once appropriate mitigation measures are carried out, will not be significant.

13.6.2 Construction Mitigation

- A Project Ecologist shall be employed in advance of any site clearance/construction activities.
- The NRA Environmental and Construction Guidelines shall be followed prior, during and post construction of the proposed development.
- The Project Ecologist shall ensure that any ecological mitigation measures which were incorporated into the M1 Motorway scheme and are now impacted by the construction of the proposed Motorway Service Area are adequately reinstated as part of the works.
- Hedgerows will be retained where possible as they provide wildlife corridors, nesting sites for birds, and may contain badger setts.
- Hedgerows to be retained, as identified by the Project Ecologist prior to site clearance, shall not be removed / damaged to facilitate stockpiling of materials or disposal of materials on-site.
- Clearance of hedgerows and trees from site shall not take place between March 1st and August 31st where possible in order to avoid the bird nesting season. Where clearance during the bird nesting season is unavoidable, a fully qualified ecologist shall undertake a nest survey prior to any clearance. Where active nests are identified, consultation will take place with the NPWS to develop a mitigation strategy.
- Disturbance of the Red Bog during construction and use of plant and machinery in this area will be limited to the section of the proposed development where the roundabout and access roads are to be constructed. The remainder of the Red Bog will be fenced off prior to any works commencing. Construction related activities including site compounds, borrow pits, spoil or storage of construction materials shall not be located in this area.
- Construction and construction related activities (including the deposition of spoil and/or placing of ancillary services) shall not take place outside the landtake. Should additional lands, outside the landtake be required the contractor shall consult with the local NPWS ranger to ensure no locally important ecological sites are impacted.
- The contractor/concessionaire shall consult an ecologist should any protected flora and fauna species be found during construction and appropriate mitigation measures will be implemented by the Project Ecologist.

- Evidence of badgers was noted during the field survey within grass verges adjacent to the proposed development and motorway. The location of the sett is currently unknown but is not within the site boundary. A full badger survey shall be carried out by a qualified ecologist prior to any construction activity on- site to identify the sett, after which appropriate mitigation will be developed in consultation with the NPWS. As a minimum the entire proposed development shall be surrounded by badger proof fencing to ensure that badgers are excluded from the site and any potential vehicle conflicts are avoided.

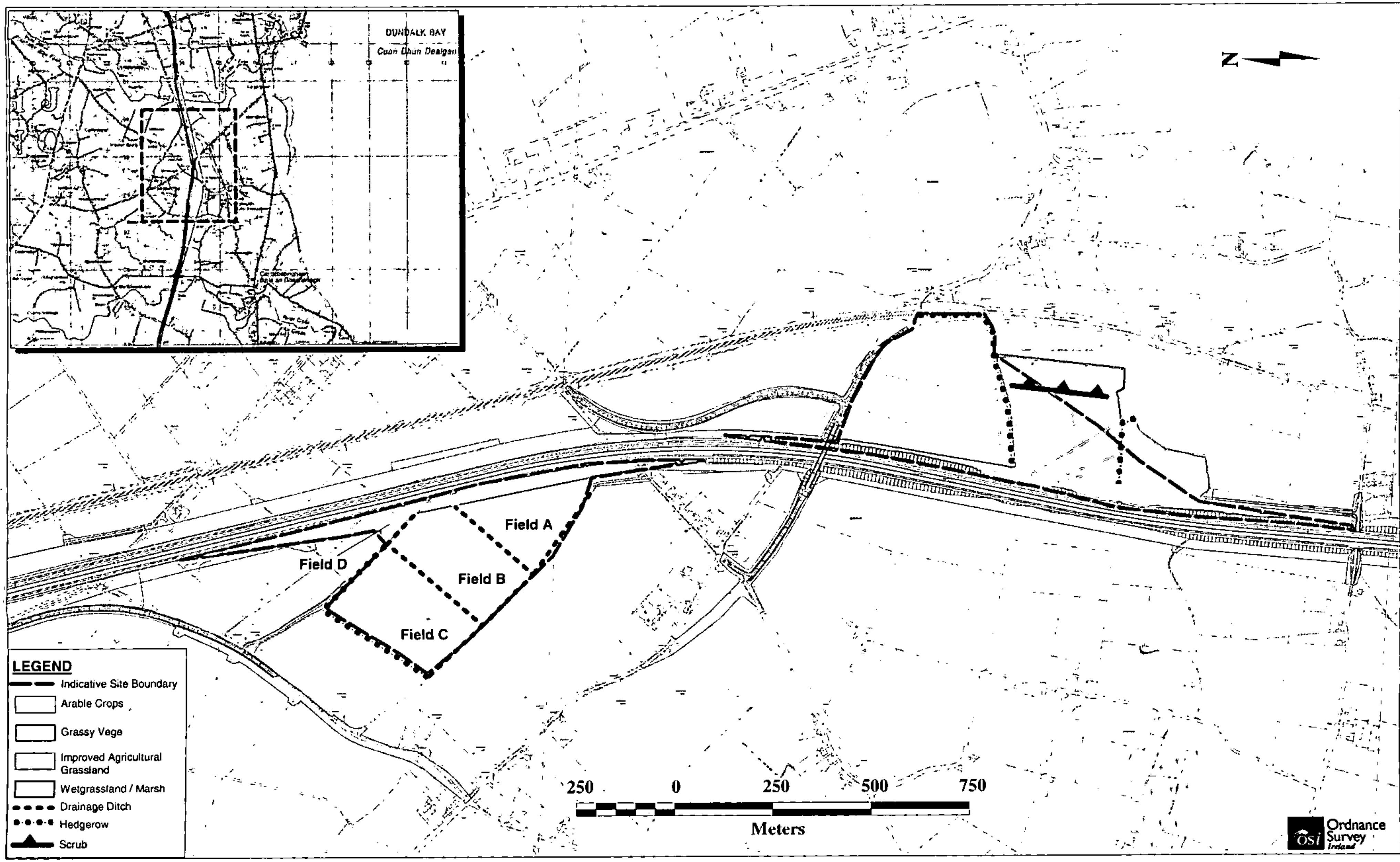
- Pre-construction bat surveys shall be carried out by a qualified ecologist during the optimum survey period specified in the NRA Environmental Assessment and Construction Guidelines prior to the commencement of any disturbance, site clearance or preparation works. The ecologist shall provide detailed mitigation for inclusion in the detailed design and construction works.

- Prior to felling of any trees, the following measures shall be taken to ensure that no impacts occur to bats that may be using them as roosts
    - A bat specialist shall inspect all trees in advance of felling to check for bats.
    - A licence must be obtained from the National Parks & Wildlife Service to fell trees that have or have the potential to contain bat species.
    - Any trees that show crevices, hollows, dead limbs or other features that could be in use as bat roosts, shall be removed under supervision of a bat specialist who is licensed to handle bats.
    - Any ivy-covered trees shall be left to lie for 24 hours after cutting to allow any bats concealed in the ivy to escape. Large trees shall be felled carefully, essentially by dismantling by tree surgeons, under supervision of a bat specialist.
    - Bat boxes shall be erected by a bat specialist to compensate for the loss of trees felled as part of the construction works.

- The detailed lighting plan shall be prepared in consultation with the Project Ecologist to ensure that the final lighting design is sympathetic to local bird life.

13.7 RESIDUAL IMPACTS

Through the application of the mitigation measures outlined above, the principal impacts of the proposed development will be addressed and no residual impacts are anticipated.



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Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	HABITAT MAP		
Designed: JOL	File Ref.: MDT0146MN1002A01	Status: Final	
Drawn: E.L.	Job No.: MDT0146		
Checked: L.C.	Scale: 1:10,000 @ A4	Figure No: 13.1	Rev: A01
Approved: A.G.	Date: 29/11/2007		

14 AQUATIC ECOLOGY

14.1 INTRODUCTION

AQUENS Ltd. carried out a water quality assessment on the aquatic environment of the proposed M1 North Motorway Service Area at Castlebellingham, Co. Louth. The potential impacts of the development and mitigation measures have been included in this report. For additional detailed information the reader is referred to **Volume 3 Appendix G.**

14.2 METHODOLOGY

14.2.1 Legislation

The following table presents the main legal constraints on the proposed development in relation to aquatic flora, fauna, habitats and fisheries.

Table 14.1: Relevant Legislation

Legislation	Description
The Local Government (Water Pollution) Act, 1977 (and associated regulations)	Prohibits the entry of unlicensed polluting matter into waters
The Local Government (Water Pollution) Act, 1977 (Water quality standards for phosphorus regulations 1998)	Requires the local authority to maintain the water quality where satisfactory water quality exists. and in cases of unsatisfactory water quality to improve the quality to a status specified in the regulations. In the case of the present project, the regulations require that the water quality in the streams be improved to a Q4 unpolluted biological quality rating.
The Fisheries (Consolidation) Act, 1959 as amended by the Fisheries (Amendment) Act, 1962	Prohibits: 1. The entry of deleterious matter into waters. (Deleterious matter is defined as any substance that is liable to injure fish, their spawning grounds or their food, or to injure fish in their value as human food.) 2. Obstructing the passage of salmon, trout or eels or their smolts and fry 3. Injury or disturbance of the spawn or fry of salmon or trout or to their spawning or nursery areas
Fisheries (Amendment) Act 1999	Requires the regional fisheries board to have regard for the need for the conservation of fish and other species of fauna & flora, habitat and biodiversity of inland fisheries and ecosystems.
The Wildlife Act 1976	Prohibits damage to protected species, which includes certain freshwater aquatic species.
Water Framework Directive (2000/60/EC)	The Water Framework Directive requires the maintenance/achievement of good ecological, hydrochemical and hydromorphological quality for all surface waters.

14.2.2 Macroinvertebrate Surveillance

Macroinvertebrates are an excellent tool when assessing water quality as they exhibit differential responses to physical and chemical changes in their environment. Some macroinvertebrates are sensitive to pollution while others are tolerant. The benthic macroinvertebrates respond rapidly to organic and physical disturbances but also provide a realistic record of the prevailing conditions.

Macroinvertebrate sampling took place on 25th October and 8th November, 2007 at four locations, as shown in **Figure 14.1**. Two sites were selected on each watercourse within the proposed motorway service area, one located upstream of the proposed point of discharge and one downstream. The method adopted was that which is routinely applied by the EPA in the national river monitoring program (McGarrigle *et. al*., 2002). An FBA (Freshwater Biological Association) pond net (1mm mesh) was used to collect a 2-minute multi-habitat kick-sample. In addition, a one minute stone-washing was also undertaken. The sample was preserved in 70% IMS and processed in the laboratory. It was sorted in an illuminated tray and all the macroinvertebrates were identified to the lowest taxonomic resolution using appropriate FBA taxonomic keys.

A Q-value was then assigned using the EPA methodology (McGarrigle *et al.*, 2002). This Q-value system is a five point score (Q1-Q5: with intermediate scores obtainable, e.g. Q3-4) based on the proportions of five groups of macroinvertebrates, with different pollution tolerances (for further information see **Volume 3 Appendix G**). In order to achieve Water Framework Directive compliance, the Q-value system has been changed slightly. This amended version was made available to AQUENS Ltd. by EPA personnel and was applied to the macroinvertebrate data, but as of yet it is not published (C. Bradley pers. comm.). Therefore, the Q-value system contained in **Volume 3, Appendix G** of this report refers to the 2002 version as referenced (McGarrigle *et. al.*, 2002). Furthermore, this version applies to eroding sites only and some differences exist when using the system for depositing sites as in all four of the sites in the current survey.

It is always advisable to calculate several metrics when assessing the state of the environment, freshwater being no exception. Therefore, two additional indices the BMWP (Biological Monitoring Working Party) score and the ASPT (Average Score per Taxon), were also determined. The BMWP score is based on the presence of pollution-tolerant to pollution-sensitive families. Each family is assigned a score. The BMWP score is the sum of these scores. Families that are sensitive to pollution are assigned higher scores than pollution-tolerant families. A high overall score indicates that the water quality is good. The ASPT is determined by dividing the BMWP score by the number of scoring taxa yielding a score between 1 and 10, values >6 usually indicate good water quality.

14.2.2.1 Limitations

The Q-assessment was conducted in October/November 2007 during a period when key macroinvertebrates may be absent from the sample due to emergence. However, this limitation is accounted for in the assessment. Sampling in spring/summer gives a more robust reflection of water quality.

14.2.3 Physico-chemical Survey

A range of physicochemical characteristics (dissolved oxygen, temperature, conductivity and pH) were taken on-site using automatic field probes. A number of physical characteristics were noted at each of the sampling sites, they included; stream width and depth; substrate type and percentage composition; nature of flow; instream habitat, riffle, glide and pool in the sampling area; aquatic vegetation; dominant bankside (riparian) vegetation, listing the main species overhanging the stream; and estimated degree of shade of the sampling site by bankside vegetation.

14.2.4 Salmonid Habitat Assessment

A salmonid habitat assessment was carried out at each of the four sites on the 25th October and 8th November 2007.

Salmonid habitat quality (adult, nursery and spawning) was rated on a scale of None/ Poor/ Fair/ Good/ Very Good/ Excellent broadly based on a qualitative procedure described by Kennedy (1984). This rating takes into account both field observations and available data. A rating of "none" was assigned if it was considered as impossible that the stream could support salmonid fish in the relevant life stage. A rating of "None - Poor" indicates the watercourse could possibly support salmonid fish in the relevant life stage but that it is extremely unlikely.

This assessment consisted of walking the stream bank within a couple of hundred metres of each sampling site. Salmonid habitat quality was assessed, taking into account the physical characteristics of the site. Based on these observations the value of each stream section for salmonid spawning, as a nursery area for juvenile salmonids, and as an area for adult salmonids, was estimated. The criteria used for assessment of salmonid habitat quality has been detailed in **Volume 3 Appendix G.**

14.2.5 Classification of the Watercourses

Below is a list of guidelines produced by the NRA and used to classify the importance of freshwaters. These guidelines were applied to the sampling sites and a rating was assigned accordingly, these are presented in **Table 14.2.**

Table 14.2: Guidelines used for classification of importance of freshwaters

Rating	Description
A	**Internationally Important** Habitats designated as SACs for Annex II species under the EU Habitats Directive. Major Salmon river fisheries. Major salmonid lake fisheries.
B	**Nationally or Regionally Important** Other major salmonid waters and waters with major amenity fishery value. Commercially important coarse fisheries. Waters with important populations of species protected under the Wildlife Act and/or important populations of Annex II species under the EU Habitats Directive. Waters designated or proposed as Natural Heritage Areas by Dúchas.
C	**High Local Value** Small water bodies with known salmonid populations or with good potential salmonid habitat, or any population of species protected under the Wildlife Act and/or listed Annex II species under the EU Habitats Directive. Large water bodies with some fisheries value.
D	**Moderate Local Value** Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any stream with an unpolluted Q-value rating.
E	**Low value** Water bodies with no current fisheries value and no significant potential fisheries value. Habitat diversity low and degraded.

14.2.6 Assessment of the Significance of the Potential Impacts

Impacts are defined on the basis of severity of impact on salmonid fish, macroinvertebrate diversity in particular any rare, protected, or commercially significant species and/or habitats. The assessment of potential considered not only site-specific effects but also potential downstream impacts. Salmonid

fish are given priority but due consideration is also given to other aquatic biota. The following table outlines the significance of extensive and localised impacts with regard to each classification rating.

Table 14.3: Classification of Impact Significance for Each Classification

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

(NRA 2004)

In line with the EPA Guidelines (2002) the following terms are defined when quantifying duration:

- Temporary: Up to 1 year
- Short-term: From 1 to 7 years
- Medium-term: 7 to 15 years
- Long-term: 15 – 60 years
- Permanent: over 60 years.

In line with other reports on motorway developments this report considers 'localised' impacts on rivers as impacts measurable no more than 250 metres 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 habitat 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.

14.3 EXISTING ENVIRONMENT

Watercourses potentially affected by the proposed development were identified using on mapping provided by West Consult. The 1:50,000 O.S. Discovery Series map were also consulted but none of the watercourses sampled were marked on the map. All watercourses draining the proposed development are small streams, most of which were largely dry ditches, heavily vegetated and silted

with some pockets of open water where it was possible to take a sample. All watercourses that may potentially be impacted by the development were considered and sampled where possible. A number of watercourses when ground truthed were completely dry ditches. Two sites were selected on the stream draining each development area, one upstream of the proposed points of discharge and one downstream. Other criteria adopted in site selection included access and the presence of water to obtain a sample.

Since all the watercourses sampled are small streams/ditches, no information was available. They do not occur on the 1:50000 Discovery Series. No EPA water quality data are available, as they are not monitored as part of the national monitoring program. It is also very unlikely and assumed that the relevant Local Authorities and Fisheries Boards do not have data on these watercourses. Therefore, the Q-assessments undertaken cannot be compared to other data and are representative of baseline conditions (i.e. prior to discharge from constructed wetland). The watercourses at Castlebellingham West and East eventually enter a little tributary of the larger River Fane. The Fane and its tributaries hold good stocks of brown trout, salmon and sea trout (www.erfb.ie). Water quality ratings along the 38mile River Fane ranged from Q2/0 to Q4 when assessed by the EPA in 2006.

14.3.1 Biological Water Quality Assessment of Potentially Affected Watercourses

The percentage representation of the key macroinvertebrate taxa used in the EPA Q-value system, complete list of macroinvertebrates recorded at all sites and the results of the other biological metrics used are presented **Volume 3 Appendix G**. A summary of water quality rating and BMWP results assigned to the sites is summarised in **Table 14.4.**

Table 14.4: Results of the Biological Metrics applied to the data

	Site 1	Site 2	Site 3	Site 4
Q-value	Q3	Q3	Q3	Q3
BMWP	28	46	26	33

14.3.1.1 Western Sites 1 (u/s) and 2 (d/s)

A Q-value of Q3 was assigned to Sites 1 and 2, which is interpreted as representing a poor quality water body. The following criteria were met in assigning this value; Group A taxa absent; Group B fauna were present in few (<1%) to small (<5%) numbers; Group C fauna were dominant (<75%); Group D fauna were numerous (25-50%) to dominant (50-75%) and Group E fauna occurred in few to fair numbers (1-10%).

The total BMWP score of 28 for Site 1 and 46 for Site 2, were considered low scores. The ASPT score was then calculated by dividing these scores by the number of scoring families present to give low values of 3.1 and 3.8 respectively. These results compare well with the Q-value assigned. The % EPT was very low at Site 2 (<1%), while no Ephemeroptera (mayfly), Plecoptera (stonefly) or Trichoptera were recorded at Site 1.

14.3.1.2 Eastern Sites 3 (u/s) and 4 (d/s)

A Q-value of Q3 was assigned to Sites 3 and 4, which is interpreted as representing a poor quality water body. The following criteria were met in assigning this value; Group A taxa absent; Group B fauna were present in few (<1%) to small (<5%) numbers; Group C fauna were dominant (<75%); Group D fauna were numerous (25-50%) to dominant (50-75%) and Group E fauna occurred in few to fair numbers (1-10%).

In terms of BMWP a score of 26 was calculated for Site 3 and 33 for Site 4, both are considered low scores. The ASPT scores were 2.9 and 3.7, respectively. These results compare well with the Q-value assigned. No Ephemeroptera (mayfly), Plecoptera (stonefly) or Trichoptera were recorded at Site 3, while, the % EPT was found to be very low at Site 4 (<2.3%).

14.3.2 Fishery Importance

The habitat and water quality in the potentially affected watercourse severely limits its value for salmonids. However, all watercourses were seen to support stickleback *Gasterosteus aculeatus* (L.) and as such it cannot be definitively stated that they could not support salmonids. It is considered highly unlikely, due to lack of suitable habitat, flow, water and acceptable dissolved oxygen levels (>9mg/l O_2 Salmonid Water Regulation Limit, Flanagan, 1992). No salmonids were observed on-site at any of the locations sampled and walked. Following salmonid habitat assessment at all sites surveyed, all were considered to have 'none-poor' salmonid habitat (adult, nursery and spawning).

14.3.3 Ecological Importance

Salmon (*Salmo salar),* Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*L. fluviatilis*) and the white-clawed crayfish (*Austropotamobius pallipes*) are all listed in Annex II of the Habitats Directive. All things considered it is unlikely that these protected species occur in any of the watercourses sampled. The potentially affected section of all the watercourses were classified as of being of 'low value' **(see Table 14.2)**

14.4 POTENTIAL IMPACTS

The main potential impacts from the proposed development would arise from the following:

- Drainage from the completed development including car parking areas and services;
- Leakage or spillage of stored fuels;
- Loss of riverine habitat due to culverting;
- Obstruction to upstream movement of fish and other aquatic fauna;
- Increased runoff from roofed and paved areas and other hard surfaces;
- Seepage from the constructed wetland;
- Insufficient capacity of the constructed wetland, to cater for high flood events; and
- Impact of contaminated discharge on the aquatic environment.

14.4.1 Impact from Drainage during Operation

The nature and amount of pollutants originating from the completed development is likely to be site specific depending on the nature and volume of traffic and the drainage system used. However, the proposed development is likely to generate similar potential pollutants as are associated with major roads. In addition, proposed refuelling facilities are a potential major source of pollutants.

14.4.1.1 Types of pollutants in runoff and their biological impact

The run-off from major roads contains contaminants from various sources (Maltby *et al.* 1995a & b). They are derived from:

- Degradation of road surface;
- Wear and tear of vehicle parts;
- The products of combustion from vehicle exhausts;
- Salts used for de-icing;
- Accidental spillages of fuels and transported goods;
- Sediment carried by vehicles; and
- Chemicals from site maintenance including herbicides.

In addition, Luker and Montague (1994) summarise the pollutants that are of most concern in highway drainage as (i) sediments, (ii) hydrocarbons, (iii) heavy metals, (iv) salts and nutrients, (v) others. Included here are polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds such as benzene, toluene, ethylbenzene, xylene and methyl tert-butyl ether (MTBE). Further information on the impact of these pollutants on the aquatic environment is provided in **Volume 3 Appendix G.**

14.4.2 Accidental Spillages

In refuelling areas there is a high potential for spillage from fuel transporters as well as smaller vehicles. Leaking storage facilities are also a significant source of pollutants. These can have serious effects on receiving surface waters as well as groundwater.

14.4.3 Impact of Leakage / Spillage of Stored Fuels and other Potential Pollutants

Leakage or spillage can be due to petrol, fuel oils, lubricating oils and hydraulic fluids. In unmodified form these are liquid, virtually insoluble and lighter than water. Some hydrocarbons, such as bitumen and heavy fuel oil, become heavier than water when affected by naturally occurring bacteria and can then be treated as sediments. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence (Luker & Montague 1994).

Harmful effects include:

- The prevention of gaseous exchange at the water surface, leading to reduced dissolved oxygen in the underlying water (Solbe 1988); and
- In the case of turbulent waters the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al* 1993).

Leaking fuel storage facilities seem to be the most significant source of MTBE contamination of groundwater, and heavy usage of two stroke outboard engines seems to be a main route into surface waters. Luker & Montague (1994) state that "*the product of the combustion of these additives are gaseous rather than particulate and so should not contribute to pollution from highway drainage. However, research should be carried out into the concentration of these materials in highway runoff.*" Analyses of the road runoff in a major Irish study (Bruen *et al* 2006) showed that contaminants include

suspended solids, heavy metals, hydro-carbons including PAHs, chlorides, nitrates and phosphorus. However, no MTBE was detected in the samples analyzed.

14.4.4 Loss of Habitat due to Culverting and Bankside Development

14.4.4.1 Culverting

Culverts can interfere with the movement of fish as well as invertebrates. Changes in flow following culverting can also affect the distribution of aquatic biota and their preferred habitats.

14.4.4.2 Obstruction to upstream movement of aquatic fauna

Culverts and other artificial channels, if not appropriately designed and constructed with the aquatic ecosystem in mind, can totally prevent any upstream movement, of many aquatic organisms including fish. Even in the case of watercourses unsuitable for fish, movement of other aquatic organisms in field drains or ephemeral watercourses can be disrupted by unsuitable culverts.

Small Fish Including Juvenile Eels

Obstruction to fish upstream movement in culverts is primarily due to the fact that most culverts do not offer an irregular natural boundary, which can provide an occasional resting place. Long undersized culverts with smooth surfaces tend to pose greatest challenges for migrating fish. Some culverts are elevated at one or both ends, and even minor drops may be enough to block small fish. Young eels migrating upstream from the sea are remarkable in their ability to bypass obstacles by moving through damp marginal vegetation etc.; however drops of only a few centimetres at the entrance to a road culvert may be enough to block their upstream movement. (Singler & Graber 2005) Culverts can also impede eels because they concentrate flow and create high water velocities that may exceed the limited swimming speed of juvenile eels. At water velocities of 0.3 meters per second, elvers generally cannot swim further than 3 meters. Older juveniles can swim 1.5 meters per second but cannot swim far against fast water. (McCleave 1980)

Salmonid Fish (Trout & Salmon)

Negative effects of culverts on salmonid upstream movement have been well documented (e.g. Jackson 1950; Dane 1961; Stuart 1964; Evans and Johnston 1980; Powers and Orsborn 1985; Chilibeck 1992; Fitch, G.M. 1995). The effect of a particular culvert will depend on water depth, speed and volume, length of culvert, type of culvert, species of fish, size and condition of fish etc. Above a critical flow velocity fish can only sustain progress for a limited period of time without resting. The faster the current velocity above this critical speed, the shorter the distance the fish can travel against the current. The impact of a culvert on fish movement is therefore primarily due to changes in hydrological conditions. Other factors such as the length of the structure and light are commonly used as significant criteria in determining the fish passage capability of an installation. However, Baker & Votapka (1990) state that light is not a major consideration in determining fish passage conditions. They also state that the "*length is not a single criterion by itself. Velocity over a given length in relation to fish capabilities is a more appropriate consideration.*" A consultation paper published by the Scottish Executive in 2000 titled "River Crossings and Migratory Fish Design Manual" states that; "*Long culverts do not in themselves represent an increased obstruction to fish as long as appropriate conditions for fish passage are maintained throughout. Lack of light in a culvert does not appear to influence fish passage*". (Anon 2000)

In addition to current velocity, turbulence and depth in culverts play a critical role. Jackson (1950) noted that turbulence deflects a swimming fish from its course, causing it to expend energy resisting upwellings, eddies, entrapped air and vortices, which in turn make it impossible for a fish to use its swimming power effectively. Stuart (1964) noted that the reduced density of the air-water mixture reduces the propulsive power of the fish's tail. Because of uniform channel bottom, culverts may have inadequate depth to allow fish movement. Partial submergence impairs the ability of the fish to generate thrust, normally accomplished by a combination of body and tail movement. Also, if gills are not totally submerged, they cannot function efficiently, promoting oxygen starvation while also reducing the fish's ability to maintain burst activity (Powers & Orsborn 1985).

Aquatic Invertebrates

In a review of the impact of road culverts on the upstream movement of invertebrates Vaughan (2002) states: "*The studies we reviewed on mollusks, crustaceans, and other macroinvertebrates indicate that these organisms may travel long distances within a stream, either attached to the gills of fish in the case of mussels or by their own power in the case of snails, amphipods, crayfish and other crustaceans. Because many of these species are confined to the water, any barrier to their dispersal impacts their populations more than insects.*"

14.4.5 Hydrological Impacts due to Increased Runoff from Paved / Roofed Areas.

Increased peak discharge from the proposed development could alter instream habitats and impact on the distribution, richness and biomass of aquatic biota.

14.4.6 Review of All Potential Impacts on Watercourses

There is a potential for negative impacts on the watercourses in the study due to contamination by pollutants in runoff to the streams during the construction and operation of the proposed development. Listed in **Table 14.5** below are the potential impacts as they apply to the proposed development and the watercourses potentially affected.

Table 14.5: Summary of potential impacts in the absence of mitigation.

Potential Impacts	All Watercourses
Impact from drainage from the completed development	Major
Impact of leakage or spillage of stored fuels and other potential pollutants	Major
Obstruction to upstream movement of fish and other aquatic fauna	Major
Hydrological impacts due to increased runoff from paved and roofed areas.	Major
Impact from inadequate retention of pollutants within constructed wetland	Major

14.5 MITIGATION MEASURES

This section provides details on the mitigation measures to be implemented, which are summarised in **Table 14.6** at the end of this section.

14.5.1 Permanent loss of habitat

The most effective method of mitigating habitat loss is to minimise it and where this is not possible to create new habitat. In the event culverts are required, the following mitigation measure will apply:

- Loss of habitat shall be minimised by keeping the length culverted to the absolute minimum necessary.

One of the most effective methods of minimising loss of stream and riparian habitat during developments such as new road construction is the establishment of Leave Strips. Leave strips are the areas of land and vegetation adjacent to watercourses that are to remain in an undisturbed state, throughout and after the development process (Chilibeck *et al* 1992). Leave strips are valuable not only because riparian vegetation is a vital component of a healthy stream ecosystem, but because this vegetation acts as an effective screen/barrier between the stream and the development area, intercepting runoff and acting as an effective filter for sediment and pollutants from the development area. The following measure is required to reduce impacts related to loss of stream and riparian habitats:

- A riparian leave strip of at least five metres, and where possible, 10m shall be fenced off along both sides of the affected watercourses. This area shall be left undisturbed during the construction phase and retained as a wildlife corridor after the completion of the development. All native trees and bushes within the leave strip shall be retained and additional native trees particularly willow, alder, ash and oak shall be planted to as to provide wildlife cover and intermittent shade to the stream and river. The long-term management of these wildlife corridors shall include periodic consultation with the Regional Fisheries Board and the National Parks & Wildlife Service.

14.5.2 Obstruction of Aquatic Fauna Movement

Fishery Guidelines for Local Authority Works published by the Department of the Marine and Natural Resources recommends that *long stretches of river or stream should never be culverted* and that rivers or streams should be culverted for *essential reasons only* (Anon 1998). Should it be determined that culverts are required, the following mitigation measures shall be implemented:

- Any culverts should be designed and constructed in such a way as to ensure that streams remain passable for fish and other aquatic fauna. This can only be reliably achieved by crossing methods that retain or provide 'natural' rough substrates that will slow currents near the bottom and create flow refuges, enabling invertebrates and juvenile fish to migrate upstream in otherwise impassable water velocities.

- The following guidelines shall be implemented when designing culverts:

  - Ideally, a culvert should not change the hydrological conditions that existed prior to that installation. This means that the cross-sectional area should not be restricted by the culvert, the slope should not change, and the roughness coefficients should remain the same. Any change in these conditions will result in a velocity change which could alter the sediment transportation capacity of the stream.
  - Fish passage problems can usually be avoided if culverts are constructed without a bottom or are installed well below stream grade.
  - If concrete bottoms are used, they should be at least 30 cm below the stream grade with cross walls not less than 8 cm to collect natural streambed material.

- Culverts should be installed at the stream gradient otherwise they may result in a change in water velocities which may create a drop below the culvert or may create a hydraulic jump at the end of the culvert.
- Culverts should not be aligned so that culvert outflows are directed into a stream bank. If a road crossing is not perpendicular to the stream, the culvert installation should be skewed.
- The culvert should be installed so that it has a constant slope through its length except for the appropriate camber allowance where settlement is anticipated.
- If necessary to maintain the desired water level within the culvert and backwater the culvert at higher flows to reduce culvert velocities, an outlet pool with tailwater control should be provided at the culvert exit. Details of the outlet pool dimensions, if required, can be found in **Appendix G, Volume 3** of this EIS.

- Regardless of the culvert design selected, the following criteria for allowing adult fish passage through culverts from Dane (1978) shall be met except in situations where the natural stream velocity exceeds these guidelines. (Major changes in water velocity may have detrimental effects on the streambed conditions upstream or downstream of the culvert (Baker & Votapka 1990)).

    - The average water velocity in the culvert should not exceed the following values: 1.2 m/s for culverts less than 24.4 m in length; 0.9 m/s for culverts between 24.4 and 61 m in length. Culverts with higher water velocities or greater length require installation of baffles to allow fish passage.
    - The depth of the water should not be less than 0.23 m at any point within the culvert.
    - Any sudden drop in the water surface profile at any point within the culvert influence should not exceed 0.31 m.
    - During the period of upstream fish migration, the length of time during which the foregoing conditions are not met at the culvert site should not exceed 3 consecutive days in the average year.
    - The effective slope (mean slope of the water surface from the culvert inlet to the tailwater control point) of the culvert should not exceed: 0.5% for a culvert greater than 24 m in length, unless baffles are added; 1.0% for a culvert less than 24 m in length unless baffles are added; 5.0% at any time even with the addition of baffles.

14.5.3 Pollution of Streams with Contaminated Water During Operation

- A sustainable drainage system shall be installed for all surface waters draining from the proposed development (including roofs). Best management practices for treatment of runoff could include: constructed wetlands; vegetated lagoons; swales; filter strips; filter drains; infiltration devices; and oil/grit separators. A combination of runoff management and control measures shall be implemented, e.g. a combination wetland incorporating an upstream sedimentation pond. The system installed shall have a proven capability of achieving and sustaining at least the following percentage pollution reduction in runoff:

Pollutant	Percentage Pollution Reduction
Total Suspended Solids	85%
Heavy Metals	50 – 80%
Chemical Oxygen Demand	50%
Hydrocarbons	90%

- Petrol/oil and grit interceptors shall be located at outfalls to watercourses. Design of those interceptors should conform to the recommendations of CIRIA Report No. 142 (Luker & Montague 1994).

- As virtually all treatment options require proper maintenance in order to function properly, and as some such as oil interceptors can become a source of pollution if not properly maintained, a program of regular cleaning, maintenance and inspection of the runoff treatment system shall be put in place by the contractor/concessionaire to ensure it functions correctly.

14.5.4 Impact of Major Accidental Spillages

- This issue is addressed through the operation of regulations made under the Dangerous Substances Act 1972 and other amending legislation. The regulations govern the conveyance by road of scheduled substances, which include flammable substances, oxidising agents, toxic substances, etc. The Water Pollution Act 1977 and 1990 shall apply to point spillages.
- Shut-off Valves shall be constructed on all outfall pipes. In the event of an accidental spillage (e.g. milk, petrol, etc.) these valves can be shut. This will prevent contaminants reaching streams where serious environmental damage could be caused.

14.5.5 Hydrological Impacts

- Flow attenuation shall be included in the design of the proposed development to ensure that no significant increase in peak stream/river flows is caused by the proposed development.

14.5.6 Potential pollution from proposed refuelling facilities

Comprehensive guidance on the design, construction, modification and maintenance of petrol filling stations is given in a publication known as the 'Blue Book' (Association for Petroleum and Explosives Administration/Institute of Petroleum 1999). The EPA are in the process of drawing up a groundwater protection response which will include guidelines for petrol stations (M.F. Rochford, EPA, pers. comm.). The following mitigation measures are based on Scottish EPA documents PPG7 & PPG27 (www.sepa.org.uk/guidance/ppg/pdfs/ppg27.pdf & ditto ppg7.pdf) and Scottish Executive Environment Group (2003). These references shall be consulted and implemented.

- All areas within the curtilage of the filling station/s shall be positively drained on an impervious surface. Any joint in the surface must be adequately sealed and those sealants must be resistant to attack from petrol and oil products.
- Surface water drainage from all areas, except uncontaminated roof water, must discharge through a full retention oil/petrol separator. The capacity of the separator shall be adequate to contain at least the maximum contents of a compartment of a road tanker likely to deliver petrol at the filling station. Note that by-pass type separators are not suitable for use on petrol station forecourts.
- Oil separators require regular maintenance in order to ensure they remain effective. Routine inspections shall be undertaken at least every six months and a log maintained of inspection date, depth of oil and any cleaning that is undertaken.
- Access to the separator shall be kept clear and not used for storage.
- A separator will not work properly for dissolved (soluble) oils or if detergents or degreasers are present. Such discharges shall be drained to the foul sewer.
- The correct handling, storage and disposal of separator waste is vital if pollution is to be avoided. Waste shall be passed only to a registered waste carrier for disposal at a suitably licensed facility.
- Unless forecourts drain to sewers which discharge to a treatment plant, degreasing or steam cleaning of the forecourt shall not take place unless: i) Any liquid is soaked up using absorbent material which is suitably disposed of off-site. Sealing of gullies may be appropriate to prevent liquid or absorbent entering the drainage system. Or ii) A closure valve is fitted at the oil separator outlet, which is closed during the cleaning operation and all accumulated washings removed for suitable disposal off-site. An alarm shall be installed to indicate that the closure valve is in the 'shut' position.

- All underground fuel storage tanks shall be designed, installed and maintained in accordance with guidelines of Association for Petroleum and Explosives Administration/Institute of Petroleum (1999). USTs shall be double-skinned (that is, have an inner and outer skin) and have an interstitial monitoring device with automatic alarms. All USTs shall be provided with overfill prevention. Ongoing wetstock monitoring/inventory shall also be carried out to detect leakages.
- All above ground fuel storage tanks shall comply with current regulations and be bunded.
- A pollution incident response plan (PIRP) shall be in place including, as a minimum, the following:
  - details of the plan owner and procedures for keeping it up to date;
  - emergency contact details for site operators etc and for all holders of the PIRP;
  - emergency contact details for third parties (e.g. Fire Brigade, EPA, specialist contractors, environment section of Local Authority etc);
  - product inventory and site layout plan;
  - site drainage plan;
  - emergency procedures; and
  - location of emergency response equipment (e.g. fire extinguishers, absorbents, emergency bunding, temporary fencing etc); and location of buried services, including water supply pipes.

Table 14.6: Summary of Operational Mitigation Measures for Sampled Watercourses

	Mitigation Measures
i.	Minimise pollution generated during construction process
ii.	Consult Fisheries Board regarding checking for salmonid fish and crayfish prior to construction of culverts and undertake translocation to suitable habitat if these species are found
iii.	Apply appropriate culvert design in accordance with guidelines outlined above, if culverts are required
iv.	Establish Leave Strips of >10m from stream banks, where possible
v	Use sustainable drainage systems and petrol/oil interceptors on all surface water runoff from the development
vi.	Create flow attenuation to ensure that no significant increase in peak stream/river flows is caused by the proposed development
vii.	Apply special measures to prevent contamination from proposed refuelling facilities
viii.	Use lined constructed wetland to ensure no leakage of contaminated water
ix.	Ensure sufficient capacity of wetland in a flooding event
x.	Undertake frequent monitoring of wetland discharge and receiving waterbody to ensure no contamination
xi.	Undertake frequent monitoring of the sediment at the points of discharge to the ditches/streams in case of heavy metal and hydrocarbon accumulation

14.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

14.6.1 Construction Impacts

Suspended sediment due to runoff of soil from construction areas or due to disturbance of fine sub-surface sediments in the course of in-water construction and excavation, can have severe negative impacts on invertebrate and plant life and on all life stages of fish as a result of settling on spawning areas, reduction in water clarity and visibility, smothering and displacement of aquatic organisms, displacement of fish and abrasion or clogging of the gills of salmonid fish.

The potential exists for a range of serious pollutants to enter the surface water system during construction. For example, any of the following substances will have deleterious effects on fish, plants and invertebrates if allowed to enter water: raw or uncured concrete and grouts; wash down water from exposed aggregate surfaces; cast-in-place concrete and from concrete trucks; fuels, lubricants and hydraulic fluids; bitumen and silanes used for waterproofing concrete surfaces; and wastewaters from on-site toilet and wheel wash facilities.

Stream continuity has in the past frequently been ignored in the design and construction of stream crossings (culverts and bridges), with many crossings becoming barriers to fish and wildlife. Streams and the interconnectedness of different parts of a stream or watershed are essential to these animals. For reasons as simple as escaping random disaster or as complex as maintaining genetic diversity, animals living in or along streams, ephemeral watercourses and linear wetlands need to be able to move unimpeded through the watershed. Bankside development or construction as well as the installation of culverts could result in habitat fragmentation and disrupt movement of fauna through the watershed.

Table 14.7 contains a summary of the potential impacts associated with construction of the proposed development. For a more detailed description of potential construction impacts see **Appendix G, Volume 3.**

Table 14.7: Summary of Potential Construction Impacts in the Absence of Mitigation.

Potential Impacts	All Watercourses
Impacts from construction activities	Major
Impact of leakage or spillage of stored fuels and other potential pollutants	Major
Loss of habitat due to culverting and bankside development or construction	Major
Obstruction to upstream movement of fish and other aquatic fauna.	Major

14.6.2 Construction Mitigation

14.6.2.1 Reduction and prevention of suspended solids pollution

Release of suspended solids to all watercourses should be kept to a minimum and total suspended solids in discharges shall not exceed 25mg/l. Efforts shall be concentrated at preventing suspended material from entering the development site during construction. The following general guidelines for erosion and sediment control are largely based on Goldman *et al* (1986) and shall be implemented during construction:

i. Earth moving or excavation works close to watercourses shall follow and implement the principles of the sediment control plan described **Chapter 15** to avoid damage to watercourses.

ii. Retain existing vegetation where possible, especially in riparian areas.

iii. Re-vegetate denuded areas, particularly cut and fill slopes and disturbed slopes as soon as possible. Use mulches or other organic stabilisers to minimise erosion until vegetation is established on sensitive soils.

iv. Cover temporary fills or stockpiles which are likely to erode into nearby watercourses with polyethylene sheeting.

v. Divert runoff away from bare soil especially on slopes.

vi. Minimise the length and steepness of slopes where possible.

vii. Minimise runoff velocities and erosive energy by maximising the lengths of flow paths for precipitation runoff, constructing interceptor ditches and channels with low gradients to minimise secondary erosion and transport, and lining unavoidably steep interceptors or conveyance ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.

viii. Retain eroded sediments on-site with erosion and sediment control structures such as sediment traps, silt fences and sediment control ponds.

ix. Access roads shall be constructed or topped with a suitable coarse granular material/non-woven geotextile, and if possible organic topsoil shall be stripped prior to access road construction.

x. If possible instream work shall be avoided. If unavoidable keep instream work to a minimum and as far as possible protect the natural stream conditions and structure to promote stability of bank and bed structures and retain riparian vegetation.

xi. If significant alterations to the existing stream/river bank, or instream works are to be carried out, the works area shall be isolated from the river/stream by cofferdams or other suitable containment methods. Water within the contained area contaminated with suspended solids or other potential pollutants shall never be released directly to the stream/river, but shall be pumped to a land site to allow sediment removal before it re-enters the river.

xii. Temporary stream diversions (such as to facilitate culvert installation) shall only be carried out in consultation with the Regional Fisheries Board. The diversion shall be excavated in isolation of stream flow, starting from the bottom end of the diversion channel and working upstream to minimise sediment production. The temporary channel shall be constructed in such a way as to minimise suspended solids released when the river is re-routed. Upon completion the bank shall be stabilised around the temporary diversion.

xiii. If unavoidable, permanent stream diversions shall be completed as far in advance as possible. The channel shall be constructed in such a way as to minimise suspended solids released when the river is re-routed. Use of loose fine-grained materials in the new channel construction shall be strictly limited.

xiv. Sediment control ponds shall be designed for a minimum retention time of 15 hours.

xv. It is important that at the planning stage provision is made for a sufficient land area to accommodate the necessary sediment control measures.

xvi. Other than single span temporary bridges with no instream structures, strictly no temporary stream crossings or temporary culverting shall take place without the prior agreement of the Regional Fisheries Board.

xvii. Machinery shall never cross a watercourse by entering it.

14.6.2.2 Prevention of pollution with other substances during construction

The following guidelines based on Chilibeck *et al* (1992), NRA (2005) and SRFB (2007) shall be implemented:

i. Raw or uncured waste concrete shall be disposed of by removal from the construction site or by burial on the site in a location and in a manner that will not impact on the watercourse.

ii. Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks shall be trapped on-site to allow sediment to settle out and reach neutral

pH before clarified water is released to the stream or drain system or allowed to percolate into the ground.

iii. Fuels, lubricants and hydraulic fluids for equipment used on the construction site shall be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice (Enterprise Ireland BPGCS005).

iv. Fuelling and lubrication of equipment shall not be carried out on sites close to water courses.

v. Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and the contaminated soil removed from the site and properly disposed of.

vi. Oil booms and oil soakage pads shall be kept on-site to deal with any accidental spillage.

vii. Waste oils and hydraulic fluids shall be collected in leak-proof containers and removed from the site for disposal or re-cycling.

viii. Prior to any instream work ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.

ix. All pumps using fuel or containing oil shall be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.

x. Foul drainage from site offices etc. shall be removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines.

14.6.2.3 Translocation of fish and crayfish (if present)

Should culverting of any of the watercourses within the proposed development be required, the Fisheries Board shall be contacted prior to dewatering works in order to determine if checks of the watercourses for salmonids, lampreys and crayfish are required. If electrofishing operations are considered necessary by the relevant Fisheries Board then adequate time must be allowed prior to the commencement of works as seasonal constraints apply to fish and crayfish surveys. All fish (particularly salmonid fish if present) and crayfish (if present) must be removed and transferred to suitable adjacent habitat by suitably qualified and experienced operators in close consultation with the Regional Fisheries Board and the National Parks and Wildlife Service. Electrofishing will require a Section 14 Permit from the Department of the Marine; crayfish capture and relocation will require a license from the National Parks & Wildlife Service, although it is highly unlikely that crayfish are present in any of the watercourses sampled. Removal of crayfish shall not be carried out in late May or June, when crayfish are releasing their young. Fish removal is not usually permitted between the end of September and the beginning of May.

14.6.2.4 Requirements for Contractors

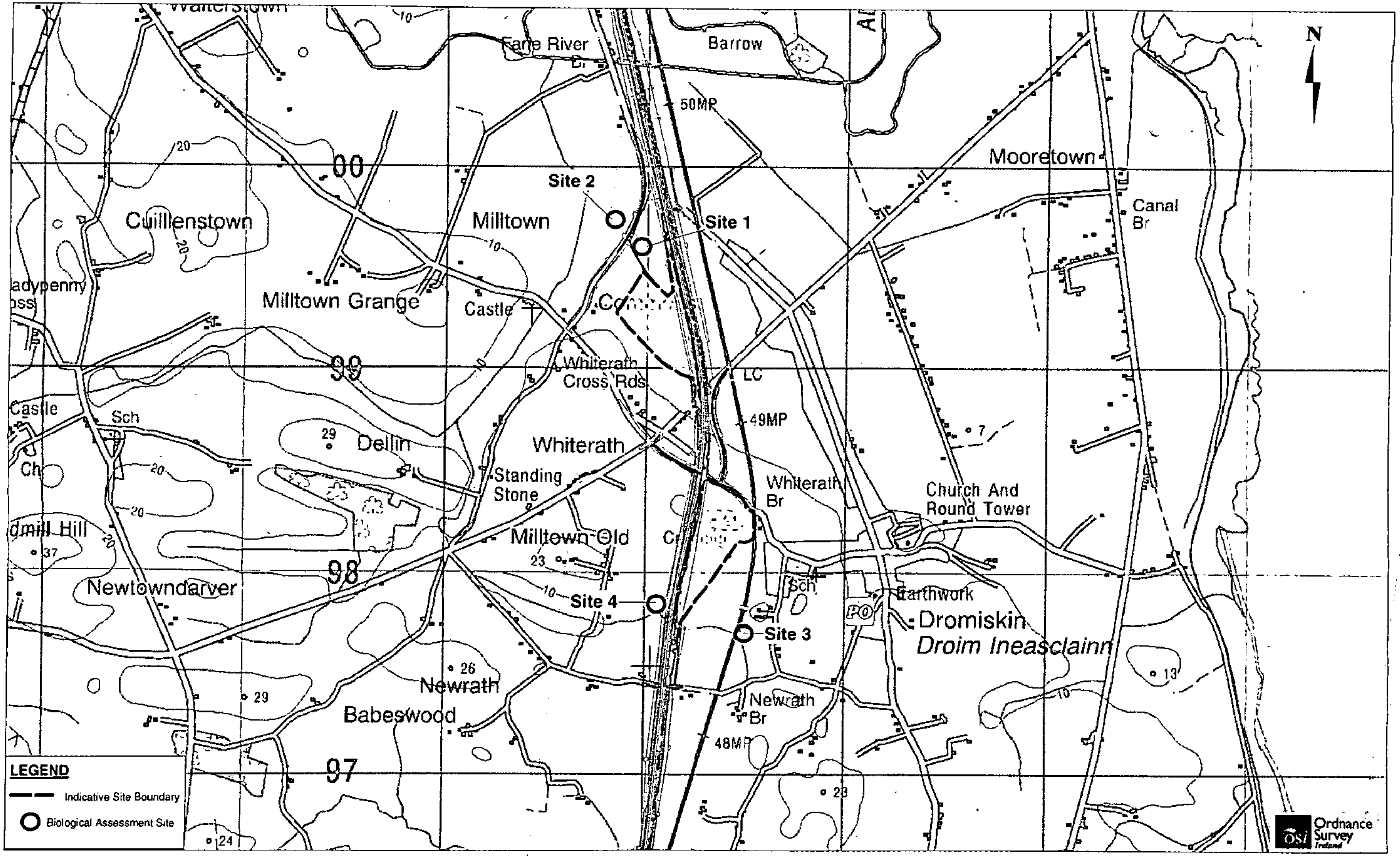
Contractors shall establish contact with the Regional Fisheries Board before works commence, and there shall be ongoing liaison with the Board throughout the construction process. Contractors shall be in possession of, and familiar with, the contents of "*Control of water pollution from construction sites - Guidance for consultants and contractors*" published by the Construction Industry Research and Information Association (CIRIA 2001) (e-mail enquiries@ciria.org.uk).

14.7 RESIDUAL IMPACTS

Table 14.8 illustrates the residual impact of the proposed development on aquatic ecology once all of the mitigation measures are implemented in full.

Table 14.8: Residual Impacts After Implementation of Mitigation Measures

Residual Impacts	All Water courses
Impacts from construction activities	Not Significant
Impact from drainage from the completed development	Not Significant
Impact of leakage or spillage of stored fuels and other potential pollutants	Not Significant
Loss of habitat due to culverting and bankside development or construction	Minor
Obstruction to upstream movement of fish and other aquatic fauna	Not Significant
Hydrological impacts due to increased runoff from paved and roofed areas	Not Significant



Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	LOCATION OF BIOLOGICAL ASSESSMENT SITES

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CONSULTING ENGINEERS

NDP NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

Transport 21

15 SOILS, GEOLOGY AND HYDROGEOLOGY

15.1 INTRODUCTION

This section assesses any likely and significant impacts on soil, geology and hydrogeology from the motorway service area proposed for development on the M1 west of Dromiskin, Co. Louth.

15.2 METHODOLOGY

This section of the EIS was prepared in accordance with the *Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA 2002) and *Geology in Environmental Impact Statements a Guide* (IGI 2002).

The assessment of impacts within this section is carried out with respect to the soil, geological and hydrogeological environment. Within the context of this chapter, impacts are considered to be effects of the proposed development, which result in a change to the current environment. Adverse impacts are those that result in a detrimental effect to the current environment, i.e. deterioration in groundwater quality. The significance of impacts has been assessed in accordance with the definitions given in the EPA Guidelines (EPA 2002).

15.2.1 Data Sources

The following sources of information were used in the compilation of this assessment:

- Department of the Environment, Heritage and Local Government (DoEHLG), Environment Protection Agency (EPA) and Geological Survey of Ireland (GSI), Groundwater Protection Schemes (1999);
- EPA Online Water Quality River Map;
- Fetter, C.W., 1993. Contaminant Hydrogeology;
- GSI, Geology of Meath, Sheet 13. Scale 1:100,000 (1996);
- GSI, Geology of Meath, A Geological description to accompany the Bedrock Geology. 1:100,000 Map Series, Sheet 13. Scale 1:100,000 (1994);
- GSI Well Database;
- GSI, Groundwater Vulnerability Map, Aquifer Classification Map and Subsoils Map;
- GSI, Online Quarries and Minerals Directory;
- Office of Public Works (OPW), On-line flood mapping;
- Ordnance Survey of Ireland, Discovery Series Map 43, 1997;
- Site Layout plans;
- Teagasc, Subsoil Map (2004); and
- EPA, Water Quality in Ireland 1998 – 2000 (2002).

15.2.2 Site Investigation

In November 2007, Glover Site Investigation Limited conducted a detailed ground investigation within the eastern section of the development area. This work comprised:

- Drilling of 10 boreholes by shell and auger methods;
- Excavation of 11 trial pits;
- In-situ testing including permeability (falling head) tests;
- Retrieval of soil samples for analysis; and
- Installation of groundwater monitoring network in 7 boreholes.

The ground investigation within the western site comprised the drilling of three boreholes by shell and auger methods. The site investigation on the western site was ongoing at the time of writing this chapter; however, sufficient information was available to determine the general subsoil conditions at the site.

15.3 EXISTING ENVIRONMENT

15.3.1 Site Setting

The proposed development is located in County Louth approximately 7km south of Dundalk town, approximately 2.5km northwest of Castlebellingham and approximately 1km west of the village of Dromiskin, in the townland of Whiterath/Commons. The proposed development is bisected by the M1 Motorway carriageway, as described in **Chapter 3.**

The regional topography is gently undulating and is characterised by the presence of drumlins. The topography of the proposed development is generally flat; although lower lying ground is present in the southern portion of the eastern site.

15.3.2 Quaternary Geology

The Quaternary Geology (subsoils) of County Louth has been mapped by the GSI and was updated by Teagasc in 2004. The map shows a distinctive difference in the quaternary geology between the eastern and western site (**Figure 15.1**).

To the south of the development area, beneath the eastern site, the subsoils comprise Till derived from Lower Palaeozoic rocks with areas of peat. To the north, beneath the western site, the subsoils are comprised predominantly of beach sands and gravels.

15.3.2.1 Site Investigation

The quaternary geology of the proposed development area has been established from the site investigation conducted in November 2007. Investigations were conducted on both sides of the M1 Motorway.

Subsoils on the eastern site generally comprised approximately 5m of Glacial Clay underlain by interbedded clays, silts, sands and gravels with occasional bands of peat present particularly in the south and south-west of the proposed development. Subsoils on the western site generally comprised beach sands underlain by Glacial Clays. The subsoil conditions for the eastern and western site are summarised in the **Tables 15.1 and 15.2**.

Table 15.1: Subsoil Conditions for the Eastern Site

Strata	Description	Thickness
Ground cover	Crops and Grassland	–
Made Ground	Encountered on the western site adjacent to the motorway and comprised reworked gravelly clay with cobbles and boulders, sand and occasional pieces of wire, wood, brick and plastic.	1.5 m to >3 m. Appears to thin to the south.
Glacial Deposits	Firm to stiff gravelly clay	4.9 m to 5.3 m in north and east of site. Absent to 2.4 m in far west and south of site below marshy grassland.
	Interbedded soft clays, silts, sands and gravels	Total thickness unknown strata not fully penetrated. Bed thickness typically ranged from 0.3 to 2.5 m.
Peat	Only encountered in south of site. Described as brown spongy peat.	0.9m to 1.5 m

Table 15.2: Subsoil Conditions for the Western Site

Strata	Description	Thickness
Ground cover	Topsoil and crops	Absent to 0.2 m
Made Ground	None encountered at time of writing	
Beach Deposits	Medium dense fine sand	3.1 m to >6. 1 m
Glacial Deposits	Firm gravelly sandy clay.	Total thickness unknown strata not fully penetrated. Unpenetrated thickness of greater than 5 m recorded in one location.

15.3.3 Bedrock Geology

The GSI Bedrock Geology of Meath, Sheet 13 indicates that the site of the proposed development is underlain by the Clontail Formation. These rocks are Ordovician – Silurian (Lower Palaeozoic) in age and consist of green-grey, medium to thickly bedded, coarse and very fine-grained greywackes, with dark grey, thinly bedded, poorly graded, quartzose fine sandstone to siltstone units. The thickness of the formation is undocumented. There is no faulting in the vicinity of the proposed development (**Figure 15.2**).

15.3.3.1 Site Investigation

Boreholes drilled as part of the ground investigation did not extend into bedrock; however, refusals were encountered between 5.10 and 9.6m bgl which may be indicative of the top of the bedrock.

15.3.4 Hydrogeology

15.3.4.1 Regional Hydrogeology

The National Draft Gravel Aquifer Map produced by the GSI (www.gsi.ie) has classified the sand and gravel (raised beach deposits) beneath the western site, in the north of the proposed twin development area, as a locally important sand and gravel aquifer. This aquifer is moderately productive, i.e. it is yielding enough water to boreholes or springs to supply villages, small towns or factories. The lateral extent of this aquifer is less than 10km^2.

The Clontail Formation has been classified by the GSI as a bedrock aquifer that is generally unproductive except for local zones. Poor aquifers exhibit shallow development of narrow, small fractures/faults that are poorly connected but with occasional widening of fractures. Because of the lack of connectivity, especially at depth, locally important aquifers are normally capable of yielding only sufficient water from wells or springs to supply single houses, small farms or small group water schemes (generally <100m^3/day).

The GSI have developed vulnerability mapping guidelines to broadly categorise groundwater bodies based on the ease with which they may become contaminated by human activities. The GSI has classified the vulnerability of the aquifers within the regions as ranging from High to low. Based on the thickness and type of subsoil derived from trial pit and borehole logs for the site, the vulnerability rating for the proposed development is considered to be moderate for the bedrock aquifer beneath the eastern site and extreme for the gravel aquifer beneath the western site.

The GSI vulnerability mapping guidelines are presented in **Table 15.3** and highlight the classification for the proposed development.

Table 15.3: GSI Vulnerability Mapping Guidelines

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. sandy subsoil)	Low permeability (e.g. clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	**0 - 3.0m**	-
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	**5.0 – 10.0m**	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Note: Shaded and bold indicates appropriate classification for site based on site investigation data

Lower Palaeozoic rocks have a low permeability; therefore, groundwater in the bedrock aquifer is likely to be restricted to the shallow weathered zone or along fault and fracture zones. Groundwater in the bedrock is likely to occur within 10m of ground surface.

Groundwater recharge will be limited in areas where low permeability Glacial Till is present overlying the bedrock.

15.3.4.2 Local Groundwater Regime

On the eastern site the site investigations have encountered groundwater within the sand and gravel horizons at depths ranging from 5.3m to 7.7m bgl. Given the heterogeneous nature of the lower glacial deposits it is likely that there will be some lateral and vertical connection between these water bodies and they can therefore be considered as a single shallow groundwater body. Groundwater monitoring wells have been installed within the boreholes; however, there are currently no stable groundwater level measurements with which to assess groundwater flow directions within the glacial deposits.

On the western site, groundwater has been encountered within the beach sands (gravel aquifer) at a depth of 2.2m bgl, and at depth within the underlying clay subsoils at 8.1m bgl. Groundwater monitoring wells have been installed within the boreholes; however, there are currently no stabilised groundwater level measurements with which to assess groundwater flow directions within the gravel aquifer, although it is anticipated to flow to the north towards the River Fane.

15.3.4.3 Groundwater Users

Treated water is distributed throughout the area using a combination of pumped mains, gravity mains and reservoirs. A search of the GSI well database shows a number of private wells in the vicinity of the proposed development although the presence of groundwater mains suggests that these are unlikely to be used as a supply of drinking water.

15.3.4.4 Groundwater Quality

Water in the lower Palaeozoic aquifers is generally soft (<251mg/l $CaCO_3$). Otherwise the quality is good except where locally contaminated (e.g. as a result of agricultural pollution).

There is currently no available information on shallow groundwater quality within the glacial deposits.

15.3.5 Hydrology

A tributary of the River Fane flows close to the southern boundary of the eastern site and flows in a northerly direction where it joins with another tributary and then discharges to the River Fane, 1.5m north of the proposed development. The River Glyde is located approximately 3km south of the proposed development. However, the watercourses within and/or adjacent to the proposed development consist largely of small field drains. Further information can be found in **Chapter 14.**

The OPW online flood mapping service indicates that no floods have been recorded at or in the environs of the proposed development. The closest recorded floods are approximately 1km to the east of the proposed development in the village of Dromiskin.

There is an area of lower lying marshy ground to the south of the eastern site. The presence of this marshy ground indicates that surface water runoff on the eastern site is likely to be towards the south, where it will eventually discharge to the unnamed stream to the south. Downward percolation of rainwater within the eastern site will be limited by the presence of the low permeability clay.

The western site is likely to have much better drainage capacity than the eastern site due to the presence of the high permeability raised beach deposits.

15.3.5.1 Surface Water Quality

The EPA Online Water Quality Rivermap indicates that the River Fane and the River Glyde has a quality score of 4-5 and is classified as an A class water course. This indicates that the quality status is 'fair' to 'good' (unpolluted) and is unlikely to become contaminated as a result of existing or potential Landuse. The surface water quality of the watercourses within and/or adjacent to the proposed development generally have a Q-rating of 3. Further information can be found in **Chapter 14.**

15.3.6 Geological Heritage

The Irish Geological Heritage (IGH) Programme aims to identify, document and protect the wealth of geological heritage in the Republic of Ireland through the conservation of important sites as National Heritage Areas (NHAs). There are no proposed geological NHA sites in the proximity of this proposed development.

15.3.7 Economic Geology

The GSI online Quarry and Minerals directory indicates that there are no active quarries within 5 km of the proposed development.

15.3.8 Potential Sources of Contamination

Reworked natural material including clays and silts are present along with plastic and wood on the western side of the eastern site of the proposed twin development. This material is present in a line parallel to the motorway and is likely to be associated with the construction of the M1. Samples of the material are currently being subjected to laboratory analysis to determine the contamination potential of this material. There are no other known sources of contamination in the vicinity of the proposed development.

15.4 POTENTIAL IMPACTS

15.4.1 Management of Surface Water Run-off

Following construction, hard-standing areas will cover a large proportion of the proposed development, potentially altering the drainage characteristics of the site. The eastern site is currently poorly draining with surface water collecting in the south of the site and discharging to an unnamed stream; therefore, the overall impact of the development on the eastern site is likely to be neutral. However, on the western site the presence of hard standing is likely to reduce the amount of rainwater infiltrating to the underlying soil and groundwater, potentially resulting in a negative impact on the groundwater regime within the underlying gravel aquifer. However, the design for the development includes large areas of landscaping; therefore, the potential impact on the underlying gravel aquifer is likely to be slight.

Surface water runoff can affect the quality of receiving watercourses as it can contain suspended solids, oil, organic solids, chloride, metals and hydrocarbons. If the intensity of a storm event is sufficient, insoluble pollutants can be mobilised from the surface and potentially result in a short or long-term significant impact on the surface water environment, depending on the severity of the storm event. For a more detailed discussion of the impacts associated with contamination of surface water runoff see **Chapter 14, Aquatic Ecology**.

15.4.2 Contamination

Potentially contaminating activities will be operated on-site as part of the proposed development including a fuel filling station and car parking areas. In order for contamination to occur there must be a source-pathway-receptor (SPR) linkage. Potential sources include hazardous materials such as fuels and chemicals which will be stored and used on-site and may be released via accidental spillage or leakage. In this case the receptors include soil, groundwater and surface water. Potentially significant SPR linkages with respect to the proposed development are presented in **Table 15.4.**

Table 15.4: Potentially Significant SPR Linkages on Proposed Development

Source/Hazard	Pathway	Receptor
Accidental spillage of fuels and other chemicals stored above ground	Direct discharge.	Soil
	Storm water Run-off	Surface Water
	Vertical migration through soils	Groundwater
Vertical percolation from drainage system retention tanks	Vertical migration through soils	Soils Groundwater
Overloading of drainage system and interceptor tank due to spillage *i.e.* tanker spillage	Direct discharge	Surface Water Soils
	Vertical migration through soils	Soils Groundwater
Leakage of fuel from underground storage tank	Direct discharge	Soils
	Vertical migration through soils	Groundwater
	Lateral migration in groundwater	Surface water

If any of these linkages are realised, there is a potential for a long-term significant impact on the receptors in a worse case scenario.

Risks of contamination will be greater on the western site due to the presence of the gravel aquifer. There are a number of private wells in the vicinity of the western site and the usage of these has not been confirmed. However, given that county council mains provide the area's drinking water supply, it is unlikely that there will be any impact on drinking water from the proposed development. In addition, the proposed development on the western site will be located down gradient of the wells recorded by the GSI.

15.5 MITIGATION MEASURES

15.5.1 General

- Where possible, advance notification of ground investigations that will provide good geological exposure shall be given to GSI to afford them the opportunity to gather data (GSI recommendation as per **Chapter 5, Consultation**).
- Where possible, significant bedrock cuttings shall be designed to remain visible and not covered with vegetation and soil (GSI recommendation as per **Chapter 5, Consultation**).

15.5.2 Management of Surface Water Run-off

Surface water has the potential to act as a pathway for contaminants to reach receiving watercourses. Therefore, the following measures are required to reduce impacts associated with surface water runoff:

- The potential reduction in recharge to the gravel aquifer beneath the western site shall be mitigated by incorporating landscaped areas within the design.
- The potential for contamination within the surface water run-off to reach underlying soil and groundwater shall also be limited through the construction of a suitably designed and engineered surface water drainage system in accordance with the SuDS philosophy.
- All run-off from the petrol filling areas will be collected within a closed drainage system which will pass through a full retention light liquid separator before being discharged to the main surface water drainage system. The drainage system will be designed such that all surface water run-off from potentially contaminated areas, including roadways, car-parks and the petrol filling station (following initial treatment) will pass through an attenuation and treatment system which will be designed to treat water to achieve a hydrocarbon concentration of less than 5mg/l. The full retention light liquid system within the petrol filling area shall be designed to contain the maximum contents of a single cell of a tanker delivering fuel at the proposed development.
- All clean uncontaminated roof water will be kept separate from potentially contaminated water and channelled directly to the constructed wetlands down gradient of the interceptor and retention/attenuation system.
- Manual shut off valves shall be installed on the discharge outlets of the underground attenuation system in order to prevent contaminants reaching the constructed wetlands in the event of a significant spillage.
- The underground retention system will allow some downward percolation of surface water in order to mitigate the affect of increased areas of hardstanding surfaces. However, the oil and petrol treatment systems within the drainage system will be designed to ensure that the total hydrocarbon content will be less than 5 mg/l.

15.5.3 Contamination

In the absence of Irish Guidance, specific guidance for the prevention of pollution at sites involving particular activities has been issued in the UK by the Environment and Heritage Service, the Scottish Environmental Protection Agency and the Environment Agency in a suite of Pollution Prevention Guidance (PPG) documents. Those specific to the activities on the proposed development include PPG2 (above ground storage tanks), PPG7 (Refuelling Activities), PPG26 (drums and bulk containers), PPG27 (underground storage tanks). In addition the following guidance documents also apply to activities associated with petrol filling stations:

- The Institute of Petroleum and Explosive Administration, *Guidance of the Design, Construction and Maintenance of Petrol Filling Stations* ("Blue Book");
- The Institute of Petroleum *Guidelines for Soil, Groundwater and Surface Water Protection and Vapour Emission Control at Petrol Fillings Stations,* June 2002;
- Draft Code of Practice for assessing the Risks from Petrol at Relevant Petrol Stations under The Dangerous Substances (Petrol Stations) Regulations 1999, and
- DEFRA (UK) Groundwater Protection Code: *Petrol Stations and other fuel dispensing facilities involving underground storage tanks*, November 2002.

The activities on the petrol filling station shall be carried out in accordance with these guidelines referred to above, which give the following broad recommendations:

- All oils and fuels will be stored in tanks of suitable integrity and strength and be placed within a secondary containment system which must be able to contain at least 110% of the tank contents;

- Storm water run-off will be minimised by the installation of roofs and covers, where appropriate;

- Surface water run-off from any area where fuel is stored or dispensed shall be separate from the surface water drainage system and any open ground or porous surfaces, by using grids and gullies and surfaces impermeable to the products used;

- Fuel storage and dispensing areas shall be paved and potentially contaminated water and spills will be directed through an oil/petrol separator, which will be designed to serve the surface area catchment of the proposed development.

- Underground storage tanks and associated pipework will be double skinned and fitted with an automatic leak detection system;

- Wetstock monitoring will be undertaken in order to allow leaks to be detected at an early stage;

- Pipework shall be protected from corrosion and placed within granular material to protect from stresses caused by obstructions in the ground or uneven settlement;

- Monitoring boreholes will be installed around the facility to enable environmental monitoring;

- Integrity testing will be carried out on tanks and pipe-work before operation of the facility commences, following this it shall be used in conjunction with a leak detection system;

- All fuel deliveries will be supervised by personnel trained in the delivery and emergency procedures;

- A full maintenance program, to include, tanks, pipe-work, monitoring equipment, drainage channels and separators will be implemented;

- All staff will be trained to deal with an Environmental Incident and formal emergency procedures shall put in place to detail actions to be taken in the event of leaks, spillages, collisions, fires and odours being detected off-site.

A groundwater protection response for subsurface petrol tanks is currently being prepared by the EPA based on the recommendations in the guidance listed above. The drainage system as described above, and in **Chapters 3 and 16**, has been designed to comply with these guidelines. In the event of a catastrophic spillage a pollution incident response plan PIRP shall be implemented as discussed in **Chapter 14 Aquatic Ecology**. In particular, the PIRP needs to ensure that sufficient measures are in place to close the manual shut off valves on the retention tanks.

It should be noted that this list is not exhaustive and reference shall be made to the appropriate guidelines and the mitigation specified in **Chapter 14, Aquatic Ecology**, **Chapter 3, Drainage**, and **Chapter 21, Risk Review**, of this EIS.

15.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

15.6.1 Construction Impacts

The proposal will entail the excavation of subsoils (Glacial Deposits) to accommodate the construction of foundations and USTs and the laying of services. The depth of excavations will be dependent upon the final results of geotechnical investigations. It would be expected that diesel fuels and related materials used in the construction process would be brought onto site during the construction phase of the project.

15.6.1.1 Excavation of Overburden

The fill material on the eastern site will require excavation prior to construction of buildings and infrastructure. This fill material has also been identified as being potentially contaminated and therefore may require treatment or off-site disposal. Additional sub-soils may also need to be excavated in order to accommodate the construction of building foundations, site services, underground storage tanks, roads and car parks. These are unavoidable aspects of the proposal that will potentially result in a moderate, long-term impact to the soil and geology environment. The removal of soil from the construction site will decrease the thickness of the material that overlies the bedrock, which will potentially increase the vulnerability of groundwater below the site. However, the treatment or removal of potentially contaminated material will have a positive impact on both the soil and hydrogeological environment by removing a potential source of contamination. The net impact of soil removal is therefore likely to be slight.

The fill material shall be subject to appropriate chemical testing to assess its contamination potential and determine an appropriate disposal route, if necessary.

15.6.1.2 Effects of Dewatering

The excavation of the overburden to accommodate the proposed development may require a dewatering system during the construction phase to temporarily lower the shallow water table below the proposed development. This is unlikely to be required beneath the eastern site unless excavations extend beyond 5m bgl. However, on the eastern site groundwater has been encountered within the raised beach deposits at 2.2m bgl. The beach deposits form part of the locally important gravel aquifer; therefore, lowering the water table may have a potential short term negative impact on existing groundwater users. There are a small number of private wells recorded by the GSI to the north-west and south-east of the western site; however, the presence of mains water makes it unlikely that these wells are used as a drinking water supply.

15.6.1.3 Contamination

During the construction phase, fuels and hazardous materials will be brought onto site as part of the construction of the petrol station to fuel vehicles and plant machinery. These materials will have the potential to cause long or short term, moderate to significant impacts to the soil, groundwater and surface water environment if not stored and used in an environmentally safe manner. The impact will be more significant on the western site due to the presence of the underlying gravel aquifer.

15.6.1.4 Soil Erosion

During the construction phase the natural drainage system at the construction site is likely to be disturbed and surface water run-off will have an increased sediment load as well potentially carrying pollutants from materials used and stored on-site. In addition to affecting water quality of receiving watercourses this disturbance can also result in soil erosion. These affects will result in a short-term moderate impact on the soils and surface water environments.

15.6.2 Construction Mitigation Measures

15.6.2.1 Excavation of Overburden

Soil removal during the construction phase of the project will be an unavoidable consequence of the development and would apply for virtually any form of development. The following mitigation measures are required to reduce the impacts associated with excavation of overburden.

- Where possible, the soil will be reused on-site.
- Chemical analysis will be carried out to assess whether the fill material presents a risk to human and/or environmental receptors and to determine a suitable on-site or off-site disposal route. Any disposal of waste off-site shall be to a fully licensed waste facility with removal by a fully licensed waste removal company.

15.6.2.2 Dewatering

- A suitably designed groundwater dewatering system shall be incorporated into the design of the proposed development. Any potential settlement of subsoils associated with dewatering shall be addressed through the use of appropriate engineering methods, such as cut off walls.
- Any recovered uncontaminated water shall be collected and disposed of under discharge consent to nearby watercourses.
- Any potentially contaminated water shall be treated prior to disposal.
- Potential impacts on any local wells shall be addressed in the design of the dewatering system. This shall include a door-to-door well survey to determine the exact usage of the water from nearby private wells. Should impacts occur to nearby groundwater wells, which are in use for domestic supply purposes, the Contractor/Concessionaire shall provide an alternate water source until water supply from the affected well is restored.

15.6.2.3 Contamination

In order to prevent the accidental release of hazardous materials (fuels, paints, cleaning agents, etc.), including oils and fuels for the petrol station, during construction site activity the following mitigation measures shall be implemented:

- All hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents.

- Temporary bunds for oil/diesel storage tanks will be used on-site during the construction phase of the project as appropriate.

- Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project and an emergency response plan shall be in place, in case of accidental spillage.

Reference shall made to additional measures required for the protection of surface water from contamination during the construction phase as provided in **Chapter 14 Aquatic Ecology.**

15.6.2.4 Soil Erosion

At the construction phase it is important to protect against sediment erosion; therefore, the following mitigation measures are required to reduce this impact.

- A sediment erosion control plan shall be implemented at the construction stage in order to prevent soil erosion and excess sediments or other material from reaching the receiving watercourses. The sediment erosion control plan shall include as a minimum the following measures:

  - The designation of appropriate locations and methods for stockpiling soil, aggregates, chemicals, etc.;

  - Restricting vehicular movement to prevent unnecessary erosion;

  - Revegetating exposed areas, as soon as practicable;

  - Use of temporary sediment trapping devices (e.g. silt fences, hay bales, etc.); and

  - Routing flows from the construction site through settlement ponds or filter channels.

Reference shall be made to additional measures required for the protection of surface water from contamination during the construction phase as provided in **Chapter 14 Aquatic Ecology.**

15.7 RESIDUAL IMPACTS

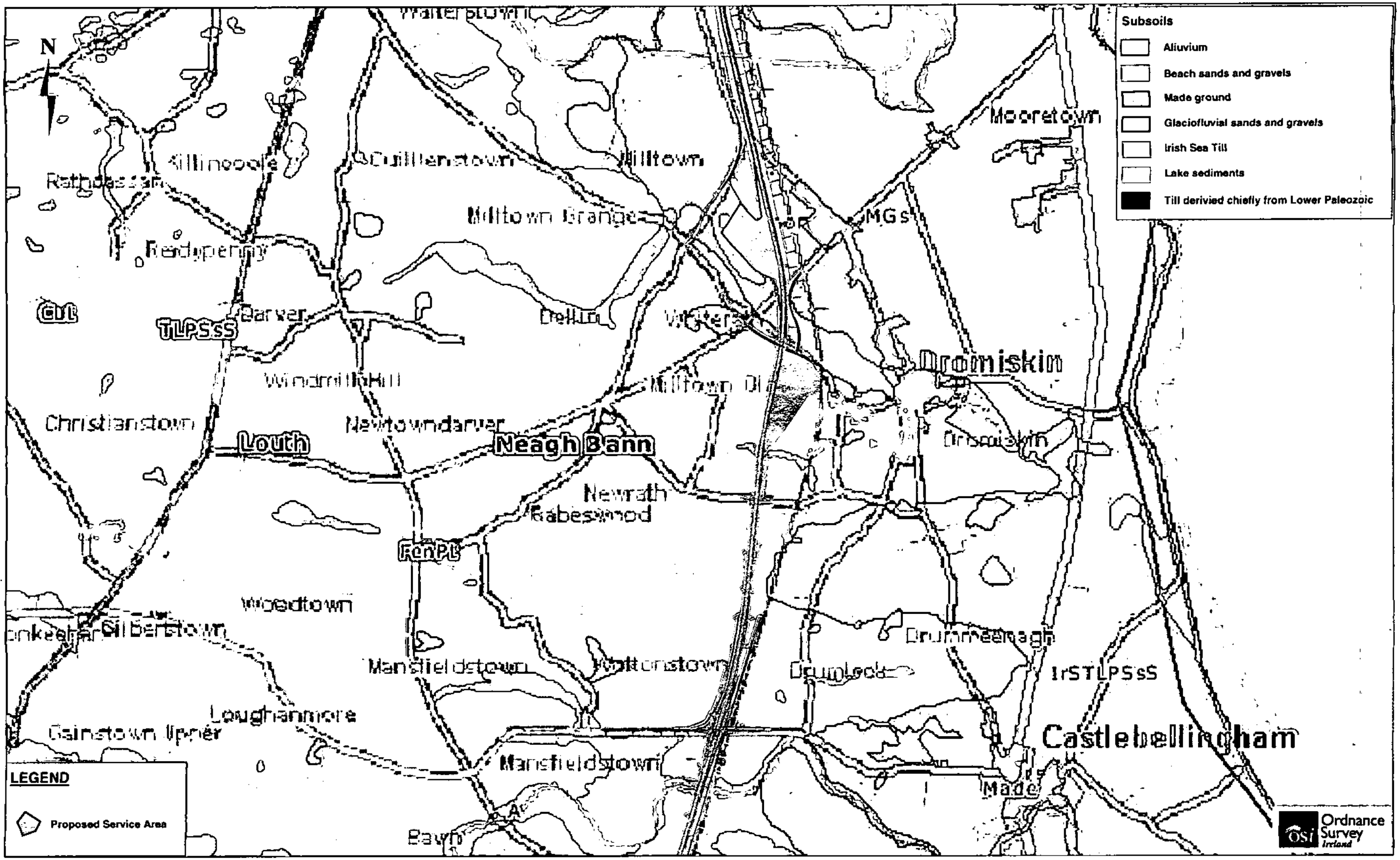
The excavation and removal of subsoil will result in a localised, permanent negative impact to the soil overburden layer. The impact will be limited to areas where excavation will occur, namely in areas of building foundations, roads and carparks and site underground services. However, this effect will be countered by the removal of potentially contaminated material, which will have a long-term positive impact on the soil environment.

By employing the mitigation measures detailed above when undertaking dewatering activities, the overall construction impact on the groundwater regime will be neutral.

Given the use of appropriate secondary containment for the storage of fuels, oils, paints and other potentially hazardous materials on-site during the construction phase, the risk of accidental release of these compounds to the soil environment will be greatly reduced. The impact to the soil and underlying groundwater from these materials is predicted to be neutral provided the mitigation

measures required in this Chapter as well as those listed in **Chapters 14, 16 and 21**, are adhered to and safe materials handling occurs on-site.

Employing the mitigation measures detailed above, as well as those listed in **Chapters 14, 16 and 21**, will greatly reduce the risks to the soil, geological, hydrological and hydrogeological environment beneath the proposed development during the operational phase and result in a neutral impact. However, given the nature of activities on the proposed development a residual risk of catastrophic spillage and other environmentally damaging incidents will remain.



NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

West consult
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CONSULTING ENGINEERS

Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	SUBSOIL MAP		
Designed: xxx	File Ref.: MDT0146M/S2012A01	Status: Final	
Drawn: E.I.	Job No: MDT0146		
Checked: L.C.	Scale: NOT TO SCALE	Figure No. 15.1	Rev. A01
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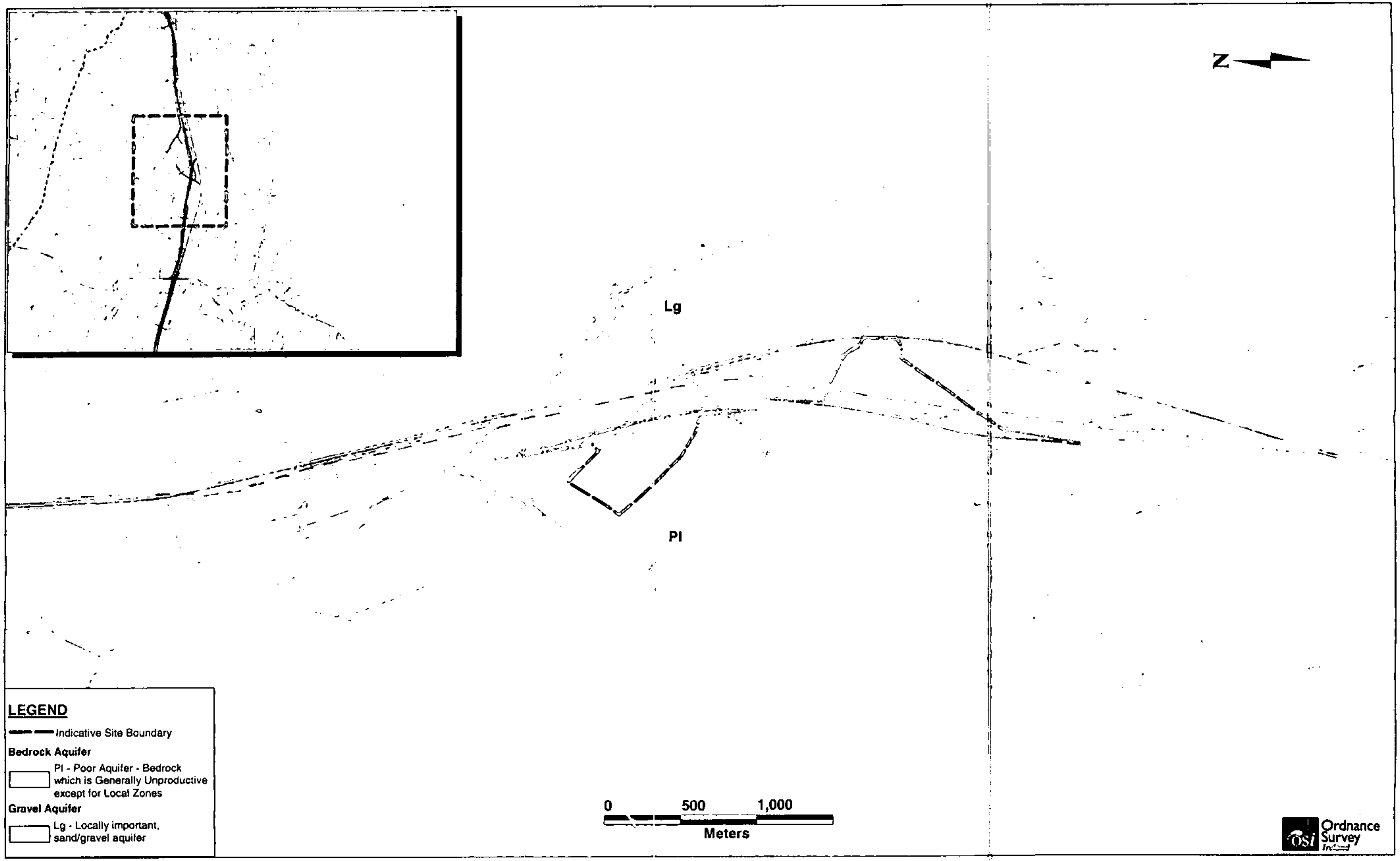

LEGEND

Indicative Site Boundary

Bedrock Aquifer

Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones

Gravel Aquifer

Lg - Locally important, sand/gravel aquifer

NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	BEDROCK GEOLOGY		
Designed: xxx	File Ref.: MDT0146MN1003A01	Status: Final	
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Approved: A.G.	Date: 03.12.2007		

16 DRAINAGE

16.1 INTRODUCTION

This section of the EIS describes the existing drainage within the study area and assesses the impact of the proposed M1 North Motorway Service Area in terms of surface water drainage. The drainage design proposed for the development is also described and details of measures to mitigate any potential negative impacts on the receiving environment are outlined.

The drainage design proposed for the motorway service area is inter-related with the aquatic ecology of the receiving waters and also hydrogeology of the study area. Further details can be found in **Chapter 14** (Aquatic Ecology) and **Chapter 15** (Soils, Geology & Hydrogeology) of this EIS.

16.2 METHODOLOGY

ROD carried out the preliminary drainage design for the proposed M1 North Motorway Service Area. The following documents were examined as part of the assessment:

- Dunleer - Dundalk Motorway Project EIS (1993); and
- HA103/06 of Volume 4 of the UK Design Manual for Roads and Bridges.

The surface water drainage design has been based on the Modified Rational Method and is designed to accommodate, without surcharge, a once in five-year rainfall event, assuming a maximum rainfall intensity of 50mm per hour. For the design, paved surfaces are assumed to be 100% impermeable and grassed areas are assumed to be 80% permeable. Pipe sizes and gradients will be such as to ensure a minimum flow velocity of 0.75 metres/second. Pipes generally will be laid with a minimum cover of 1.2 metres from paved surface to top of pipe.

The proposed motorway service area eastern and western sites will each be provided with separate but similar surface water drainage systems.

During the Preliminary Design Stage consultations were held with the following bodies to discuss their requirements with respect to drainage of the proposed development and treatment of watercourses affected by the proposed development:

- Office of Public Works;
- Eastern Regional Fisheries Board;
- Waterways Ireland; and
- Louth County Council.

At detailed design stage more comprehensive consultations with the interested bodies will be undertaken.

16.3 EXISTING ENVIRONMENT

The land upon which the eastern site is to be located is gently undulating and varies in level between 17.5 metres Above Ordnance Datum (AOD) on the eastern boundary and 9.5 metres AOD near the southern end of the eastern site. The low-lying area includes a small area of bogland known locally as the Red Bog. The lands forming the western site are virtually level, between 3.9 and 4.5 metres AOD. The land use is predominantly agricultural, mostly tillage.

The southern section of the eastern site is traversed by a small stream flowing into the Red Bog. The western site contains no significant watercourses on-site but there is a small stream located at the northern corner of the western site. At present the lands are drained by overland or sub-surface flow into these watercourses.

The M1 Motorway, which bisects the proposed development, drains directly into the existing ditch and stream network.

16.3.1 Characteristics of the Proposal

The proposed motorway service area will include a number of elements which have relevance to the drainage design. These include the fuel and fuel storage areas, the service building, the parking provisions and also the internal road drainage. An indicative drainage layout has been shown in **Figure 16.1** and **Figure 16.2**

The drainage design follows the principles of Sustainable Drainage Systems (SuDS). The SuDS system aims to limit surface water runoff rates from developments to the previously existing greenfield rate and provides a series of treatment systems, which combine to ensure that surface water runoff entering the receiving watercourse is of a high level of water quality.

16.3.1.1 Drainage of Fuel Service Areas

The fuel station forecourts, fuel delivery areas and other paved surfaces surrounding the fuel pumps, will be contoured to ensure that all rainwater and spillages within these areas will be contained within the individual catchments. A separate surface water closed pipe drainage system will be provided to accept the runoff and accidental spillages. This system will discharge to a full retention light liquids separator with sufficient storage capacity to accept an accidental spillage equalling the volume of a single cell of a fuel delivery vehicle. From the interceptor the runoff will pass into the carriageway drainage system where it will be treated in a hydrodynamic vortex separator and constructed wetlands before being discharged into the receiving watercourses. The constructed wetland will comply with the requirements of HA103/06 of Volume 4 of the UK Design Manual for Roads and Bridges.

The closed pipe drainage system will also drain the underside of the road pavement as it is a requirement to isolate the road pavement from the underground strata in the areas of the fuel station forecourt and fuel delivery areas.

16.3.1.2 Drainage from Service Area/Amenity Buildings

Runoff from the roofs of all motorway service area buildings (including the runoff from the forecourt canopies) will discharge to a dedicated closed-pipe drainage system, which will discharge directly to the constructed wetland. It will not pass through the attenuation/infiltration system, ensuring that some proportion of the runoff from the proposed development will feed the wetland. The constructed

wetland will provide sufficient flow attenuation on this portion of the site runoff. None of the proposed works will discharge to the existing M1 Motorway drainage system.

16.3.1.3 Carriageway Drainage

The runoff from the slip roads, the internal roadways in the Motorway Service Area and the HCV parking will be collected by means of kerbs and road gullies or similar. A closed pipe system will collect the runoff and discharge, via a hydrodynamic vortex separator that will remove grit, oils and 'floatables' from the water, to Stormbloc, or similar proprietary, underground storage systems. The storage system will be surrounded by a permeable engineering membrane, which allows water to infiltrate into the soil, if possible, and thereby recharge groundwater. Any water not infiltrating into the ground will flow via a flow attenuation device to the constructed wetland.

16.3.1.4 Parking Area Drainage

The drainage of the car parking areas on-site will be by means of kerbs, road gullies or similar and a closed pipe system. It will discharge to the same treatment and storage system as the carriageway drainage described above, and then to the constructed wetland.

16.4 POTENTIAL IMPACTS

16.4.1 Water Quality

Run-off can affect the water quality of receiving watercourses. It can contain suspended solids, oil, organic matter and metals. If the rainfall intensity of a storm event is sufficient, insoluble pollutants can be mobilised and flow into the drainage system and into the receiving waters. The drainage system must therefore include measures to improve the quality of runoff prior to discharge to receiving waters.

16.4.2 Flow Attenuation

When a site is developed, the runoff from impermeable surfaces, such as roofs, parking areas and access roads will arrive at the receiving watercourse earlier than the previous "greenfield" runoff. Sometimes, at the downstream section of a larger river catchment, this earlier arrival allows the storm runoff from the site to reach a peak and subside before the arrival of the peak flow from the upstream section of the catchment and no significant increase in peak flow in the watercourse will ensue. However, in the case of smaller catchments the peak flow will occur quickly and the accelerated runoff from the site will result in an increase in peak flows in the watercourses, followed by an increased risk of flooding downstream.

16.4.3 Flooding

The construction of the proposed motorway service area will create an impervious area within the existing catchment as a result of internal roads, parking areas, buildings, etc. The impervious areas will increase the volume of storm runoff relative to the existing drainage network. The drainage from the motorway service area will increase the rate of runoff. This could, if unmitigated, potentially cause flooding downstream of the outfall point.

16.4.4 Culverting

Where extension to existing culverts or installation of new culverts is required, this could reduce storage capacity of the existing land drains. Culverts could also act as hydraulic restriction causing flooding upstream. Culverts can also impact on aquatic ecology by blocking the upstream movement of fish. This impact is discussed in **Chapter 14 Aquatic Ecology**.

16.5 MITIGATION MEASURES

The reader is also referred to the mitigation measures outlined in **Chapter 14** (Aquatic Ecology) and **Chapter 15** (Soils, Geology & Hydrogeology) for additional mitigation measures relevant to drainage.

16.5.1 Water Quality/Pollution Control

- To ensure the protection of watercourses from pollutants, it is proposed to implement measures to minimise risk of pollution of watercourses. Soakaways or settlement ponds shall be installed on drains accepting runoff from heavily trafficked roads as per the Department of Marine and Natural Resources publication *Fishery Guidelines for Local Authority Works.*

- The receiving environment from road surfaces, parking areas, and forecourts runoff, pollution control shall be provided at each proposed outfall location.

- Pollution control in the form of constructed wetlands immediately before discharge to the adjoining watercourses will be provided. Upstream, to prevent discharge of oil, petrol or other liquids to the constructed wetlands, full retention light liquids separators shall be used on the forecourt drainage and hydrodynamic vortex separators or similar shall be used on the drainage systems serving the roadways and car parks. These separators will also remove grit and floatables from the surface water.

- All pollution control facilities and attenuation areas shall be fitted with a penstock or similar restriction at the outfall to the receiving channel. Such devices can be used to contain pollutants in the event of accidental spillage.

- A light liquid separator (as described above) shall be used to provide sufficient storage to accommodate the contents of one fuel cell of a petrol/oil delivery tanker.

16.5.2 Flow Attenuation

- The surface water runoff from the eastern site will discharge to a stream located approximately 380 metres south of the access roundabout while the western site will discharge to the stream located at the northern corner of the western site. Flow attenuation, shall be provided to ensure that there will be no increase in peak flows in these watercourses.

- To minimise the risk of increasing the peak flows in the watercourses Sustainable Drainage Systems (SuDS) techniques shall be implemented on-site. To achieve Greenfield runoff rates it is normal to restrict the discharge to the watercourses by means of a flow attenuation device. This will result in a back up of waters at the attenuation device, which will be contained by the provision of a water storage system. The attenuation device will allow a constant discharge to the receiving waters during and after the storm until the storage system is emptied.

16.5.3 Storage Systems

The temporary storage of runoff water can be by means of ponds, concrete tanks or proprietary cellular block type systems. In large developments ponds can be an effective solution and can be an asset to the area if a permanent water body is provided. However in a development this size underground storage will provide the best solution. Concrete tanks are effective but all the water will be discharged to the watercourse instead of recharging the groundwater as was the case on the Greenfield site.

- A cellular system shall be provided in the proposed development. The volume of storage provided shall be sufficient to accommodate the runoff from a once in one hundred years rainfall event.

16.5.4 Culverts

- Any culverts will be designed to accept the flow from a once in 100 years flood event.
- During the detailed design stage, consultations shall take place with the Eastern Regional Fisheries Board with regard to any in stream works and in relation to the final design of any potential culverts.
- During the detailed design stage, consultations shall take place with the Office of Public Works. It will be necessary to obtain approval from the Office of Public Works under Section 50 of the Arterial Drainage Act (1945) prior to undertaking any construction works on the stream.

16.6 CONSTRUCTION IMPACTS & MITIGATION

16.6.1 Impacts

During the construction phase, the main potential impact is likely to be entry of suspended solids and other potentially harmful materials into existing watercourses, which could have impacts on water quality and the ecology of the watercourse.

In addition, the installation/extension of culverts could potentially result in impacts on instream and bankside habitats as well as flora and fauna.

16.6.2 Mitigation

To reduce these potential construction impacts the following mitigation measures shall be implemented:

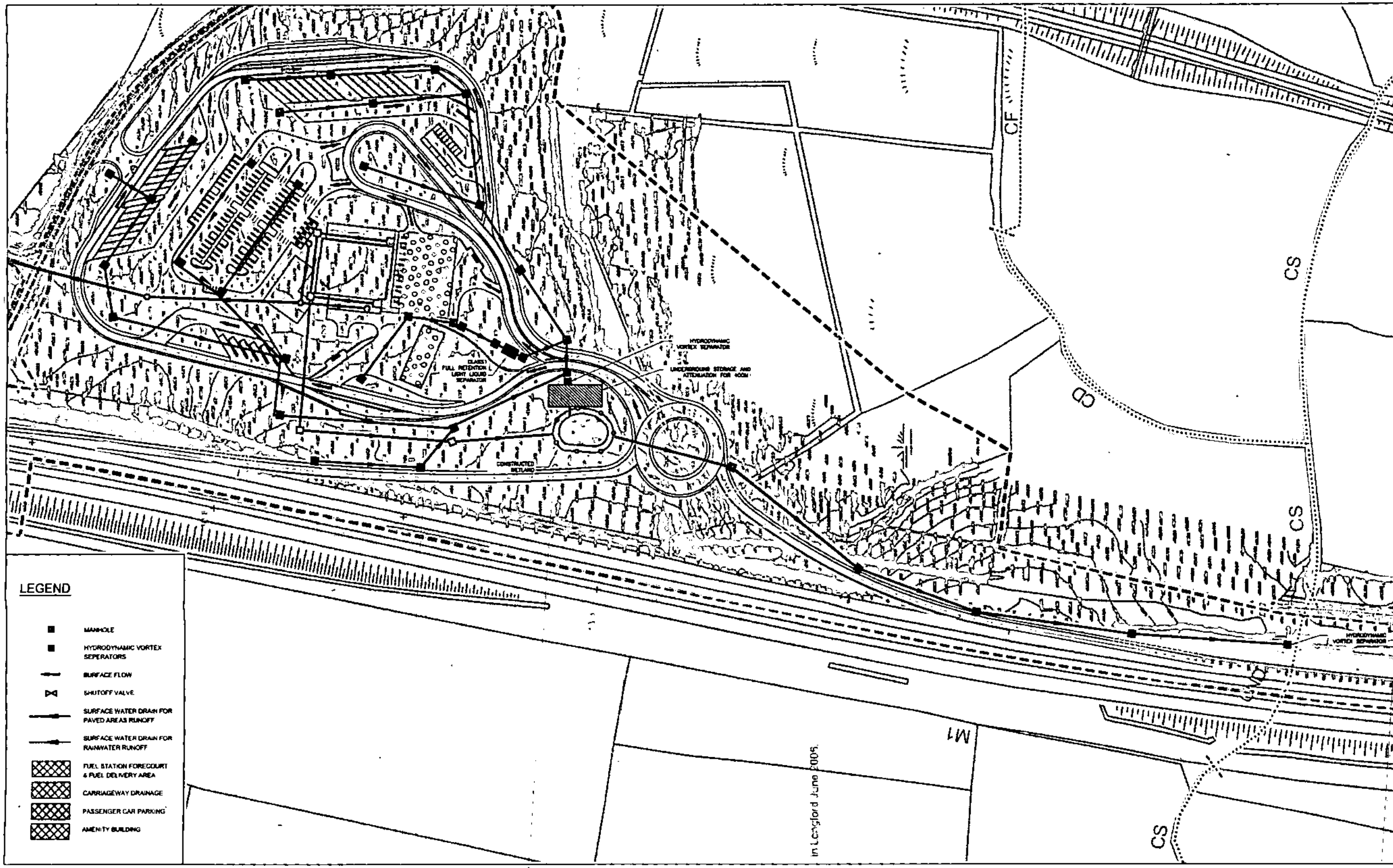
- The contractor, prior to commencement of any construction related works, shall be required to have an approved Sediment and Erosion Control Plan on-site;
- The contractor shall be required to store chemicals and other construction materials safely and ensure that no oil or chemicals are discharged into watercourses;
- Construction works directly affecting watercourses will generally be restricted. The period when in stream works are permitted will be agreed with the fisheries board before any temporary or permanent in stream works commence;
- During the detailed design stage, consultations shall take place with the Eastern Regional Fisheries Board and the Office of Public Works with regard to design and positioning of culverts;

- In addition, the contractor/concessionaire will be required to consult further with the Eastern Regional Fisheries Board and the OPW regarding the implementation of mitigation measures designed for both the construction and operational phases of the job before construction commences;
- Temporary silt traps shall be put in place to minimise impacts on nearby watercourses. Temporary facilities to trap any accidental spillage shall also be required.
- The contractor/concessionaire shall construct and commission elements of the permanent drainage system as early as practicable. Construction of the tanks needed for attenuation of the run-off from the proposed development will also need to be completed at an early stage.

Reference shall be made to additional mitigation measures provided in **Chapters 14** and **15** of this volume in relation to the Aquatic Ecology and Soils, Geology and Hydrogeology.

16.7 RESIDUAL IMPACTS

No residual impacts are anticipated however, the drainage design proposed will require maintenance at regular intervals during the life of the motorway service area facility



Transport 21

NDP National Development Plan

NRA National Roads Authority

West consult
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CONSULTING ENGINEERS

M1 NORTH MOTORWAY
SERVICE AREAS

INDICATIVE DRAINAGE LAYOUT
SHEET 1 OF 2

FINAL

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16.1

A01

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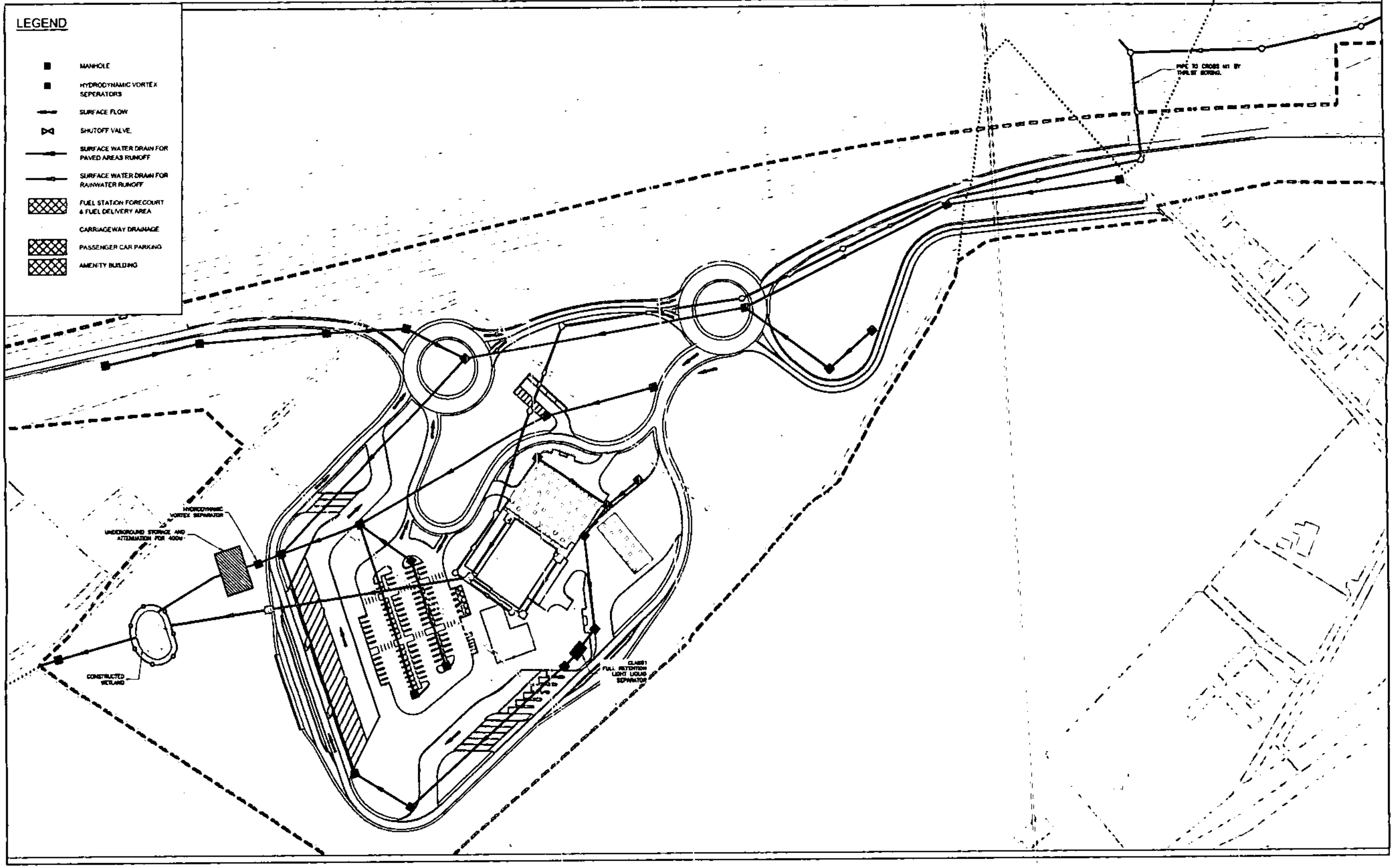

Transport 21	NDP National Development Plan	NRA National Roads Authority	West consult RPS • ROUGHAN & O'DONOVAN CONSULTING ENGINEERS	Project Title	M1 NORTH MOTORWAY SERVICE AREAS
				Drawing Title	INDICATIVE DRAINAGE LAYOUT SHEET 2 OF 2
				Drawing No.	16.2
				Rev	A01
				Status	FINAL

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17 AGRICULTURAL MATERIAL ASSETS

17.1 INTRODUCTION

RPS undertook an assessment of the potential agricultural impact from the proposed Motorway Service Area development near Dromiskin, Co. Louth. The location for the proposed motorway service area is currently a greenfield site located in Co. Louth. It will potentially impact four agricultural landowners. There are no non-agricultural properties directly impacted by the proposed development and as such no further impact assessment is required. However, the indirect impacts associated with the non-agricultural properties for example air quality, noise & vibration and landscape & visual, etc. have been assessed in earlier chapters of this EIS.

17.2 METHODOLOGY

A desktop survey and a field survey were carried out to assess the potential impact on agriculture in the area. The survey assessed a number of factors including:

- The current agricultural practice taking place on the lands in and around the proposed development; and
- Level of management currently practiced.

The following publications and documents were considered in undertaking this assessment:

- *Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads*, March 2003;
- OSI, 50,000 and 2,500 maps; and
- CSO data.

The potential effects that a proposal of this nature may have on agriculture are primarily related to the enterprise type and the intensity that the enterprise is farmed. **Table 17.1** lists the enterprises that may be affected by a development such as the one proposed and shows the potential effects on the different agricultural enterprises. It should be noted that this is a general list of agricultural enterprises and not all of the enterprises listed occur on the site of the proposed development. **Table 17.2** describes the criteria for the different levels of impact significance.

Table 17.1: The Potential Effects on Agriculture for Different Enterprise Types

Enterprise Type	Description
Dairying	These farms require stock to be moved to and from the place of milking to the grazing area twice daily. Due to this frequency of movement difficulties such as accessing grazing areas may place considerable limitations on the suitability of these areas for future grazing and subsequently affect profitability.
Horses	Horses, particularly thoroughbred horses are of a more nervous disposition than other stock types and are prone to stress caused by unaccustomed noise and moving vehicles, which may arise from the proximity of a new development to the grazing area.

Enterprise Type	Description
Tillage	This farm enterprise is generally less severely affected than livestock farms. Machinery can easily move from one land parcel to another although there are additional costs involved especially where the remaining areas are of a less regular shape. The size of the remaining areas may be considered too small to operate large machinery, requiring a change in enterprise type.
Drystock	Enterprises such as beef and sheep are generally less affected than dairy farms. Livestock on these farms are not moved from field to field as frequently as on a dairy farm. Although there may be an impact, the farming practices on these farms can be adapted to mitigate the overall impact.

Table 17.2: Degree of Overall Impact – Assessment Criteria

Significance of Impact	Criteria
Not significant	Agriculture is not affected by the development or the development may encroach slightly on a boundary causing a slight inconvenience.
Minor	Development causes a small inconvenience but does not require a significant change in current management practices. Mitigation would overcome any problems.
Moderate	Development causes a degree of landtake or severance that will cause a change in management practices. No changes should occur in current enterprises although there may be an increase in labour charges or machinery costs. Mitigation measures should overcome most difficulties.
Major	Possible change in enterprise due to severance, land take or loss of buildings. This change would usually occur with dairy or stud farms changing to drystock or tillage. The impact would require a significant change in management practices with associated costs. This level of impact would require considerable mitigation measures and not all difficulties would be overcome.
Severe	Farming operations can no longer continue. No mitigation measures would overcome impact to allow any farming to continue. This will only occur when the landtake is significant and farming cannot continue.

17.3 EXISTING ENVIRONMENT

17.3.1 General

There are 1,740 farms in Louth, utilising approximately 61,400 hectares (CSO 2000). The average farm size is 35.2 hectares. **Table 17.3** shows the breakdown of the numbers and percentages of farms specialising in different enterprises in Louth. From the information in the table it can be seen that the majority of the agricultural lands in Louth are involved in specialist beef production with a considerable percentage specialising in dairy and tillage production.

Table 17.3: Numbers of Farms in Louth in Different Enterprises

Enterprise Type	Number of Farms	Percentage of Total
Specialist Tillage	290	16.5
Specialist Dairy	290	16.5
Specialist Beef Production	620	36
Specialist Sheep	170	10
Mixed Grazing Livestock	240	14
Mixed Crops and Livestock	130	7
Total	**1740**	100

17.3.2 Topography

The topography of the eastern site is mostly level while gently sloping southwards along the existing M1 Motorway. The topography of the western site is also generally level. Further details of the topography can be found in **Chapter 3** of this volume.

17.3.3 Agriculture

The majority of the lands potentially affected by the proposal are all of good agricultural quality and as such have the potential to be utilised in any of the primary agricultural enterprises such as, tillage, dairying and drystock. The lands comprising the western site are principally involved in tillage production with a smaller area of grassland adjacent to a dwelling house at the northern end of the study area. The lands comprising the eastern site are mainly involved in tillage production with an area of scrubland to the south and a further smaller area of grassland at the southern end of the study area adjacent to the existing M1 Motorway.

17.4 POTENTIAL IMPACTS

The proposed development will not have a significant impact on agriculture on a national or regional scale. However, it will have an impact on a local scale due to loss of agricultural land. Approximately 9.4 hectares of agricultural land will be acquired on both the eastern and western sides of the M1 Motorway as shown in **Figure 17.1**. Four landowners will be impacted by the proposed development. Two landowners will experience moderate impacts as a result of the proposed motorway service area, while the remaining two will experience minor impacts. As stated above a moderate impact is that which causes a degree of landtake or severance that will cause a change in management, while a minor impact is that which causes a minor inconvenience but does not require a significant change in current management practices. The pre-mitigation impacts on the lands affected are shown in **Figure 17.2**.

The lands required for this proposal are adjacent to the existing M1 Motorway; therefore, no further severance will occur as a result of this proposed development.

Noise can be an issue with certain types of livestock such as dairy cows and horses. Although noise can affect stock there are large numbers of cattle (dairy and drystock) and horses grazing alongside major roads all over the country with no ill affects. Noise from the proposed development will have no adverse effect on tillage production.

There will be an increase in localised traffic during the operational phase of the proposed development as vehicles enter/exit the motorway service area, which may give rise to increased dust.

17.5 MITIGATION MEASURES

Mitigation for landtake shall be through compensation under the statutory code.

Potential impacts in relation to dust shall be mitigated in line with the recommendations in **Chapter 9, Air Quality.**

No significant noise impacts on agricultural resources are expected to occur as a result of operation of the proposed motorway service area; therefore, no specific mitigation measures are required. It should be noted that the mitigation measures recommended in **Chapter 10, Noise**, would further reduce any already less than significant noise impacts.

It is proposed that access to the site, once operational, will be via the motorway with the exception of staff cars. By excluding the use of the local road network the potential impact arising from increased traffic on agricultural operations will not be significant.

17.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

17.6.1 Construction Impacts

The activity of earth moving machinery, transport lorries and other ancillary vehicles could generate significant dust in the immediate vicinity of the proposed development during construction. The proliferation of dust has a nuisance value.

There will be increased traffic during the construction phase of the proposed development, which has the potential to cause nuisance to local agricultural traffic.

Field drainage systems currently *in situ* may be disturbed and in places disabled during construction. This damage may lead to wet or flooded fields during spells of wet weather, and farm productivity could be reduced.

There are residences located adjacent to the proposed development, which could be subject to temporary impacts with regard to access during the construction phase of the project. The mitigation measures outlined below would address any temporary impacts to access.

While no impacts to known water supplies are expected to occur during the construction phase of the project, there is the potential for services to be subject to impacts as a result of accidental disruption. The mitigation measures outlined below would address any unforeseen disruptions to services.

17.6.2 Construction Mitigation Measures

Discussions shall take place with landowners who are concerned that noise and dust levels from the construction are causing a disturbance to their stock. Mitigation measures regarding noise are outlined in the **Noise Section** of the EIS. Measures to control dust are outlined in the **Air Quality Section** of the EIS.

Steps shall be taken to minimise dust and mud from construction activities. Measures will include, as appropriate, the watering and containment of material with dust or mud potential. Further details of dust minimisation can be found in the **Air Quality** chapter of this EIS.

Discussions shall take place with landowners to ensure that construction traffic does not interfere with farm operations. It is proposed that HCV construction traffic travelling to and from the proposed development must travel via the M1 Motorway, as they will not be permitted to use the existing local road network for haulage of plant and materials to and from site. Mitigation measures regarding traffic impacts are outlined in the **Traffic Section** of the EIS.

All drainage likely to be affected or disturbed during the construction phase will be identified and reinstated quickly and properly. Delay in reinstatement may cause flooding and subsequent damage to crops. Surface drainage may also be affected where vehicular traffic has damaged soil structure. Areas that have been affected in this way will require remedial work. Damage to crops and soils by flooding will be rectified and/or compensated.

Where necessary, suitable stockproof temporary fencing shall be erected for the duration of the works.

Where any fences, walls or hedges are damaged they shall be made stockproof immediately, where necessary. Any necessary permanent restoration of fences, walls, drains or land will be completed within two months of the work concluding.

During the construction stage the contractor shall be instructed that any gates used by them are closed so as to prevent animals from straying.

Existing accesses to property, including homes and farms shall, where practicable, be maintained during construction, otherwise reasonable temporary access will be provided.

Land drains shall, to the extent possible, be maintained during the course of the works and any damage due to the works will be made good on completion of the works.

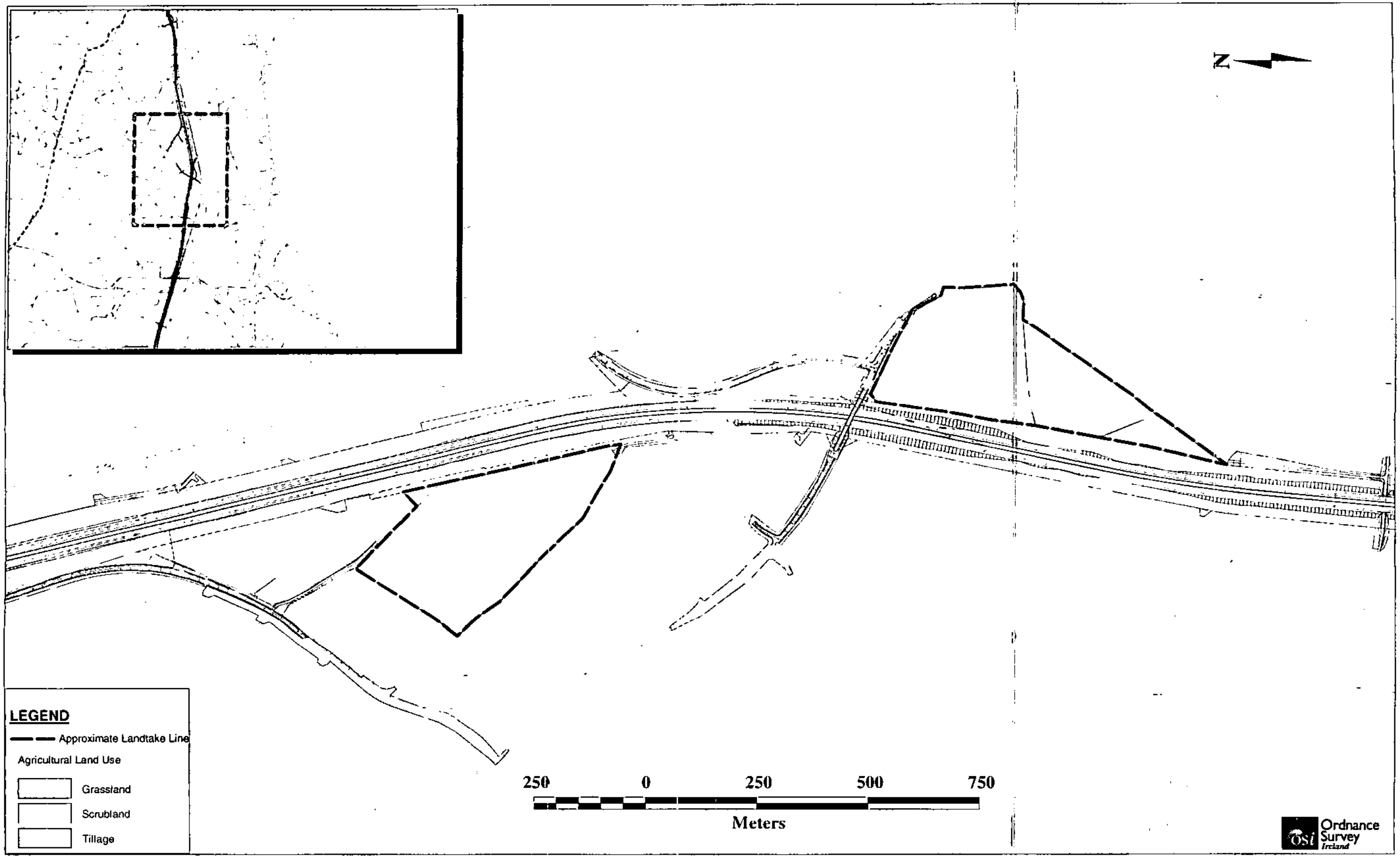
The contractor/concessionaire shall ensure, as far as practicable, that additional drainage problems or ponding does not occur as a result of the construction works. Any permanently severed pipes or drains will be connected into a new drain and any pipe disturbed by the works reinstated to ensure free discharge into a suitable outfall.

The contractor/concessionaire shall follow best practice in seeking to avoid damage from flooding of land.

Care shall be taken with soil and other material, removed in the course of the works, when reinstated. Unless otherwise agreed, topsoil, which will be separated from other material, will be reinstated as the top layer.

17.7 RESIDUAL IMPACTS

The residual impact from the proposed development will not be significant on a national or regional perspective. After implementation of the proposed mitigation measures there will be a minor residual impact on two of the four landowners affected by the proposed development, and a not significant impact on the remaining two landowners (see **Figure 17.3**).



Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	AGRICULTURAL LAND USE

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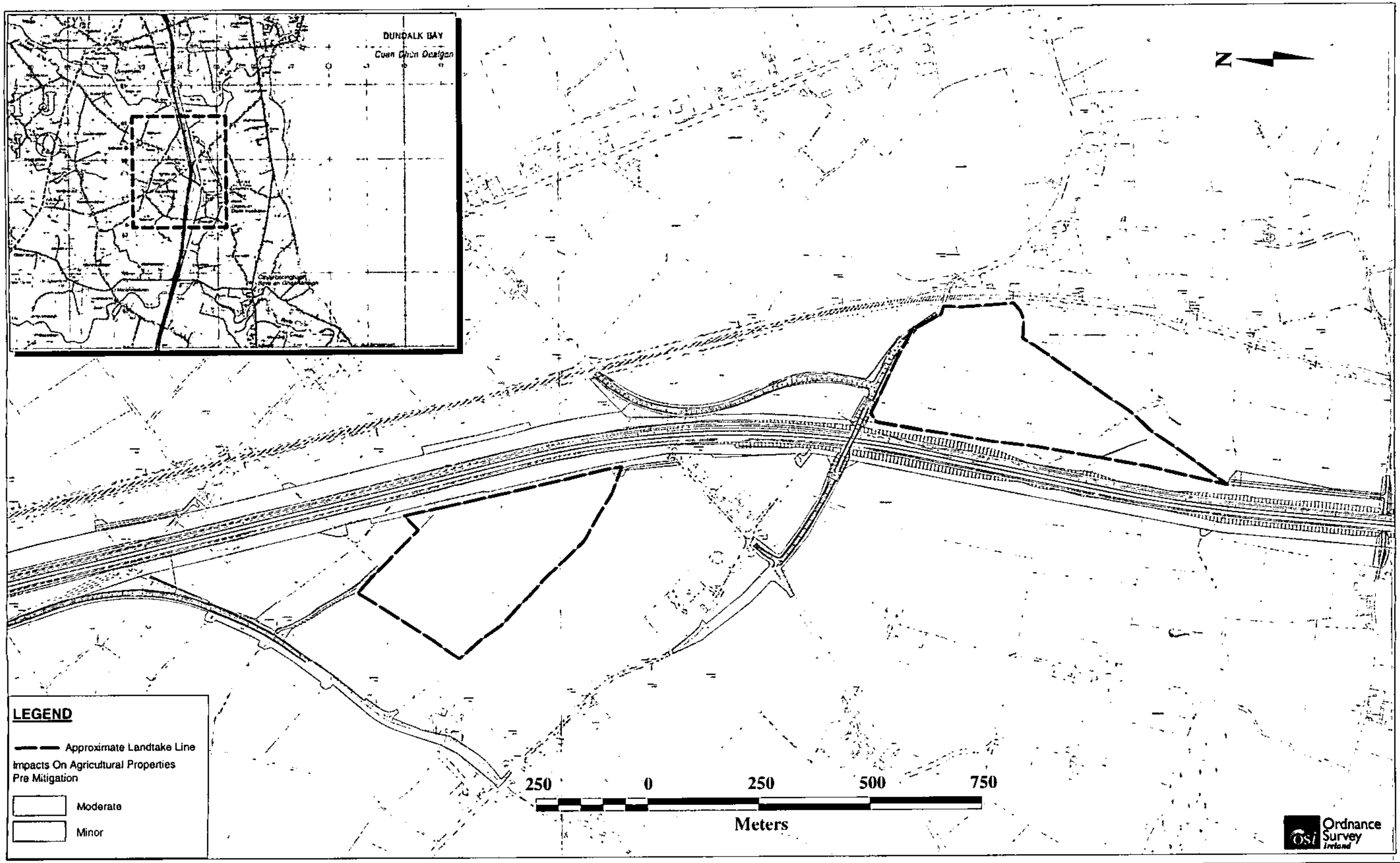
Drawn: E.L.	Job No: MDT0146		
Checked: L.C.	Scale: 1:10000 @ A4	Figure No: 17.1	Rev: A01
Approved: A.G.	Date: 06/12/2007		

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

NDP NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

Ordnance Survey Ireland



NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

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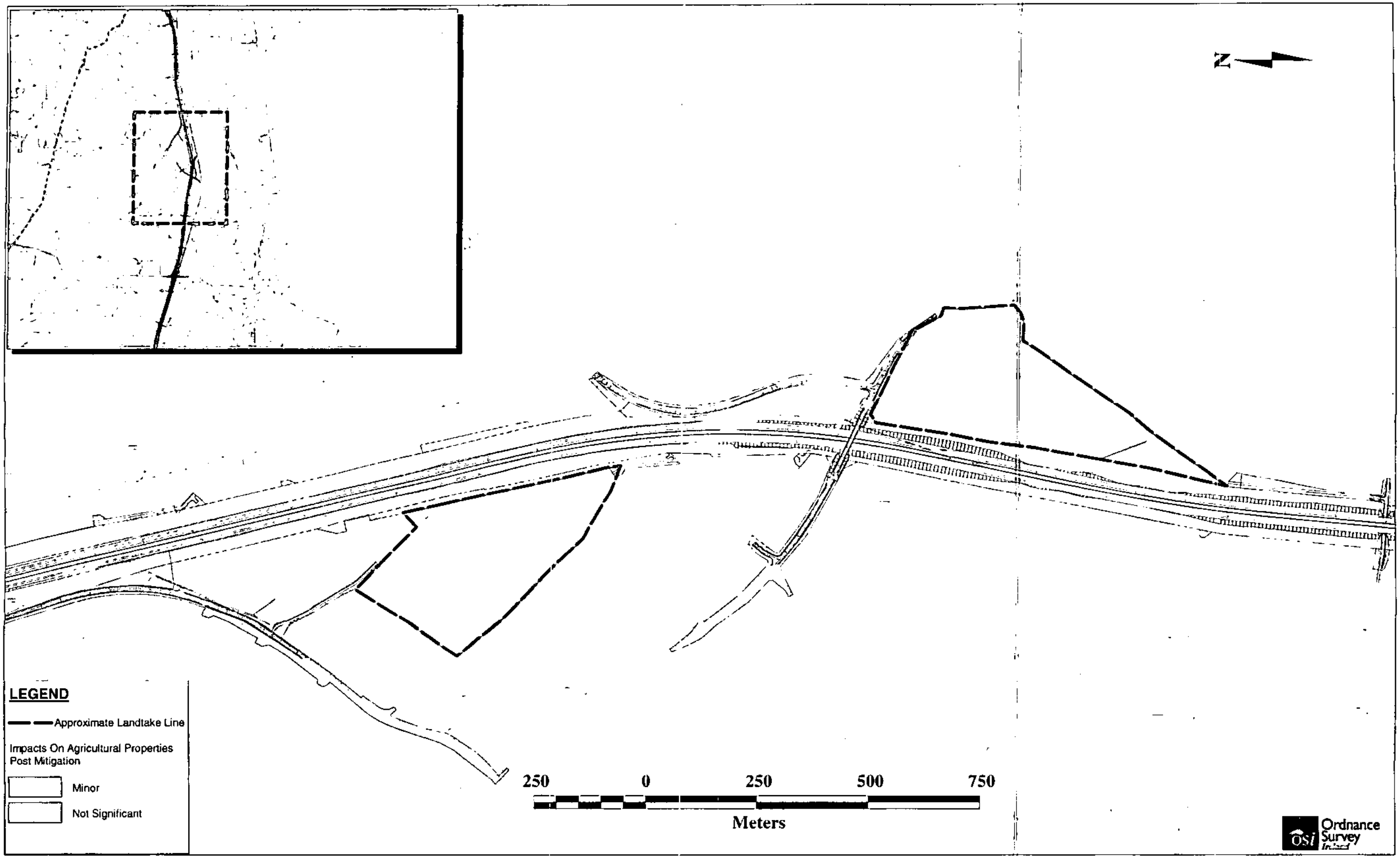
Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	IMPACTS ON AGRICULTURAL PROPERTIES PRE MITIGATION		
Designed: xxx	File Ref.: MDT0146MN1006A01	Status: Final	
Drawn: E.L.	Job No.: MDT0146		
Checked: L.C.	Scale: 1:10,000 @ A4	Figure No: 17.2	Rev: A01
Approved: A.G.	Date: 07/12/2007		



NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

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Project Title	M1 NORTH MOTORWAY SERVICE AREAS		
Drawing Title	IMPACTS ON AGRICULTURAL PROPERTIES POST MITIGATION		
Designed: xxx	File Ref.: MDT0146MN1007A01	Status: Final	
Drawn: E.I.	Job No: MDT0146		
Checked: L.C.	Scale: 1:10,000 @ A4	Figure No: 17.3	Rev: A01
Approved: A.G.	Date: 07/12/2007		

18 MATERIAL ASSETS – NATURAL AND OTHER RESOURCES

18.1 INTRODUCTION

This sub-section of Material Assets considers the existence of, and the impact of the proposed development on, natural and other resources in the vicinity of the proposed development. The heading includes extractable materials that could be quarried for commercial venture, land affected by the development and effects of the proposed development on the infrastructure of the area including existing roads and utilities.

18.2 METHODOLOGY

The following information was examined in order to assess the impacts on natural and other resources:

- EPA Guidelines;
- Examination of current mapping;
- Examination of engineering drawings; and
- Review of preliminary engineering design report (soil, water, utilities, lighting).

18.3 EXISTING ENVIRONMENT

18.3.1.1 Water Supply & Foul Water

The existing water supply in the area is provided via a County Council mains network. There are a small number of private wells in the vicinity of the proposed development; however, the presence of mains water makes it unlikely that these wells are used as a drinking water supply.

There are existing foul sewer services in the area that facilitate local needs in the vicinity of the proposed development. The foul sewer network in Dromiskin discharges to a wastewater treatment works to the north of the village. The treatment works is presently operating near to, or at, capacity.

18.3.1.2 Watercourses

A tributary of the River Fane flows close to the southern boundary of the eastern property and flows in a northerly direction where it joins with another tributary and then discharges to the River Fane, 1.5m north of the proposed development. The Glyde River is located approximately 3km south of the proposed development. All watercourses draining the proposed development were small streams, most of which were largely dry ditches, heavily vegetated and silted with some pockets of open water. They do not occur on the 1:50000 Discovery Series. No EPA water quality data are available as they are not monitored as part of the national monitoring program. The watercourses at near the east and west sides of the M1 North Motorway Service area eventually enter a little tributary of the larger River Fane. The Fane and its tributaries hold good stocks of brown trout, salmon and sea trout

(www.erfb.ie). Water quality ratings along the 38mile River Fane ranged from Q2/0 to Q4 when assessed by the EPA in 2006. Further information can be found in **Chapter 14.**

18.3.2 Landuse and Soil

The land use at the proposed development is primarily tillage production with smaller areas of grassland and scrubland. Beneath the eastern site, the subsoils are comprised of Till material derived from Lower Palaeozoic rocks with areas of peat, while beneath the western property the subsoils are comprised predominantly of beach sands and gravels. Full details of the soils, geology and hydrogeology of the existing environment are included in **Chapter 15** of this EIS.

The GSI online Quarry and Minerals directory indicates that there are no active quarries within 5 km of the proposed development.

18.3.3 Transport Network

The existing road transport network within the study area includes the M1 Motorway, and its associated overbridges, as well as the local roadway network. The section of the M1 Motorway located adjacent to the proposed development is situated between the Dundalk and Drumleck interchanges. The CR 182, which was realigned with an overbridge and upgraded with the construction of the M1 Motorway, provides a link between the R132 (Dundalk Road) to the east and the N52 (Craigs Lane) to the west. The road width is an average of 6m and has a good road surface condition on realigned sections. The CR185, which intersects the R182 on the west side of the motorway (Whiterath Crossroads) also provides linkages to villages and local community areas.

18.3.4 Utilities

Due to the proximity of the proposed development to Dromiskin and neighbouring communities, there already exists a network of utilities associated with the village and surrounding residential development.

18.3.4.1 ESB

An overhead 10kV line runs along the length of the western site adjacent to the M1 Motorway. To the east of the M1 Motorway there is an existing 10kV line that is located along the terminated local road, which formed part of the CR185, and runs parallel to the M1 Motorway.

18.3.4.2 Telecommunication

Overhead telecommunication lines supplied by Eircom are located along both the CR185 to the west of the M1 Motorway and along the CR182 to the east of the M1 Motorway.

18.3.4.3 Bord Gais

Bord Gais provide services to the local communities in the vicinity of the proposed development.

18.3.4.4 Motorway Communication Services

Ducting and cabling associated with the M1 communication services are located along the verges of the M1 Motorway.

18.3.5 Lighting

Currently, there is no lighting along the M1 Motorway at the proposed location of the M1 North Motorway Service Area. There is also no lighting along the local road network.

18.4 POTENTIAL IMPACTS

Overall the proposal will have a minor negative impact on natural and other resources. These impacts have been described below.

18.4.1 Economic Minerals

It is considered that the Motorway Service Area will have no significant impact on mineral resources in the vicinity of the proposed development.

18.4.2 Water Supply & Foul Water

There will be no direct impact on the Fane River or the River Glyde from the proposed Motorway Service Area. Instream works would be required if installation or extension of existing culverts occurs. The impacts associated with potential instream works are fully described in **Chapter 14**. The mitigation measures proposed in **Chapter 14** would be carried out by the contractor, if instream works are required.

The proposed development does not conflict with the existing foul sewer and it is proposed that foul line for the development connect into existing services, so that the effluent can be taken to the treatment works in Dromiskin. As stated above the wastewater treatment works in Dromiskin is currently operating near capacity. However, Louth County Council propose to increase the capacity of the works shortly in order to facilitate other development in the area. The Council will allow the contribution of wastewater from the motorway service area to the system, subject to agreement. More detail as to the wastewater transport and treatment for the development is provided in **Chapter 3**.

Water supply to the proposed development will be provided via the public mains supply. Upgrades to the supply will be required in order to accommodate the proposed development; however, once these improvements are in place no significant impacts to water supply are expected to occur. Alternatively the M1 North western site could potentially be served by a groundwater supply well within the underlying sand and gravel. The M1 North Eastern Site is located above a poor aquifer and low permeable ground and as such it is considered that well yields would be very poor. Furthermore, the introduction of a well may also upset the ecologically sensitive wetland area which could indirectly impact on the Red Bog. Therefore, it is not recommended to pursue a well at this eastern site. More details on the water supply for the development are provided in **Chapter 3**.

18.4.3 Land and Soil

In total the proposal will occupy approximately 19 hectares of land. This incorporates primarily agricultural land. Some works will also be required to the motorway to facilitate entrance and exit points. Further information on materials to be imported, exported and/or transferred has been included later in this chapter under Construction impacts.

18.4.4 Transport Network

It is proposed that access to the motorway service area will be generally via the motorway only, with the exception staff vehicles, which will be able to access the motorway service area via the CR182 for the eastern site and the CR185 for the western site, both at controlled access points.

It will be necessary to upgrade the M1 carriageways, north and south to facilitate the required diverge and merge lanes needed to enter and exit the motorway service area within safe limits.

18.4.5 Utilities

The following describes the potential impacts on utilities within the study area.

18.4.5.1 ESB

No conflicts have been identified between the proposed development and the ESB transmissions lines. The remaining electricity pylons and distribution lines located in the vicinity are also unaffected.

18.4.5.2 Telecommunications

A review of the mobile and terrestrial phone providers in the vicinity of the proposed development showed that there were no conflicts to services including the overhead and underground cable network.

18.4.5.3 Bord Gais

There are no conflicts with Bord Gais services and facilities with regard to the development of the proposed motorway service area.

18.4.5.4 Motorway Communication

It will be necessary to relocate the ducting and cabling for the existing motorway communication services to facilitate the construction of the slip roads tapers for the proposed motorway service area. This will involve diverting existing services into the new verges adjacent to the slip road.

18.4.5.5 Lighting

The extent of the proposed lighting for the proposed development is shown on **Figure 3.4**. It is proposed to provide lighting at two intensities – 10 lumens (x10 lux) and 20 lumens (x20 lux).

The proposed motorway service area will include for the provision of the same lighting intensity along the full length of the internal road network within the motorway service area to ensure that the vehicle routes are clearly visible at all times. Lighting will also be provided in the parking area, to enhance safety of pedestrians and to provide a secure environment for the parked vehicles. This shall be designed to the specifications stipulated in TD30 NRA DMRB.

The lighting levels for the fuel service station and external roads within the motorway service area will be 20 lux lighting to adhere to lighting safety standards. While the lighting in proximity to sensitive receptors, amenity buildings and parking areas will be a level of 10 lux lighting. This lighting will be in accordance with BS EN 13201-2. In addition, the lighting levels will be reduced to 10 lux in proximity to sensitive receptors in order to reduce the impact of lighting intrusion. Lighting will also be required on the M1 Motorway, in the vicinity of the slip roads, to achieve the appropriate safety standards.

18.5 MITIGATION MEASURES

The following lists the mitigation measures to be provided during the operational phase of the proposed development.

- Reference shall be made to mitigation measures in **Chapters 14** (Aquatic Ecology) and **Chapter 15** (Soils Geology, Hydrogeology) with regard to potential operational impacts on the nearby watercourses.

- The local service accesses for the motorway service area on the CR182 for the eastern site and the CR185 for the western site shall be private controlled accesses that is restricted to staff cars.

- The local service access shall be designed in accordance with **Chapter 3** (Site Description) and will incorporate any mitigation measures described in **Chapter 9** (Traffic).

- A lighting plan shall be completed as part of detailed design. The lighting of the proposed motorway service area shall provide 20 lux and 10 lux lighting as shown in **Figure 3.4.**

- Materials used to finish the exterior of the amenity building shall be non-reflective in nature in order to reduce the impact of reflective lighting and glare from within the motorway service area on nearby sensitive receptors, particularly during night-time periods.

- Should the western site be served by a ground water supply well, the following mitigation measures shall be implemented:-
  - A detailed hydrogeological assessment at detailed design stage shall be undertaken to determine the suitability of such a well and will include pump testing to determine the yield capacity of the aquifer and establish a likely zone of influence around the borehole.
  - The well/borehole shall be located up-gradient of the fuel station and any other sources of contamination and at such a distance that any potential sources and or adjacent users are outside of the zone of influence.
  - Potential impacts to adjacent users shall be further assessed by conducting a survey of recorded wells in the area.

- Monitoring wells shall be installed between the borehole and the pumping station in order to protect against contamination within the zone of influence.
- The borehole shall be constructed in accordance with the Institute of Geologists Ireland's guidelines on the drilling of water wells for private supplies.

18.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

18.6.1 Construction Impacts

In general, the construction impact of the proposed motorway service area is largely associated with possible disruption to services and existing transport networks. It is considered that these impacts will be of a temporary nature and can be adequately mitigated to less than significant levels.

It should be noted that due to the poor quality of material in the existing ground available within the site of the proposed development, earthworks excavations and the importation of fill material will need to be completed before other works on-site can commence. In addition, the amenity buildings and fuel service stations will form a significant element of the works to be executed. These works will require careful planning due to the lead in times for the delivery of the specialist materials.

18.6.1.1 Economic Minerals

Earthworks fill material will be required for the two sites (see **Chapter 3** for details as to the required volumes). Due to the nature of the existing ground, it is likely that the capping material will be sourced from outside the site. Due to the access restrictions on the existing CR182, all of this material will have to be hauled via the M1 Motorway.

18.6.1.2 Water Supply & Foul Sewer

The contribution to the planned upgrades to the wastewater treatment system in Dromiskin and proposed upgrades to the existing water mains supply line in the vicinity of the proposed development will address any significant impacts to the water supply and foul sewer network.

18.6.1.3 Land & Soil

Construction of the proposed development will require excavation of soil from both the eastern and western sites (see **Chapter 3** for volumes). It is anticipated, subject to further testing, that a portion of this soil material is likely to be classified as unsuitable for reuse in engineering works, i.e. embankment construction, etc. The unsuitable excavated material or any other excess materials, which cannot be used for landscaping, noise bunds or in the designated disposal area, will require removal off-site. The contractor / concessionaire must ensure that the facility to which it is brought is licensed in compliance with applicable waste management legislation. The contractor/concessionaire, as holder of the waste is responsible under the Waste Management Act for ensuring that all statutory obligations are met.

18.6.1.4 Transport Network

As construction vehicles are restricted to hauling materials by the M1 Motorway, it is anticipated that there will be additional traffic movements associated with the transferral of materials on and off the eastern and western sites of the proposed motorway service area. Further information on the impact of construction vehicles is as described in **Chapter 9.**

18.6.1.5 Utilities

There will be no direct conflict with any utility providers with the exception of the motorway communication system. All providers with plant in the area will be advised in advance to avoid potential disruption to services. With regard to the motorway communication system, the project engineer will liaise with the M1 concessionaire to ensure disruption is kept to a minimum.

18.6.1.6 Lighting

Depending on the time of construction, additional lighting may be required to facilitate the construction of the proposed motorway service area. Any temporary lighting provided shall be restricted to the working hours as outlined in **Chapter 11.**

18.6.2 Mitigation Measures

- A construction traffic management plan will be required to minimise the impact of construction vehicles on the M1 Motorway. Reference to, and implementation of, mitigation measures provided in **Chapter 9** shall also be undertaken.

- The construction mitigation measures provided in **Chapters 14 and 15** shall be implemented during the construction phase in order to minimise impacts to watercourses.

- The contractor shall contact and liaise, on an ongoing basis, with Louth County Council with regard to the construction of the foul drainage system and water supply and its connection with the existing system. This is to minimise the level of disruption to users of this facility.

- Any excavated material deemed suitable shall be re-used on-site for the proposed motorway service area.

- Any other excess materials, which cannot be used for landscaping, earthen bunds, will require removal off-site. The contractor/concessionaire must ensure that the facility to which it is brought is licensed in compliance with the applicable waste management legislation. The contractor/concessionaire, as holder of the waste is responsible under the Waste Management Act for ensuring that all statutory obligations are met.

- A Construction & Demolition Waste Management Plan shall be prepared.

- HCV construction traffic travelling to and from the proposed development must travel via the M1 Motorway, as they will not be permitted to use the existing local road network for haulage of plant and materials to and from the construction site.

- The Contractor shall provide adequate notice to service providers with regard to any disruption, allowing them to organise alternative supplies to their customers and to provide information to the public through various media channels.

- The contractor shall contact all service providers before commencement of the works to discuss minimum acceptable notice requirements for each service provider. These notice periods shall then be observed by the contractor throughout the progression of the development.

- The Contractor/Concessionaire/Design Project Engineer shall consult and liaise with M1 concessionaire on an ongoing basis with regard to potential disruption of the motorway communication system.

- Lighting of the proposed motorway service area during construction shall be restricted to the working hours described in **Chapter 11**.

18.7 RESIDUAL IMPACTS

Overall the motorway service area will have a minor negative impact on natural and other resources.

19 CULTURAL HERITAGE

19.1 INTRODUCTION

This chapter summarises an archaeological desk study and field survey of the proposed M1 North Motorway Service Area. The proposed development is located on land that is currently used for tillage. Further details on the proposed development, including the area of the site, the surrounding land uses, topography, etc., are included in **Chapter 3**.

The purpose of this assessment was to identify any possible impact on known or potential architectural, archaeological and cultural heritage located within the proposed development footprint. This report details a desktop survey of the archaeological potential of the area of the proposed development. The report includes information on sites and monuments of archaeological and architectural interest in proximity to the proposed area of development.

19.2 METHODOLOGY

19.2.1 Paper Survey

An archaeological desk-based study of existing archaeological records and other potentially relevant literary and cartographic sources was undertaken to identify all known archaeological, architectural heritage and industrial archaeological sites within the study area that may be affected by the proposed development. Sources consulted include:

- Record of Monuments & Places (RMP);
- National Museum of Ireland's Topographical Files;
- National Inventory of Architectural Heritage;
- Louth County Development Plan;
- Ordnance Survey 6" Maps;
- Relevant Literary Sources;
- Annual Excavations bulletin;
- Cartographic Sources, including the Down Survey and aerial photography; and
- Environmental Impact Statement for the Dunleer – Dundalk Motorway Project.

19.2.2 Site Inspection

A site inspection took place on the 30th of August 2007 in clear weather, which involved walking the entire area of the proposed development and photo-documenting any features of interest. These photographs are included in the full archaeological report included in **Appendix I** of **Volume 3**.

The aims of the site inspection were:

- To examine known sites within the study area;
- To identify any previously unknown sites and areas of archaeological potential through topographical evidence; and
- To highlight any structures of architectural merit.

19.3 EXISTING ENVIRONMENT

19.3.1 Archaeological Features

The small village of Dromiskin is situated c. 10km of Dundalk in County Louth. This is the site of a monastery founded in the late 5th or early 6th century by Lughaidh, a disciple of St. Patrick. St. Ronan, a victim of the great plague of 664, later became its patron and in 801 his relics were placed in a richly decorated shrine. In the 10th and 11th century both Irish and Viking armies plundered the monastery. The round Tower, the monastery's bell-tower, is now relatively short and squat, but it was originally much taller. The conical roof and two rectangular windows below it were added in 1879. Its doorway is a fine example of the round-arched *Romanesque* style, which was popular in the 12th century. The ruined church close by may date from the 13th century, but its present east window was inserted in the 15th century. The head of a 10th century High Cross was re-erected in 1918 on a granite base and shaft to the east of the Round Tower. The cross was carved will illustration of stories from the bible, but these cannot now be identified.

A crannóg[1] site (Site A1 on **Figure 19.1**) is located partially within the proposed development. The confines of Site A1, as outlined by the DoEHLG in the RMP, encompass a circular area approximately 50m in diameter. Approximately one third of this area is within the study area in dry, undulating, possibly reclaimed pasture. The remaining two-thirds of the crannóg site is situated in low-lying, boggy ground, known locally as the Red Bog. No evidence of the crannóg was visible during the field inspection and records state that the last time traces of the crannóg were visible was during a dry summer in 1976 when some stakes could be seen protruding from the bog.

19.3.2 Architectural Features

No site of architectural heritage was noted during the field inspection. A 19th century railway bridge, heavily altered in the past 10 years, is located outside the confines of the proposed development, northwest of Site A1.

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[1] A crannóg is a defensive habitation site constructed on a natural or artificial island in a lake, river, or marshy area. They were usually constructed by building up layers of wood and /or stone to form a raised platform, which is higher than the surrounding water or bog. The majority of these sites have been dated to the early medieval period.

19.3.3 Areas of Archaeological Potential

The bogland area, known locally as the Red Bog, was identified during the field inspection and paper study as an area of archaeological potential (Site AP1).

Low-lying boggy and marshy areas are considered archaeologically sensitive; potential wetland sites can vary from trackways, platforms and bridges, to fishweirs and fulachta fiadh. The site of a crannóg and the discovery of a fragment of sheet bronze indicate the use of this wetland area in the past. Anaerobic conditions can lead to high quality preservation of organic remains, such as wooden structures, palaeoenvironmental material, human and animal remains and artefacts of organic material, including cloth and manuscripts. Wetland margins are also of high archaeological potential; however, the boundaries of these areas are likely to have changed over time. It is likely that some of the land directly north of Site A1 was reclaimed and the Red Bog was originally more extensive. While much land reclamation has taken place in the interim, the terrain remains quite boggy and marshy in places.

19.4 POTENTIAL IMPACTS

An operational impact is an impact that would result from long-term operation of a project and negatively affect the setting of sites of archaeological and/ or architectural heritage.

The operation of the proposed motorway service area will not impact on the cultural heritage of the area, including the setting of sites of archaeological and/ or architectural heritage.

19.5 MITIGATION MEASURES

No mitigation measures are required to reduce operational impacts related to cultural heritage.

19.6 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

19.6.1 Construction Impacts

A construction impact is an impact where disturbance and potential damage to unknown subsurface remains or the removal and/or damage to known surface or subsurface remains may occur during construction activities.

A number of sites will experience impacts during the construction phase of the proposed project. These are outlined in **Tables 19.1** and **19.2**, below.

Table 19.1. Potential Construction Impacts on Known Archaeological Features

Site	Site Type	Description	Impact
A1	Crannóg	Site of a crannóg, originally noted by General Stubbs in 1889. No visible surface remains surviving today.	Indirect

Table 19.2. Potential Construction Impacts on Areas of Archaeological Potential

Site	Site Type	Description	Impact
AP1	Bogland	Marshy ground known locally as the Red Bog. Site of Crannóg and possible early medieval find spot.	Direct

19.6.2 Construction Mitigation Measures

Mitigation measures to be implemented during both the pre-construction and construction phases, shall be undertaken in compliance with national policy guidelines and statutory provisions for the protection of the archaeological and cultural heritage, including the following:

- National Monuments Acts 1930-2004;
- Architectural Heritage Protection, Guidelines for Planning Authorities (Draft 2001). Department of Arts, Heritage, Gaeltacht & the Islands;
- Framework & Principles for the Protection of the Archaeological Heritage (1999). Department of Arts, Heritage, Gaeltacht & the Islands; and
- Policy & Guidelines on Archaeological Excavation (1999). Department of Arts, Heritage, Gaeltacht & the Islands.
- Code of Practice between the NRA and the Minister for Arts, Heritage, Gaeltacht and the Islands (2000).
- Guidelines for the Assessment of Architectural Heritage and National Road Schemes (2005). NRA
- Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005). NRA

The project design has managed to avoid direct impacts on recorded monument A1; however, complete avoidance of the area of potential, AP1, was not possible. Therefore, mitigation measures have been provided to reduce the resulting impacts on this site. These recommendations include measures to be implemented both prior to and during construction, as described below.

19.6.2.1 Mitigation Measures to be Implemented Prior to Start of Construction

Prior to construction, a qualified archaeologist shall carry out an archaeological investigative excavation at AP1, and in the vicinity of site A1. Should any features or material of archaeological significance be uncovered, further mitigation measures shall be provided by the archaeologist, prior to the start of the construction phase.

These investigations shall be undertaken in advance of the construction phase. This is to allow a satisfactory time frame in which the mitigation measures can be conducted and the results assessed without causing delays to the construction program.

19.6.2.2 Mitigation Measures During Construction

Archaeological Monitoring

Archaeological monitoring shall be undertaken during the ground works phase of the development. This will include any associated earthworks and drainage works, where and as required by the Statutory Authority. There should be a provision for preservation (in situ) or preservation by record of any archaeologically significant material uncovered at this time.

Discovery of Archaeological Material

In the event of archaeological features or material being uncovered during the construction phase, the machine work shall cease in the immediate area to allow the archaeologist to inspect any such material. Initial assessment will determine the nature, extent and significance of the archaeology present. As a result of the assessment, decisions on the most appropriate mitigation strategy will be taken with the approval of the DoEHLG. The discovery of any archaeological object will be reported to the Director of the National Museum of Ireland or the Garda Síochána within 96 hours of discovery (Section 23 of the National Monuments Acts 1930 (as amended)).

Preservation in situ

Strategies for the preservation in situ of archaeological remains as described above should be considered on a case-by-case basis, in consultation with the Statutory Authority.

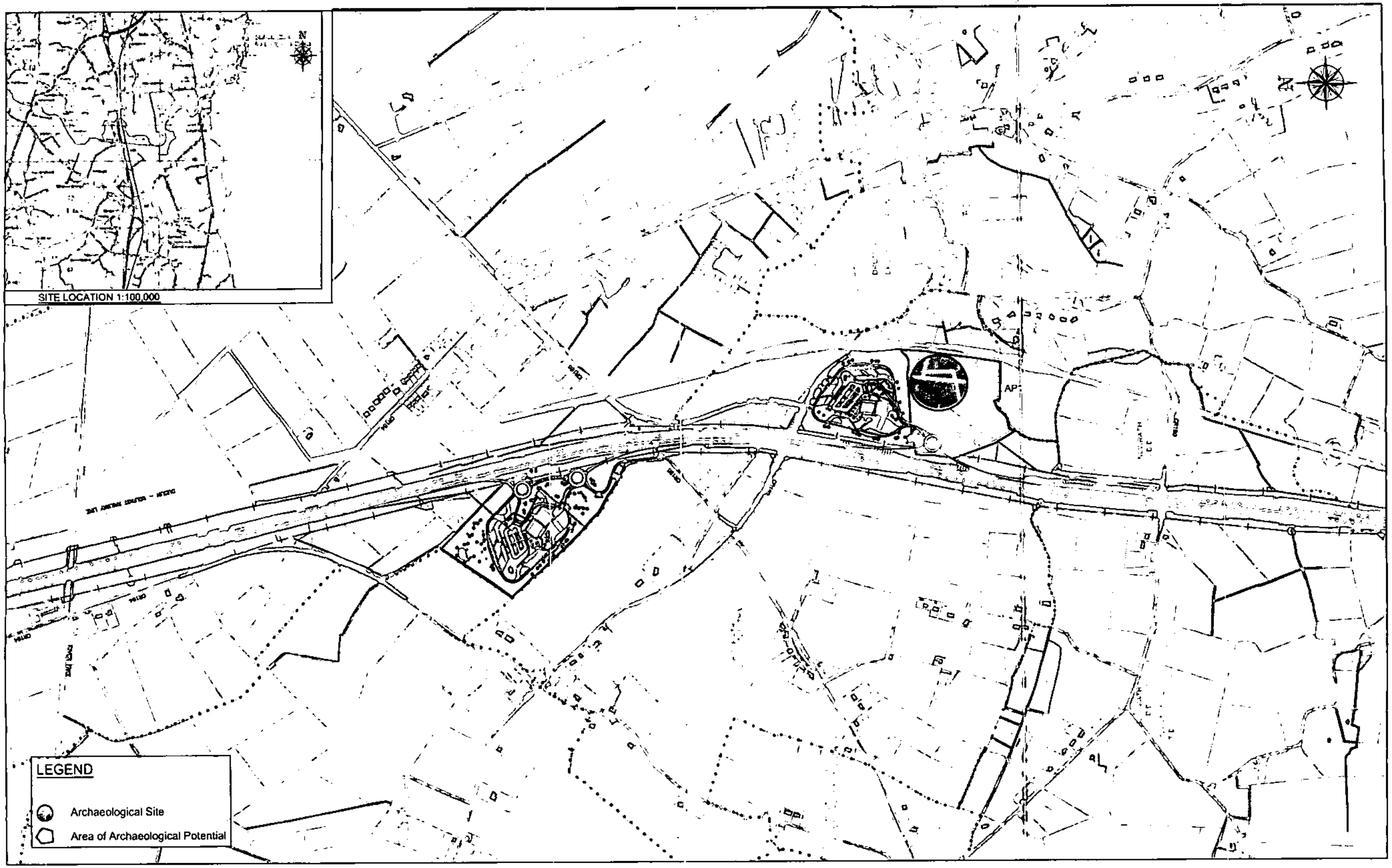
Construction Works

The positioning of temporary site offices, access roads, haul roads, spoil heaps and borrow pits shall take into account the location of identified sites and areas of archaeological potential.

Should it be established that archaeological potential does exist at this location further specific recommendations and ameliorative measures will be made. The implementation of these recommendations must be conducted well in advance of any further construction activities in the vicinity of the uncovered resources.

19.7 RESIDUAL IMPACTS

There will be no residual impacts with relation to cultural heritage as a result of the proposed project, should all mitigation measures be implemented.



NRA National Roads Authority

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

Project Title	M1 NORTH MOTORWAY SERVICE AREAS
Drawing Title	Location of Cultural Heritage
Status	FINAL
Drawing No.	19.1
Rev.	A01

20 INTERACTIONS

In line with Section 50 of the Roads Act, 1993 (as amended by the EIS Regulations (S.I. No. 93 of 1999) in addition to the assessment of impacts on human beings, fauna and flora, soil, water, air, climate factors and the landscape and material assets, including architecture, archaeological heritage, and cultural heritage, the inter-relationship between these factors was also taken into account as part of the EIS scoping and assessment. Where a potential exists for interaction between two or more environmental topics, the relevant specialists have taken the potential interactions into account when making their assessment and, where possible, complementary mitigation measures have been proposed.

Table 20.1 shows a matrix of significant interactions likely to occur for the M1 North Motorway Service Area. The boxes marked in **Table 20.1** indicate that a potential relationship exists between the two environmental areas. The level of interaction between the various topics will vary greatly; however, the table allows the interactions to be recognised and developed further, where necessary. The table is constructed on the basis that an environmental subject has a potential inter-relationship both during the construction and operational phases of the proposed development. Summary details on the interactions are provided in **Table 20.2.**

Table 20.1: Interaction/Inter-Relationship Matrix - Potential Significant Interaction in the Receiving Environment

Human Beings								
Air and Climate	•							
Noise	•							
Landscape	•		•					
Flora and Fauna	•	•	•	•				
Surface Water and Groundwater	•	•		•	•			
Soils	•	•		•	•	•		
Material Assets (including Cultural Heritage)	•	•	•	•	•		•	
	Human Beings	**Air and Climate**	**Noise**	**Landscape**	**Flora and Fauna**	**Surface Water and Groundwater**	**Soils**	**Material Assets (including Cultural Heritage)**

The following are the interactions anticipated from the proposed development.

Table 20.2: Summary of Potential Interactions / Inter-relationships

Subject	Interaction With;	Interactions / Inter-Relationships
Human Beings	**Air & Climate**	Dust and particulate matter during construction and operation of the motorway service area has the potential to affect human beings. This has been taken into account in **Chapter 10**.
	Noise	Sensitive receptors located close to the proposed development have the potential to experience an increase in noise as a result of vehicles using the parking facilities and while entering /exiting the proposed development. The building services, e.g. air conditioning, may also contribute to the noise environment. The impact of noise generated by the facility on sensitive receptors in the area is dealt with in **Chapter 11.**
	Landscape	The proposed road will intrude on landscape appearance in the area and may impact on the local community and adjacent residences. This has been taken into account in **Chapter 12.**
	Flora and Fauna	The proposed development may have potential impacts on fish species that are of importance for fisheries and angling. This is assessed in **Chapter 14.**
	Surface Water / Groundwater	Run off and accidental spillages from the proposed development have the potential to impact on human beings through contamination of local water supplies. Run off and accidental spillages may also impact the amenity value of the rivers and streams in the area. This is assessed in **Chapter 14, 15** and **16.**
	Soils	Dust from exposed soils during the construction period can cause a nuisance if not properly controlled. This is considered in **Chapter 10.**
	Material Assets including Cultural Heritage	Currently the lands at the site of the proposed development are in tillage. The proposal will permanently alter the land use at the site and will provide additional transport infrastructure for the M1 Motorway road users. Both known and potential archaeological, architectural and cultural heritage resources at the site have been protected as far possible during design of the proposed development. Full details are provided in **Chapter 19**.
Air & Climate	**Flora and Fauna**	Dust and particulate matter from the construction of the proposed development could negatively impact on flora and fauna. Dust minimisation measures are provided in **Chapter 10.**
	Surface Water / Groundwater	Dust and particulate matter from the construction of the proposed development could negatively impact surrounding watercourses and associated vegetation. Dust minimisation measures are provided in **Chapter 10.**

Subject	Interaction With;	Interactions / Inter-Relationships
	Soils	Dust from exposed soils during construction could cause deterioration of air quality in the immediate vicinity of the road. Dust minimisation measures are provided in **Chapter 10.**
	Material Assets	Reduction in air quality caused by dust could impact on agricultural enterprises in the vicinity of the proposed development particularly during construction. Dust minimisation measures are provided in **Chapter 10.**
Noise	**Landscape**	The provision of noise barriers can create visual impacts while mitigating noise increases. The landscape and visual specialist has included all required noise mitigation in the assessment to ensure that all potential landscape and visual impacts have been assessed.
	Flora and Fauna	Noise disturbance can impact on local fauna especially birds. The terrestrial ecology assessment has taken this into account in **Chapter 13.**
	Material Assets	Dairy cattle and other sensitive animals are reputed to be sensitive to sudden noise events that may occur as part of the construction. The proposed development site is currently used primarily for tillage and no dairy cattle or equine interests were identified during the field assessment. This is considered in **Chapter 17.**
Landscape	**Flora & Fauna**	There is an inter-relationship between landscape and visual issues and ecology. The landscape and visual mitigation proposed can provide new and more diverse habitats in and around the new development, which could benefit biodiversity.
	Surface Water / Groundwater	There are no significant surface water features within or adjacent to the proposed development; however, the River Fane runs north of the area. This feature has been taken into account in the landscape and visual assessment in **Chapter 12.**
	Soils	Movement and storage of large quantities of soil can affect the appearance of the landscape and affect sensitive visual receptors therefore the location of bunds and materials storage has been taken into account in the landscape **Chapter 12.**
	Material Assets	There is a potential inter-relationship between landscape and visual issues and cultural heritage, especially in relation to architectural heritage features. Two significant linear features in the form of Dublin/Belfast Rail line and the M1 Motorway dominate the landscape in the area.
Flora and Fauna	**Surface Water / Groundwater**	There is a likely inter-relationship between ecology, hydrogeology and drainage for the proposed development especially in relation to the Red Bog. The ecology of the bog may be impacted by physical changes, pollution caused by run-off or spillages and changes in flow as a result of culverts and/or diversions. The aquatic ecology assessment, hydrogeology assessment and drainage design have had regard for this potential interaction.

Subject	Interaction With;	Interactions / Inter-Relationships
	Soils	The creation of embankments can alter habitats and pathways of fauna, such as badgers. The location of embankments has been taken into account by the terrestrial and aquatic ecologists.
	Material Assets	Some evidence of badgers was noted. Territories may already have been disturbed by the construction of the M1 Motorway and this additional landtake may result in further impacts to badgers through habitat loss and disruption of existing mitigation measures.
Surface Water / Groundwater	**Soils**	Movement of materials within the site during construction may give rise to suspended solid, which have the potential to impact on receiving water environment.
Soils	**Material Assets**	Some material will have to be excavated and either used on-site or sent to an off-site facility for disposal, under license. In addition, fill material will be required from an external source in order to complete construction.

21 PRELIMINARY ENVIRONMENTAL RISK REVIEW

21.1 INTRODUCTION

This Environmental Risk Review has been carried out as part of the Environmental Impact Assessment for the proposed M1 North Motorway Service Area at Dromiskin. The Environmental Risk Review identifies potential and likely hazards, specifically in relation to the operation of the service fuel station, which may pose a risk to the environment and human health. Following the identification process, advised standard mitigation measures are outlined to address each of the identified environmental risks.

It should be noted that this Environmental Risk Review acts as a preliminary advisory document prior to the commencement of the Environmental Risk Assessment (ERA). The ERA is advised under Regulation 5 (1) (b) of the Draft Dangerous Substances (Petrol Stations) Regulations 1999. Further and more comprehensive risk mitigation measures may be required following completion of the ERA.

In carrying out this Environmental Risk Review, the following documents/guidance have been referenced:

- The Institute of Petroleum: *Guidelines for Soil, Groundwater and Surface Water Protection and Vapour Emission Control at Petrol Fillings Stations,* June 2002;

- Draft Code of Practice for assessing the Risks from Petrol at Relevant Petrol Stations under The Dangerous Substances (Petrol Stations) Regulations 1999;

- DEFRA Groundwater Protection Code: *Petrol Stations and other fuel dispensing facilities involving underground storage tanks,* November 2002; and,

- Environment Agency: *Pollution Prevention Guidelines.*

This review assumes that the construction and operation of the proposed development will comply with all relevant health & safety legislation and that all risks to human health will be addressed and mitigated against.

21.2 RISK REVIEW METHODOLOGY

This Environmental Risk Review has been carried out using the information made available by the applicant. The review consists of:

- A preliminary identification of potential environmental hazards during the construction and operation of the facility and any hazards as a result of unplanned events, accidents and emergencies during the operation of the petrol station at the motorway service area; and,

- Recommended mitigation measures.

This review makes use of procedures outlined in the references provided in **Section 21.1**.

The facility is assessed under normal working conditions and under emergency conditions. The risk review identifies unplanned potential hazards, which may occur during the construction and operation of the motorway service area. Potential hazards can be present at a number of stages of the proposed development. They include:

- Site construction and commissioning of the proposed facility;
- Transportation of materials to the site during the operational phase;
- Fuel pipelines and storage during operational phase; and,
- Fuel dispensing during operational phase.

21.3 RISK REVIEW RESULTS

The risk review results are presented in **Table 21.1.** A description of each heading in the table is given below:

- **Activity** – Activity associated with the proposed development.
- **Potential Hazards** – Hazards that may result in an incident that has the potential to have a negative impact on the environment. The incidents should be foreseeable, but unplanned, with the potential to occur under normal, start-up, shutdown or emergency conditions during the construction and operational lifetime of the facility.
- **Pathway** – Route/media for the transport of the incident emissions/effect.
- **Sensitive receptor** – The receptor or receptors potentially most impacted by the incident.

The potential sources of pollution or harm associated with this development are identified under the headings below.

1. Leaks and Spills	Underground tanks and piping Aboveground tanks and piping Fuel dispensing equipment Fuel delivery equipment
2. Wastewater Runoff	Contaminated surface water runoff from paved surfaces
3. Drainage	Failure of drainage system to prevent contaminated surface water from entering the groundwater and surface water environment without proper treatment
4. Emissions to Air	Volatile Organic Compounds (VOCs) from storage, fuel delivery and dispensing operations

Table 21.1: Result table for the Environmental Risk Review for proposed M1 North Motorway Service Area facility

Activity (Source)	Potential Hazard	Pathway	Sensitive Receptor	Mitigation Measures
Leakage & Spills	Leaks from Underground Storage Tanks (UST) and Above Ground Storage Tanks (AST)	Groundwater, Subsoils	Groundwater, Surface water, subsoils, humans	All USTs/ASTs shall be designed, constructed, inspected, tested and maintained in accordance with recognised industry standards and appropriate BS codes and International equivalents. Secondary containment systems shall be incorporated to prevent uncontrolled release of fuel, i.e. double skinned composite USTs/ASTs. Automatic leak detection systems shall be installed within the interstitial space of the USTs/ASTs. Corrosion protection measures for all USTs/ASTs shall be incorporated into the design. Overfill alarms, automatic shut-off devices and catch basins around fill pipes shall be installed. ASTs should be located in a secure area, protected from potential collisions by vehicles, vandalism, and other hazards. A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

Activity (Source)	Potential Hazard	Pathway	Sensitive Receptor	Mitigation Measures
	Leaks from underground and overground pipe work	Groundwater, Subsoils, Air	Groundwater, Surface water, Subsoils, Humans	All piping, fittings and connections shall be designed and built according to recognised industry standards. Pipe work shall be protected from corrosion, be not vapour permeable and laid in granular material in order to protect from damage of larger stones or uneven settlement. The number of joints and fittings shall be kept to a minimum. Pressure pipe systems should include secondary containment with plastic. New pipe work shall meet requirements of IP Performance specification for underground pipework systems at petrol filling stations, 2nd edition A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

Activity (Source)	Potential Hazard	Pathway	Sensitive Receptor	Mitigation Measures
	Leaks and Spills from Fuel Dispensing Equipment	Groundwater, Surface Water, Subsoils, Air	Groundwater, Surface water, Humans	Suction systems shall include a leak-proof drip tray beneath the dispenser. Pressure systems shall be equipped with leak-proof sumps instead of, or in addition to, a drip tray beneath the Dispenser. Non-return or check valves, fitted within the dispenser housing, should be installed on each line of a suction system. The dispenser should be located in such a way that it cannot be easily damaged. Use of "breakaway" hose connections shall be installed, which provide emergency shutdown of flow should the fuelling connection be broken through movement. Nozzles shall be fitted with automatic shut off and attitude devices. Fuel dispensing areas shall be paved and be equipped with drainage into an oil / water separator able to contain accidental spills which may occur during vehicle fuelling. A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the Proposed development.

Activity (Source)	Potential Hazard	Pathway	Sensitive Receptor	Mitigation Measures
	Leaks and Spills from Fuel Delivery Equipment	Groundwater, Surface water, Air	Groundwater, Surface water, Humans	Fill pipes should have suitable fittings to ensure a secure, leak-proof connection with the hoses from delivery trucks. Such fittings should have provision for a locking device that prevents unauthorized access. Where fill pipes are installed above ground, the height shall be below the minimum height of the delivery tanker's bottom loading adaptor to ensure proper draining of the hose contents into the storage tank. A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.
	Accident involving collision with tanker and major fuel spillage.	Air, Groundwater, Surface water	Humans, Groundwater, Surface water, Humans	All tankers shall have easy access to site. A suitably designed drainage system incorporating oil/water interceptors, suitably designed shut off valves and bunding shall be in place to contain the escaping fuel. Written safe system of work and emergency plan shall be incorporated into an emergency health and safety system on-site.
	Overfill or leakage from tanker delivery tanks	Air, Surface water	Humans, Groundwater, Surface water, Humans	Fill points shall be located more than 5m from occupied buildings, site boundary and public drainage system. Failsafe overfill protection devices shall be installed. A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

Activity (Source)	Potential Hazard	Pathway	Sensitive Receptor	Mitigation Measures
Wastewater Runoff	Storm water runoff from fuel delivery and dispensing areas	Surface water	Groundwater, Surface water	Storm water generated from vehicle fuelling stations and AST containment areas shall be minimised by the installation of roofs and other types of covers. Surface water drainage from all areas, except uncontaminated roof water, must discharge through a full retention oil/water separator. The oil/water separator shall be properly designed, operated, and maintained to achieve the desired water treatment results. Gullies draining to the separator should be of the trapped type to prevent the spread of fire.
Drainage	Leaks from faulty oil/water separator operation	Groundwater, subsoils	Groundwater, Surface water, subsoils	As this fuel service station will discharge to surface water, a Class 1 separator is required (i.e. discharge concentration of less than 5 mg/litre of oil) This separator shall be designed in accordance with BS EN 858-1:2002 and BS EN 858-2:2003; Reference 5). Each interceptor tank shall be installed with an automatic closure device that will prevent flow passing through the separator tank when the quantity of oil in the separator exceeds the design oil storage volume. An automatic warning device shall be installed in each interceptor to provide warning of oil levels approaching 90% retention capacity.

Activity (Source)	Potential Hazard	Pathway	Sensitive Receptor	Mitigation Measures
	Surface Spillages entering directly to surface water or groundwater from Drainage System	Groundwater, surface water, subsoils	Surface water, Groundwater	The drainage system shall be designed such that surface spillages are contained and there is no direct loss to ground or surface watercourses for surface water drainage without prior treatment. Surface water spillages should pass through an oil/water treatment system designed in accordance with Pollution and Prevention Guidelines PPG3. The drainage systems should be designed in accordance with Sustainable Drainage Systems (SuDS).
Air Emissions	Vehicle filling - Vapours	Air	Customer, staff	Suitably designed vapour recovery system. UK LAQM states that where dispensing pumps are more than 10m from residential properties, the petrol station is unlikely to have significant influence on concentrations of benzene close to the properties. A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the Proposed development. The development will comply with the requirements of the Air Pollution (Petrol Vapour Emissions) Regulations (SI 375 of 1997).
	Vehicle filling - Fire	Air	Customer, staff, neighbours	Vapour recovery system shall be installed to minimise airborne vapours. Correct signage and staff training shall reduce the potential for ignition sources.

21.4 DISCUSSION AND CONCLUSION

The results of the Risk Review highlight the main risks associated with the construction of the proposed M1 North Motorway Service Area and to a lesser extent, the operational phase of the project.

The highlighted risks would be reduced to acceptable levels following implementation of the outlined mitigation measures. This document should be reviewed prior to commencement of an Environmental Risk Assessment of the development.

22 SUMMARY OF MITIGATION MEASURES

22.1 PLANNING

22.1.1 Operational Phase Mitigation Measures

- The retail unit proposed in this subject development will remain secondary to the use of this development as a fuel filling station. It is intended to maintain a range of goods and services to cater solely for the needs of motorway users.
- Ensure character of the area is maintained by ongoing maintenance and monitoring of the proposed motorway service area.

22.1.2 Construction Phase Mitigation Measures

No mitigation measures are required for the construction phase.

22.2 SOCIO-ECONOMIC

22.2.1 Operational Phase Mitigation Measures

- CCTV cameras shall be installed and full time presence of security staff will be available during night time hours typically between 11pm and 6am.
- Proper management of facilities in line with requirements of the NRA as the Contracting Authority.

22.2.2 Construction Phase Mitigation Measures

- The hours of operation of construction machinery on the proposed development shall comply with NRA requirements/guidelines and the mitigation measures listed in **Chapter 11** to limit any potential short-term noise impact on adjacent residential properties associated with the proposed works.
- The Concessionaire/Contractor shall develop and implement a *Construction Traffic Management Plan* in consultation with the Contracting Authority.
- The Concessionaire/Contractor shall develop and implement a *Construction Environmental Management Plan* in consultation with the Contracting Authority. This plan will include the provision of reasonable and safe facilities for all road users during the construction period.
- Advance warning shall be given of any necessary route diversions. Alternative routes/accesses will be clearly signed.
- Construction compounds will not be sited within 250m of residential locations.
- Suitable warning signs will be provided on all roads used by construction traffic to alert other drivers to the potential hazards and any appropriate temporary speed restrictions.

22.3 TRAFFIC IMPACT

22.3.1 Operational Phase Mitigation Measures

- The local service access for the motorway service area on the CR182 and the CR185 for the western and eastern sites shall be a private controlled access and shall be restricted to staff cars. All other vehicles shall access the motorway service area via the M1 Motorway.
- Advanced signage shall be devised and implemented for the motorway service area and local service access roads as part of the detailed design phase of the project.

22.3.2 Construction Phase Mitigation Measures

- A Construction Traffic Management Plan shall be prepared and implemented by the Contractor to minimise any impacts on other road users and to maximise safety.
- All construction traffic, including light vehicles, travelling to and from the proposed development must travel via the M1, as they will not be permitted to use the existing local road network for haulage of plant and materials to and from the site, due to the loading restrictions that are in place.
- Wheel wash facilities will be provided on-site to ensure that construction debris will not have an impact on the quality of roads in the surrounding area.
- Construction vehicles shall not be permitted to park on the local road network or on the hard shoulder of the M1 Motorway. Parking will be provided on the construction site for both employees and visitors.

22.4 AIR QUALITY AND CLIMATE

22.4.1 Operational Phase Mitigation Measures

No mitigation measures are required for the operational phase.

22.4.2 Construction Phase Mitigation Measures

- A dust minimisation plan shall be prepared as part of the Construction Environmental Management Plan. This plan shall adhere to the industry guidelines including the Building Research Establishment document entitled 'Control of Dust from Construction and Demolition Activities' and the Construction Industry Research and Information Association (CIRIA) 'Environmental Good Practice on Site' as well as the NRA Environmental Construction Guidelines.
- The dust minimisation plan shall also include, as a minimum, the following mitigation measures:
    - Site roads will be regularly cleaned and maintained, as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only;
    - Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential);
    - All vehicles exiting the site will make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Wheel washes will be self-contained systems that do not require discharge of the wastewater to water bodies;

- Public roads outside the site (used as part of the haulage route) shall be regularly inspected for cleanliness, and cleaned as necessary;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind;
- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- The contractor shall be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum; and
- The transport of soils should be undertaken in vehicles covered with tarpaulin.

- Stock piling with the exception of materials for bunding will not take place within a minimum of 100m from local receptors and will have regard to air, noise and visual mitigation provided in this EIS. The prevailing wind direction shall be taken into account when locating stockpiles, with the preferred stockpile location upwind of nearest sensitive receptor. Where the minimum setback distance is not achievable or the location relative to prevailing wind is unfavourable, then additional mitigation measures must be employed, e.g. screening.
- The construction contractor shall be required to maintain monthly dust levels below the guideline of 350mg/m^2/day (as stated in the German VDI Guidelines TA Luft "*Technical Instructions on Air Quality*") as an annual average at sensitive receptors. Where dust levels are measured to be above this guideline the mitigation measures in the area must be reviewed as part of the dust minimisation plan.

22.5 NOISE AND VIBRATION

22.5.1 Operational Phase Mitigation Measures

No mitigation measures are required to reduce noise impacts from the proposed development. However, should significant changes be proposed at detailed design stage, a noise expert will be required to re-evaluate whether mitigation would be required for the proposed development in order to ensure that the stated criterion is met, as a minimum.

22.5.2 Construction Phase Mitigation Measures

- British Standard BS 5228 "Noise Control on Construction and Demolition Sites" shall be implemented. This includes best practice measures to reduce noise and vibration impacts.

- Normal working hours shall be as per the NRA Guidelines for the Treatment of Noise on National Road Schemes, i.e. within the period 07:00 – 19:00 Monday to Friday and 08:00 – 16:30 on Saturday. (Note that times outside normal working hours include evenings (19:00 – 23:00) and nighttimes (23:00 – 07:00) as well as Sundays and Bank Holidays). Works outside normal working hours shall only take place with the express written agreement from the Relevant Local Authority. This permission, if granted, can be withdrawn at any time should the working hours regulations be breached or should excessive noise be generated during the respective periods.

- Construction compounds will not be sited within 250m of any sensitive receptors.

- The contractor shall be required to produce a method statement to ensure that the safety and the noise and vibration impacts associated with piling activities are minimised. See **Appendix D** for guidelines.

- The maximum allowable vibration levels during general construction (particularly with regard to piling activities) shall be as specified in the NRA Guidelines for the Treatment of Noise on National Road Schemes, as outlined in **Table 11.13.**

- The following guidelines shall be followed and adhered to with regard to vibration impacts during construction:
  - BS6472: 1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz); and
  - BS7385: Part 2 1993: Evaluation and Measurement for Vibration in Buildings - Guide to Damage Levels from Ground-Borne Vibration and
  - Building Research Establishment (BRE) Digest 353 (July 1990): Damage to structures from ground borne vibration.

- In terms of allowable levels of noise during the construction phase, there is no published Irish guidance relating to the permissible noise level that may be generated during the construction phase of a project. In general local authorities detail either permissible construction noise levels or limited hours of operation whereby construction activities may be carried out. These values have been obtained with reference to the NRA's guidance document for noise and vibration in national road schemes.

22.6 LANDSCAPE AND VISUAL

22.6.1 Operational Phase Mitigation Measures

22.6.1.1 General Landscape Planting

- The implementation of the landscape mitigation measures shall be in accordance with the NRA Guide to landscape treatments.
- The landscape planning of the proposed development shall provide as diverse a woodland habitat structure as practicable and shall endeavour to establish species of trees that are beneficial to wildlife.
- The landscaping shall only use native plants and seed from indigenous sources.
- The retention of the existing hedgerows and trees will be undertaken, as far as possible.
- The use of larger size trees and evergreen shrubs will be required to reduce visual impacts at significantly affected properties, i.e. locations where substantial or moderate/substantial negative impacts have been predicted (See Specific Landscape Mitigation in **Chapter 12**).
- Tall upright growing trees (of *Fastigiata* varieties) shall be placed near adjacent roadways to prevent spread of foliage horizontally and shall achieve the required visual mitigation.
- During the detailed design stage, a Landscape Master Plan for the motorway service area shall be devised by suitably qualified landscape architect, in consultation with the Project Ecologist and Design Project Engineer. The Project Ecologist shall ensure that the ecological mitigation measures reflected in **Chapter 13** have been incorporated into the Master Plan. The Master Plan will take into account the following:
  - That an equivalent amount of hedgerows and tree line removed by the scheme will be replaced by similar indigenous species at appropriate locations in the landscape where hedgerows are a feature;
  - The use of plant species shall be appropriate to the angle of slope, soil characteristics, etc. of the proposed scheme; and
  - The landscape design shall integrate the re-use of site-excavated material (subject to hydrogeological testing).

- Lighting columns in proximity to sensitive receptors shall be restricted to a height of 10 metres within the motorway service area. The lighting design specifications shall follow that described in **Chapter 3** of this EIS.

22.6.1.2 Specific Landscape Mitigation

- The **Specific Landscape Mitigation Measures (SLMs)** summarised in **Table 22.1** shall be implemented as part of the proposed development.

Table 22.1: Specific Landscape Measures

Location	Description of SLM to be Implemented
SLM 01 Along eastern and southern boundary of the east service area and within the development (semi mature tree planting).	Minimum 10 metres wide belt of woodland planting with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property references; 8 and 21, 23 and 24 (See **Figure 12.3** for location of properties).
SLM 02 Along southern eastern and western boundary of the western service area and within the development (semi mature tree planting).	Minimum 10 metres wide belt of woodland planting with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property references; 11, 12, 13, 16 and18 (See **Figure 12.3** for location of properties).
SLM 03 Around remaining boundaries of the east and west service areas.	Minimum 10 metres wide belt of woodland planting to form a woodland framework with a high proportion of evergreen species and semi mature trees, as well as semi mature trees planted around and within proposed car parks necessary to mitigate significant landscape impacts on the surrounding Muirhevna Plain Landscape.
SLM 04 Along the lands adjacent to the merge lane of the western service area.	Minimum 10 metres wide belt of woodland planting to form a woodland framework with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property reference 18. (See **Figure 12.3** for location of properties).

- The SLMs in **Table 22.1** shall incorporate the following:
  - o The woodland screening mix shall be composed of strong growing native species that reflect the species found in adjacent hedgerows in this part of the County Louth landscape. Suitable woodland species within the mix shall include – *Fraxinus excelsior*, *Quercus robur*, *Betula pendula*; *Alnus glutinosa* and *Corylus avellana*. Suitable evergreen species shall include *Ligustrum vulgare*; *Ilex aquilfolium* and *Ulex europaeus*.
  - o Individual native woodland trees shall be planted as semi mature trees within the woodland screening mix for additional screening at densities that will reflect the distribution of scattered trees within woodland and hedgerows in the surrounding landscape. The woodland shall be such that it establishes a closed canopy within five years. The woodland trees and shrubs shall be managed and monitored by the PPP Concessionaire as it develops.
  - o In line with the recommendations of the terrestrial ecology assessment (see **Chapter 13**), non-native trees or shrub species such as sycamore, beech, red osier and non-native willow shall not be used for landscaping purposes. Where landscaping is proposed, appropriate native trees and shrubs shall be used such as those outlined in **Table 13.6**.

22.6.1.3 Earthen Bunds

- Should the design of the earthen bunds change during the detailed design stage from that described in this EIS the Project Engineer shall consult with the Landscape Architect to ensure no adverse visual impact.
- The material to be re-used for earthen bunds shall only be used if deemed appropriate subject to hydrogeological testing.
- The earthen bunds shall be developed in sympathy with the local environment and shall have a natural profile of 1:4 side slopes.
- The maximum height of the bunds shall be restricted to a height of 2 metres above the existing ground level, which will be designed during the detailed design stage in consultation with the Project Engineer and the Landscape Architect.

22.6.1.4 Monitoring and Maintenance

- The contractor/concessionaire shall prepare and implement a landscape maintenance plan after the construction of the scheme which will form an integral part of the on-going site management. This will include the following:
  - A defects liability period during which any defective plant material is to be replaced to insure the healthy establishment of mitigation planting;
  - Weed and litter control, including monitoring, particularly during the early growing seasons of the landscape maintenance contract;
  - Grass cutting and replacement of failed plants;
  - Compliance with all health and safety standards, in particular with regard to maintenance works during the operational phase of the project; and
  - Measures to be taken to ensure that there is no detrimental impact on adjacent ground/surface water bodies or adjacent vegetation or fauna.

22.6.2 Construction Phase Mitigation Measures

- Construction compounds will not be located within 250m of residential properties; and
- If construction activities take place during dry weather, dust control measures shall be implemented to avoid dust arising that may draw attention to construction activities. The mitigation measures provided in **Chapter 10 Air Quality** shall be implemented to minimise these impacts.

22.7 TERRESTRIAL ECOLOGY

22.7.1 Operational Phase Mitigation Measures

- Where hedgerows and treelines are to be removed for the proposed scheme an equivalent amount of hedgerow and treeline shall be replaced by similar indigenous species. This will be agreed with the Project Ecologist and Landscape Architect during the preparation of the Landscape Master Plan.
- Non-native trees or shrub species such as sycamore, beech, red osier and non-native willow will not be used for landscaping purposes. Where landscaping is proposed, appropriate native trees and shrubs shall be used as per **Table 22.2**.

Table 22.2: Suggested plant species for landscaping purposes

Common Name	Scientific Name	Common Name	Scientific Name
Ash	*Fraxinus excelsior*	Hawthorn	*Crategeus monogyna*
Alder	*Alnus glutinosa*	Blackthorn	*Prunus spinosa*
Hazel	*Corylus avellana*	Elder	*Sambucus nigra*
Holly	*Ilex aquifolium*	Dog Rose	*Rosa canina*
		Willow	*Salix spp*

- The development of the Landscape Master Plan for the proposed development will be carried out in consultation with a qualified ecologist to ensure the final landscape design incorporates habitat and structural diversity and uses plant species, which have a positive benefit for biodiversity.
- Mitigation in relation to watercourses is in included in **Aquatic Ecology** assessment (**Chapter 14**).

22.7.2 Construction Phase Mitigation Measures

- A Project Ecologist shall be employed in advance of any site clearance/construction activities.
- The NRA Environmental and Construction Guidelines shall be followed prior, during and post construction of the proposed development.
- The Project Ecologist shall ensure that any ecological mitigation measures which were incorporated in the M1 Motorway scheme and are now impacted by the construction of the proposed motorway service area are adequately reinstated as part of the works.
- Hedgerows will be retained where possible as they provide wildlife corridors, nesting sites for birds, and may contain badger setts.
- Hedgerows to be retained, as identified by the Project Ecologist prior to site clearance, shall not be removed / damaged to facilitate stockpiling of materials or disposal of materials on-site.
- Clearance of hedgerows and trees from site shall not take place between March 1st and August 31st where possible in order to avoid the bird nesting season. Where clearance during the bird nesting season is unavoidable, a fully qualified ecologist shall undertake a nest survey prior to any clearance. Where active nests are identified, consultation will take place with the NPWS to develop a mitigation strategy.
- Disturbance of the Red Bog during construction and use of plant and machinery in this area will be limited to the section of the proposed development where the roundabout and access roads are to be constructed. The remainder of the Red Bog will be fenced off prior to any works commencing. Construction related activities including site compounds, borrow pits, spoil or storage of construction materials shall not be located in this area.
- Construction and construction related activities (including the deposition of spoil and/or placing of ancillary services) shall not take place outside the landtake. Should additional lands, outside the landtake be required the contractor shall consult with the local NPWS ranger to ensure no locally important ecological sites are impacted.
- The contractor/concessionaire shall consult an ecologist should any protected flora and fauna species be found during construction and appropriate mitigation measures will be implemented by the Project Ecologist.
- Evidence of badgers was noted during the field survey within grass verges adjacent to the proposed development and motorway. The location of the sett is currently unknown but is not within the site boundary. A full badger survey shall be carried out by a qualified ecologist prior to any construction activity at the site to identify the sett, after which appropriate mitigation will be developed in consultation with the NPWS. As a minimum the entire proposed development shall be surrounded by badger proof fencing to ensure that badgers are excluded from the site and any potential vehicle conflicts are avoided.

- Pre-construction bat surveys shall be carried out by a qualified ecologist during the optimum survey period specified in the NRA Environmental Assessment and Construction Guidelines prior to the commencement of any disturbance, site clearance or preparation works. The ecologist shall provide detailed mitigation for inclusion in the detailed design and construction works.
- Prior to felling of any trees, the following measures shall be taken to ensure that no impacts occur to bats that may be using them as roosts.
  - A bat specialist shall inspect all trees in advance of felling to check for bats.
  - A licence must be obtained from the National Parks & Wildlife Service to fell trees that have or have the potential to contain bat species.
  - Any trees that show crevices, hollows, dead limbs or other features that could be in use as bat roosts, shall be removed under supervision of a bat specialist who is licensed to handle bats.
  - Any ivy-covered trees shall be left to lie for 24 hours after cutting to allow any bats concealed in the ivy to escape. Large trees shall be felled carefully, essentially by dismantling by tree surgeons, under supervision of a bat specialist.
  - Bat boxes shall be erected by a bat specialist to compensate for the loss of trees felled as part of the construction works.
- The detailed lighting plan shall be prepared in consultation with the Project Ecologist to ensure that the final lighting design is sympathetic to local bird life.

22.8 AQUATIC ECOLOGY

22.8.1 Operational Phase Mitigation Measures

The following table summarises the key mitigation measures to be implemented, further details of which are provided hereafter.

Table 22.3: Summary of Operational Mitigation Measures for Sampled Watercourses

	Mitigation Measures
i.	Minimise pollution generated during construction process
ii.	Consult Fisheries Board regarding checking for salmonid fish and crayfish prior to construction of culverts and undertake translocation to suitable habitat if these species are found
iii.	Apply appropriate culvert design in accordance with guidelines outlined above, if culverts are required
iv.	Establish Leave Strips of >10m from stream banks, where possible
v	Use sustainable drainage systems and petrol/oil interceptors on all surface water runoff from the development
vi.	Create flow attenuation to ensure that no significant increase in peak stream/river flows is caused by the proposed development
vii.	Apply special measures to prevent contamination from proposed refuelling facilities

	Mitigation Measures
viii.	Use lined constructed wetland to ensure no leakage of contaminated water
ix.	Ensure sufficient capacity of wetland in a flooding event
x.	Undertake frequent monitoring of wetland discharge and receiving waterbody to ensure no contamination
xi.	Undertake frequent monitoring of the sediment at the points of discharge to the ditches/streams in case of heavy metal and hydrocarbon accumulation

22.8.1.1 Permanent loss of habitat

The most effective method of mitigating habitat loss is to minimise it and where this is not possible to create new habitat. In the event culverts are required, the following mitigation measure shall be implemented:

- Loss of habitat shall be minimised by keeping the length culverted to the absolute minimum necessary.

One of the most effective methods of minimising loss of stream and riparian habitat during developments such as new road construction is the establishment of Leave Strips. Leave strips are the areas of land and vegetation adjacent to watercourses that are to remain in an undisturbed state, throughout and after the development process (Chilibeck *et al* 1992). Leave strips are valuable not only because riparian vegetation is a vital component of a healthy stream ecosystem, but because this vegetation acts as an effective screen/barrier between the stream and the development area, intercepting runoff and acting as an effective filter for sediment and pollutants from the development area. The following measure is required to reduce impacts related to loss of stream and riparian habitats:

- A riparian leave strip of at least five metres, and where possible, 10m shall be fenced off along both sides of the affected watercourses. This area shall be left undisturbed during the construction phase and retained as a wildlife corridor after the completion of the development. All native trees and bushes within the leave strip shall be retained and additional native trees particularly willow, alder, ash and oak shall be planted to as to provide wildlife cover and intermittent shade to the stream and river. The long-term management of these wildlife corridors should include periodic consultation with the Regional Fisheries Board and the National Parks & Wildlife Service.

22.8.1.2 Obstruction of Aquatic Fauna Movement

Fishery Guidelines for Local Authority Works published by the Department of the Marine and Natural Resources recommends that *long stretches of river or stream should never be culverted* and that rivers or streams should be culverted for *essential reasons only* (Anon 1998). Should it be determined that culverts are required, the following mitigation measures shall be implemented:

- Any culverts should be designed and constructed in such a way as to ensure that streams remain passable for fish and other aquatic fauna. This can only be reliably achieved by crossing methods that retain or provide 'natural' rough substrates that will slow currents near the bottom and create flow refuges, enabling invertebrates and juvenile fish to migrate upstream in otherwise impassable water velocities.
- The following guidelines shall be implemented when designing culverts:
  - Ideally, a culvert should not change the hydrological conditions that existed prior to that installation. This means that the cross-sectional area should not be restricted by the culvert, the

slope should not change, and the roughness coefficients should remain the same. Any change in these conditions will result in a velocity change which could alter the sediment transportation capacity of the stream.

- Fish passage problems can usually be avoided if culverts are constructed without a bottom or are installed well below stream grade.
- If concrete bottoms are used, they should be at least 30 cm below the stream grade with cross walls not less than 8 cm to collect natural streambed material.
- Culverts should be installed at the stream gradient otherwise they may result in a change in water velocities which may create a drop below the culvert or may create a hydraulic jump at the end of the culvert.
- Culverts should not be aligned so that culvert outflows are directed into a stream bank. If a road crossing is not perpendicular to the stream, the culvert installation should be skewed.
- The culvert should be installed so that it has a constant slope through its length except for the appropriate camber allowance where settlement is anticipated.
- If necessary to maintain the desired water level within the culvert and backwater the culvert at higher flows to reduce culvert velocities, an outlet pool with tailwater control should be provided at the culvert exit. Details of the outlet pool dimensions, if required, can be found in **Appendix G, Volume 3** of this EIS.

- Regardless of the culvert design selected, the following criteria for allowing adult fish passage through culverts from Dane (1978) shall be met except in situations where the natural stream velocity exceeds these guidelines. (Major changes in water velocity may have detrimental effects on the streambed conditions upstream or downstream of the culvert (Baker & Votapka 1990)).

  - The average water velocity in the culvert should not exceed the following values: 1.2 m/s for culverts less than 24.4 m in length; 0.9 m/s for culverts between 24.4 and 61 m in length. Culverts with higher water velocities or greater length require installation of baffles to allow fish passage.
  - The depth of the water should not be less than 0.23 m at any point within the culvert.
  - Any sudden drop in the water surface profile at any point within the culvert influence should not exceed 0.31 m.
  - During the period of upstream fish migration, the length of time during which the foregoing conditions are not met at the culvert site should not exceed 3 consecutive days in the average year.
  - The effective slope (mean slope of the water surface from the culvert inlet to the tailwater control point) of the culvert should not exceed: 0.5% for a culvert greater than 24 m in length, unless baffles are added; 1.0% for a culvert less than 24 m in length unless baffles are added; 5.0% at any time even with the addition of baffles.

22.8.1.3 Pollution of Streams with Contaminated Water During Operation

- A sustainable drainage system shall be installed for all surface waters draining from the proposed development (including roofs). Best management practices for treatment of runoff could include: constructed wetlands; vegetated lagoons; swales; filter strips; filter drains; infiltration devices; and oil/grit separators. A combination of runoff management and control measures shall be implemented, e.g. a combination wetland incorporating an upstream sedimentation pond. The system installed shall have a proven capability of achieving and sustaining at least the following percentage pollution reduction in runoff:

Pollutant	Percentage Pollution Reduction
Total Suspended Solids	85%
Heavy Metals	50 – 80%
Chemical Oxygen Demand	50%
Hydrocarbons	90%

- Petrol/oil and grit interceptors shall be located at outfalls to watercourses. Design of those interceptors should conform to the recommendations of CIRIA Report No. 142 (Luker & Montague 1994).
- As virtually all treatment options require proper maintenance in order to function properly, and as some such as oil interceptors can become a source of pollution if not properly maintained, a program of regular cleaning, maintenance and inspection of the runoff treatment system shall be put in place by the contractor/concessionaire to ensure it functions correctly.

22.8.1.4 Impact of Major Accidental Spillages

- This issue is addressed through the operation of regulations made under the Dangerous Substances Act 1972 and other amending legislation. The regulations govern the conveyance by road of scheduled substances, which include flammable substances, oxidising agents, toxic substances, etc. The Water Pollution Act 1977 and 1990 shall apply to point spillages.
- Shut-off Valves shall be constructed on all outfall pipes. In the event of an accidental spillage (e.g. milk, petrol, etc.) these valves can be shut. This will prevent contaminants reaching streams where serious environmental damage could be caused.

22.8.1.5 Hydrological Impacts

- Flow attenuation shall be included in the design of the proposed development to ensure that no significant increase in peak stream/river flows is caused by the proposed development.

22.8.1.6 Potential pollution from proposed refuelling facilities

Comprehensive guidance on the design, construction, modification and maintenance of petrol filling stations is given in a publication known as the 'Blue Book' (Association for Petroleum and Explosives Administration/Institute of Petroleum 1999). The EPA are in the process of drawing up a groundwater protection response which will include guidelines for petrol stations (M.F. Rochford, EPA, pers. comm.). The following mitigation measures are based on Scottish EPA documents PPG7 & PPG27 (www.sepa.org.uk/guidance/ppg/pdfs/ppg27.pdf & ditto ppg7.pdf) and Scottish Executive Environment Group (2003). These references shall be consulted for detailed recommendations.

- All areas within the curtilage of the filling station/s shall be positively drained on an impervious surface. Any joint in the surface must be adequately sealed and those sealants must be resistant to attack from petrol and oil products.
- Surface water drainage from all areas, except uncontaminated roof water, must discharge through a full retention oil/petrol separator. The capacity of the separator shall be adequate to contain at least the maximum contents of a compartment of a road tanker likely to deliver petrol at the filling station. Note that by-pass type separators are not suitable for use on petrol station forecourts.
- Oil separators require regular maintenance in order to ensure they remain effective. Routine inspections shall be undertaken at least every six months and a log maintained of inspection date, depth of oil and any cleaning that is undertaken.
- Access to the separator shall be kept clear and not used for storage.
- A separator will not work properly for dissolved (soluble) oils or if detergents or degreasers are present. Such discharges shall be drained to the foul sewer.
- The correct handling, storage and disposal of separator waste is vital if pollution is to be avoided. Waste shall be passed only to a registered waste carrier for disposal at a suitably licensed facility.
- Unless forecourts drain to sewers which discharge to a treatment plant, degreasing or steam cleaning of the forecourt shall not take place unless: i) Any liquid is soaked up using absorbent material which is suitably disposed of off-site. Sealing of gullies may be appropriate to prevent liquid or absorbent entering the drainage system. Or ii) A closure valve is fitted at the oil separator outlet, which is closed

during the cleaning operation and all accumulated washings removed for suitable disposal off-site. An alarm shall be installed to indicate that the closure valve is in the 'shut' position.

- All underground fuel storage tanks shall be designed, installed and maintained in accordance with guidelines of Association for Petroleum and Explosives Administration/Institute of Petroleum (1999). USTs shall be double-skinned (that is, have an inner and outer skin) and have an interstitial monitoring device with automatic alarms. All USTs shall be provided with overfill prevention. Ongoing wetstock monitoring/inventory shall also be carried out to detect leakages.
- All above ground fuel storage tanks shall comply with current regulations and be bunded.
- A pollution incident response plan (PIRP) shall be in place including, as a minimum, the following:
  - details of the plan owner and procedures for keeping it up to date;
  - emergency contact details for site operators etc and for all holders of the PIRP;
  - emergency contact details for third parties (e.g. Fire Brigade, EPA, specialist contractors, environment section of Local Authority etc);
  - product inventory and site layout plan;
  - site drainage plan;
  - emergency procedures; and
  - location of emergency response equipment (e.g. fire extinguishers, absorbents, emergency bunding, temporary fencing etc); and location of buried services, including water supply pipes.

22.8.2 Construction Phase Mitigation Measures

22.8.2.1 Reduction and prevention of suspended solids pollution

Release of suspended solids to all watercourses should be kept to a minimum and total suspended solids in discharges shall not exceed 25mg/l. Efforts shall be concentrated at preventing suspended material from entering the proposed development during construction. The following general guidelines for erosion and sediment control are largely based on Goldman *et al* (1986) and shall be implemented during construction:

- Earth moving or excavation works close to watercourses shall follow and implement the principles of the sediment control plan described **Chapter 15** to avoid damage to watercourses.
- Retain existing vegetation where possible, especially in riparian areas.
- Re-vegetate denuded areas, particularly cut and fill slopes and disturbed slopes as soon as possible. Use mulches or other organic stabilisers to minimise erosion until vegetation is established on sensitive soils.
- Cover temporary fills or stockpiles which are likely to erode into nearby watercourses with polyethylene sheeting.
- Divert runoff away from bare soil especially on slopes.
- Minimise the length and steepness of slopes where possible.
- Minimise runoff velocities and erosive energy by maximising the lengths of flow paths for precipitation runoff, constructing interceptor ditches and channels with low gradients to minimise secondary erosion and transport, and lining unavoidably steep interceptors or conveyance ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.
- Retain eroded sediments on-site with erosion and sediment control structures such as sediment traps, silt fences and sediment control ponds.
- Access roads shall be constructed or topped with a suitable coarse granular material/non-woven geotextile, and if possible organic topsoil shall be stripped prior to access road construction.
- If possible instream work shall be avoided. If unavoidable keep instream work to a minimum and as far as possible protect the natural stream conditions and structure to promote stability of bank and bed structures and retain riparian vegetation.

- If significant alterations to the existing stream/river bank, or instream works are to be carried out, the works area shall be isolated from the river/stream by cofferdams or other suitable containment methods. Water within the contained area contaminated with suspended solids or other potential pollutants shall never be released directly to the stream/river, but shall be pumped to a land site to allow sediment removal before it re-enters the river.
- Temporary stream diversions (such as to facilitate culvert installation) shall only be carried out in consultation with the Regional Fisheries Board. The diversion shall be excavated in isolation of stream flow, starting from the bottom end of the diversion channel and working upstream to minimise sediment production. The temporary channel shall be constructed in such a way as to minimise suspended solids released when the river is re-routed. Upon completion the bank shall be stabilised around the temporary diversion.
- If unavoidable, permanent stream diversions shall be completed as far in advance as possible. The channel shall be constructed in such a way as to minimise suspended solids released when the river is re-routed. Use of loose fine-grained materials in the new channel construction shall be strictly limited.
- Sediment control ponds shall be designed for a minimum retention time of 15 hours.
- It is important that at the planning stage provision is made for a sufficient land area to accommodate the necessary sediment control measures.
- Other than single span temporary bridges with no instream structures, strictly no temporary stream crossings or temporary culverting shall take place without the prior agreement of the Regional Fisheries Board.
- Machinery shall never cross a watercourse by entering it.

22.8.2.2 Prevention of pollution with other substances during construction

The following guidelines based on Chilibeck *et al* (1992), NRA (2005) and SRFB (2007) shall be followed and implemented:

- Raw or uncured waste concrete shall be disposed of by removal from the site or by burial on the site in a location and in a manner that will not impact on the watercourse.
- Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks shall be trapped on-site to allow sediment to settle out and reach neutral pH before clarified water is released to the stream or drain system or allowed to percolate into the ground.
- Fuels, lubricants and hydraulic fluids for equipment used on the construction site shall be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice (Enterprise Ireland BPGCS005).
- Fuelling and lubrication of equipment shall not be carried out on sites close to water courses.
- Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and the contaminated soil removed from the site and properly disposed of.
- Oil booms and oil soakage pads shall be kept on-site to deal with any accidental spillage.
- Waste oils and hydraulic fluids shall be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Prior to any instream work ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.
- All pumps using fuel or containing oil shall be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.
- Foul drainage from site offices etc. shall be removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines.

22.8.2.3 Translocation of fish and crayfish (if present)

Should culverting of any of the watercourses within the proposed development be required, the following shall be undertaken:-

- The Fisheries Board shall be contacted prior to dewatering works in order to determine if checks of the watercourses for salmonids, lampreys and crayfish are required.
- If electrofishing operations are considered necessary by the relevant Fisheries Board then adequate time must be allowed prior to the commencement of works as seasonal constraints apply to fish and crayfish surveys.
- All fish (particularly salmonid fish if present) and crayfish (if present) must be removed and transferred to suitable adjacent habitat by suitably qualified and experienced operators in close consultation with the Regional Fisheries Board and the National Parks and Wildlife Service. Electrofishing will require a Section 14 Permit from the Department of the Marine; crayfish capture and relocation will require a license from the National Parks & Wildlife Service, although it is highly unlikely that crayfish are present in any of the watercourses sampled.
- Removal of crayfish shall not be carried out in late May or June, when crayfish are releasing their young. Fish removal is not usually permitted between the end of September and the beginning of May.

22.8.2.4 Requirements for Contractors

- Contractors shall establish contact with the Regional Fisheries Board before works commence, and there shall be ongoing liaison with the Board throughout the construction process.
- Contractors shall be in possession of, and familiar with, the contents of *"Control of water pollution from construction sites - Guidance for consultants and contractors"* published by the Construction Industry Research and Information Association (CIRIA 2001) (e-mail enquiries@ciria.org.uk).

22.9 SOILS, GEOLOGY AND HYDROGEOLOGY

22.9.1 Operational Phase Mitigation Measures

22.9.1.1 General

- Where possible, advance notification of ground investigations that will provide good geological exposure shall be given to GSI to afford them the opportunity to gather data (GSI recommendation as per **Chapter 5, Consultation**).
- Where possible, significant bedrock cuttings shall be designed to remain visible and not covered with vegetation and soil (GSI recommendation as per **Chapter 5, Consultation**).

22.9.1.2 Management of Surface Water Run-off

- The potential reduction in recharge to the gravel aquifer beneath the western property shall be mitigated by incorporating landscaped areas within the design.
- The potential for contamination within the surface water run-off to reach underlying soil and groundwater shall also be limited through the construction of a suitably designed and engineered surface water drainage system in accordance with the SuDS philosophy.
- All run-off from the petrol filling areas will be collected within a closed drainage system which will pass through a full retention light liquid separator before being discharged to the main surface water drainage system. The drainage system will be designed such that all surface water run-off from potentially contaminated areas, including roadways, car-parks and the petrol filling station (following initial treatment) will pass through an attenuation and treatment system which will be designed to treat water to achieve a hydrocarbon concentration of less than 5mg/l. The full retention light liquid system

within the petrol filling area shall be designed to contain the maximum contents of a single cell of a tanker delivering fuel at the proposed development.

- All clean uncontaminated roof water will be kept separate from potentially contaminated water and channelled directly to the constructed wetlands down gradient of the interceptor and retention/attenuation system.
- Manual shut off valves shall be installed on the discharge outlets of the underground attenuation system in order to prevent contaminants reaching the constructed wetlands in the event of a significant spillage.
- The underground retention system will allow some downward percolation of surface water in order to mitigate the affect of increased areas of hardstanding surfaces. However, the oil and petrol treatment systems within the drainage system will be designed to ensure that the total hydrocarbon content will be less than 5 mg/l.

22.9.1.3 Contamination

- In the absence of Irish Guidance, specific guidance for the prevention of pollution at sites involving particular activities has been issued in the UK by the Environment and Heritage Service, the Scottish Environmental Protection Agency and the Environment Agency in a suite of Pollution Prevention Guidance (PPG) documents. Those specific to the activities on the proposed development include PPG2 (above ground storage tanks), PPG7 (Refuelling Activities), PPG26 (drums and bulk containers), PPG27 (underground storage tanks).
- In addition the following guidance documents also apply to activities associated with petrol filling stations:
    - The Institute of Petroleum and Explosive Administration, *Guidance of the Design, Construction and Maintenance of Petrol Filling Stations* ("Blue Book");
    - The Institute of Petroleum *Guidelines for Soil, Groundwater and Surface Water Protection and Vapour Emission Control at Petrol Fillings Stations,* June 2002;
    - Draft Code of Practice for assessing the Risks from Petrol at Relevant Petrol Stations under The Dangerous Substances (Petrol Stations) Regulations 1999, and
    - DEFRA (UK) Groundwater Protection Code: *Petrol Stations and other fuel dispensing facilities involving underground storage tanks*, November 2002.
- The activities on the petrol filling station shall be carried out in accordance with the above guidelines, which give the following broad recommendations:
    - All oils and fuels will be stored in tanks of suitable integrity and strength and be placed within a secondary containment system which must be able to contain at least 110% of the tank contents;
    - Storm water run-off will be minimised by the installation of roofs and covers, where appropriate;
    - Surface water run-off from any area where fuel is stored or dispensed shall be separate from the surface water drainage system and any open ground or porous surfaces, by using grids and gullies and surfaces impermeable to the products used;
    - Fuel storage and dispensing areas shall be paved and potentially contaminated water and spills will be directed through an oil/petrol separator, which will be designed to serve the surface area catchment of the proposed development.
    - Underground storage tanks and associated pipework will be double skinned and fitted with an automatic leak detection system;
    - Wetstock monitoring will be undertaken in order to allow leaks to be detected at an early stage;
    - Pipework shall be protected from corrosion and placed within granular material to protect from stresses caused by obstructions in the ground or uneven settlement;
    - Monitoring boreholes will be installed around the facility to enable environmental monitoring;
    - Integrity testing will be carried out on tanks and pipe-work before operation of the facility commences, following this it shall be used in conjunction with a leak detection system;
    - All fuel deliveries will be supervised by personnel trained in the delivery and emergency procedures;

- A full maintenance program, to include, tanks, pipe-work, monitoring equipment, drainage channels and separators will be implemented;
- All staff will be trained to deal with an Environmental Incident and formal emergency procedures shall put in place to detail actions to be taken in the event of leaks, spillages, collisions, fires and odours being detected off-site.

- In the event of a catastrophic spillage a pollution incident response plan PIRP shall be implemented as discussed in **Chapter 14 Aquatic Ecology**. In particular, the PIRP needs to ensure that sufficient measures are in place to close the manual shut off valves on the retention tanks.
- It should be noted that this list is not exhaustive and reference shall be made to the appropriate guidelines and the mitigation specified in **Chapter 14, Aquatic Ecology, Chapter 3, Drainage**, and **Chapter 21, Risk Review**, of this EIS.

22.9.2 Construction Phase Mitigation Measures

22.9.2.1 Excavation of Overburden

- Where possible, the soil will be reused on-site.
- Chemical analysis will be carried out to assess whether the fill material presents a risk to human and/or environmental receptors and to determine a suitable on-site or off-site disposal route. Any disposal of waste off-site shall be to a fully licensed waste facility with removal by a fully licensed waste removal company.

22.9.2.2 Dewatering

- A suitably designed groundwater dewatering system shall be incorporated into the design of the proposed development. Any potential settlement of subsoils associated with dewatering shall be addressed through the use of appropriate engineering methods, such as cut off walls.
- Any recovered uncontaminated water shall be collected and disposed of under discharge consent to nearby watercourses.
- Any potentially contaminated water shall be treated prior to disposal.
- Potential impacts on any local wells shall be addressed in the design of the dewatering system. This shall include a door-to-door well survey to determine the exact usage of the water from nearby private wells. Should impacts occur to nearby groundwater wells, which are in use for domestic supply purposes, the Contractor/Concessionaire shall provide an alternate water source until water supply from the affected well is restored.

22.9.2.3 Contamination

- All hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents.
- Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project as appropriate.
- Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project and an emergency response plan shall be in place, in case of accidental spillage.
- Reference shall also be made to **Chapter 14 Aquatic Ecology** which states additional measures required for the protection of surface water from contamination during the construction phase.

22.9.2.4 Soil Erosion

- A sediment erosion control plan shall be implemented at the construction stage in order to prevent soil erosion and excess sediments or other material from reaching the receiving watercourses. The sediment erosion control plan shall include as a minimum the following measures:
  - The designation of appropriate locations and methods for stockpiling soil, aggregates, chemicals, etc.;
  - Restricting vehicular movement to prevent unnecessary erosion;
  - Revegetating exposed areas, as soon as practicable;
  - Use of temporary sediment trapping devices (e.g. silt fences, hay bales, etc.); and
  - Routing flows from the construction site through settlement ponds or filter channels.
- Reference shall be made to **Chapter 14 Aquatic Ecology** which states additional measures required for the protection of surface water from contamination during the construction phase.

22.10 DRAINAGE

22.10.1 Operational Phase Mitigation Measures

- Reference shall be made to the mitigation measures outlined in **Chapter 14** (Aquatic Ecology) and **Chapter 15** (Soils, Geology & Hydrogeology) for additional mitigation measures relevant to drainage.

22.10.1.1 Water Quality/Pollution Control

- To ensure the protection of watercourses from pollutants, it is proposed to implement measures to minimise risk of pollution of watercourses. Soakaways or settlement ponds shall be installed on drains accepting runoff from heavily trafficked roads as per the Department of Marine and Natural Resources publication *Fishery Guidelines for Local Authority Works.*
- The receiving environment from road surfaces, parking areas, and forecourts, runoff, pollution control shall be provided at each proposed outfall location.
- Pollution control in the form of constructed wetlands immediately before discharge to the adjoining watercourses will be provided. Upstream, to prevent discharge of oil, petrol or other liquids to the constructed wetlands, full retention light liquids separators shall be used on the forecourt drainage and hydrodynamic vortex separators or similar shall be used on the drainage systems serving the roadways and car parks. These separators will also remove grit and floatables from the surface water.
- All pollution control facilities and attenuation areas shall be fitted with a penstock or similar restriction at the outfall to the receiving channel. Such devices can be used to contain pollutants in the event of accidental spillage.
- A light liquid separator (as described above) shall be used to provide sufficient storage to accommodate the contents of one fuel cell of a petrol/oil delivery tanker.

22.10.1.2 Flow Attenuation

- The surface water runoff from the eastern site will discharge to a stream located approximately 380 metres south of the access roundabout while the western site will discharge to the stream located at the northern corner of the western site. Flow attenuation, shall be provided to ensure that there will be no increase in peak flows in these watercourses.
- To minimise the risk of increasing the peak flows in the watercourses Sustainable Drainage Systems (SuDS) techniques shall be implemented on-site. To achieve Greenfield runoff rates it is normal to restrict the discharge to the watercourses by means of a flow attenuation device. This will result in a back up of waters at the attenuation device, which will be contained by the provision of a water storage system. The attenuation device will allow a constant discharge to the receiving waters during and after the storm until the storage system is emptied.

22.10.1.3 Storage Systems

- A cellular system shall be provided in the proposed development. The volume of storage provided shall be sufficient to accommodate the runoff from a once in one hundred years rainfall event.

22.10.1.4 Culverts

- Any culverts will be designed to accept the flow from a once in 100 years flood event.
- During the detailed design stage, consultations shall take place with the Eastern Regional Fisheries Board with regard to any in stream works and in relation to the final design of any potential culverts.
- During the detailed design stage, consultations shall take place with the Office of Public Works. It will be necessary to obtain approval from the Office of Public Works under Section 50 of the Arterial Drainage Act (1945) prior to undertaking any construction works on the stream.

22.10.2 Construction Phase Mitigation Measures

- The contractor, prior to commencement of any construction related works, shall be required to have an approved Sediment and Erosion Control Plan on-site;
- The contractor shall be required to store chemicals and other construction materials safely and ensure that no oil or chemicals are discharged into watercourses;
- Construction works directly affecting watercourses will generally be restricted. The period when in stream works are permitted will be agreed with the fisheries board before any temporary or permanent in stream works commence;
- During the detailed design stage, consultations shall take place with the Eastern Regional Fisheries Board and the Office of Public Works with regard to design and positioning of culverts;
- In addition, the contractor/concessionaire will be required to consult further with the Eastern Regional Fisheries Board and the OPW regarding the implementation of mitigation measures designed for both the construction and operational phases of the job before construction commences;
- Temporary silt traps shall be put in place to minimise impacts on nearby watercourses. Temporary facilities to trap any accidental spillage shall also be required.
- The contractor/concessionaire shall construct and commission elements of the permanent drainage system as early as practicable. Construction of the tanks needed for attenuation of the run-off from the construction site will also need to be completed at an early stage.
- Reference shall be made to additional mitigation measures are provided in **Chapters 14** and **15** of this volume in relation to the Aquatic Ecology and Soils, Geology and Hydrogeology.

22.11 AGRICULTURAL MATERIAL ASSETS

22.11.1 Operational Phase Mitigation Measures

- Mitigation for landtake shall be through compensation under the statutory code.
- Potential impacts in relation to dust shall be mitigated in line with the recommendations in **Chapter 9, Air Quality.**
- Mitigation measures recommended in **Chapter 10, Noise**, shall be followed to reduce any already less than significant noise impacts.

22.11.2 Construction Phase Mitigation Measures

- Discussions shall take place with landowners who are concerned that noise and dust levels from the construction are causing a disturbance to their stock. Mitigation measures regarding noise are outlined in the **Noise Section** of the EIS. Measures to control dust are outlined in the **Air Quality Section** of the EIS.
- Discussions shall take place with landowners to ensure that construction traffic does not interfere with farm operations. It is proposed that HCV construction traffic travelling to and from the proposed development must travel via the M1 Motorway, as they will not be permitted to use the existing local road network for haulage of plant and materials to and from the construction site. Mitigation measures regarding traffic impacts are outlined in the **Traffic Section** of the EIS.
- All drainage likely to be affected or disturbed during the construction phase will be identified and reinstated quickly and properly. Delay in reinstatement may cause flooding and subsequent damage to crops. Surface drainage may also be affected where vehicular traffic has damaged soil structure. Areas that have been affected in this way will require remedial work. Damage to crops and soils by flooding will be rectified and/or compensated.
- Where necessary, suitable stockproof temporary fencing shall be erected for the duration of the works.
- Where any fences, walls or hedges are damaged they shall be made stockproof immediately, where necessary. Any necessary permanent restoration of fences, walls, drains or land shall be completed within two months of the work concluding.
- During the construction stage the contractor shall be instructed that any gates used by them are closed so as to prevent animals from straying.
- Existing accesses to property, including homes and farms shall, where practicable, be maintained during construction, otherwise reasonable temporary access will be provided.
- Land drains shall, to the extent possible, be maintained during the course of the works and any damage due to the works will be made good on completion of the works.
- The contractor/concessionaire shall ensure, as far as practicable, that additional drainage problems or ponding does not occur as a result of the construction works. Any permanently severed pipes or drains will be connected into a new drain and any pipe disturbed by the works reinstated to ensure free discharge into a suitable outfall.
- The contractor/concessionaire shall follow best practice in seeking to avoid damage from flooding of land.
- Care shall be taken with soil and other material, removed in the course of the works, when reinstated. Unless otherwise agreed, topsoil, which will be separated from other material, will be reinstated as the top layer.

22.12 MATERIAL ASSETS – NATURAL AND OTHER RESOURCES

22.12.1 Operational Phase Mitigation Measures

- Reference shall be made to mitigation measures in **Chapters 14** (Aquatic Ecology) and **Chapter 15** (Soils Geology, Hydrogeology) with regard to potential operational impacts on the nearby watercourses.
- The local service accesses for the motorway service area on the CR182 for the eastern site and the CR185 for the western site shall be private controlled accesses that is restricted to staff cars.
- The local service access shall be designed in accordance with **Chapter 3** (Site Description) and will incorporate any mitigation measures described in **Chapter 9** (Traffic).
- A lighting plan shall be completed as part of detailed design. The lighting of the proposed motorway service area shall provide 20 lux and 10 lux lighting as shown in **Figure 3.4.**
- Materials used to finish the exterior of the amenity building shall be non-reflective in nature in order to reduce the impact of reflective lighting and glare from within the motorway service area on nearby sensitive receptors, particularly during night time periods.

22.12.2 Construction Phase Mitigation Measures

- A construction traffic management plan shall be required to minimise the impact of construction vehicles on the M1 Motorway. Reference to, and implementation of, mitigation measures provided in **Chapter 9** shall also be undertaken.
- The construction mitigation measures provided in **Chapters 14 and 15** shall be implemented during the construction phase in order to minimise impacts to watercourses.
- The contractor shall contact and liaise, on an ongoing basis, with Louth County Council with regard to the construction of the foul drainage system and water supply and its connection with the existing system. This is to minimise the level of disruption to users of this facility.
- Any excavated material deemed suitable shall be re-used on-site for the proposed motorway service area.
- Any other excess materials, which cannot be used for landscaping and earthen bunds etc, will require removal off-site. The contractor/concessionaire must ensure that the facility to which it is brought is licensed in compliance with the applicable waste management legislation. The contractor/concessionaire, as holder of the waste is responsible under the Waste Management Act for ensuring that all statutory obligations are met.
- A Construction & Demolition Waste Management Plan shall be prepared.
- HCV construction traffic travelling to and from the proposed development must travel via the M1 Motorway, as they will not be permitted to use the existing local road network for haulage of plant and materials.
- The Contractor shall provide adequate notice to service providers with regard to any disruption, allowing them to organise alternative supplies to their customers and to provide information to the public through various media channels.
- The contractor shall contact all service providers before commencement of the works to discuss minimum acceptable notice requirements for each service provider. These notice periods shall then be observed by the contractor throughout the progression of the development.
- The Contractor/Concessionaire/Design Project Engineer shall consult and liaise with M1 concessionaire on an ongoing basis with regard to potential disruption of the motorway communication system.
- Lighting of the proposed motorway service area during construction shall be restricted to the working hours described in **Chapter 11**.

22.13 CULTURAL HERITAGE

22.13.1 Operational Phase Mitigation Measures

No mitigation measures are required to reduce operational impacts related to cultural heritage.

22.13.2 Construction Phase Mitigation Measures

- Mitigation measures to be implemented during both the pre-construction and construction phases, shall be undertaken in compliance with national policy guidelines and statutory provisions for the protection of the archaeological and cultural heritage, including the following:
  - National Monuments Acts 1930-2004;
  - Architectural Heritage Protection, Guidelines for Planning Authorities (Draft 2001). Department of Arts, Heritage, Gaeltacht & the Islands;
  - Framework & Principles for the Protection of the Archaeological Heritage (1999). Department of Arts, Heritage, Gaeltacht & the Islands; and

- Policy & Guidelines on Archaeological Excavation (1999). Department of Arts, Heritage, Gaeltacht & the Islands.

- The project design has managed to avoid direct impacts on recorded monument A1; however, complete avoidance of the area of potential, AP1, was not possible. Therefore, mitigation measures have been provided to reduce the resulting impacts on this site. These recommendations include measures to be implemented both prior to and during construction, as described below.

22.13.2.1 Mitigation Measures to be Implemented Prior to Start of Construction

- Prior to construction, a qualified archaeologist shall carry out an archaeological investigative excavation at AP1, and in the vicinity of site A1. Should any features or material of archaeological significance be uncovered, further mitigation measures shall be provided by the archaeologist, prior to the start of the construction phase.
- These investigations shall be undertaken in advance of the construction phase. This is to allow a satisfactory time frame in which the mitigation measures can be conducted and the results assessed without causing delays to the construction programme.

22.13.2.2 Mitigation Measures During Construction

- **Archaeological Monitoring:** This shall be undertaken during the ground works phase of the development. This will include any associated earthworks and drainage works, where and as required by the Statutory Authority. There should be a provision for preservation (in situ) or preservation by record of any archaeologically significant material uncovered at this time.
- **Discovery of Archaeological Material:** In the event of archaeological features or material being uncovered during the construction phase, the machine work shall cease in the immediate area to allow the archaeologist to inspect any such material. Initial assessment will determine the nature, extent and significance of the archaeology present. As a result of the assessment, decisions on the most appropriate mitigation strategy will be taken with the approval of the DoEHLG. The discovery of any archaeological object will be reported to the Director of the National Museum of Ireland or the Garda Síochána within 96 hours of discovery (Section 23 of the National Monuments Acts 1930 (as amended)).
- **Preservation in situ:** Strategies for the preservation in situ of archaeological remains as described above should be considered on a case-by-case basis, in consultation with the Statutory Authority.
- **Construction Works:** The positioning of temporary site offices, access roads, haul roads, spoil heaps and borrow pits shall take into account the location of identified sites and areas of archaeological potential.
- Should it be established that archaeological potential does exist at this location further specific recommendations and ameliorative measures will be made. The implementation of these recommendations must be conducted well in advance of any further construction activities in the vicinity of the uncovered resources.

22.14 PRELIMINARY ENVIRONMENTAL RISK REVIEW

22.14.1 Leakage & Spills

Leaks from Underground Storage Tanks (UST) and Above Ground Storage Tanks (AST)

- All USTs/ASTs shall be designed, constructed, inspected, tested and maintained in accordance with recognised industry standards and appropriate BS codes and International equivalents.
- Secondary containment systems shall be incorporated to prevent uncontrolled release of fuel, i.e. double skinned composite USTs/ASTs.
- Automatic leak detection systems shall be installed within the interstitial space of the USTs/ASTs.

- Corrosion protection measures for all USTs/ASTs shall be incorporated into the design.
- Overfill alarms, automatic shut-off devices and catch basins around fill pipes shall be installed.
- ASTs should be located in a secure area, protected from potential collisions by vehicles, vandalism, and other hazards.
- A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

Leaks from underground and overground pipe work

- All piping, fittings and connections shall be designed and built according to recognised industry standards.
- Pipe work shall be protected from corrosion, be not vapour permeable and laid in granular material in order to protect from damage of larger stones or uneven settlement.
- The number of joints and fittings shall be kept to a minimum.
- Pressure pipe systems should include secondary containment with plastic.
- New pipe work shall meet requirements of IP Performance specification for underground pipework systems at petrol filling stations, 2nd edition.
- A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

Leaks and Spills from Fuel Dispensing Equipment

- Suction systems shall include a leak-proof drip tray beneath the dispenser.
- Pressure systems shall be equipped with leak-proof sumps instead of, or in addition to, a drip tray beneath the Dispenser.
- Non-return or check valves, fitted within the dispenser housing, should be installed on each line of a suction system.
- The dispenser should be located in such a way that it cannot be easily damaged.
- Use of "breakaway" hose connections shall be installed, which provide emergency shutdown of flow should the fuelling connection be broken through movement.
- Nozzles shall be fitted with automatic shut off and attitude devices.
- Fuel dispensing areas shall be paved and be equipped with drainage into an oil / water separator able to contain accidental spills which may occur during vehicle fuelling.
- A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the Proposed development.

Leaks and Spills from Fuel Delivery Equipment

- Fill pipes should have suitable fittings to ensure a secure, leak-proof connection with the hoses from delivery trucks. Such fittings should have provision for a locking device that prevents unauthorized access.
- Where fill pipes are installed above ground, the height shall be below the minimum height of the delivery tanker's bottom loading adaptor to ensure proper draining of the hose contents into the storage tank.
- A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

Accident involving collision with tanker and major fuel spillage.

- All tankers shall have easy access to proposed development.
- A suitably designed drainage system incorporating oil/water interceptors, suitably designed shut off valves and bunding shall be in place to contain the escaping fuel.
- Written safe system of work and emergency plan shall be incorporated into an emergency health and safety system on-site.

Overfill or leakage from tanker delivery tanks

- Fill points shall be located more than 5m from occupied buildings, site boundary and public drainage system.
- Failsafe overfill protection devices shall be installed.
- A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the proposed development.

22.14.2 Wastewater Runoff

Storm water runoff from fuel delivery and dispensing areas

- Storm water generated from vehicle fuelling stations and AST containment areas shall be minimised by the installation of roofs and other types of covers.
- Surface water drainage from all areas, except uncontaminated roof water, must discharge through a full retention oil/water separator.
- The oil/water separator shall be properly designed, operated, and maintained to achieve the desired water treatment results. Gullies draining to the separator should be of the trapped type to prevent the spread of fire.

22.14.3 Drainage

Leaks from faulty oil/water separator operation

- As this Motorway Service Area will discharge to surface water, a Class 1 separator is required (i.e. discharge concentration of less than 5 mg/litre of oil).
- This separator shall be designed in accordance with BS EN 858-1:2002 and BS EN 858-2:2003; Reference 5).
- Each interceptor tank shall be installed with an automatic closure device that will prevent flow passing through the separator tank when the quantity of oil in the separator exceeds the design oil storage volume.
- An automatic warning device shall be installed in each interceptor to provide warning of oil levels approaching 90% retention capacity.

Surface Spillages entering directly to surface water or groundwater from Drainage System

- The drainage system shall be designed such that surface spillages are contained and there is no direct loss to ground or surface watercourses for surface water drainage without prior treatment.
- Surface water spillages should pass through an oil/water treatment system designed in accordance with Pollution and Prevention Guidelines PPG3.
- The drainage systems should be designed in accordance with Sustainable Drainage Systems (SuDS).

22.14.4 Air Emissions

Vehicle filling – Vapours

- Suitably designed vapour recovery system.

- UK LAQM states that where dispensing pumps are more than 10m from residential properties, the petrol station is unlikely to have significant influence on concentrations of benzene close to the properties.
- A detailed Environmental Management System (EMS) and Health and Safety Plan shall be incorporated into the operation of the Motorway Service Area.
- The development will comply with the requirements of the Air Pollution (Petrol Vapour Emissions) Regulations (SI 375 of 1997).

Vehicle filling - Fire

- Vapour recovery system shall be installed to minimise airborne vapours.
- Correct signage and staff training shall reduce the potential for ignition sources.

23 SUMMARY OF RESIDUAL IMPACTS

23.1 PLANNING

No likely or significant impact is predicted in terms of strategic planning context. On operation, in relation to the statutory planning context, the M1 North Motorway Service Area is predicted to have a significant positive impact on development plan policy as it relates to the national road network and supporting infrastructure for the Dublin-Belfast Economic Corridor. The M1 North Motorway Service Area works are predicted to consolidate established land use structure along the M1 Motorway within the Louth County Council area, rather than provide any significant change in direction for the land use structure.

23.2 SOCIO-ECONOMIC

23.2.1 Demography & Employment

There will be a slight positive benefit in that proposed construction works will provide employment opportunities for both local residents as well as across the region and state. It is expected that the construction phase of the subject development proposal will likely have no significant impact on the population and employment profile of the study area. The operation of the M1 North Motorway Service Area will provide a small number of new employment opportunities as a result of the new services. In particular the operation of the M1 North Motorway Service Area will contribute to the viability and sustainability of this key transport corridor by connecting communities, promoting employment and prosperity and enhancing the quality of life.

23.2.2 Community

23.2.2.1 Resident Population

The resident population using the M1 will share in the beneficial impacts of the scheme in terms of enhanced service facilities along the existing M1 Motorway and the creation of long-term employment opportunities. This is a significant and positive long-term residual impact.

23.2.2.2 Working Population

The long distance road users working population will have a high quality and readily accessible motorway service area as a result of this project. Existing employment locations predominantly to the east of the proposed development are some distance from the new motorway service area itself, and as a result are not likely to experience a benefit in association with the new services.

23.2.2.3 Visiting Population

The project will result in a positive long-term residual impact to users of the motorway due to the provision of high quality services along this nationally important transport corridor.

23.2.3 Retail Aspects

There will be no long-term residual impact on existing retail developments in the area.

23.3 TRAFFIC IMPACT

No residual impacts are anticipated from the proposed development.

23.4 AIR QUALITY AND CLIMATE

Table 23.1 summarises the potential residual impact after the mitigation measures (provided in **Chapter 10**) have been implemented.

Table 23.1: Summary of Residual Impacts for Air Quality and Climate

Description of impact	Significance of residual impact
Construction Phase Following the implementation of appropriate environmental management controls, only minor, localised and temporary adverse effects are anticipated, at worst (during dry conditions), from construction related dust. Appropriate mitigation measures will be implemented where significant stockpiling of material is planned	Negligible to short term minor adverse impact
Operational Phase A total of two representative receptors were assessed for future air quality. The operational effects of the scheme on local air quality are predicted to be negligible. The predicted increase in pollutant concentrations is very small to extremely small and absolute concentrations are well within current air quality limits and additional mitigation measures are not required.	Negligible impact on air quality
Additional CO_2 emissions are unlikely to be significant with the scheme in place. The impact on climate will be negligible	Negligible impact on climate

23.5 NOISE AND VIBRATION

In summary, with implementation of the required mitigation measures, the proposed development would result in a short-term negative impact at sensitive receptors within the vicinity of the proposed development as a result of construction activities; however, it should be noted that the estimated construction noise levels are expected to be below the guideline levels at most of the receptors, as outlined in the NRA Guidelines. With regard to operational noise, a negligible/imperceptible residual impact on existing noise levels in the area is expected to occur as a result of the proposed development.

23.6 LANDSCAPE AND VISUAL

After 10 years of growth the proposed planting will help to integrate the development into the existing landscape. The woodland framework will limit the extent of the influence of the facilities associated with the

motorway service area on the Muirhevna Plain Landscape with a resultant reduction in impact from Substantial/Moderate Negative Impact to Moderate Negative Impact.

With regards to visual impact on sensitive receptors a loss of existing views will remain for one property. In general the visual impacts are significantly reduced. The predicted residual visual impacts for all properties are provided in detail in **Table 12.10** and summarised in **Table 23.2**.

Table 23.2: Summary of Visual Impact (after mitigation)

Degree of Visual Impact	Number of properties (before mitigation)	Number of properties (after mitigation)
Substantial negative impact	20	1
Moderate negative impact	6	19
Slight negative impact	18	6
No change	50	69

23.7 TERRESTRIAL ECOLOGY

Through the application of the mitigation measures outlined above, the principal impacts of the proposed development will be addressed and no residual impacts are anticipated.

23.8 AQUATIC ECOLOGY

Table 23.3 illustrates the residual impact of the proposed development on aquatic ecology once all of the mitigation measures are implemented in full.

Table 23.3: Residual Impacts After Implementation of Mitigation Measures

Residual Impacts	All Water courses
Impacts from construction activities	Not Significant
Impact from drainage from the completed development	Not Significant
Impact of leakage or spillage of stored fuels and other potential pollutants	Not Significant
Loss of habitat due to culverting and bankside development or construction	Minor
Obstruction to upstream movement of fish and other aquatic fauna	Not Significant
Hydrological impacts due to increased runoff from paved and roofed areas	Not Significant

23.9 SOILS, GEOLOGY AND HYDROGEOLOGY

The excavation and removal of subsoil will result in a localised, permanent negative impact to the soil overburden layer. The impact will be limited to areas where excavation will occur, namely in areas of

building foundations, roads and carparks and site underground services. However, this effect will be countered by the removal of potentially contaminated material, which will have a long-term positive impact on the soil environment.

By employing the mitigation measures detailed in **Chapter 15** when undertaking dewatering activities, the overall construction impact on the groundwater regime will be neutral.

Given the use of appropriate secondary containment for the storage of fuels, oils, paints and other potentially hazardous materials on-site during the construction phase, the risk of accidental release of these compounds to the soil environment will be greatly reduced. The impact to the soil and underlying groundwater from these materials is predicted to be neutral provided the mitigation measures required in **Chapter 15** as well as those listed in **Chapters 14, 16 and 21**, are adhered to and safe materials handling occurs on-site.

Employing the mitigation measures detailed in **Chapter 15**, as well as those listed in **Chapters 14, 16 and 21**, will greatly reduce the risks to the soil, geological, hydrological and hydrogeological environment beneath the site during the operational phase and result in a neutral impact. However, given the nature of activities on the proposed development a residual risk of catastrophic spillage and other environmentally damaging incidents will remain.

23.10 DRAINAGE

No residual impacts are anticipated however, the drainage design proposed will require maintenance at regular intervals during the life of the motorway service area facility

23.11 AGRICULTURAL MATERIAL ASSETS

The residual impact from the proposed development will not be significant on a national or regional perspective. After implementation of the proposed mitigation measures there will be a minor residual impact on two of the four landowners affected by the scheme, and a not significant impact on the remaining two landowners (see **Figure 17.3**).

23.12 MATERIAL ASSETS – NATURAL AND OTHER RESOURCES

Overall the motorway service area will have a minor negative impact on natural and other resources.

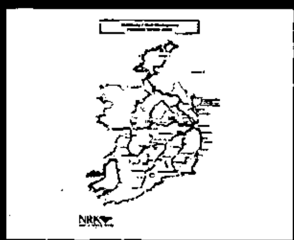
23.13 CULTURAL HERITAGE

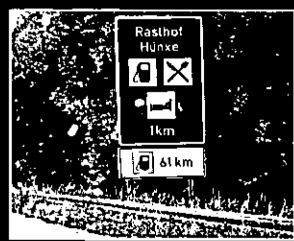
There will be no residual impacts with relation to cultural heritage as a result of the proposed project, should all mitigation measures be implemented.

NRA
National Roads Authority
An tÚdarás um Bóithre Náisiúnta

M1 North Motorway Service Area

Environmental Impact Statement



Volume 3

Technical Appendices

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M1 North
Motorway Service Area

Environmental Impact Statement

Volume 3
Technical Appendices

Client	National Roads Authority
Project Title	M1 North Motorway Service Area
Document Title	Environmental Impact Statement
Document No.	MDT0146Rp9003 Volume 3 (Technical Appendices)

PREFACE

The structure of the Environmental Impact Statement (EIS) for the proposed M1 North Service Area, at Dromiskin, Co. Louth, is laid out in the preface of each volume for clarity. The EIS consists of three volumes as follows:

Volume 1 – Non-Technical Summary

A non-technical summary of information contained in Volume 2.

Volume 2 – Environmental Impact Statement

This volume deals with the environmental impact of the proposed development including the structure, associated signage, access / egress points and associated auxiliary works to the proposed development.

Volume 3 – Technical Appendices

Specialist technical reports on which information in Volume 2 is based.

ACKNOWLEDGEMENTS

This EIS has been prepared by WestConsult, a joint venture comprised of RPS Consulting Engineers and Roughan & O'Donovan Consulting Engineers and their specialist environmental sub-consultants.

Project Team

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Non-agriculture material assets	RPS Group
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APPENDIX A

PLANNING & SOCIO-ECONOMIC

PLANNING

1 PLANNING

1.1 INTRODUCTION

This section of the EIS considers the strategic and statutory context governing planning and development at the subject site. This includes an assessment of the national, regional and local strategic planning context, as well as an assessment of the Louth County Development Plan 2003 - 2009 and other relevant Statutory planning context documents. This section also examines issues governing prospective trends in development.

1.2 METHODOLOGY

The methodology adopted assesses land use planning and development under three categories. These are:

> *Strategic Planning context* – This category catalogues current national and strategic policies and objectives that are relevant to the subject site on the M1 Motorway in Dromiskin, Co. Louth
>
> *Statutory Development Plan context* - This category catalogues the statutory land use planning and development policies and objectives as adopted by Louth County Council, that are relevant to the subject site.
>
> *Prospective trends in development* - This category documents recent land use developments and considers prospective development trends along the M1 Motorway in the general vicinity of the subject site.

1.2.1 Criteria for Rating of Impacts

The likelihood and significance of land use planning and development impacts due to the construction and operation of the M1 North - Motorway Service Area can be rated as follows:

<u>Strategic and Statutory Development Plan Context</u>

The rating of a planning impact relates to the importance of that policy or objective in the national/local development plan. Thus if the impact of the scheme is to achieve a strategic/statutory plan objective this is a significant positive impact. On the other hand if the effect of the M1 North - Motorway Service Area is to mitigate against a small site-specific objective and where mitigation may be available to achieve that objective in another location or form, such as for example, re-siting of part of a small open area, then the scale of the impact would not be significant.

Significant impact: Where the M1 North - Motorway Service Area would have a major role in enabling/prohibiting achievement of national/local development policy or objective.

Moderate impact: Where the M1 North - Motorway Service Area would contribute to / mitigate against the achievement of national/local development plan policy or objective.

Slight impact: Where the M1 North - Motorway Service Area would have a token impact on a plan policy or objective.

Prospective Trends in Development

In this category the rating of impacts relate to the assessment of the M1 North - Motorway Service Area's contribution to the achievement of development potential. For example the operation of the M1 North - Motorway Service Area may serve as a catalyst for employment development, in certain areas.

Significant impact: Where the M1 North - Motorway Service Area would have a major role in reducing/augmenting the viability of development such that relocation of development proposals away from this area/into this area would occur.

Moderate impact: Where the M1 North - Motorway Service Area would decrease/increase development in an area to a limited degree.

Slight impact: Where the M1 North - Motorway Service Area would cause minor inconvenience/benefit to proposals for development in an area.

1.3 STRATEGIC PLANNING CONTEXT

1.3.1 National Development Plan 2007-2013

The National Development Plan, 2007-2013 (NDP) '*Transforming Ireland – A Better Quality of Life for All*', was published in January 2007 and notes that the Irish economy and society will undergo a transformation almost as radical as the changes experienced in the past decade of growth and development. This would be driven largely by the continuing increase in the population which is projected to reach over five million people by 2021.

The NDP will invest some €32.9 billion in transport infrastructure over the Plan's lifetime. It estimates that €17.6 billion will be invested in improving Ireland's road network. Although the NDP emphasises the need to promote more sustainable forms of transport and the need to encourage the use of public transport, it also recognises the need for a high quality road network. The NDP notes that "*98.3% of internal merchandise trade is carried out on the road network and this underlines the need for a world-class roads system, especially between major urban centres.*"

The principal objectives of the NDP's Roads Sub-Programme include:

- *"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 the main NSS Gateways;*
- *Ongoing development of the Atlantic Road Corridor from Letterkenny through Belfast, Galway, Limerick, Cork and Waterford;*
- *Continued upgrading of road links to Northern Ireland;*
- *Targeted improvements of a number of key national secondary routes;*

- *Improvement and maintenance of the non-national roads network; and*
- *Investment in strategic non-national roads which will complement the national roads investment".*

The NDP recognises the opportunities to be achieved through North/South co-operation. The Plan seeks to realise these opportunities by strengthening North/South co-operation across a wide range of areas including infrastructure provision and spatial planning. In seeking to prioritise more balanced regional development, the Government will continue to support improvements to the Dublin-Dundalk-Newry-Belfast corridor. In this regard the NDP states that "*the upgrading of the entire Dublin-Belfast road to Motorway/Dual carriageway status in the coming years will ensure that this corridor will form a major axis for economic development on the island.*" As such the development of the Dublin-Dundalk-Newry-Belfast road corridor is a key focus of the NDP. It is envisaged that "*this project will be completed in the early years of the Plan, allowing rapid movement of people and goods between the two cities.*" Essentially, it will facilitate access to the motorway for the Northern cities connecting them to cities in the south and due for completion in 2010.

The M1 motorway is recognised by the NDP as a 'major inter-urban link'. This corridor connects Dublin to the National Spatial Strategy's Gateway city of Dundalk and the city of Belfast in Northern Ireland. The construction and operation of the M1 North Motorway Service Area on this motorway would reinforce this road as a key transport corridor and enhance the overall quality and economic viability of this strategic link and ensure compliance with EU Directives. The M1 motorway was fully completed in early 2000. The final section from North of Dundalk to Newry was officially opened in August 2007 and links in with the Northern Ireland A1/M1 route to Belfast. This is the first of the 'major inter-urban link' to be completed and provides motorway standard road all the way from Dublin Port to the Border. It has served to dramatically reduce journey times between Dublin and Belfast and increase trade along the route.

1.3.2 Sustainable Development – A Strategy for Ireland, 1997

Sustainable Development – a Strategy for Ireland was published in 1997 by the Department of the Environment. The Strategy recognises the need for good spatial planning and the inclusion of sustainability concerns in urban and built environment policies. The Strategy identifies that the pattern and density of urban development has a major influence on travel patterns.

The Strategy sets out a more sustainable approach to urban development, outlining that such requires:

- *"closer co-ordination between transport and land use planning;*
- *the promotion of higher residential densities in appropriate locations; and*
- *emphasis in the proposed new Guidelines on Development Plans on clear demarcation between urban and rural land use".*

The Strategy recognises that land use planning can support sustainable development in a number of ways. These include:

- *"Efficiency in the use of energy, transport and natural resources may be encouraged through the careful location of residential, commercial and*

industrial development, and controls on the shape, structure and size of settlements;

- *The planning process can also promote the most effective use of already developed areas;*
- *The protection and enhancement of the natural environment, including unique of outstanding features, landscapes and natural habitats can be secured; and*
- *New development needs to be accommodated in an environmentally sustainable and sensitive manner".*

The Strategy promotes a range of sustainable development principles, which support development that promotes multi-purpose trips as well as those that are located close to transport nodes and access points. The Strategy encourages a reduction in the growth in transport demand by locating high movement activities, such as retail, in areas of high accessibility to transport and other activities.

Ultimately, the Strategy identifies the fundamental link between transport policy, planning and land use policy and states that Planning Authorities will be encouraged to take a more strategic view of settlement patterns, development needs and major infrastructural services.

In reference to the provisions of the Strategy, the subject site is considered to be well suited for a service station and associated retail unit as this land is adjacent to the M1 motorway and would serve to enhance the quality and economic sustainability of this transport corridor. At present the nearest petrol filling station available to motorway users is situated in the centre of Dromiskin town.

1.3.3 National Spatial Strategy, 2002-2020

The National Spatial Strategy (NSS), published in 2002, is a twenty year planning framework designed to achieve a better balance of social, economic, physical development and population growth between regions. The NSS sets out a national context for spatial planning which will inform regional planning guidelines and strategies, as well as county and city development plans and strategies.

The NSS stresses that in order to achieve balanced regional development it is essential to provide high quality transport infrastructure between the designated Gateways and Hubs. The Strategy seeks to:

"support balanced regional development, Ireland's transport networks must build on Ireland's radial transport system of main roads and all rail lines connecting Dublin to other regions, by developing an improved mesh or network of roads or public transport services".

The NSS designates the M1 motorway as a "*Strategic Radial Corridor*" which provides vital links between Dublin, the Gateway city of Dundalk, Newry and the city of Belfast in Northern Ireland. The proposed northern Service Area on the M1 would add to the overall quality of this motorway and assist in maintaining the viability and sustainability of this transport corridor and ensure compliance with EU Directives.

1.3.4 Regional Planning Guidelines for the Border Region, 2004-2016

The Regional Planning Guidelines for the Border Region 2004 – 2016 seek to provide a robust sustainable planning framework for the Border Region within the context of the Planning and Development Act 2000 and the National Spatial Strategy 2002 – 2020. The Guidelines provide a long term strategic planning framework for the development of the Border Region in the twelve year period up to 2016 and within the National Spatial Strategy's vision for 2020, to be reviewed after six years.

The "vision" of the Guidelines will principally be achieved through a number of objectives including the *"provision of a high quality built and physical environment, with essential infrastructure including housing, transport, water services, schools, healthcare, retail, community and recreational facilities".*

The Guidelines recognise the M1 motorway as a *"key transport linkage of national and international importance".* The Guidelines include the following objectives with regard to transportation:

- *"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 County, 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".*

It is envisaged that the proposed development will meet these objectives by providing essential services to motorway users and thus improving the overall quality of the M1 motorway.

1.3.5 Dublin Transportation Office: A Platform for Change, 2000-2016

The Dublin Transportation Office (DTO) Strategy is the planning framework for the future development of the transportation network in the GDA. The Strategy aims to address and provide a framework for a more integrated approach to transportation and land use in a way that is complementary to the land use strategy of the Regional Planning Guidelines for the Greater Dublin Area 2004 – 2016. The Strategy is an integrated process based on two interdependent elements;

- *"Infrastructure and Service Improvements to increase the supply of transport, including a substantial expansion of the public transport network, some strategic road construction and traffic management*
- *Demand management to reduce the growth in travel though the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking)".*

The Strategy sets out several objectives including to *"improve accessibility to and from the Greater Dublin Area"* and to *"optimise the use of existing infrastructure facilities".*

The M1 motorway is recognised by the DTO Strategy as a major transportation corridor which provides vital links between Dublin and other large urban centres

including Dundalk, Newry and Belfast. The proposed northern Service Area along this motorway would strengthen the existing road network by providing essential services to motorway users.

1.3.6 Retail Planning Guidelines, 2001 & 2005

The Retail Planning Guidelines for Planning Authorities (RPGs) were published in January 2001 and subsequently updated on the 1st February 2005. The RPGs outlines a number of strategic policy objectives, which seek to accommodate additional retail development in a way that is efficient, equitable and sustainable. The RPGs provides a comprehensive framework for dealing with retail development proposals. Central to the RPGs is the importance of the statutory development plan process, the role of the town centre and the need to adhere to sustainable land use and transportation policies. Service Areas are a new innovation in Ireland which serves only a select niche market, the motorway user. Thus, this category is not covered by the Guidelines and therefore must be assessed on its requirements to meet national objectives with respect to road users and EU Directives. However, the proposed development has ensured the practices indicated in the RPGs have been undertaken. In this regard the reference to petrol filling stations and associated retail units outlined in the RPGs states:

"Petrol filling stations can provide a wide range of retail goods in an associated shop. In rural areas, some function as the local shop or small supermarket. Whilst the important role of such provision is recognised, such shops should, in general, remain secondary to the use as a petrol filling station".

The RPGs recommend that larger retail units associated with petrol stations should be assessed in the same way as would an application for a retail development without petrol filling facilities in the same location. For larger retail units associated with petrol stations, the RPGs state:

> *"Where retail space in excess of 100 square metres of net retail sales area associated with petrol filling facilities is sought the sequential approach to retail development will apply."*

As noted previously, the RPGs do not provide a definition of a Motorway Service Area which is distinct from a Petrol Filling Station. Notwithstanding this it is considered that a Petrol Filling Station is generally located on the way out of a town rather than on a motorway. For the purposes of this EIS, and to ensure rigorous assessment the sequential approach to site selection for the retail element of the proposed northern M1 Motorway Service Area has been adopted in this instance.

The RPG's recommend that attention should be given to the following issues when dealing with applications for petrol stations with retail developments over 100 sq.m:

- *"The potential disruption and queuing for those wishing to use the petrol pumps caused by large numbers of parked cars in station forecourts.*
- *Safety aspects of circulation and parking within the station forecourt.*
- *The additional custom which can lead to additional car borne trips".*

Notwithstanding the fact that the proposed development is for a Motorway Service Area as opposed to a Petrol Filling Station the above design elements have been incorporated into the design of the proposed facility. The proposed northern M1

Service Area is intended to provide a range of facilities for M1 road users (particularly long distance drivers) who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. The proposed design of the service areas as described in **Volume 2 Chapter 3 of this EIS** has evolved from the need to ensure the highest safety standards for circulation and parking within the station forecourt. In this regard the heavy commercial vehicles and the light passenger vehicles are segregated by the proposed internal road network and parking areas in order to minimise conflict between vehicles and pedestrians. Adequate parking facilities will be provided away from the forecourt area in order to remove and potential disruption and queuing of customers wishing to use the petrol pumps. The number of parking spaces provided has been calculated in accordance with the National Roads Authority DMRB standards.

The proposed development on the M1 motorway would provide an essential convenience-based retail unit and food service for motorway users. As recommended by the RPGs, the retail unit proposed in this subject development will remain secondary to the use of this development as a petrol filling station.

Given the scale of this transport corridor, a retail unit in excess of 100 sq.m. can be justified to meet the increased demand found along such a major national route (Dublin to Dundalk c.85 km, Dublin to Newry c.180 km and Dublin to Belfast c.169 km). As the proposed retail unit is in excess of 100 sq.m., the sequential approach has been adopted. This is discussed in greater detail in **Volume 3 Appendix A** of this EIS.

1.3.7 Characteristics of the Proposal

The proposed M1 Motorway Service Area Scheme will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities.

The proposed development is located approximately 2 kilometres to the west of Dromiskin, and approximately 10km to the south of Dundalk Town centre in Co. Louth. Facilities are provided on both sides of the motorway to cater separately for eastbound and westbound traffic. Public access to the Service Areas will be restricted to direct access from the M1 Motorway via slip roads and at-grade roundabouts.

Each Service Area will provide segregated parking areas for passenger cars, Heavy Commercial Vehicles (HCV) and Coaches. Fuel facilities will be provided along with a convenience shop, restaurant, toilets, showers, tourist information kiosk and inside and outside children's play areas. Recreation and picnic areas will also be provided within a landscaped environment.

A Garda enforcement area will be provided within each site. Restricted access to and from the local road network will be provided for workers and delivery vehicles of less than 3.5 tonnes.

1.3.8 Potential Impact of the Proposal

Construction phase
The construction phase of the M1 North - Motorway Service Areas are not anticipated to have any material impact on the relevant strategic policies and objectives on transportation, land use etc.

Operational phase
The proposed northern Service Areas will operate along an established transportation corridor (M1 motorway). The delivery and operation of the M1 North - Motorway Service Area is anticipated to have significant positive impact on the strategic policies and objectives for the national road network and the economic development of both the county and the country, particularly given the M1's designation as a major inter-urban link.

'Do nothing' scenario

Under the 'do nothing' scenario, the achievement of strategic policies in relation to promoting the viability of a key transport corridor and enhance the overall quality and economic viability of this strategic link would fail to be delivered.

Remedial or Reductive Measures

Construction phase
No remedial or reductive measures are applicable under this heading.

Operational phase
No remedial or reductive measures are applicable under this heading.

1.3.9 Predicted Impact of the Proposal

Construction phase
No likely or significant impact is predicted in terms of strategic planning context.

Operational phase
On operation, the northern Service Area is predicted to have a significant positive impact on strategic policy as it relates to the national road network.

'Worst case' scenario

On strategic planning matters, the 'worst case' scenario is most likely to be the 'do nothing' scenario; namely that without the proposed M1 North - Motorway Service Area, strategic policies would not be achieved.

Monitoring

Construction phase
No monitoring is required.

Operational phase
No monitoring is required.

Reinstatement

Construction phase
No reinstatement measures are required.

Operational phase
No reinstatement measures are required.

1.4 STATUTORY PLANNING CONTEXT

The proposed location for the M1 North - Service Area is located within the administrative area of Louth County Council. The current statutory Development Plan for the subject lands is the Louth County Development Plan 2003 – 2009. This Section of the EIS examines and provides an assessment of various relevant objectives contained within the statutory plan.

1.4.1 Louth County Development Plan 2003 – 2009

A variation of the Louth County Development Plan 2003 – 2009 was adopted in July 2006. The Plan seeks to provide an overall strategy for the sustainable development of the County for the period 2003 to 2009 and to provide a framework for the control and regulation of development and use of land. The main aims of the Plan include the following:

- *"to provide for the incorporation of central government policy and guidelines into the development plan;*
- *to seek to provide for the employment needs of the inhabitants of the county at locations that are convenient to where they reside; and*
- *to secure the provision of essential physical infrastructure to facilitate the appropriate and sustainable development of the county".*

Transport
Chapter 8.0 of the Plan is deals with "*Transport and Telecommunications*" and includes the following strategic objectives:

- *"to promote sustainable development within the county through the integration of transport and land use policies in order to reduce the need to travel; and*
- *to maintain road reservations and road improvement line free from development for those schemes that it is an objective of the planning authority to implement".*

The Plan specifically seeks *"to provide and maintain a road hierarchy based on motorway, national routes, regional routes and all county roads with the aim of maintaining the carrying capacity and lifespan of the road network, ensuring traffic safety and the avoidance of traffic hazards for motorists, pedestrians or other road users".* It is therefore a policy of the planning authority to prohibit any development whose traffic movements would result in the creation of traffic hazard or traffic congestion.

M1/EO1 Euro-route

The Plan states that *"by reason of its strategic location on the Dublin/Belfast economic corridor... the county is well placed to continue to grow in population and economic terms into the foreseeable future"*.

The subject site is unzoned agriculture land adjacent to the existing M1 motorway which is part of the M1/EO1 Euro-route and is recognised in the Plan as a key transportation corridor. The Plan states that *"much of County Louth's strength as a source and provider of employment lies in its strategic location and the continued development of the M1/EO1 Euro-route motorway"*.

According to the Plan, the influence of the M1/EO1 Euro-route has the potential to *"transform the county of Louth as a whole and impact on the development of its towns, including settlements located some distance from the motorway"*.

The Plan states that when the M1/EO1 Euro-route motorway is completed, *"it will strategically link the key ports and airports of Larne, Belfast, Dublin and Rosslare"*. The quality and vitality of this route is therefore of great importance.

Motorway Service Stations

It is a policy of the planning authority to preserve free of development lands associated with construction of the motorway. Section 8.12 of the Plan states that when assessing service station proposals, the following factors shall be taken into consideration:

- *"Effect on amenities of other adjoining uses, particularly residential;*
- *Impact on built form and townscape;*
- *Quality of design, layout and materials used; and*
- *Compliance with the requirements of Dangerous Substances regulations (1979)"*.

These factors are all considered in this report and will be discussed in greater detail in their appropriate chapters.

Section 8.12 of the Plan states that *"it is the policy of the planning authority that generally all new service stations,* **with the exception of motorway related services** *be located at the edge of towns and villages within speed limit areas"*. It is therefore submitted that the location of the proposed development is in accordance with Development Plan policy as it is a "motorway related service" which needs not be located at the edge of a town or village.

With regard to motorway related service stations, the Plan states that *"planning applications for motorway related service station will be considered on their individual merits having regard to considerations of the need for such services, traffic safety and visual amenity grounds. Direct access onto the motorway will not be permitted"*.

The Plan also states that *"an application for a motorway service station shall include proposals for advertisements, materials to be used in hard surface areas and boundaries, landscaping and screening, picnic area, toilets, restaurant facility"*. This information is included in the proposed development

1.4.2 Retail Strategy for County Louth

As required under the provision of the Retail Planning Guidelines 2000, a Retail Strategy for County Louth is included in the Louth County Development Plan 2003 - 2009. The strategic objectives of this Retail Strategy are as follows:

- *"To protect and enhance the role of all towns and villages within the county as the primary location for retailing activity with particular emphasis on maintaining the vitality and viability of town and village centres.*
- *To protect the role of Dundalk, Drogheda and Ardee as the principle shopping towns in the county and to promote their roles as important county and regional retailing centres*
- *To protect and enhance the vitality and viability of small towns and villages and maintain their role as local shopping and service centres*
- *To ensure that adequate provision is made in new residential areas to meet the day to day shopping and service needs of residents".*

Section 7.7.4 of the Development Plan states that it is the policy of the Council *"to limit the net sales on the forecourt of petrol filling stations to 100sqm".* However, as the proposed development is a *"Motorway Service Area"* it shall (according to Section 8.13 of the Development Plan) be considered on its individual merits. It should therefore be noted that the proposed development will have a large population catchment due to its direct relationship with the M1 motorway which will justify its c.250 sqm net retail area.

The Plan also states that it is a policy of the Council *"to carry out health checks to monitor the vitality and viability of town centres and require that all applications for major retail development be accompanied by an assessment of the likely impact of the development on the existing town centre".* Such a health check was carried out for the proposed development in June 2007 and is included in **Chapter 8** of this EIS.

1.4.3 Characteristics of the Proposal

The proposed M1 North - Motorway Service Area will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities.

The scheme is located approximately 2 kilometres to the west of Dromiskin and 10 kilometres to the south of Dundalk in County Louth. Facilities are provided on both sides of the road to cater separately for eastbound and westbound traffic. Public access to the Service Areas will be restricted to direct access from the M1 Motorway via slip roads and at-grade roundabouts.

Each Service Area will provide segregated parking areas for passenger cars, Heavy Commercial Vehicles (HCV) and Coaches. Fuel facilities will be provided along with a convenience shop, restaurant, toilets, showers, tourist information kiosk and inside and outside children's play areas. Recreation and picnic areas will also be provided within a landscaped environment.

1.4.4 Potential Impact of the Proposal

Construction phase
The construction phase of the M1 North - Motorway Service Area is not anticipated to have any material impact on the relevant statutory development plan policies and objectives on transportation, land use etc.

In relation to land use structure, it is not anticipated that the construction of the proposed northern Service Areas will impact on the established pattern of land uses in the vicinity of the subject site.

Beyond local rural housing, the predominant land use is agriculture. The construction period of the M1 North - Motorway Service Area will have no direct impact on prospective trends of development.

Operational phase
The delivery and operation of the M1 North - Motorway Service Area is anticipated to have significant positive impact on the statutory development plan policies and objectives for the national road network and the economic development of the county.

It is not anticipated that the northern Service Areas would significantly alter the current land use structure within the surrounding environs. Rather it is likely that an effective continuation of rural activities such as agriculture will prevail.

The proposed northern Service Area will operate along an established transportation corridor (M1 motorway). Notwithstanding the fact that the proposed development will introduce a new activity into this area, it will not create any additional traffic in the area. It is envisaged that the existing and future users of the M1 motorway will constitute the prospective customers of the Service Area. In this regard, it is anticipated that the overall structure of land uses adjoining will continue along similar line to the present.

'Do nothing' scenario

Under the 'do nothing' scenario, the achievement of a statutory development plan policy in relation to the national road network would fail to be delivered for within the vicinity of the subject lands within Louth County Council's administrative area.

Remedial or reductive measures

Construction phase
No remedial or reductive measures are applicable under this heading.

Operational phase
No remedial or reductive measures are applicable under this heading.

1.4.5 Predicted Impact of the Proposal

Construction phase
No likely or significant impact is predicted under the heading of planning and land use context.

Operational phase
On operation, the Service Area is predicted to have a significant positive impact on development plan policy as it relates to the national road network.

The northern Service Area works are predicted to consolidate established land use structure along the M1 Motorway within Louth County Council area, rather than provide any significant change in direction for the land use structure.

'Worst case' scenario

On planning and land use matters, the 'worst case' scenario is most likely to be the 'do nothing' scenario; namely that without the proposed M1North - Motorway Service Area, statutory development plan policy would not be achieved.

Monitoring

Construction phase
No monitoring is considered necessary.

Operational phase
Louth County Council will monitor the land use and development proposals that may bear relation to the Service Area, in the course of their statutory duties under the development control processes.

Reinstatement

Construction phase
No reinstatement measures are envisaged as necessary under this heading.

Operational phase
No reinstatement measures are envisaged as necessary under this heading.

SOCIO-ECONOMIC

1 SOCIO-ECONOMIC

1.1 INTRODUCTION

Human beings comprise the most important element of the environment, therefore any potential impact on the status of human beings by the proposed M1 North Service Areas must therefore be comprehensively addressed. The principal concern in this respect is that human beings experience no significant unacceptable diminution in an aspect, or aspects of 'quality of life' as a consequence of the construction and operation of the proposed development. Components of 'quality of life' relevant to this section of the Environmental Impact Statement include community and socio-economic aspects, with relevance to population profile and trends in these.

1.2 METHODOLOGY

This Section of the EIS comprises a socio-economic study of the population in the general vicinity of the subject site. The purpose of the assessment is to estimate any likely and significant impact on the location, size and profile of the populations to be served by the M1 Motorway Service Area. Relevant components of *"Human Beings"* in this Section of the EIS include Demography, Employment and Local Communities, including retail issues.

1.2.1 Demography and Employment

Population
Demographic trends were analysed at state, county and local levels for the purposes of this EIS. The most recent census of population taken by the Central Statistics Office (CSO) was taken on the 23rd of April 2006. The smallest geographical units identified by the CSO are Electoral Divisions (previously called District Electoral Divisions or Wards). A local area catchment was defined by selecting and aggregating Electoral Divisions (EDs) for which the designated M1 North Motorway Service Area passes through.

An examination was made of the key demographic characteristics of the population within each catchment area, including population structure, age profile and household size. The combined population statistics for each of these EDs has been used to give an indication of population trends within the local area. Figures are based on 2002 and 2006 Census Data. In utilising census data for these EDs total populations for entire EDs within the local catchment area are utilised, even if part only of the ED falls within the defined radius. This is because no smaller breakdown of data is available. In any case, it reflects the likely overlap of patronage attraction at and around the edge of M1 North - Motorway Service Area catchment area.

Employment
The Census of Population 2002 and 2006, and the Quarterly National Household Survey were both used to measure the levels of employment and unemployment. The unemployment rate, as a percentage of the labour force, was calculated by adding the numbers of persons classified as unemployed to the number of first time job seekers. This figure was then added to the numbers of people at work to obtain the total labour force. The unemployment rate was then obtained by dividing the total numbers of persons unemployed by the total labour force.

The Live Register was not used because it is not designed to measure unemployment. It includes part-time workers (those who work up to three days a week), seasonal and casual workers entitled to Unemployment Assistance or Benefit. Unemployment is best measured by the Quarterly National Household Survey (QNHS). The results of the QNHS provide the basis for the series of quarterly labour force estimates. Identical questions were used for both the Census of 2002, 2006 and the QNHS. Even so there are appreciable differences in the results obtained. The main categories affected are the constituents of the question on economic status. The main reasons for the differences are:

- the Census form is completed by a responsible adult in each household throughout the state in respect of everyone present in the household on Census night while the QNHS is a face to face interview;

- the Census relates to all persons present in the state (including visitors from abroad) at the same time of the census while the QNHS covers persons usually resident in Ireland;

- the Census is a complete enumeration while the QNHS is a sample survey; and

- the QNHS has a much wider range of questions on the labour force which may have a bearing on the responses received to individual questions.

Unemployment as a percentage of the labour force was used in tandem with the QNHS, which is based on a sample of the population. It was necessary to use unemployment calculated as a percentage of the labour force In order to gain information at ED and County level, information that the QNHS is not able to disseminate.

Sectoral Composition of Employment
The Census of Population, determines social class by the nature of employment, and provides a guide to the principal types of occupation in which the population is employed or in which the population is capable of being employed. The entire population is classified as follows:

- Higher professional, higher managerial, proprietors employing others and farmers farming 200 or more acres;
- Lower professional, lower managerial, proprietors without employees and farmers farming 100-199 acres;
- Other non-manual and farmers farming 50-99 acres;
- Skilled manual and farmers farming 30-49 acres;
- Semi-skilled manual and farmers farming less than 30 acres;
- Unskilled manual; and
- Unknown.

Social Classes 1, 2 and 3 when combined, include most professionals as well as other non-manual occupations. Social Classes 4-7 when combined include skilled, semi-skilled and unskilled manual labour and service employment sectors.

Criteria for Rating of Impacts

The Section of the EIS which deals with *Demography and Employment* is essentially a socio-economic appraisal of the receiving environment and the impact of the introduction of this project to that environment.

The M1 North Motorway Service Area is not expected to directly significantly alter the demographic profile of an area's population.

It is therefore appropriate to consider the impact of the project on *Demography and Employment* at a strategic level, in conjunction with other trends, using various socio-economic indicators. As such, the following system was adopted for the rating of demographic and employment impacts:

Profound impact: Where the socio-economic character of a population would be acutely altered.

Significant impact: Where the demographic structure of a population is fundamentally altered as a direct result of the M1 North Motorway Service Area. An example of this would be where one or more categories of population living or working in an area (e.g. young persons seeking first homes, middle sized family units, office workers) move into the area to live/work, or depart from there.

Moderate impact: Where the demographic structure of an area is noticeably altered as a result of the M1 North Motorway Service Area. For example, where the workforce and number of households are predicted to be added to / taken from the current populations but without fundamental changes in demographic profile.

Slight impact: Where any alteration to the demographic breakdown is incidental and no meaningful alteration to population and employment profiles is readily identifiable.

1.2.2 Community Issues

Community Issues which are addressed in this Section include issues of severance and mobility. Severance can be defined as the sum of the divisive effects that a development project may impose on a community in terms of access to and movement between locations such as residences, workplaces, commercial / retail areas, schools, community facilities etc. Thus, using its widest definition, it is the impact that a development can have on the accessibility and mobility of the resident, working and visiting communities.

Severance may be experienced by pedestrians, cyclists and by those travelling in vehicles (particularly access and delivery traffic). It relates to the impact on the ability to move at, around and through the area where the service area is proposed.

Certain persons are more prone to the impact of severance than others. Disabled persons, the elderly, children, adults with small children and persons without access to private transport, are typically more vulnerable. An assessment of severance therefore combines the structural and routing implications of the M1 North Motorway Service Area with consideration of the demographic profile of the population likely to be impacted.

In deciding on a framework within which broad measurement of community severance can be undertaken, the most relevant way of looking at interrelationships that produce community movement is to categorise severance impacts to this

movement by the type of users affected. Consideration was given to the service area location, adjoining land uses, access nodes and general movements. Whilst assessing and rating the significance of severance, regard was also taken of the number of people who would be impacted upon; the presence of particularly vulnerable groups such as children, the aged or the disabled, among those likely to be impacted; the duration of impact.

The methodology incorporated a visual survey of the site location, including an assessment of traffic, as well as principal development and community activities. It was possible to establish typical patterns of movement in the various areas. This enables an appraisal as to whether the M1 North Motorway Service Area results in severance in a particular area, the extent of any such severance and, whether the change from the existing circumstance is positive or negative in nature.

Criteria for Rating of Impacts

The following system for rating community severance during both construction and operation has been adopted.

Significant impact: Where people are likely to be deterred from/encouraged into making trips to an extent that is sufficient to induce a re-organisation of their normal day to day habits. This would lead to a change in the location of centres of activity or in some cases to a permanent loss/addition to a particular community.

Moderate impact: Where people are likely to be dissuaded from/encouraged into making some trips (e.g. trips are made longer or less attractive). A re-organisation of habits, but clearly understood to be temporary.

Slight impact: The current journey pattern is likely to be maintained, but with some change.

1.2.3 Retail Assessment

The Retail Planning Guidelines for Planning Authorities (RPG) were published in January 2001 and subsequently updated on the 1st February 2005. The RPG outlines a number of strategic policy objectives, which seek to accommodate additional retail development in a way that is efficient, equitable and sustainable (please refer to **Volume 2 Chapter 7 of this EIS**). The RPG provides a comprehensive framework for dealing with retail development proposals. Central to the RPG is the importance of the statutory development plan process, the role of the town centre and the need to adhere to sustainable land use and transportation principles.

With regard to the location of new retail development, the RPG advocates the sequential approach. This states that the preferred location for new retail development where practicable and viable, is within a town centre. Where it is not possible to provide the form and scale of development that is required on a site within the town centre then consideration can be given to a site on the edge of the town centre so as to encourage the possibility of one journey serving several purposes. Paragraph 59 of the Guidelines state:

> *"Having assessed the size, availability, accessibility and feasibility of developing both sites and premises, firstly within a town centre and secondly on the edge of a town centre, alternative out of centre sites should be considered only where it can be demonstrated that there are no town centre or edge of town centre sites which are suitable, viable and*

> *available. This is commonly known as the sequential approach to the location of retail development."*

This retail assessment considers the impact of the retail element of the proposed development in the context of relevant retail planning policy and provides an assessment of the vitality and viability of the existing town. With regard to vitality and viability the RPG outlines that in order for town centres to achieve their full potential and to improve as retail destinations, it is appropriate for planning authorities to take a pro-active role in enhancing the vitality and viability of their centre(s). The concept of vitality and viability is central to sustaining and enhancing town centres. The RPG defines these terms as follows:

> *"Vitality is a measure of how active and buoyant a centre is, whilst viability refers to the commercial well-being of a town. In combination, they highlight the relative strength and success in the retail hierarchy. This will depend on many factors, including the range and quality of activities in a centre, its mix of uses, its accessibility to people living and working in the area and its general amenity, appearance and safety."*

A retail health check of all commercial/retail units within a 15 minute off peak drive time from the subject site was carried out in June 2007. The study assessed every settlement within this catchment based on the criteria set out in Annex 2 of the Retail Planning Guidelines 2000.

The RPG includes the following as the most appropriate health check indicators:

- Diversity of uses and attractions;
- Vacant street level property;
- Accessibility and parking; and
- Environmental quality and amenity.

Criteria for Rating of Impacts
The following system for rating the impact on exiting town centres during both construction and operation has been adopted.

Significant impact: Where people are likely to be encouraged into changing their retail habits to an extent that is sufficient to induce a re-organisation of their normal day to day habits. This would lead to a change in retail patterns or in some cases to a permanent loss of retail sales to a particular town centre.

Moderate impact: Where people are likely to be encouraged into making some trips and availing of the new convenience facilities. A re-organisation of habits, but clearly understood to be temporary.

Slight impact: The current retail pattern is likely to be maintained, but with some change.

1.3 DEMOGRAPHY AND EMPLOYMENT

The key demographic and employment characteristics of the resident population within the catchment area are examined. These include: population structure, age profile, household size, number of persons at work, unemployment profile, social class and economic dependency data. This information is sourced from Census of Population 2002 and 2006.

1.3.1 Receiving Environment

Demographic trends are analysed at state, county and local levels for the purposes of this EIS. The most recent census of population taken by the CSO was taken on the 23rd of April 2006.

The smallest geographical units distinguished by the Central Statistics Office (CSO) are Electoral Divisions (previously called District Electoral Divisions or Wards). The proposed development is located within the Electoral Division of Dromiskin. Census data for this Electoral Division has been used as the best available source to identify trends with respect to the population of the wider area of which the site forms part.

For the purposes of this assessment, the figures for County level relate to Louth while local level has been defined as those Electoral Divisions which are located immediately adjacent to the Electoral Division of Dromiskin. These adjacent Electoral Divisions are as follows:

- Haggardstown
- Drummullagh
- Mansfieldtown
- Stabannan
- Castlebellingham

Population

Table 1.1 below summarises population trends within the catchment population of the subject site between 2002 and 2006. For the purpose of comparison, population change within the State and Louth are also given.

Table 1.1 Total Population 2002 - 2006

Area	2002	2006	Change in Population 2002-2006 (%)
Dromiskin ED	949	992	4.5
Local	2,952	3,258	9.4
County	101,821	111,267	9.3
State	3,917,203	4,239,848	8.2

Source: Census of Population 2002, 2006

The population of the State increased by 8.2% between 2002 and 2006, while for the corresponding period for Louth recorded a higher increase of 9.3%. The local area recorded a increase of 9.4% while Dromiskin ED experienced a lesser growth of 4.5% between 2002 and 2006.

Age Profile

Table 1.2 below contains information on population according to age group for Louth and for the State for 2006. Louth's population is generally younger than that of the State. 36.6% of Louth's population were 25 years of age or less in 2006 while the corresponding figure for the State was 35.3%. The proportion of people aged 65 or older accounted for 10.4% of Louth's population while the corresponding figure for the State was slightly higher at 11%. These statistics show that Louth had a younger population than that of the State in 2006. Those persons outside the working age cohort (15-65) accounted for 32.5% of Louth's population in 2006 while the corresponding figure for the State was lower at 31.4%.

Table 1.2 2006 Population Classified by Age Profile

Age Group (Years)	Louth (persons)	%	State (persons)	%
0-14	24,568	22.1	864,449	20.4
15-24	16,092	14.5	632,732	14.9
25-44	35,570	32.0	1,345,873	31.8
45-64	23,432	21.0	928,868	21.9
65+	11,605	10.4	467,926	11.0
Total	**111,267**	**100**	**4,239,848**	**100**

Source: Census of Population 2002

Household Size

The results of the 2006 Census of Population indicate that the average number of persons per private household in Ireland is decreasing over time. Between 1996 and 2002 the average number of persons per private household in the State decreased from 3.14 to 2.94. Between 2002 and 2006, the number decreased from 2.94 to 2.82. The number of persons per private household in Louth showed a similar decrease over this period with the number decreasing from 2.99 to 2.83.

The number of private households in Louth in 2002 was 33,495. By 2006, this grew to 38,703 - representing a 15.5% increase. The corresponding percentage change over this period for the State was slightly lower at 14.1%.

1.3.2 Employment

The Census of Population 2002 and 2006, and the Quarterly National Household Survey were both used to measure the levels of employment and unemployment. The impact of the proposed development on employment in the vicinity of the existing M1 corridor will be examined in the context of the number of persons at work, levels of unemployment and the sectoral composition of employment.

ESRI Quarterly Economic Commentary, Autumn 2007

The Economic and Social Research Institute (ESRI), Quarterly Economic Commentary for Autumn 2007 provides a revised downwards growth forecast for 2008, relative to the June Commentary. In the June Commentary, the forecasted GNP growth was 3.7%. This has been revised down to the current forecast of 2.9%.

The Autumn Commentary notes that house-building is an important factor in these downwards revisions. A dramatic slowdown in house building effectively reduces the forecast GDP growth by 0.5 percentage points in 2007 and by 1.3 percentage points in 2008. Another major issue is the turbulence in the financial markets. Although financial uncertainties are expected, no attempt is made to factor these due to their unknown impacts and duration.

It is also noted that:

> *"While a fall in the rate of investment growth is central to our overall domestic growth forecast, we also see consumption growing at a slower pace in 2007 and 2008 relative to earlier forecasts".*

Consumption is expected to grow by 7.5% in 2007 and by 4% in 2008. As a result of the general slowdown, in the economy, it is expected that employment growth will slow in 2007 and 2008 relative to 2006. For 2008, the expected unemployment rate is an average of 5.6%.

The Autumn Commentary concludes that:

> *"Given the generally healthy state of the public finances, we consider that a mildly stimulatory budget in 2008, including the full implementation of the NDP, is affordable in the context of the overall macroeconomic management".*

ESRI Medium Term Review

A long term view of the health of the economy is examined in the ESRI's Medium Term Review: 2003-2010. While in the short term the outlook for the Irish economy is uncertain, the Irish economy remains fundamentally healthy. In the medium term it has the potential to grow at 5% per year. The ESRI predicts that in the future, the market services sector will play a gradually increasing role in raising output and employment. The ESRI anticipates that in the medium term, less output and employment growth will come from the manufacturing sector.

Trends in the Number of Persons at Work

The 2006 Census of Population was compared to the 2002 Census to determine the number of persons at work, unemployment levels and the sectoral composition of the population, based upon principal economic status.

In 2002 the total number of persons aged 15 years and over at work in the State was 1,641,587. Of this total, 39,776 were at work in Louth. By comparison, a total of 1,448,188 persons were unemployed in the State in 2002 of which 38,970 were accounted for in Louth. The 2006 census shows that the total number of persons aged 15 and over at work in the State has increased to 1,930,042 – representing a 17.6% increase over the 2002 figure. Louth, on the other hand, showed a greater increase from 39,776 to 48,129. This represents a 21% increase.

Section 7.2 of the Louth County Development Plan 2003 – 2009 states that *"the majority of employment in Louth is in the manufacturing sector (28%), professional services/commerce (19%) and electricity and gas sectors (0.8%). A relatively low proportion of the county is involved in farming or agricultural activities (5.9%), reflecting the highly urbanised nature of the county and the general declined in agricultural employment in recent years".*

Table 1.3 below illustrates the increase in the number of people at work within the catchment populations of the proposed development between 2002 and 2006. During this period, the total number of people at work in the State increased by approximately 18.2%.

Table1.3 Number of persons at work between 2002 and 2006

Area	At work 2002	At work 2006	% change '02 –'06
State	1,641,587	1,940,800	+18.2
Louth	39,776	48,129	+21.0
Dromiskin	817	845	+3.4
Haggardstown	2,746	2,619	-4.6
Drummullagh	305	413	+35.4
Mansfieldtown	182	311	+70.9
Stabannan	236	271	+14.8
Castlebellingham	526	609	+15.8

Source: Census of Population 2002 & 2006.

Table 1.3 above shows that the number of persons at work within each of the catchment areas generally increased over the 2002 to 2006 period with an average increase of 21.9%. The only decrease was experienced in Haggardstown ED. The greatest increases were experienced in Mansfieldtown and Drummullagh with 70.9% and 35.4% respectively. Much of this growth can be attributed to strong population growth within Louth. The subject site lies within the ED of Dromiskin which experienced a slight increase of 3.4%.

Rate of Unemployment

To establish a more balanced picture of the employment situation it is necessary to examine trends in unemployment. **Table 1.4** below, sets out figures relating to rates of unemployment for the catchment area between 2002 and 2006.

Table 1.4 Unemployment rate as a percentage of the labour force 2002 and 2006

Area	Unemployment rate 2002	Unemployment rate 2006
State	7.4%	7.7%
Louth	8.6%	10.6%
Dromiskin	11.8%	12.4%
Haggardstown	14.3%	17.6%
Drummullagh	6.2%	10.9%
Mansfieldtown	9.8%	19.4%
Stabannan	14.2%	28.4%
Castlebellingham	8.7%	9.7%

Source: Census of Population 2002 & 2006.

Table 1.4 illustrates diverse changes in unemployment rates with increases in some places and decreases in others. In general, the more populated areas experienced a slight decline in unemployment. Louth experienced an increase similar to that of the State. The lesser populated areas also experienced increases in their unemployment rates with the most notable increase experienced in Stabannan ED whose unemployment rate had doubled since 2002. A moderate increase in the unemployment rate was experienced in the immediate catchment area of the proposed development with the figure increasing from 11.8% in 2002, to 12.4% in 2006.

Table 1.5 National seasonally adjusted standardised unemployment rates 1998 - 2007

Year	Rate %
1998	7.4
1999	5.5
2000	4.2
2001	3.9
2002	4.4
2003	4.6
2004	4.4
2005	4.4
2006	4.4
2007	4.7

Source: Central Statistics Office 2007 (Quarterly National Household Survey).

Table 1.5 above shows the seasonally adjusted standardised unemployed rates between 1998 and 2007 based on the results of the Quarterly National Household Survey (QNHS). It should be noted that the differences between the labour force rate of unemployment and the seasonally adjusted figures are due to a number of factors. The Census data relates to all persons present in the State (including visitors from abroad) at the time of the Census while the QNHS covers only persons usually resident in Ireland. It illustrates the sustained high levels of growth experienced by the State over the period with the rate of unemployment falling from 7.4% in 1998 to a low of 3.9% in 2001, increasing to 4.4% in 2004. The average unemployment rate for the third quarter of 2007 was 4.7%.

Sectoral Composition of Employment

The Census of Population, determines social class by the nature of employment, and is therefore useful as a rough guide to the principal types of occupation in which the population is employed or in which the population is capable of being employed. The entire population is classified as follows (class one to seven from top of list):

1. Higher professional, higher managerial, proprietors employing others and farmers farming 200 or more acres;
2. Lower professional, lower managerial, proprietors without employees and farmers farming 100-199 acres;
3. Other non-manual and farmers farming 50-99 acres;
4. Skilled manual and farmers farming 30-49 acres;
5. Semi-skilled manual and farmers farming less than 30 acres;
6. Unskilled manual; and
7. Unknown.

Social Classes one to three when combined, generally include most professionals as well as other non-manual occupations. Social Classes four to seven when combined generally include skilled, semi-skilled and unskilled manual labour and service employment sectors. Social Class composition data from the 1996 and 2002 Census of Population has been summarised for the subject catchment area in **Table 1.6** below.

Table 1.6 Social Class as a percentage of population 2002 and 2006

Area	Total categories 1 to 3	Total categories 4 to 7
State 2002	48.1%	51.9%
State 2006	**50.2%**	**49.8%**
Louth 2002	43.7%	56.3%
Louth 2006	**46.7%**	**53.3%**
Dromiskin 2002	46.6%	53.4%
Dromiskin 2006	**50.5%**	**49.5%**
Haggardstown 2002	63.5%	36.5%
Haggardstown 2006	**69.3%**	**30.7%**
Drummullagh 2002	34.0%	66.0%
Drummullagh 2006	**47.8%**	**52.2%**
Mansfieldtown 2002	41.6%	58.4%
Mansfieldtown 2006	**53.5%**	**46.5%**
Stabannan 2002	51.9%	48.1%
Stabannan 2006	**57.5%**	**42.5%**
Castlebellingham 2002	38.4%	61.6%
Castlebellingham 2006	**43.4%**	**56.6%**

Source: Census of Population 2002 & 2006.

In 2006 the proportion of the population of the State in social classes one to three (approximating to professional and managerial occupations), increased to 50.2% from 48.1% in 2002. This increasing trend is evident in all of the study areas including Dromiskin ED, where the proportion of the population in social classes one to three increased from 46.6% in 2002 to 50.5% in 2006. The likely reason for this shift is the population increases experienced in these areas which in turn attracts professional and managerial occupations.

Summary

For the purposes of this EIS, data from the 2002 and 2006 census of population was used to assess the demographics and employment in the vicinity of the subject site. This data indicates a general growth in employment in the study area. The rate of unemployment in areas with higher populations was generally lower than that of lesser populated areas. A similar geographical split is shown between rural and urban areas where the majority of population in rural areas were engaged in skilled, semi skilled and unskilled manual labour whereas in urban areas the majority were engaged in professional and non-manual occupations. Recent population increases in these urban may account for decline in unemployment and the increase in professional occupations. The immediate catchment area of the proposed development (Dromiskin) experienced an increase in the number of persons at work and the data for this area indicated positive changes. Much of this growth can be attributed to the population growth of Louth.

1.3.3 Characteristics of the Proposal

The proposed M1 North Motorway Service Area Scheme will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. In addition to the service facilities the current proposal includes inter alia a retail unit, restaurant and tourist information kiosk all of which will provide new employment opportunities for existing residents in the local area.

1.3.4 Potential Impact of the Proposal

Construction Phase
It is anticipated that the construction phase of the subject development proposal, will have no material impact on the existing population and employment structure of the area.

The workforce required to construct the proposed northern Service Areas will most likely travel from their existing places of residence outside the study area to the construction site, rather than temporarily reside in the area during the construction phase. The proposed construction works will entail a sizeable workforce. In this context it is reasonable to assume that members of the local labour force may have the opportunity to secure employment in these works.

It is not anticipated that the construction phase of the scheme, will have a material impact on the overall existing population and employment structures of the study area.

Operational Phase
The delivery of a motorway service area at this location will constitute an asset for this area and will deliver significantly enhanced facilities for M1 Motorway road users, both local and national, who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. In terms of likely and significant impact on population and employment, it is more likely that the proposed development will catalyse employment levels as it secures an increased attractiveness to employers and employees alike. There will be no impact on the resident population or population change as the proposed service area will not catalyse further resident population increases in the service area catchments.

Under a 'do nothing' scenario, there would be no material impact on the existing population and employment structure of the area. In addition there will be no improvements to services on the M1 motorway operating within the study area.

Remedial and Reductive Measures

Construction Phase
No general remedial or reductive measures are envisaged in relation to population levels. Recruitment of construction workers from the local area could be prioritised. The use of local labour will have additional benefits (e.g. less travel time to work).

Operational Phase
The proposed Service Area is in line with the policies and objectives of Louth County Council and strategic policy guidance. No remedial or reductive measures are considered necessary during the operational phase of the M1 North Motorway Service Area.

1.3.5 Predicted Impact of the Proposal

Construction Phase
It is expected that the construction phase of the M1 North Motorway Service Area will have no likely and significant impact on the demographics within the study area. There will be a slight positive benefit in that proposed construction works will provide employment opportunities for both local residents as well as across the region and state. It is expected that the construction phase of the subject development proposal

will have no likely and significant impact on the population and employment profile of the study area.

Operational Phase
The operation of the M1 North Motorway Service Area will provide a small number of new employment opportunities as a result of the new services. In particular the operation of the northern Service Area will contribute to the viability and sustainability of this key transport corridor.

'Worst case' Scenario

In this instance, the 'worst case' is in effect the 'do nothing' scenario. In the event that the scheme does not proceed, there will be no improvements to services on the M1 motorway operating within the study area.

Monitoring

Not applicable.

Reinstatement

Not applicable.

1.4 COMMUNITY ISSUES

1.4.1 Receiving Environment

There are three principal elements to the community within the study area. These can be considered as:

- The resident community;
- The working community; and
- The visiting community.

The Resident Community
The subject land consists of a green field site which is currently in agricultural use. The local residential community consists mainly of one-off housing and has strong links with the agricultural usage of the surrounding area. The nearest village, Dromiskin, has several old and new residential dwellings which range from one-off houses on the outskirts of the village, to ribbon development on the road approaches, to housing estates of varying design and densities.

The Working Community
Local employment areas include the nearby towns of Dromiskin and Castlebellingham. There are also several businesses located along the R132 (Old N1) although these are relatively small businesses such as restaurant/bars or convenience-based retail units. There are a number of community and educational establishments in Dromiskin.

The Visiting Community

The M1 motorway currently carries a significant number of visitors passing through the catchment area to other destinations both countrywide and nationwide. The visiting community comprises M1 motorists and people visiting the adjacent ED's.

Dromiskin historic remains would draw a small number of visitors to the town. For many years, Dromiskin was home to a monastery where a round tower was built and still remains. The top of the tower offers views of Dundalk bay and the surrounding countryside. The town was also home to the Archbishops of Armagh for some time.

Castlebellingham would draw a number of visitors in relation to its medieval remains. Castlebellingham Castle was built in 1660 and has a rich history through fires and wars. The castle is currently used as a hotel. Castlebellingham is also home to a brewery which was built in 1770 and now houses Smallwares Ltd. (also known as "the button factory").

The seaside town of Blackrock with its broad beach would also draw a number of visitors, albeit more so in the summer months. The beach and its promenade is the focal point of the town and offers views over Dundalk Bay toward the Cooley Mountains. As the beach has a small gradient, the sea retreats about 5km at low tide and provides an ideal habitat for a variety of birds. When exposed, the seabed is also a popular venue for sail-boarding and kite-surfing.

Vehicle Flow

A technical appraisal of traffic is set out at **Volume 2 Chapter 9 of this EIS.** However from the viewpoint of community severance the following is pertinent.

The M1 motorway is recognised by the NDP as a 'major inter-urban link'. The main routes of through-traffic are from Dublin are from Dublin to Drogheda, Dundalk, Newry and Belfast.

Traffic flows on the local distributor roads are significant but vary considerably from road to road. A more detailed assessment of vehicle flows is given in **Volume 2 Chapter 9 of this EIS.**

Public Transport

The surrounding area of the proposed M1 Service Area is served predominantly by bus. This is discussed in detail in **Chapter 9 of this EIS**. Bus Eireann and other private bus operators provide regular services from Dublin to Belfast and vice versa along the M1 corridor in close proximity to the proposed development.

The proposed M1 Service Area will be approximately 7.6km from Dundalk railway station and approximately 24km from Drogheda railway station. These stations have regular services to and from Dublin City Centre and all major towns including Dundalk and Belfast. Between Dunleer and Dundalk, the railway line runs parallel to the M1 (between 5 and 40m to the east of the road).

Pedestrian/Cyclist Flows

Motorways are roads that help reduce journey times by separating traffic and removing road junctions. However, Section 11 of the rules of the road restricts both

pedestrians and cyclists from using motorways. There are no cycling or pedestrian facilities available within the vicinity of the proposed Service Area sites.

1.4.2 Characteristics of the Proposal

The proposed M1 North Motorway Service Area Scheme will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities.

The scheme is located less than one kilometre to the west of Dromiskin on the M1 Motorway within County Louth. Facilities are provided on both sides of the road to cater separately for northbound and southbound traffic. Public access to the Service Areas will be restricted to direct access from the M1 Motorway via slip roads and at-grade roundabouts.

1.4.3 Potential Impact of the Proposal

Construction Phase

<u>Resident Community</u>
A motorway is a clearly defined and understood 'sealed' corridor for operational and safety reasons. Points of movement at and across the motorway corridor are confined to roads and overbridges. In the case of the M1 Motorway, direct change to the existing environment may be caused by; the introduction of the proposed Service Area, the location of new slip roads and at-grade roundabouts to access the site. In this context the scale and extent of community severance can be analysed by reference to changes to:

- where populations are sited;
- accessibility to the Service Area;
- pedestrian and vehicular movement patterns by the population to access the Service Area

Changes in journey times, routings and the nature of the journey environment for pedestrians and others, affect the degree to which a locality is subject to '*community severance*'. Community severance is the separation of persons from the facilities and services they wish to use within and beyond their geographical district. Changes in separation can be caused by new or modified transport corridors (positive or negative), and by changes in transport service levels along the existing corridors.

Severance can be reduced by new facilities (in for example crossing facilities over a motorway corridor, improvements to footpaths etc.) and including the increase in service provision itself. In addition, severance can be caused by the removal of a community facility or the loss of land used by members of the public, as a result of works involved in a new scheme.

Potential community severance effects are not evenly spread amongst population. The elderly, disabled persons and children, are more vulnerable to severance impacts. Furthermore perceptions of severance vary amongst the separate populations related to an Area. Thus, for example, the resident population may experience a different severance impact to the working or visitor populations.

It is proposed to locate the northern Service Area facilities on both sides of the road to cater separately for northbound and southbound traffic. Public access to the northern Service Areas will be restricted to direct access from the M1 Motorway via slip roads and at-grade roundabouts.

Working Community
The local working population in the local area are located predominantly in Dromiskin, Castlebellingham and Blackrock. Local movement patterns of the working population are unlikely to be significantly impacted by the construction programme for the project. Access and local movement patterns of the working population will not be materially impacted by the construction programme for the project. Any impacts associated with construction are of a temporary nature and therefore not considered a significant impact.

Visiting Community
The potential impact relates to inconvenience during the construction of the slip roads to the site. It is not expected that these impacts will affect the visiting community to the same extent as existing local communities, since these movements are not normal daily requirements for the visitors.

Vehicle Flows
No significant disruption to vehicular traffic will occur during the construction or operational phase.

Minimal practical disruption to traffic will occur due to the construction of the access/slip roads to the site at either side of the motorway.

Public Transport
There is no impact in terms of public transport.

Pedestrian / Cyclist Flows
There is no impact in terms of pedestrian and cyclist flows.

Operational Phase

Resident Population
The resident population will share in the beneficial impacts of the scheme in terms of enhanced service facilities along the M1 motorway. This proposed Service Area facility is significant and positive. The proposal includes fuel facilities along with a convenience shop, restaurant, toilets, showers, tourist information kiosk and inside and outside children's play areas. Recreation and picnic areas will also be provided within a landscaped environment.

Working Population
The working population located in the local area will have access to good quality service facilities as a result of this project. In addition the wider working community including long distance drivers will experience positive impacts during the operational phase of the scheme. The proposed M1 North Motorway Service Area Scheme will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities. The physical insertion of the Service Area along the existing (already segregated) transport corridor, will not materially impact on the operating environment of this working community by reference to issues of severance.

Visiting Community
The visiting population will have access to good quality service facilities during their motorway journeys as a result of this project. The visiting population to this area, outside of motorway traffic, is modest. Visitors to the Motorway Service Area can avail of information on tourism in the wider area via the information kiosk will be provided to advise people of local tourist amenities and facilities within the locality, which should result in a beneficial impact to the area.

Vehicular Flows
It is not expected that vehicle flows will increase as a result of the proposed development. The proposed M1 North Motorway Service Area Scheme will merely provide facilities for existing M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities.

Public Transport
There is no impact in terms of public transport.

Pedestrian / Cyclist Flows
There is no impact in terms of pedestrian and cyclist flows.

'Do nothing' Scenario
Under a 'do nothing' scenario, there would be no Service Area provided. No effective service facilities such as fuel, toilet and food facilities would be provided for M1 motorway users. If the M1 North Motorway Service Area is not implemented, it will not assist in addressing the growing service deficit for long distance road users.

Remedial or Reductive Measures

Construction Phase

Resident Population
It is proposed that the overall project works will be undertaken within a construction programme designed specifically to ensure continued use of the M1 transportation corridor. Traffic management measures will be implemented on roads affected by the construction of the northern Service Area to ensure safe traffic, access and working conditions. These measures will be implemented in consultation with the relevant Local Authorities.

In order to mitigate impacts associated with construction traffic, a traffic management plan will be developed as part of the overall Construction Traffic Management Plan.

During the construction phase, it is proposed that the contractors will be obligated to comply with the safety regime imposed by the Local Authority in carrying out works and activities at all times. Furthermore, given the identified potential significant impact of construction traffic levels on traffic flows access to the construction site for all construction traffic will be restricted to the M1 motorway. Advance warning will be given of any necessary route diversions. Alternative routes/accesses will be clearly signed. Construction compounds will not be sited within 250m of residential locations. Construction compounds/sites will be located as far as is practicable from watercourses. Construction compounds will be located at a minimum distance of 50m from the nearest watercourse. Suitable warning signs will be provided on all roads used by construction traffic to alert other drivers to the potential hazards and any

appropriate temporary speed restrictions. Any damage to roads as a result of construction traffic will be promptly reinstated by the concessionaire/contractor.

The main remedial measures relating to potential impacts of the proposed Service Area on the local community during the construction phase relate to the phasing programme for the construction of the proposed development.

Working Population
In order to mitigate impacts associated with construction traffic, a construction traffic management plan will be developed prior to commencement of works on the Service Area.

Visiting Population
No specific mitigating measures are deemed necessary beyond those listed above.

Vehicle Flows
Traffic restrictions during the construction phase have been described in traffic assessment of this EIS.

Public Transport
There is unlikely to be any impact or disruption to public transport during the construction phase.

Pedestrian/Cyclist Flows
There is no impact in terms of pedestrian and cyclist flows.

Operational phase

Resident Population
The resident population of this area will have access to new service facilities including convenience and restaurant facilities along the existing M1 corridor. Thus no mitigating measures are proposed. During the developers will take such steps as are required to operate road services along the M1 in a safe manner. The relevant Local Authorities will institute such measures as are necessary in its opinion to maintain a safe flow of traffic and provide access. Signage and road markings will be maintained.

Working Population
The working population will be significantly and beneficially served by the new northern Service Area facility on the M1 motorway. No mitigating measures are necessary.

Visiting Population
No specific mitigating measures are deemed necessary beyond those listed above.

Vehicle Flows
There are no remedial measures necessary.

Public Transport
There are no remedial measures necessary.

Pedestrian / Cyclist Flows
There are no remedial measures necessary.

1.4.4 Predicted Impact of the Proposal

Construction Phase

Resident Population
In this regard, specific construction works are not likely to impact materially on the ability of residents to access local community facilities.

The construction phase of the proposed northern Service Area will result in temporary disturbances primarily for the residential and working communities of the area. It is considered that with the implementation of the proposed construction traffic, these impacts can be minimised. Nevertheless given the rural nature of the local catchment area and the reality that during some construction works, the predicted impact on community severance is temporary but significant.

Working Population
The working population is focused predominantly in the area to the east of the motorway with current road access off the M1 and the R132 Road corridors. Access and local movement patterns of the working population are unlikely to be materially impacted by the construction programme for the project.

Visiting Population
No material impact is anticipated to arise during the construction phase beyond the movement inconvenience as described above.

Vehicle Flows
There is no impact in terms of vehicle flows.

Public Transport
There is no impact in terms of public transport.

Pedestrian / Cyclist Flows
There is no impact in terms of pedestrian and cyclist flows.

'Worst case' scenario

Under the 'worst case' scenario, failure to provide the appropriate traffic management measures during the construction phase could lead to serious adverse impact on traffic flow, congestion and safety.

Operational phase

Resident Population
The resident population who use the M1 motorway will share in the beneficial impacts of the scheme in terms of enhanced service facilities along the existing M1 motorway. This is moderate and positive.

Working Population
The working population using the motorway will have a high quality and readily accessible Service Area as a result of this project. Existing employment locations predominantly to the east of the proposed development are some distance from the new Service Area itself, and as a result are not likely to experience a benefit in association with the new services.

Visiting Population
No material impact is anticipated to arise during the construction phase beyond the movement inconvenience as described above.

Vehicle Flows
There is no impact in terms of vehicle flows.

Public Transport
There is no impact in terms of public transport.

Pedestrian / cyclist flows
There is no impact in terms of pedestrian and cyclist flows.

'Worst case' scenario

Under the 'worst case' scenario, delay in the completion of the construction phase of the proposed development, would result in significant inconvenience to pedestrian and vehicular traffic.

Under the 'worst case' scenario, failure to provide the appropriate traffic management measures during the construction phase could lead to serious adverse impact on traffic flow, congestion and safety.

Monitoring

Construction phase
Monitoring of road infrastructure, operations and safety will be undertaken by the contractors. Monitoring of traffic management measures will be undertaken by the relevant Local Authorities.

The Contractor(s) will be bound by the Safety, Health and Welfare at Work (Construction) Regulations 1995 (SI No. 138 of 1995) to observe safety and environmental standards.

Operational phase
The contractors will undertake ongoing monitoring of the Service Area and associated access roads infrastructure, operations and safety. The relevant Local Authorities will undertake ongoing monitoring of road traffic flows and safety.

Reinstatement

Construction phase
Temporary reinstatement of road infrastructure and surfaces where affected will be ongoing during the construction phase. Permanent reinstatement of road infrastructure will be undertaken prior to the completion of the Service Area.

Operational phase
No reinstatement measures are required other than ongoing maintenance of the road infrastructure.

1.5 RETAIL ASSESSMENT

The following retail assessment is intended to establish the potential commercial impact, if any, of the retail element of the proposed new northern Motorway Service Area on existing retail developments within the towns and villages within an approx. 10km radius/15 min off peak drive time of the subject site. While some retail proposals may be modest in strategic terms, the local impact can be substantial, particularly in more rural areas.

1.5.1 Receiving Environment

The Retail Planning Guidelines 2000 (RPG) suggest that *"Development Plans should provide an indication of the general scale and form of retail development that is required in the future and this will constitute the context for making decisions on planning applications."* With regard to Petrol Filling Stations that:

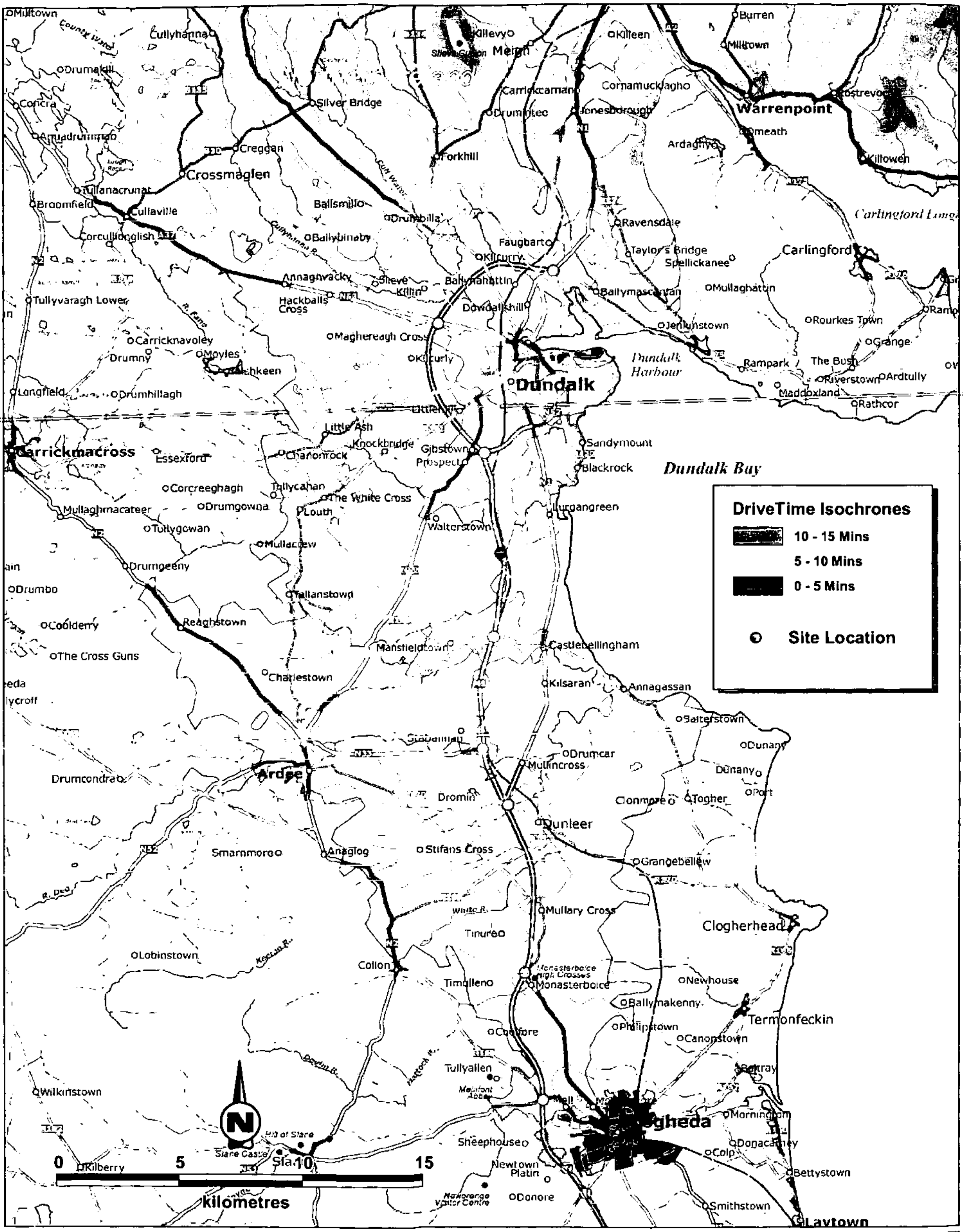
> *"where retail space in excess of 100 square metres of net retail sales area associated with petrol filling facilities is ought the sequential approach to retail development will apply....".*

The proposed development comprises a Motorway Service Area with a net retail sales area of approx. 250sqm and although different from a Petrol Filling Station a *"Retail Health Check"* (an assessment of the vitality and viability) of existing towns and villages within a 10km radius/15 minute off peak drive time was carried out for the proposed Service Area in June 2007, refer to **Figure 1**. The towns included in the "*Retail Health Check*" are as follows:

- Dromiskin
- Castlebellingham
- Blackrock
- Dunleer
- Kilsaran
- Knockbridge
- Monasterboice
- Sporadically Located Units

1.5.2 Retail Health Check

Annex 2 of the RPGs sets out methods for assessing the vitality and viability of town centres and the indicators which should be used to carry out a *"Health Check"* of towns and villages. Vitality is a measure of how busy, or lively a centre is, while viability is a measure of the town centres capacity to attract ongoing investment; together they provide an indication of the health of a town centre.



Project Title	M1 MOTORWAY DROMISKIN SERVICE AREAS
Drawing Title	OFF-PEAK DRIVE TIME ISOCHRONES

Designed:	n/a	File Ref:	PD07133MI0020D01	Fig. 1
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Approved:	CH	Date:	12/12/2007	D01

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A retail health check of all commercial/retail units within a 15 minute off peak drive time (10km radius) of the subject site was carried out in June 2007, refer to **Figure 1** Off-Peak Drive Time Isochrones. The study assessed every settlement within this catchment based on the criteria set out in Annex 2 of the RPGs which includes the following as the most appropriate health check indicators:

- Diversity of uses and attractions;
- Vacant street level property;
- Accessibility and parking; and
- Environmental quality and amenity.

Dromiskin

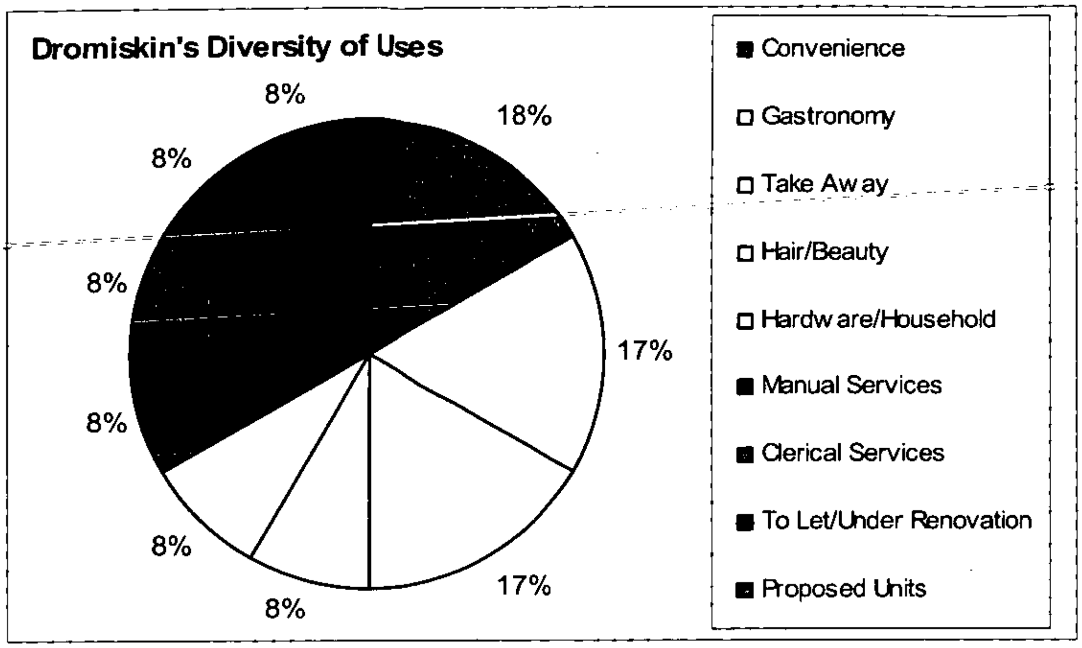
Dromiskin is located approximately 10km to the south of Dundalk town centre in County Louth and is approximately 3km north, north west of Castlebellingham. The village is located 1km to the east of the M1 motorway that runs from Dublin to Belfast. The nearest M1 interchange to Dromiskin is located to the west of Castlebellingham where the R166 regional road intersects the motorway (Drumleck Bridge). The R132 regional road from Castlebellingham to Blackrock is just over 1km to the east of Dromiskin and follows the coast which is a further 0.5km to the east.

It is evident that the relatively small population of Dromiskin must travel to larger urban centres to satisfy their wider convenience shopping needs. The village's total of 10 no. existing commercial/retail units consists of: 2 no. convenience stores (a 'Centra' and a 'Londis'); 2 no. restaurant/pubs; 2 no. take away restaurants; 1 no. hairdresser; 1 no. antique furniture shop; 1 no. flower shop; and 1 no. credit union. Planning permission is also being sought for the development of a commercial unit on the lands of an existing restaurant/pub and there is a large green field site in the centre of the village that has recently been sold. The table and graph below show the breakdown of the type of units in Dromiskin.

Table 1.7: Dromiskin – Diversity and Quantity of Retail Uses within the Village

Unit Type	Units
Fashion	0
Convenience	2
Gastronomy	2
Take Away	2
Hair/Beauty	1
Bookmakers	0
Hardware/Household	1
Manual Services	1
Butchers	0
Clerical Services	1
Medical	0
Electronics	0
Off Licence	0
Hotel	0

Cleaning Services	0
Post Office	0
Miscellaneous	0
To Let/Under Renovation	1
Proposed Units	1

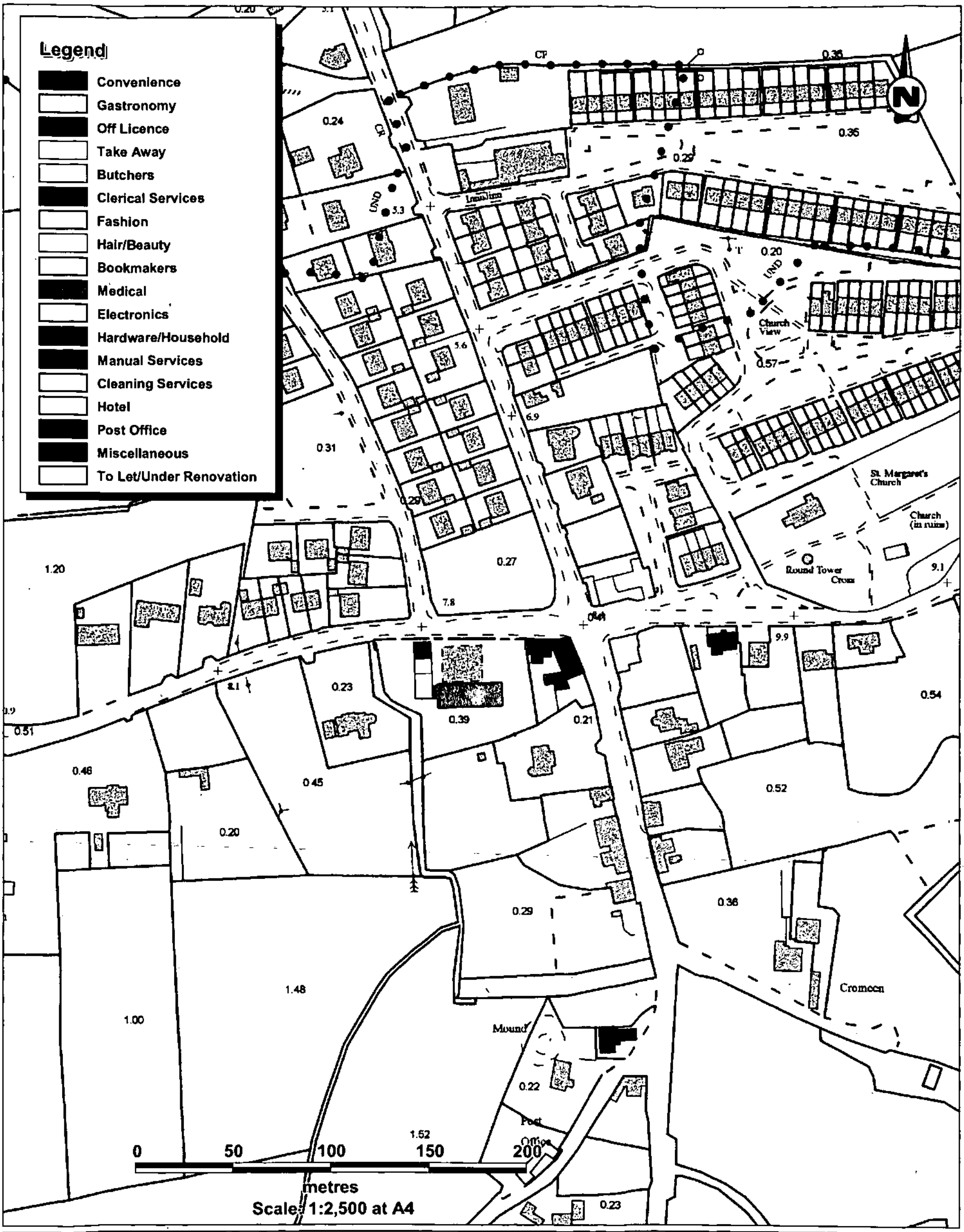


The retail provision in Dromiskin may be limited due to its low population and close proximity to higher order centres such as Castlebellingham. Dromiskin's diversity of uses suggest that it is a low order town that plays a supporting role to the higher order centres in the area. Dromiskin's diversity of uses is illustrated in **Figure 2.**

The proportion of vacant street level property is low (8%). Furthermore, there is evidence of some renewal and redevelopment which indicates that the village is economically active. A new commercial unit is proposed as part of renovation to an existing restaurant/pub.

The M1 motorway provides access to the general area whilst preventing potential congestion caused by through traffic. The motorway can be exited at Drumleck Bridge which is located approximately 3km south of the village. From here, the R166 and R132 regional roads and several local roads can be used to access Dromiskin. The two local roads that cross in the centre of the village are small, but are of good quality. Due to the rural location of Dromiskin, the levels of traffic in the village are relatively light. Several parking spaces are provided at the 'Centra'/'Maxol' petrol station, behind 'Herity's' restaurant/pub, and beside 'Mulligan's Londis'. There are some formal on-street car parking spaces (e.g. outside 'Angelo's Take Away') but as traffic levels are low, informal on-street parking is generally accepted.

Dromiskin is generally an attractive village with a prominent round tower located to the east of the main cross roads that contributes to the village's historical and cultural amenity. Its proximity to higher order urban centres (including Dundalk) and to the sea, makes this village a practical and attractive place to live.



Project Title
M1 MOTORWAY
DROMISKIN SERVICE AREAS

Drawing Title
DROMISKIN - DIVERSITY OF USES

Designed:	n/a	File Ref:	PD07133MI0013D01	**Fig. 2**
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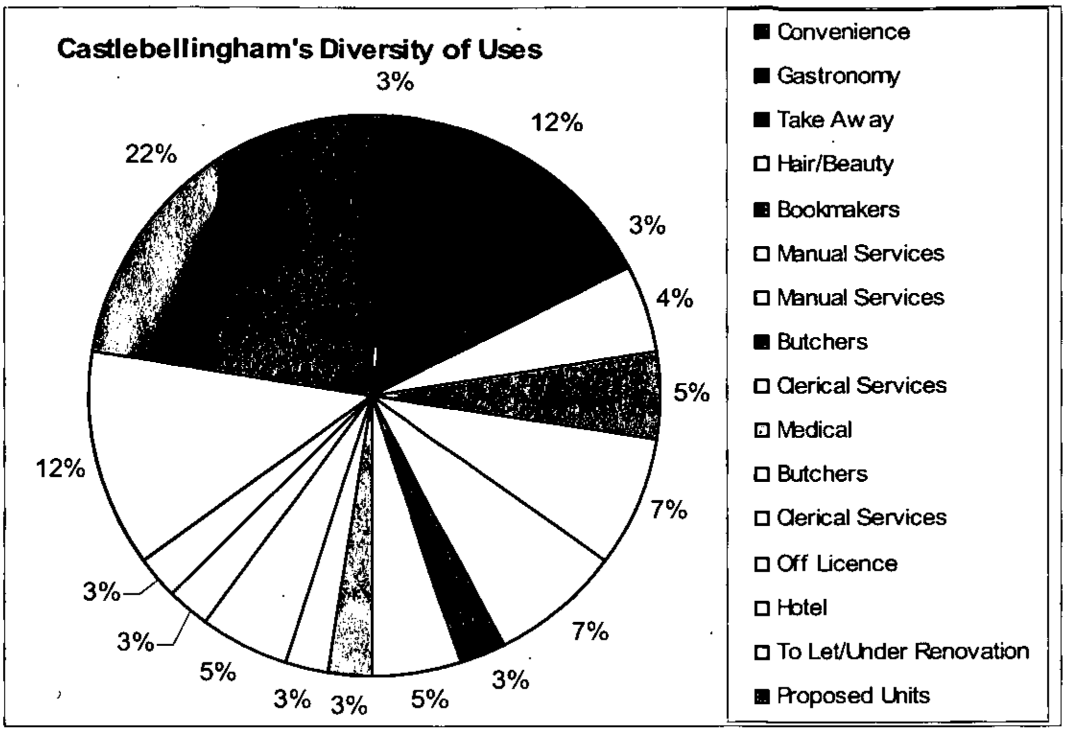
Castlebellingham

Castlebellingham is located approximately 12km to the south of Dundalk town centre in County Louth. The village is located 2km to the east of the M1 motorway and approximately 3km to the south of Dromiskin. The village has developed around the intersection of the R166 and R132 regional roads which is located approximately 1.5km to the west of the coast.

The diversity of uses found in Castlebellingham are relatively high as illustrated in **Figure 3**. Of a total of 34 no. units there are 14 no. commercial units that are either under construction/renovation, for sale/to let or pending planning permission. This suggests that the village is growing and has a strong local economy. There are 5 no. units which can be either classified as restaurants, pubs, cafes, or bakeries. In addition to this, the 'Bellingham Castle Hotel' provides another restaurant and bar. The village also has 2 no. hairdressers, 2 no. bookmakers, 1 no. insurance company, 1 no. estate agents, 1 no. take away, 1 no. convenience store, 1 no. butchers, 1 no. pharmacy, 1 no. off licence, 1 no. shop selling fireplaces, 1 no. plumbers' offices, and 1 no. shop servicing and supplying domestic gas. The table and graph below show the breakdown of the type of units in Castlebellingham.

Table 1.8: Castlebellingham– Diversity and Quantity of Retail Uses within the Village

Unit Type	Units
Fashion	0
Convenience	1
Gastronomy	5
Take Away	1
Hair/Beauty	2
Bookmakers	2
Hardware/Household	0
Manual Services	3
Butchers	1
Clerical Services	2
Medical	1
Electronics	0
Off Licence	1
Hotel	1
Cleaning Services	0
Post Office	0
Miscellaneous	0
To Let/Under Renovation	5
Proposed Units	9



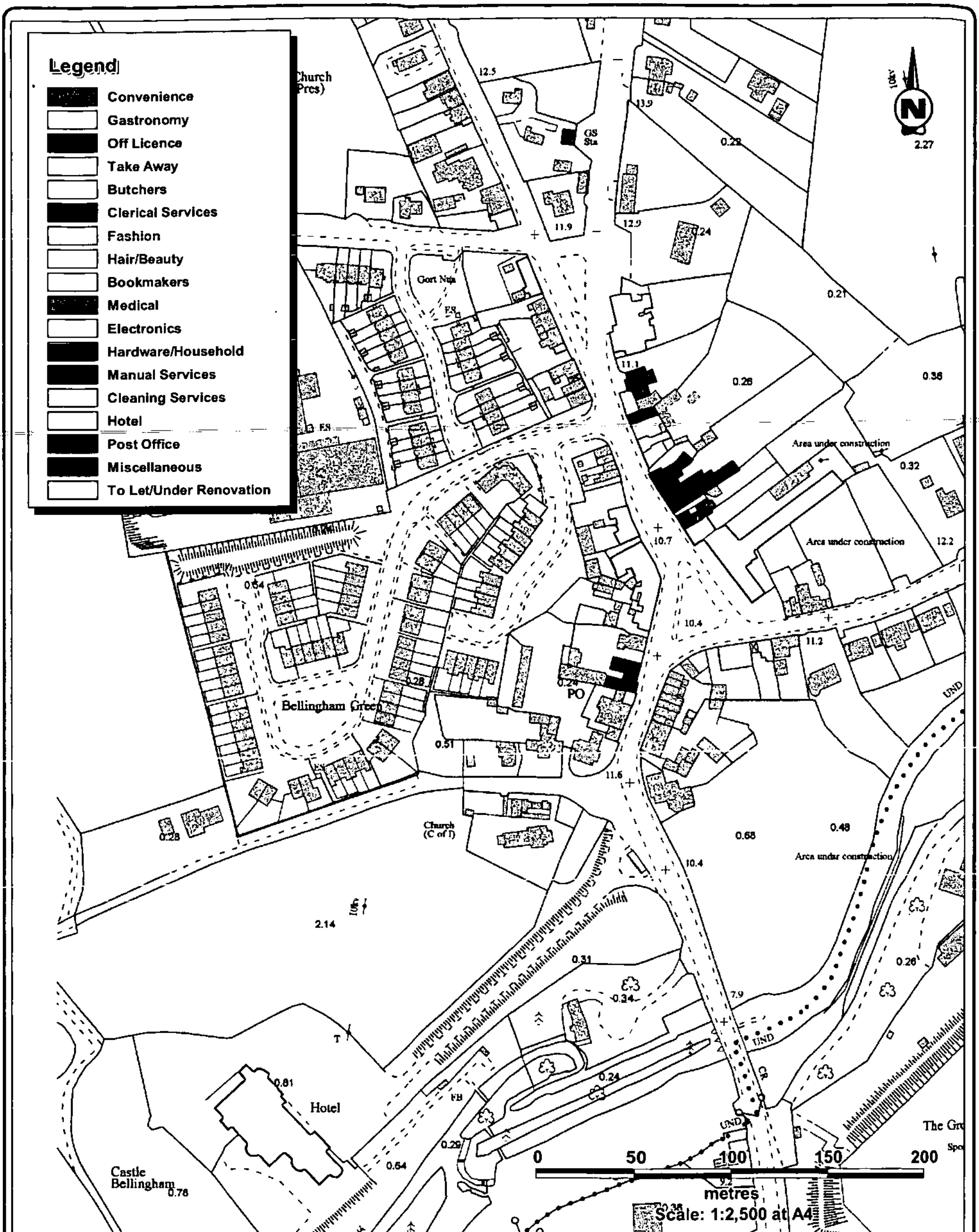
12% of Castlebellingham's commercial/retail units can be classified as "vacant, for sale or under renovation". The majority of these units are either for sale or available to let. Very few are without any intention for renovation or sale etc.

In addition to these vacant units, there are 9 no. proposed commercial units which are currently seeking planning permission. If granted, these new shops will represent 22% of Castlebellingham's total commercial/retail units.

The M1 motorway provides access to the general area whilst preventing potential congestion caused by through traffic. From the Drumleck Bridge exit, the R166 regional road leads into Castlebellingham. The regional and local roads which run through the village are generally of good quality. The R132 and R166 regional roads are the primary access roads to the village with the R132 making up the main retail street.

For some of the larger units, customer car parking is provided off-street, but the majority of parking takes place at kerbside in designated indented bays. Informal kerbside parking is also generally accepted as traffic levels are modest.

Castlebellingham is a pleasant and active village that is clean and tidy. There are several attractions including the 'Bellingham Castle Hotel' and 'The Malthouse' - a recently renovated building that was first built in 1866. 'The Malthouse' provides 4 no. commercial units in a unique setting that respects the village's historical context. Natural amenities for Castlebellingham include the nearby River Glyde and, of course, the sea which is less than 2km to the east.



Project Title	**M1 MOTORWAY DROMISKIN SERVICE AREAS**		
Drawing Title	**CASTLEBELLINGHAM - DIVERSITY OF USES**		
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Approved: CH	Date: 27/11/2007		D01

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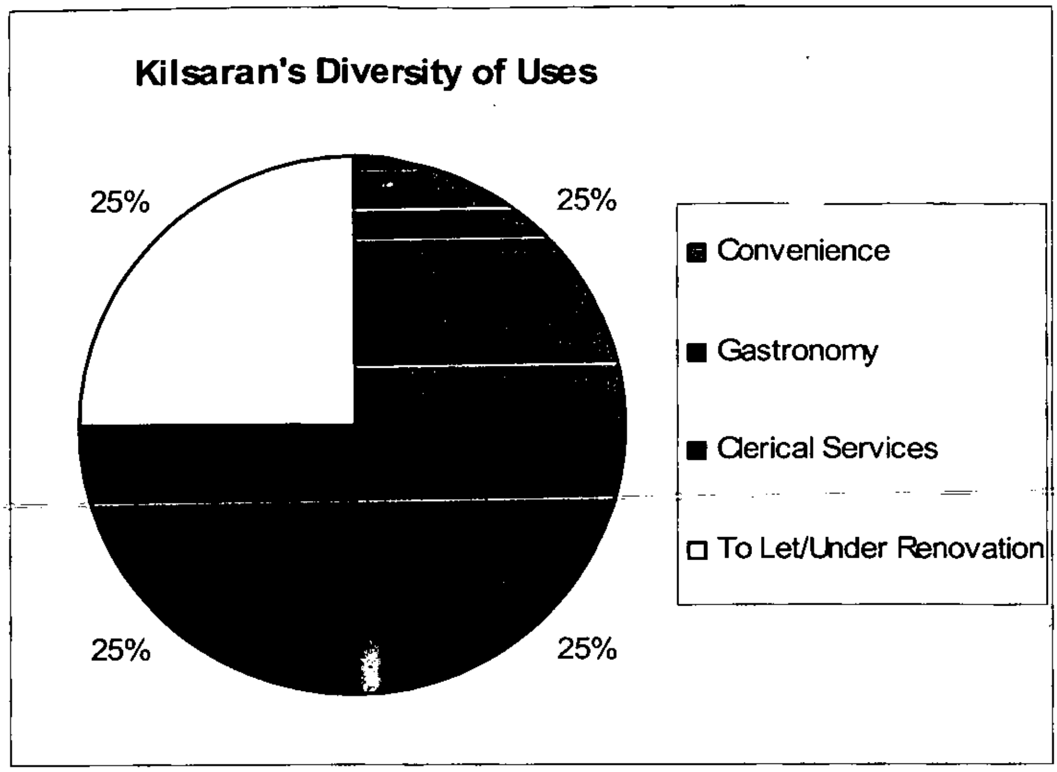
Kilsaran

Kilsaran is located approximately 1km to the south of Castlebellingham along the R132 regional road.

There are 4 no. commercial/retail units located in Kilsaran which include 1 no. convenience store ('Bell's Newsagents'), 1 no. restaurant/bar (the 'Crowing Cock Inn'), 1 no. credit union ('Kilsaran Credit Union') and 1 no. vacant unit. Due to its close proximity to Castlebellingham and its low amount and diversity of uses, it is evident that this village is dependant on Castlebellingham for the majority of its convenience and comparison shopping needs. Kilsaran therefore plays a supportive role to Castlebellingham and other nearby urban centres. The table and graph below show the breakdown of the type of units in the village.

Table 1.9: Kilsaran– Diversity and Quantity of Retail Uses within the Village

Unit Type	**Units**
Fashion	0
Convenience	1
Gastronomy	1
Take Away	0
Hair/Beauty	0
Bookmakers	0
Hardware/Household	0
Manual Services	0
Butchers	0
Clerical Services	1
Medical	0
Electronics	0
Off Licence	0
Hotel	0
Cleaning Services	0
Post Office	0
Miscellaneous	0
To Let/Under Renovation	1
Proposed Units	0



The is 1 no. vacant unit in Kilsaran. There is no current planning applications for the building or the site and there are also no signs of renovation/renewal.

Kilsaran is located along the R132 regional road which serves as the village's primary access road. This road runs parallel to the M1 motorway and is intersected by 2 no. local roads – one which leads to Annagasan (located on the east coast) and the other which leads to Stabannan (to the west of the M1 motorway). Off-street car parking is provided outside 'Bell's Newsagents', 'Kilsaran Credit Union', and the 'Crowing Cock Inn'. Some formal on-street car parking is provided in indented bays, but kerbside parking is generally accepted.

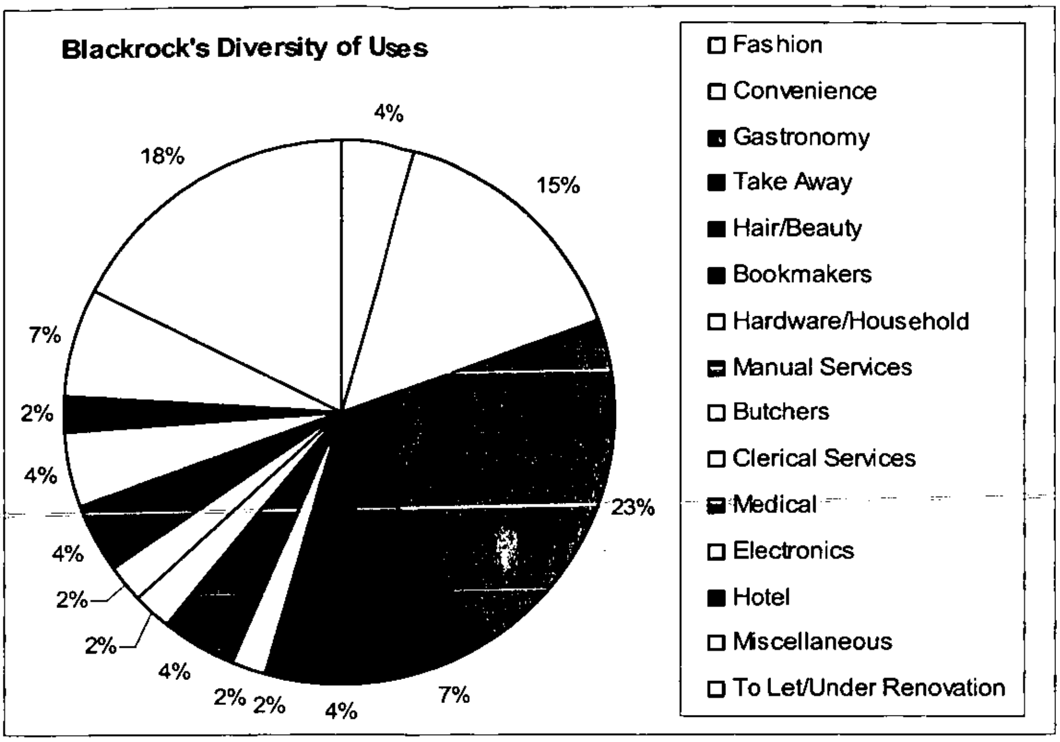
Blackrock

Blackrock is located on the east coast approximately 4.6km to the south of Dundalk town centre. The village is just over 7km to the east of the M1 motorway and is approximately 5.5km to the north of Dromiskin. Blackrock is served by the R172 regional road that runs through the centre of the village where the majority of the commercial/retail units are located. The R132 regional road runs parallel to this, along the west side of the village where an additional 4 no. units are located.

Blackrock has a rich diversity of uses as illustrated in **Figure 4**. 23% of the commercial/retail units are restaurant/bars or cafés and 15% are convenience stores or supermarkets. A total of 18% of these units are either vacant, for sale, or under renovation. Although the village has a large range of unit types to offer, its proximity to Dundalk allows Blackrock to play a supporting role to this larger urban centre. The figures represented in the table and graph below include 4 no. units located along the R132 regional road (to the west of the village) and 2 no. units located approximately 1.5km to the north of the village centre. The table and graph below show the breakdown of the type of units in Blackrock.

Table 1.10: Blackrock– Diversity and Quantity of Retail Uses within the Village

Unit Type	Units
Fashion	2
Convenience	7
Gastronomy	10
Take Away	3
Hair/Beauty	2
Bookmakers	1
Hardware/Household	1
Manual Services	2
Butchers	1
Clerical Services	1
Medical	2
Electronics	2
Off Licence	0
Hotel	1
Cleaning Services	0
Post Office	0
Miscellaneous	3
To Let/Under Renovation	8
Proposed Units	0

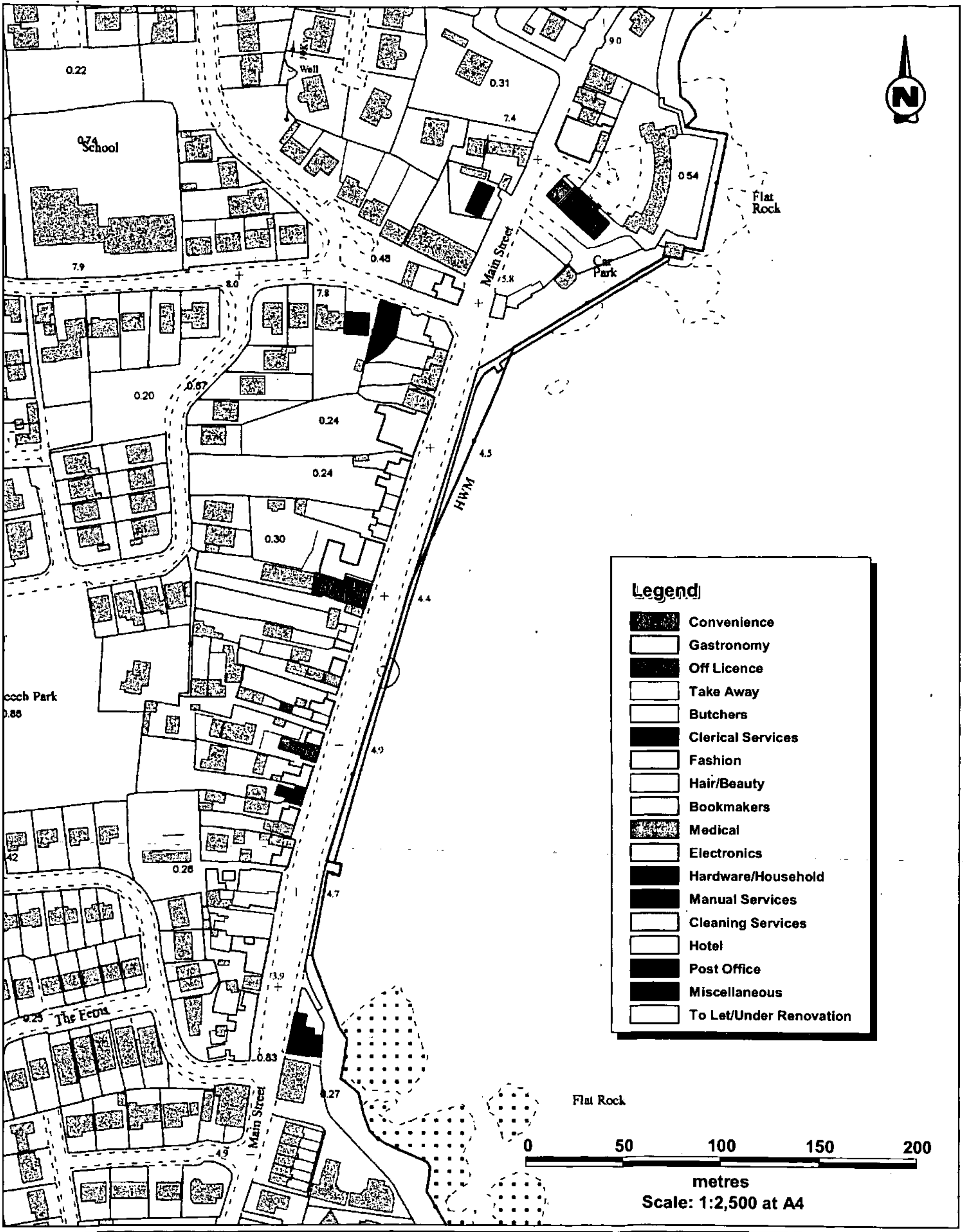


There are 8 no. units which are either vacant, for sale, or under renovation. Only 1 no. of these units appears to be completely vacant – it is envisaged that the rest should all be in use within a few years. These 8 no. units represent 18% of Blackrock's total commercial/retail units and suggest that the village is changing in response to an active and healthy economy.

Blackrock is located along the R172 regional road which serves the majority of the retail units in the village. This road continues north towards Dundalk where 3 no. commercial units are served along the way ('Family Value' convenience store, 'The Violet Bar and Lounge' and a vacant warehouse with petrol pumps). These roads are of good quality and are well maintained. The M1 motorway and several national roads which serve Dundalk all add to the high level of accessibility that Blackrock has.

The R132 regional road runs parallel to this and serves as the access road to 4 no. units including the 'Felda Health and Fitness Spa', an 'Esso' petrol station served by a convenience store ('Mace'), the 'Fairways Hotel' and another convenience store ('Kelly's Gala'). The primary car parking for all units in Blackrock village is located along the east side of the R172 regional road in indented bays. Some of the larger units provide off-street car parking on their individual sites – including the 4 no. units located on the R132 regional road.

Blackrock is a quaint and attractive village and has a very pleasant setting. Its seaside location and proximity to the Dundalk makes it an ideal place to live or visit.



Project Title: **M1 MOTORWAY DROMISKIN SERVICE AREAS**

Drawing Title: **BLACKROCK - DIVERSITY OF USES**

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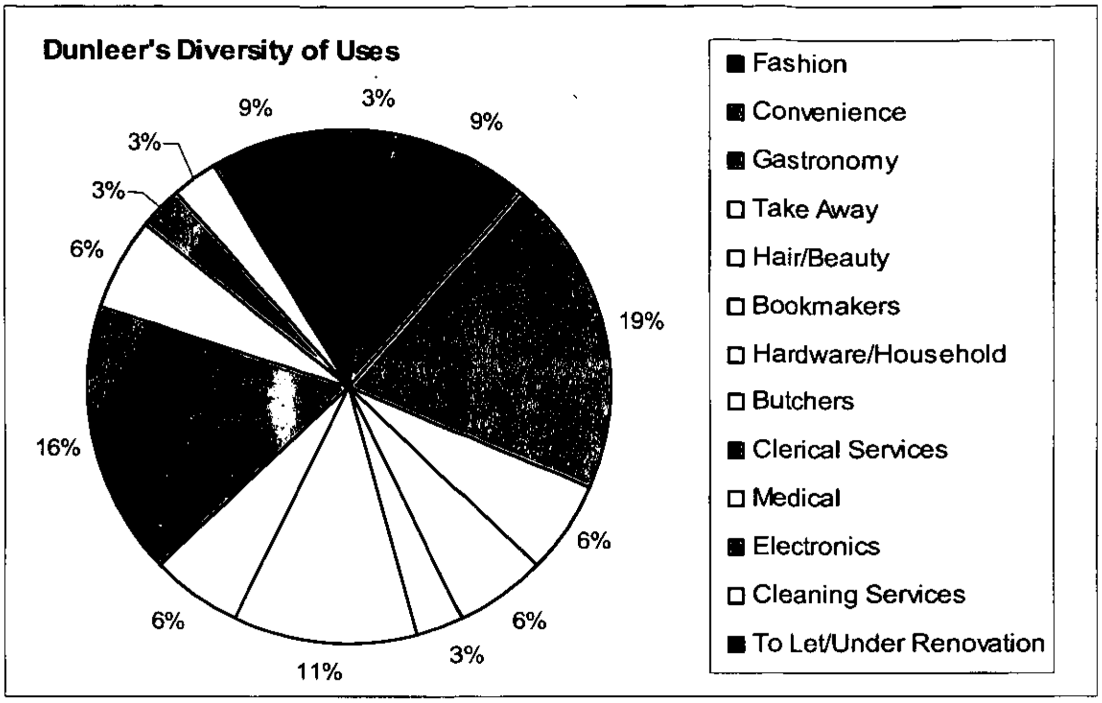
Dunleer

Dunleer is located approximately 7.5km to the south of Castlebellingham and 1km to the east of the M1 motorway at the junction of the R132 and R170 regional roads. The village is approximately 9km from the east coast and 11km from Clogherhead.

The diversity of uses in Dunleer is quite high as illustrated in **Figure 5**. Although 19% of the total commercial/retail units are restaurant/bars or cafés, there are also several insurance companies, solicitors, and property agents (16% altogether) which generally require a higher critical mass of population to be economically viable. The village is fairly self-reliant in terms of convenience shopping but is dependant on larger urban centres for the majority of its comparison shopping needs. The table and graph below show the breakdown of the type of units in Dunleer.

Table 1.11: Dunleer– Diversity and Quantity of Retail Uses within the Village

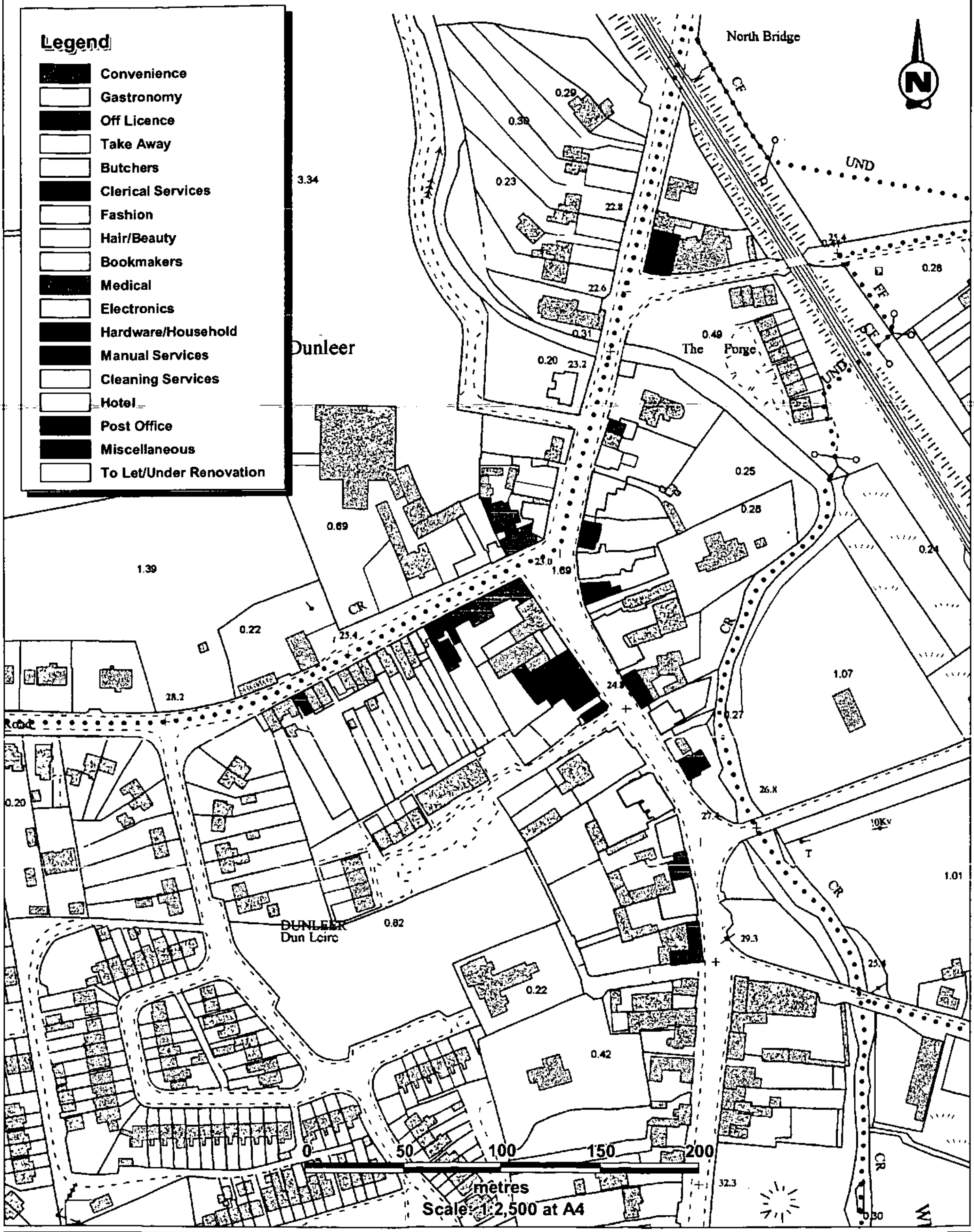
Unit Type	Units
Fashion	1
Convenience	3
Gastronomy	7
Take Away	2
Hair/Beauty	2
Bookmakers	1
Hardware/Household	4
Manual Services	0
Butchers	2
Clerical Services	6
Medical	2
Electronics	1
Off Licence	0
Hotel	0
Cleaning Services	1
Post Office	0
Miscellaneous	0
To Let/Under Renovation	3
Proposed Units	0



There are 3 no. vacant properties in Dunleer. One is currently under renovation/construction and two are for sale/to let. There are no units that are completely vacant– indicating that property is at a premium here and the village's economy is strong.

The M1 motorway is located to the west of Dunleer and has an interchange with the R169 regional road to the south west of the village. The R169 regional road joins the R132 regional road which runs through the village. Dunleer can also be accessed by the R170 regional road which meet with the R132 regional road in the village centre. Formal car parking spaces are hard to find forcing most customers parking at the kerbside. There are very few designated on-street spaces and even less off-street spaces. Some of the larger units provide off-street car parking spaces on their sites.

The White River provides an attractive natural amenity to the north and the village's proximity to larger urban centres such as Ardee makes Dunleer an ideal place to live.



Project Title	M1 MOTORWAY DROMISKIN SERVICE AREAS
Drawing Title	DUNLEER - DIVERSITY OF USES

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Knockbridge
Knockbridge is located approximately 7.5km to the south west of Dundalk and 8.2km to the east of Blackrock. The nearest M1 interchange is with the N52 and the N1 and is approximately 4km to the east. The R171 regional road runs through the town and is intersected by local roads which connect to the R178 regional road and N52 national road. The Fane River runs to the south west of the village.

There are 3 no. commercial/retail units in Knockbridge which include a petrol station ('Thomas MacConmide's'), a convenience store ('Brodigan's Daybreak'), and a restaurant/bar with an off licence ('T. McNamee's Bar/Lounge'). There is also a small coffee and craft shop that is located on a local road which connects Knockbridge to the N52 national road.

Knockbridge is located on the R171 regional road which runs parallel to the R178 regional road and N52 national road. The N52 joins the M1 motorway approximately 4km to the east of the town. The 3 no. units provide off-street parking in addition to a large surface car park located across from the church. The coffee shop located along the local road to the south east also provides off-street car parking.

Sporadically Located Units
There are a few individual commercial/retail units that are sporadically located throughout the area which include the following:

'P.S. Donegan's Bar/Lounge'
'P.S. Donegan's Bar/Lounge' is located just off the M1 motorway at the interchange with the R132 regional road at Monasterboice. There are a few off-street car parking spaces provided on the site.

Vacant Unit
A large vacant commercial unit which has recently been sold is located to the east of Dromiskin along the R132 regional road. There are a few off-street car parking spaces provided on the site.

'Statoil' Petrol Station and 'L.S. Doran's Bar/Lounge'
A 'Statoil' petrol station and 'L.S. Doran's Bar/Lounge' are located along the R132 near the Drumcar turn off. Both have ample off-street car parking on site.

1.5.3 The Sequential Approach

The sequential approach is an integral part of planning. The intention is that the sequential approach will promote town centre vitality and viability by focussing development in town centres. The RPGs recognise that a sequential approach should be applied in selecting appropriate sites for allocation within the centres where identified need is met. All options in the centre should be thoroughly assessed before less central sites are considered for development for main town centres.

As noted in **Volume 2 Chapter 7** of this EIS, central to the RPGs is the importance of the statutory development plan process, the role of town centre and the need to adhere to sustainable land use and transportation policies. With regard to petrol filling stations and associated retail units, the RPGs state:

"Petrol filling stations can provide a wide range of retail goods in an associated shop. In rural areas, some function as the local shop or small supermarket. Whilst the important role of such provision is recognised, such shops should, in general, remain secondary to the use as a petrol filling station."

The RPGs recommend that larger retail units associated with petrol stations should be assessed in the same way as would an application for a retail development without petrol filing facilities in the same location. For larger retail units associated with petrol filling stations, the RPGs state:

"Where retail space in excess of 100 square metres of net retail sales area associated with petrol filling stations is sought the sequential approach to retail development will apply."

The sequential approach requires that locations are considered in the following order:

- *"First locations in appropriate existing centres where suitable sites or building for conversion, and or likely to become, available within the development plan document period, taking account of an appropriate scale of development in relation to the role and function of the centre, then*
- *Edge of centre locations, with preference given to sites which are or will be well-connected to the centre; and then*
- *Out-of-town centres, with preference given to sites which are or will be well served by a choice of means of transport and which are close to the centre and have a high likelihood of forming links with the centre."*

Having regard to the above the preferred location for new retail development is within a Town Centre. Where this is not possible, due consideration must be given to a site on the edge of Town Centre, and then to an Out-of-Town Centre location, so as to encourage the possibility of one journey serving several purposes.

Notwithstanding the above it is important to re-iterate that the RPG's do not distinguish between a Petrol Filling Station and a Motorway Service Area. Given the nature and function of a Motorway Service Area, the lack of alternative sites available and having regard to the Sequential Test recommended in the RPG's, it is considered that the subject site presents an ideal opportunity for the delivery adequate provision of Motorway Service Stations at appropriate locations in the county.

The proposed development comprises a Motorway Service Area with an ancillary net retail sales area of approximately 250sqm and other associated uses. Given that the proposed Motorway service Area is located on the motorway and aimed solely at motorway users it is not envisaged that the retail element will impact materially ion surrounding commercial/retail development.

1.5.4 Characteristics of the Proposal

The proposed M1 North Motorway Service Area Scheme will provide facilities for M1 Motorway road users who wish to rest during their journeys and/or avail of fuel, toilet and food facilities.

The northern Service Areas will primarily provide fuel and service facilities with ancillary retail, and restaurant uses to motorway users. The proposed development should not be considered as a convenience store similar to that located within a town centre.

1.5.5 Potential Impact of the Proposal

Construction phase
The construction phase of the subject development proposal, will have no impact on existing retail developments within the wider area.

Operational phase
The delivery of a motorway service area at this location will constitute an asset for this area and will deliver significantly enhanced facilities for M1 Motorway road users, both local and national, who wish to rest during their journeys and/or avail of fuel, toilet and food facilities.

There will be no impact on local retail development within the surrounding environs.

Do nothing' scenario

Under a 'do nothing' scenario, there would be no impact on the existing retail structure of the area. In addition there will be no improvements to services on the M1 motorway operating within the study area.

Remedial and reductive measures

Construction phase
No general remedial or reductive measures are envisaged in relation to population levels. Recruitment of construction workers from the local area could be prioritised. The use of local labour will have additional benefits (e.g. less travel time to work).

Operational phase
The proposed Service Area is in line with the policies and objectives of Louth County Council and strategic policy guidance. No remedial or reductive measures are considered necessary during the operational phase of the M1 North Motorway Service Area.

1.5.6 Predicted Impact of the Proposal

Construction phase
The construction phase of the subject development proposal, will have no impact on existing retail developments within the wider area.

Operational phase
The operation of the M1 North Motorway Service Area will be a positive impact on motorway users.

There will be no impact on existing retail developments in the area.

'Worst case' scenario

In this instance, the 'worst case' is in effect the 'do nothing' scenario. In the event that the scheme does not proceed, there will be no improvements to services on the M1 motorway operating within the study area.

Monitoring

Construction phase
No monitoring is considered necessary.

Operational phase
Louth County Council will monitor the land use and development proposals that may bear relation to the Service Area, in the course of their statutory duties under the development control processes.

Reinstatement

Construction phase
No reinstatement measures are envisaged as necessary under this heading.

Operational phase
No reinstatement measures are envisaged as necessary under this heading.

APPENDIX B

TRAFFIC

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1 TRAFFIC IMPACT

1.1 INTRODUCTION

RPS carried out a Traffic Impact Assessment (TIA) as part of the Environmental Impact Statement for the proposed Motorway Service Area (MSA) on the Dunleer to Dundalk section of the M1 Motorway. The proposed MSA, is located within the boundaries of Louth County Council approximately 3.0km to the north of the Drumleck interchange in a predominately rural area of south County Louth.

The main purpose of this assessment is to consider the traffic implications of the proposed development. This TIA assesses the impact of the proposed development on the local road network and deals with the traffic and highway considerations of the development proposals. This will include an assessment of the existing traffic conditions and of the future traffic conditions with and without the proposed development in place. In addition, mitigation measures will be proposed in order to alleviate any significant negative impacts that may arise from the proposed development.

The methodology, as described below, was adopted for this TIA.

1.1.1 Study Area

The study area included the Dunleer to Dundalk section of the M1, two local roads (CR182 and CR185) which are located between both sites, the 2 internal roundabouts within the MSA sites and the 2 proposed priority junctions onto the CR182 and the CR185. The study area is shown in Figure **TR1001**, which is contained in Appendix A of this report.

1.1.2 Assessment Criteria

This Traffic Impact Assessment looked at several criteria of the proposed development and associated construction techniques. The potential impact of the operational and construction phases of this development has been assessed with regard to the local road network in the study area. This assessment has included the:

- **Comparable Site Surveys:** Motorway Service Areas are a new development on Irish roads and no data is currently available in relation to these. Traffic surveys were undertaken at appropriate developments on or near national primary routes to assess the percentage turnoff from the mainline traffic into these developments. Details of these sites and results from the surveys are provided later in this chapter.

- **M1 Registration Plate Surveys:** Registration plate traffic surveys were undertaken at two M1 interchanges to assess the current levels of vehicles leaving the motorway to enter the local road network but returning within a one-hour period. Details of these sites and results from the surveys are provided later in this chapter.

- **Assessment Years:** According to the Institution of Highways and Transportation document 'Guidelines for Traffic Impact Assessment' the traffic implications of a proposed development must be assessed for both the Opening Year and 15 years after the opening of the full development (referred to as the Design Year in this case where new infrastructure is to be provided). This is considered appropriate in order to determine whether the infrastructure can cater for future forecasted traffic levels. The NRA's Draft 'Traffic and Transport Guidelines' recommends assessment timescales of the year of opening and 15 years after the opening year as standard

assessment criteria. In the case of this project, three future years have been tested as part of the assessment.

These assessment years included:

- 2008 Construction Stage
- 2009 'Opening Year' of the proposed development
- 2024 'Design Year', i.e. fifteen years after the Opening Year

- **Link Flows Capacity Assessment:** The current flows on the road network were calculated and the proposed development's traffic flows, for both the construction and operational phases, were added to these existing flows. An assessment was then carried out to measure the impact the development would have on the road network in the surrounding area and whether the road network has the capacity to cater for the traffic associated with the development.

- **Junction Capacity Assessment:** The proposed junctions associated with the development were modelled using PICADY (Priority Intersection Capacity and Delay Version 5), for priority junctions, and ARCADY (Assessment of Roundabout Capacity and Delay Version 6), for roundabout junctions, computer programmes for predicting capacities, queues and delay. These junctions were tested with the aforementioned software to determine if there would any queuing and delay during the opening and design years.

- **Junction Accommodation of HCV movements:** The adequacy of the road network in the vicinity of the proposed development to cater for the associated HCV movements to and from the site were assessed using AutoTrack. AutoTrack analysis consists of a computer simulation of various vehicle movements at specific junctions.

- **Review of Guidelines & International Research:** A review of various guidelines and international research documentation on Motorway Service Areas was undertaken.

1.1.3 Forecasting Methods

The NRA traffic growth factors used to determine the estimated growth in background traffic on the surrounding road network for the assessment years are summarised in **Table 1.1.** This has been calculated using the National Roads Authority's (NRA) traffic growth figures (*NRA Future Traffic Forecasts 2002 – 2040, August 2003*).

The road network within the study area for this project consists of a National Primary Road and Non National Roads. Using the factors, together with existing traffic flows, the future year scenarios were forecasted for all roads in the study network. This is deemed to be robust for the future year traffic assessment.

Table 1.1: Traffic Growth Factors

Road Type	Growth Period	Growth Factor (Cars & LGVs*)	Growth Factor (HCV**)
National Primary	2007 – 2008	1.03	1.03
	2007 – 2009	1.07	1.07
	2007 – 2024	1.41	1.47
Non National	2007 – 2008	1.02	1.01
	2007 – 2009	1.04	1.03
	2007 – 2024	1.21	1.22

* LGVs – Light Goods Vehicles similar to that of a van/ commercial vehicle
** HCVs – Heavy Commercial Vehicles similar to that of a truck or lorry

The future traffic volumes combined the traffic associated with the proposed development were inputted into the Excel Spreadsheet model. A number of scenarios, described later, were tested to assess the impact of the proposed development on the surrounding road network. These scenarios included the comparison of *Do Nothing,* that is without the development in place, and *Do Something,* that is with the development in place.

1.1.4 Comparable Sites

Motorway Service Areas on the road network is a new feature to Ireland. There is no published data available for developments like this in Ireland. In order to determine appropriate traffic parameters/assumptions for the proposed MSA, traffic surveys, undertaken by Count On Us, were carried out at several petrol stations and one road side restaurant. These are located on or near national primary routes across the country and deemed to be appropriate comparison locations. These locations listed as follows are shown in Figures **TR1002-TR1005** contained in Appendix A of this report.

- Texaco Petrol Station located on the N9, approximately 12.5km north of Castledermot
- Apple Green Petrol Station located on the N7, approximately 11km northeast of Naas;
- Esso Petrol Station located on the N7, approximately 3km northeast of Naas;
- Statoil Petrol Station located on the N7, approximately 6km northeast of Naas;
- Top Petrol Station located on the N2, approximately 7km south of Castleblayney; and
- Mother Hubbard's Restaurant located on the R148 (old N4), approximately 8.5km west of Enfield

The surveys undertaken at each of these sites included a 7 day Automatic Traffic Count (ATC) on the main routes adjacent to the sites and AM, PM and off peak surveys of the inward movements to each of the comparable locations. This data was assessed to give the percentage inward movements from the main route and the percentage of HCVs turning in. Further information on the assumptions and analysis is provided later in this chapter.

1.1.5 M1 Registration Plate Surveys

To determine the current traffic patterns on the M1, registration plate traffic surveys, undertaken by Count On Us, were carried out at two interchanges on the M1. These interchanges are located near town in which people could avail of services similar to that in the MSA. These locations listed as follows are shown in Figure **TR1006** contained in Appendix A of this report.

- Hammondstown located approximately 1.5km to the southwest of Dunleer; and
- Drumleck located approximately 2km to the west of Castlebellingham.

The surveys undertaken at each of these sites included a 12 hour registration plate survey on the off and on ramps to the motorway. This data was assessed to give the percentage of the vehicles turnoff the motorway but returning within a one-hour period. Further information on the assumptions and analysis is provided later in this chapter.

1.1.6 Existing Research Documentation

A review of policy documents from both Ireland and the UK was undertaken by West Consult to identify the key policy objectives, which informed our assessment of an appropriate level of patronage for the proposed MSA. The following is an overview of key documentation examined.

1.1.6.1 Transport Research Laboratory (TRL) document 'Turning flows at Motorway Service Areas', 2000

TRL undertook a major research project for the Highways Agency entitled 'Motorway junction layout to increase capacity and safety at low cost'. As part of this project TRL were requested to look at the factors affecting turning flows at Motorway Service Areas (MSA) in the United Kingdom.

TRL carried out surveys at six MSA's incorporating video/questionnaire surveys in 1994 and 1997. One-day video surveys were also carried out at four MSAs in December 1994. The survey details provided in **Appendix B** (including MSA facilities, gross floor area etc) were examined and integrated as part of the approach for the proposed M1 MSA.

The main finding of the video surveys at the MSAs was as follows:

- The relationship between turn-in percentage and main flow was less variable and almost always negative, i.e. the larger the main flow, the smaller the proportion of vehicles turning into an MSA. The average of the turn-in percentage over all the sites was 12.6%.

The main findings of the questionnaire survey were as follows:

- Main reasons given for deciding to stop at the MSA were for rest, refreshment, toilets, and fuel. At both sites, the main reason for stopping at the particular MSA at which interviewing took place was 'convenience' of time/distance.

- Overall, 43% of respondents said they only use MSAs when absolutely necessary and further 15% said they only use them when on business. General (volunteered) comments revealed that at least 45% of respondents considered MSAs to be expensive/overpriced.

- The study confirmed the view that a motorist's decision to turn into a MSA is influenced by his/her journey length, journey purpose, location of a MSA relative to origin and destination, the availability and proximity of other MSAs of alternative facilities off the motorway, and the amount of parking space available at the MSA, based on previous experience.

1.1.6.2 NRA Policy Statement on the Provision of Service Areas on Motorways and High Quality Dual Carriageways

Given the development of motorway and high quality dual carriageway road network in Ireland, the need for resting facilities i.e. availability of fuel, toilet and food facilities has been identified. The NRA put forward the above policy document, which outlines the provision of service areas to cater for users on national roads in Ireland. This takes into account the extensive improvements made and future works planned to the Irish road network.

The following summarises the NRA's strategy for the provision of Service Areas as stated in the policy document:

- *A service area may be defined as a facility for motorists and their passengers which provides extensive parking, fuel station, toilet block, Garda enforcement area and restaurant/food outlet facilities. A service area may be defined as a facility for motorists and their passengers which typically provides a fuel station, shop, restaurant/food outlet, toilet, extensive parking and Garda enforcement area.*

- *Service areas should be provided at intervals of approximately 50-60kms, where feasible/practicable, for motorway/high quality dual carriageway sections of the national road network.*
- *The strategy is for the provision of on-line service areas along motorway/high quality dual carriageway routes.*
- *Proposals must clearly demonstrate that the development would not significantly affect the safety of road users and the operational efficiency of the roadway concerned or of the road network in the area.*
- *Appropriate advanced information signage will be erected on motorways and high quality dual carriageways to advise road users of the location of service areas that have been provided in accordance with the NRA policy.*

This strategy has been followed and integrated as part of the methodology of this motorway service area.

1.1.6.3 NRA Document Draft TA 90 "The Location and Layout of National Road Service Areas"

The NRA document Draft TA 90 gives the general principles to be followed for the siting and layout of service areas on national roads. These principles have been followed in the development of the design for the proposed motorway service area.

The document also provides technical advice with regard to the sizing of service areas. The document requires that the development provide adequate parking within the site to ensure that vehicles do not park on the carriageway of any internal or approach roads where they may impede traffic and create a safety hazard. The extent of parking facilities associated with the service areas is based on an estimate of demand. Demand is affected by factors such as traffic flows, traffic composition, service area spacing, proximity to junctions, and proximity to areas of population and other local facilities.

The number and detail of parking bays provided as part of the scheme are included in Chapter 3 of the EIS.

1.1.7 Guidelines

This TIA has been undertaken in accordance with the EPA document *Guidelines for Information to be contained in Environmental Impact Statements* and the Institute of Highways and Transportation document *Guidelines for Traffic Impact Assessment*. Other sources referred to included:-

- EPA, 2003 *Advice Notes on Current Practices (in the preparation of Environmental Impact Statements);*
- National Roads Authority, Design Manual for Roads & Bridges;
- Highways Agency (UK), Design Manual for Roads & Bridges;
- National Roads Authority, June 2005, Draft Traffic and Transport Assessment Guidelines;
- Dublin Transportation Office, May 2003, Traffic Management Guidelines Manual;
- Scottish Executive, January 2003, Guide to Transport Assessment in Scotland Consultation Paper; and
- Expansion Factors for Short Period Traffic Counts 1978 by J Delvin.

1.2 EXISTING ENVIRONMENT

The proposed development is located within the administrative area of Louth County Council. It is situated in a predominately rural area in eastern County Louth. It is approximately 3km to the north of the Drumleck M1 interchange.

1.2.1 Existing Road Network

1.2.1.1 M1 Motorway

The proposed development will have direct access to/from the M1 Motorway. This section of the M1 Motorway was opened in 2001 as part of the Dunleer-Dundalk Motorway scheme. The M1 is a 2-lane motorway standard road and links the N1 south of Dundalk to Dublin City. It is a main interurban route linking Belfast to Dublin. The M1 is tolled with the toll located approximately 27km to the south of the proposed site on the Drogheda bypass. In the vicinity of the proposed development the nearest interchanges will be the Drumleck interchange, which is approximately 3km to the south, and the Dundalk interchange, which is approximately 8km to the north.

1.2.1.2 CR182 Local Road

The CR182 is classed as a local road and is a link between Dromiskin Village and the N52, via Whiterath Cross Roads. The road width is an average of 6m and has a good road surface condition. A section of this road was upgraded as part of the M1 Motorway scheme. The road was realigned and a bridge was constructed over the M1. This upgraded section of road is of high quality and is approximately 500m long.

1.2.1.3 CR185 Local Road

The CR185 is classed as a local road and was severed by the M1 Motorway scheme. The western section of this road runs from the cul de sac near the M1 to the N52 and is approximately 4.5km in length. There are approximately 9 houses located on this road. This road forms a crossroad junction with the CR182 local road. The road width is an average of 6m but narrows on the approach to the cul de sac to approximately 4.5m. The road has a generally good road surface condition.

1.2.2 Existing traffic flows within the study area

1.2.2.1 M1 Motorway Traffic Flows

The National Roads Authority's (NRA) traffic counter "Drumleck M01-08A", which is located on the road section between the Dundalk and Drumleck interchanges on the M1, was used to estimate the Annual Average Daily Traffic (AADT) on the M1 in 2007. This counter estimates the 2007 two way AADT flow on the M1 on this section of road is currently 27,202 vehicles. The composition of Heavy Commercial Vehicle (HCV) was 13.6% (3,699 vehicles).

1.2.2.2 Traffic Flows on the CR182

ATC surveys were undertaken on 13th to the 14th November 2007 at the M1 over bridge on the CR182. This traffic data was converted to Annual Average Daily Traffic (AADT) flows using the aforementioned expansion factors. The AADT on the CR182 for 2007 was calculated to be 1,595 vehicles with the composition of HCVs being 5% (80 vehicles).

Junction turning movements surveys were also undertaken on Wednesday 21 November 2007 at the CR182 and the CR185 stagger priority junction during the AM and PM peak periods.

1.2.2.3 Traffic Flows on the CR185

Junction turning movements surveys, as stated previously, were undertaken on Wednesday 21 November 2007 at the CR182 and the CR185 stagger priority junction during the AM and PM peak periods. This traffic data was converted to Annual Average Daily Traffic (AADT) flows using the aforementioned expansion factors. The AADT on the CR185 for 2007 was calculated to be 1,327 with the composition of HCVs being 2% (28 vehicles).

1.2.3 Comparable Sites

Motorway Service Areas on the road network is a new feature to Ireland. There is no published data available for developments like this in Ireland. In order to determine appropriate traffic parameters/assumptions for the proposed MSA, RPS in conjunction with Count On Us undertook traffic surveys at several petrol stations and one road side restaurant, which are located on or near national primary routes across the country and deemed to be appropriate comparisons. These sites have been summarised in **Table 1.2** and shown in **Figures TR1002-TR1005**, which are contained in Appendix A of this report.

Table 1.2: Comparable Sites

Location	Description
Texaco Petrol Station located north of Castledermot (single carriageway, western side of N9)	This is located on the N9 is approximately 12.5km north of Castledermot. It has the following facilities available: ATM, two types of car wash, 8 car parking spaces, 4 HCV parking spaces, toilets, shop with deli and coffee dock, seating for 8 people, 8 petrol/diesel pumps and car cleaning area. Also located in the vicinity of the development are Lily O'Brian's Chocolate Shop, Garage, The Railway Store and The Crookstown Store but these do not share an entrance with the petrol station.
Apple Green Petrol Station located on the N7 (multi-lane carriageway, southern side of N7)	This is located on the N7 approximately 11km northeast of Naas Town. It has the following facilities available: ATM, car wash, 24 car parking spaces, toilets, shop with deli and coffee dock, seating for 5 people inside and 12 people outside and 14 petrol/diesel pumps. There is no HCV parking available within the station but it was noted, during a site visit, that trucks park in the lay by of the N7 in order to use the facility.
Esso Petrol Station located on the N7 (multi-lane carriageway, southern side of N7)	This is located on the N7 approximately 3km northeast of Naas Town. It has the following facilities available: ATM, car wash, 20 car parking spaces, 4 HCVs parking spaces, shop including 911 coffee dock serving sandwiches and pizzas, seating for 22 people and 10 petrol/diesel pumps.
Statoil Petrol Station located on the N7 (multi-lane carriageway, southern side of N7)	This is located on the N7 approximately 6km northeast of Naas Town. It has the following facilities available: 2 diesel pumps for HCVs, 16 standard petrol/diesel pumps, unsigned parking for approximately 10 HCVs and 20 cars and a shop including small coffee dock.
Top Petrol Station located on the N2 (single carriageway, eastern side of N2)	The Top Petrol Station is located on the N2 approximately 7km south of Castleblayney. It has the following facilities available: 8 petrol/diesel pumps, unsigned parking for approximately 10 HCVs and 20 cars and a shop including small coffee dock..
Mother Hubbard's Restaurant located on the R148 (single carriageway, southern side of R148)	The Mother Hubbard's Restaurant is located on the R148 (old N4) approximately 8.5km west of Enfield. There are two restaurants in this development although one is currently closed and is to let. The restaurant that is operating on the site has seating for approximately 60 people and is opened throughout the day. The parking available at the site is extensive with approximately 94 car parking spaces or 20 HCV parking spaces. There was also a sign for a barbershop in the development but it was not opened during the site visit and could not be confirmed whether it is still operating here.

The surveys undertaken at each of these sites included 7 day Automatic Traffic Count (ATC) on the main route adjacent on the site and AM, PM and off peak surveys of the inward movements to each of the service areas. Three of the service stations were located close together on the N7 between Rathcoole and Johnstown, and therefore only one ATC survey was required for the mainline.

1.2.3.1 Automatic Traffic Counts (ATC)

Independent ATCs were undertaken by Count-On-Us on behalf of RPS at four sites over a one-week period between the 13th and 19th of June 2007. The N7 site required to be resurveyed due to a technical fault. This was undertaken between the 19th and 25th of July 2007. The traffic data was also converted to AADT flows using aforementioned expansion factors as summarised in **Table 1.3.**

Table 1.3:Existing AADTs on mainline routes adjacent to Comparison Sites

Comparable Site Surveys			
Location Number	**ATC Site Location**	**AADT**	**% HCV**
1	Texaco Petrol Station located on the N9, approximately 12.5km north of Castledermot	15,702	6.8
2	Top Petrol Station located on the N2, approximately 7km south of Castleblayney	7,664	9.4
3	Mother Hubbard's Restaurant located on the R148 (old N4), approximately 8.5km west of Enfield	6,608	13.4
4	N7 Westbound, 500 metres west of Applegreen Petrol Filling Station	28,616	8.6

1.2.3.2 Turn In Surveys

The comparable sites also had the inward movements to the service areas surveyed during the AM, PM and off peaks on a midweek day, during the same period as the ATC surveys were undertaken. This data was assessed, together with the ATC surveys, to give the percentage inward movements from the main route to the service area and the percentage of HCVs using the service areas. **Table 1.4**, summarises the findings for the comparable sites.

Table 1.4: Comparison Sites Surveys Summary

Comparable Site Surveys			
Location Number	**Site Description**	**% Turn In Movements**	**% HCV**
1	Texaco Petrol Station - N9	8.8%	5.1%
2	Top Petrol Station - N2	11.7%	17.2%
3	Mother Hubbard's Restaurant - R148	4.9%	27.8%
4A	Apple Green Petrol Station - N7	7.2%	3.8%
4B	Esso Petrol Station - N7	5.0%	8.4%
4C	Statoil Petrol Station - N7	4.3%	33.5%
Average	All Sites	7.0%	16.0%

The range in the percentage turn in movements can be seen in **Table 1.4**. The lowest % turn in movements was seen at the Statoil petrol station on the N7, with 4.3%, and the highest was at the Top

petrol station on the N2 near Castleblayney, with 11.7%. The overall turn in percentage of all the sites over the three different time periods was 7.01% with the average HCV % calculated as 16.04%.

1.2.4 Registration Plate Surveys

To determine the current traffic patterns on the M1, registration plate traffic surveys, undertaken by Count On Us, were carried out at two interchanges on the M1. These interchanges are located near towns in which people could avail of services similar to that in the MSA. These locations listed as follows are shown in Figure **TR1006** contained in Appendix A of this report.

- Hammondstown located approximately 1.5km to the southwest of Dunleer; and
- Drumleck located approximately 2km to the west of Castlebellingham.

The surveys undertaken at each of these sites included a 12 hour registration plate survey on the off and on ramps to the motorway. This data was assessed to give the percentage of the vehicles turnoff the motorway but return within a one-hour period.

The results from these surveys are summarised in **Tables 1.5** to **1.8** below.

Table 1.5: Hammondstown Interchange Survey Results

Site	Flow	Plates Record	Sample %	Matches	Match %
Northbound Off-Slip	957	910	95.1%	104	11.4%
Northbound On-Slip	1,683	1,609	95.6%	108	6.7%
Southbound Off-Slip	1,648	1,633	99.1%	115	7.0%
Southbound On-Slip	920	880	95.7%	111	12.6%
Total	5,208	5,032	96.6%	438	8.7%

Table 1.6: Drumleck Interchange Survey Results

Site	Flow	Plates Record	Sample %	Matches	Match %
Northbound Off-Slip	840	820	97.6%	72	8.8%
Northbound On-Slip	416	405	97.4%	61	15.1%
Southbound Off-Slip	507	502	99.0%	71	14.1%
Southbound On-Slip	786	726	92.4%	82	11.3%
Total	2,549	2,453	96.2%	286	11.7%

Table 1.7: Hammondstown Interchange Return Journeys

Hammondstown Interchange			
	Destination		
Origin	Northbound On slip	Southbound On slip	Total
Northbound Off slip	48	56	104
Southbound Off slip	60	55	115
Total	108	111	219

Table 1.8: Drumleck Interchange Return Journeys

Drumleck Interchange			
	Destination		
Origin	Northbound On slip	Southbound On slip	
Northbound Off slip	32	40	72
Southbound Off slip	29	42	71
Total	61	82	143

It can be seen from **Tables 1.7** and **1.8** that 219 vehicles at the Hammondstown interchange and 143 vehicles at the Drumleck interchange left the motorway and returned within an hour. These figures correspond to AADTs of 271 and 177 for the Hammondstown interchange and the Drumleck interchange respectively. When these turn off AADTs are compared with the mainline flow on the M1 motorway at each location, the turn off percentage is 0.81% for the Hammondstown interchange and 0.65% for the Drumleck interchange. The results indicate that a very low number vehicles would use local services surrounding these interchanges.

1.2.5 Accident Data

An assessment of accident data within the Study Area was undertaken to determine if there were any existing problems on the road network. The NRA accident data for an 8 year period (1996– 2004) was extracted for the sections of road in the vicinity of the proposed development. The available accident data information has been summarised in **Table 1.9**. The results of the accident data were divided into different categories of 'Fatal', 'Serious' or 'Minor'. The accidents are also shown in **Figure TR1007**, contained in Appendix A, the recorded accident data does not include "material damage only" accidents, or accidents which were not reported to or recorded by the Gárda Síochana.

Table 1.9: Accident Statistics for adjacent road network.

Road Section	Fatal Injury	Serious Injury (Number of Incidents)	Minor Injury (Number of Incidents)
M1	0	0	3
CR182	1	1	5
CR185	0	0	6

The results show that there have been a number of minor accidents recorded on the CR182 including one serious accident to the west of Whiterath Cross Roads. There is limited accident data available on the serious accident. It occurred in June 1997.

One fatal accident appears to have occurred on the CR182 near the M1 over bridge, from **Figure TR1007**, but when the accident data was reviewed this accident actually occurred on the M1.This fatal accident occurred on the Thursday, 26th June 2003 and involved 3 vehicles. There were also three minor accidents on the M1. Six minor accidents occurred on the CR185.

1.2.6 Public Transport

The area of the proposed MSA site is served predominately by bus. Bus Eireann and other private bus operators provide regular services from Dublin to Belfast and Dundalk and vice versa, which pass in the vicinity proposed development. These services operate extensively throughout the day.

The proposed MSA site is located to the west of the Dublin to Belfast railway line. The nearest railway station is over 10km away in Dundalk. This station has regular services to and from Dublin City Centre and all major towns including Belfast and Drogheda.

There are no cycling or pedestrian facilities currently available within the area of the proposed MSA sites. It should be noted that given the nature of the development and that the only public access to site is from the M1 motorway, there will be no pedestrian and cyclist movements to or from the site.

1.2.7 Committed development

A review of relevant planning applications submitted to Louth County Council over the past five years was undertaken to establish the committed development within the vicinity of the proposed development. This information would determine if the committed development would result in increased traffic levels within the vicinity of the proposed development. The committed developments were assessed to determine whether the traffic flows generated by these developments would have been accounted for in the traffic surveys undertaken. The granted planning permissions examined relate to a housing development for approximately 18 houses, one-off houses or amendments to existing dwellings, which would not add a significant traffic contribution to the road network in this locality. They have therefore been discounted in terms of the traffic assessment for the M1 MSA.

1.3 IMPACTS

1.3.1 Description of proposed development

The subject site is split into two sites one west and one east of the M1 motorway. The west site is bound to the north, south and west by agricultural lands. The east site is bound to the north by the CR182, to the south is bound by agricultural lands and to the east it is bound by the Dublin/Belfast rail line. Further information on the proposed development is provided in **Volume 2 Chapter 3** of this EIS. The proposed development consists of the construction of an MSA including fuel facilities, retail units and restaurants to be provided on both sides of the motorway. The MSA is expected to provide a fuel station, restaurant, shop, children's play area and information kiosk on each site. The MSA will also contain toilets, Garda enforcement areas and parking provision for cars and HCVS. In addition, a local access road will be provided at each site in order to facilitate employees.

1.3.2 Assessment Years

The 'Base Year', 'Year of Opening' and the 'Design Year' were evaluated for the scheme. The 'Base Year' for the scheme is identified as 2007 to correspond to the traffic data collection. The 'Year of Opening' of the scheme is expected to be 2009. In accordance with the IHT Guidelines and the NRA's draft document "Traffic and Transport Assessments Guidelines" the scheme should be tested for a period of 15 years beyond the construction of the infrastructure ('Year of Opening'). This gives a 'Design Year' of 2024 for the scheme.

1.3.3 Future Background traffic flows

The estimated future year traffic volumes within the Study Area were calculated using the National Roads Authority's (NRA) traffic growth figures (*NRA Future Traffic Forecasts 2002 – 2040, August 2003*) as shown in **Table 1.1**. These growth factors were applied to the existing traffic flows on the

road network surrounding the development. A summary of the existing traffic flows and the proposed traffic flows are shown below in **Table 1.11**.

Table 1.11: Future Traffic Flows

Assessment Year	Year	M1 (Drumleck section) Predicted AADT	CR182 Predicted AADT	CR185 Predicted AADT
Base Year	2007	27,202	1,595	1,327
Construction Year	2008	28,098	1,616	1,345
Opening Year	2009	28,977	1,645	1,369
Design year	2024	38,482	1,935	1,611

The future traffic volumes combined with the traffic associated with the proposed development were inputted into the Excel Spreadsheet model. A number of scenarios, described later, were tested to assess the impact of the proposed development on the surrounding road network. These scenarios included the comparison of *Do Nothing,* that is without the development in place, and *Do Something,* that is with the development in place.

1.3.4 Operational Phase

1.3.4.1 Trip Generation

The proposed MSA sites are expected to be open 24 hours a day everyday of the year. Given the nature of this development it was assumed that the MSA will not generate additional trips onto the road network, instead the trips to the MSAs will be 100% bypass trips. It was also assumed there would be a link between the number of vehicles entering the site and the number of vehicles on the M1 Motorway. The estimated number of vehicles entering and exiting the proposed MSA has been based on traffic activities at the comparable sites surveyed and available international research.

The comparable sites surveyed showed an average of 7.0% vehicles turning off the mainline into the sites with 16% of these vehicles being HCVs. TRL undertook 12 surveys, 4 in 1994, 2 in 1997 and 6 in1998 on six different sites when producing the research document on the turning flows at MSAs. These surveys showed an average of 12.6% vehicles turning off the mainline in the sites.

Taking into account the comparable site surveys undertaken in Ireland and the results from the TRL document it was deemed appropriate to take an average of 12% turn off to produce a robust assessment and to allow for additional trip generation to a development of this type. This turnoff percentage is total vehicles and it was further assumed of the 12% figure, 16% would be HGVs, based on the comparable site surveys.

The following **Table 1.12** summarises the predicted trips to the MSAs for the 'Opening Year', 2009, and the 'Design Year', 2024 scenarios.

Table 1.12: Predicted MSAs Daily Traffic Flows

Year	AADT (vehicles)	HCVs (vehicles)
2009	1,739	282
2024	2,309	375

The local service access will be restricted to employees only. It is anticipated that these accesses could generate a number of new trips on the local roads surrounding the site. It is considered that the maximum daily two-way flow on this road is estimated to be approximately 120 vehicles.

1.3.5 Trip Distribution

The main traffic to and from both sites will use the M1 motorway. Therefore the traffic using the MSAs will continue their journey once they leave the MSA site and there will be no impact on the trip distribution around the development.

There will however be a small percentage of vehicles using the local road to the MSA sites. These will be restricted to 120 two way movements per day for the two local service area accesses. It is anticipated that 50% will arrive from/ depart to the CR182 East, 25% will arrive from/ depart to the CR182 West and 25% will arrive from/ depart to the CR185 south, this is based on current traffic flows on the local road.

1.3.6 Operational Phase impacts

This section examines the potential impact of the proposed development on the surrounding road network. The road network is tested with and without the proposed development in place i.e. Do Nothing and Do Something. The proposed development traffic in the Do Something Scenario includes the MSAs traffic. The results, described below, will show whether any of the junctions within the study area will experience operational difficulties such as queuing or delay.

1.3.7 Design Years Junction Capacity Analysis

The existing traffic flows, taken from the traffic counts carried out in 2007 and the traffic data from the M1, together with the MSA have been used to put together the predicted traffic flows for the future design years. The future scenarios described below were analysed for both AM peak (08:00 – 09:00) and PM peak (17:00 – 18:00) hours and the turning movements for these scenarios are shown in **Figures TR1008 to TR1011** contain in Appendix A of this report.

The following summarises each scenario tested:-

- ***Do Nothing 2009***(i.e. without the MSAs in place). This includes the 2007 traffic flows factored to 2009 using the NRA growth rates.
- ***Do Something 2009*** (i.e. with the MSAs in place). This includes the 2007 traffic flows factored to 2009 using the NRA growth rates and the traffic associated with the MSA
- ***Do Nothing 2024*** (i.e. without the MSAs in place). This includes the 2007 traffic flows factored to 2024 using the NRA growth rates
- ***Do Something 2024*** (i.e. with the MSAs in place). This includes the 2007 traffic flows factored to 2024 using the NRA growth and the traffic associated with the MSA

1.3.7.1 Junction capacity analysis

The four proposed junctions associated with the development and the existing CR182/CR182 priority junction were tested for operational capacity in order to determine whether they will operate effectively

or have capacity issues at these junctions by the way of queuing and delays etc. These have been tested using junction capacity models, PICADY (Priority Intersection Capacity and Delay) version 5.0 and ARCADY (Assessment of Roundabout Capacity and Delay) version 6.0. These junction models are based on the Ratio to Flow Capacity (RFC), which is the output figure of each junction arm. If the RFC value exceeds 0.85, then the junction is considered not to be operating satisfactorily and would experience junction delays and queuing. The following summarises the results of the junction capacity analysis for each junction during the Opening Year 2009 and Design Year 2024. The relevant turning counts traffic flows/AADT information for each junction have been shown in **Figures TR1008 to TR1011** as provided in Appendix A of this report. Junction details are contained in **Volume 2 Chapter 3** of this EIS.

In the Do Nothing scenarios there will be no development in place on either of the sites, and therefore there will be no junctions constructed on the road network. The only junction assessed for the Do Nothing scenarios was the CR182/CR185 priority junction, as this will be the only junction that will be in existence.

1.3.7.2 CR182 Local Road and CR185 Local Road Staggered Priority Junction (No 1)

The priority junction was modelled, using PICADY, for future traffic flows with and without the MSA development traffic. The junction arm labelling convention is as follows:

- Arm A – CR182 East
- Arm B – CR185 South
- Arm C – CR182 West
- Arm D – CR185 Cul de sac/ MSA access

The relevant turning counts can be seen in **Figures TR1008 to TR1011**. **Table 1.13** summarises the results of the crossroads capacity analysis. The information in **Table 1.13** indicates that the priority junction is significantly under capacity during the weekday peaks for all test years with the proposed MSA development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

Table 1.13: CR182 and CR185 Staggered Junction Capacity Analysis Results

	Arm A CR182 Eastbound		Arm B CR185 Southbound		Arm C CR182 Westbound		Arm C CR185 Cul de sac/MSA Access	
Weekday	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**
2009								
2009 "Do Nothing" AM Peak	0.005	0.01	0.108	0.12	0.011	0.01	0.010	0.01
2009 "Do Nothing" PM Peak	0.014	0.01	0.095	0.10	0.005	0.01	0.006	0.01
2009 "Do Something" AM Peak	0.018	0.02	0.125	0.14	0.011	0.01	0.020	0.02
2009 "Do Something" PM Peak	0.027	0.03	0.113	0.13	0.005	0.01	0.023	0.02
2024								
2024 "Do Nothing" AM Peak	0.007	0.01	0.126	0.14	0.013	0.01	0.011	0.01
2024 "Do Nothing" PM Peak	0.018	0.02	0.111	0.12	0.007	0.01	0.009	0.01

2024 "Do Something" AM Peak	0.020	0.02	0.144	0.17	0.013	0.01	0.022	0.02
2024 "Do Something" PM Peak	0.031	0.03	0.129	0.15	0.007	0.01	0.026	0.03

* Q denotes the number of vehicles in a queue on a given junction arm

1.3.7.3 CR182 Local Road and East MSA Site Access Junction (No 2)

The priority junction was modelled, using PICADY, for future traffic flows with the MSA development traffic. The junction arm labelling convention is as follows:

- Arm A – CR182 Eastbound
- Arm B – East MSA Service Access
- Arm C – CR182 Eastbound

The relevant turning counts can be seen in **Figures TR1008 to TR1011**. **Table 1.14** summarises the results of the crossroads capacity analysis.

Table 1.14: CR182 and East MSA Access Junction Capacity Analysis Results

	Arm A CR182 Eastbound		Arm B East MSA Service Access		Arm C CR182 Eastbound	
Weekday	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**
2009						
2009 "Do Something" AM Peak	-	-	0.014	0.01	0.015	0.02
2009 "Do Something" PM Peak	-	-	0.014	0.01	0.015	0.02
2024						
2024 "Do Something" AM Peak	-	-	0.014	0.01	0.015	0.02
2024 "Do Something" PM Peak	-	-	0.015	0.01	0.015	0.02

* Q denotes the number of vehicles in a queue on a given junction arm

Table 1.14 indicates that the priority junction is significantly under capacity during the weekday peaks for all test years with the proposed MSA development. Arm A does not have any values as its associated movements are not required to give way to any other arms (i.e. straight through movement and a left turn movement). It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

1.3.7.4 East MSA Roundabout (No 3)

The M1/East MSA Roundabout junction was analysed using ARCADY, and a summary of the results can be seen in **Table 1.15**. The junction arm labelling convention is as follows:

- Arm A – M1 Off Slip
- Arm B – MSA

- Arm C – M1 On Slip

Table 1.15: M1/East MSA Roundabout Junction Capacity Results

	Arm A M1 Off Slip		Arm B MSA		Arm C M1 On Slip	
Weekday	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**
2009						
2009 "Do Something" AM Peak	0.067	0.1	0.071	0.1	-	-
2009 "Do Something" PM Peak	0.080	0.1	0.085	0.1	-	-
2024						
2024 "Do Something" AM Peak	0.088	0.1	0.094	0.1	-	-
2024 "Do Something" PM Peak	0.105	0.1	0.113	0.1	-	-

* Q denotes the number of vehicles in a queue on a given junction arm

Table 1.15 indicates that the roundabout junction is significantly under capacity during the weekday peaks for all test years with the proposed MSA development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

1.3.7.5 West MSA South Roundabout (No 4)

The M1/West MSAs south roundabout junction was analysed using ARCADY, and a summary of the results can be seen in **Table 1.16**. The Junction arm labelling convention is as follows:

- Arm A – M1 Off Slip
- Arm B – Service Access
- Arm C – MSA
- Arm D – Internal Link Road

Table 1.16: M1/West MSA South Roundabout Junction Capacity Results

	Arm A M1 Off Slip		Arm B Service Access		Arm C MSA		Arm D Internal Link Road	
Weekday	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**
2009								
2009 "Do Something" AM Peak	0.072	0.1	0.007	0.0	-	-	0.007	0.0
2009 "Do Something" PM Peak	0.086	0.1	0.008	0.0	-	-	0.007	0.0
2024								

2024 "Do Something" AM Peak	0.095	0.1	0.008	0.0	-	-	0.007	0.0
2024 "Do Something" PM Peak	0.114	0.1	0.008	0.0	-	-	0.007	0.0

* Q denotes the number of vehicles in a queue on a given junction arm

Table 1.16 indicates that the roundabout junction is significantly under capacity during the weekday peaks for all test years with the proposed MSA development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

1.3.7.6 West MSA North Roundabout (No 5)

The M1/West MSAs north roundabout junction was analysed using ARCADY, and a summary of the results can be seen in **Table 1.17**. The Junction arm labelling convention is as follows:

- Arm A –Internal Link Road
- Arm B – MSA – LV and Cars Exit
- Arm C – MSA – HGV Exit
- Arm D – M1 On Slip

Table 1.17: M1/West MSA North Roundabout Junction Capacity Results

	Arm A Internal Link Road		Arm B MSA – LV and Cars Exit		Arm C MSA – HGV Exit		Arm D M1 On Slip	
Weekday	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**	**Max RFC**	**Max Q**
2009								
2009 "Do Something" AM Peak	0.000	0.0	0.056	0.1	0.023	0.0	-	-
2009 "Do Something" PM Peak	0.000	0.0	0.075	0.1	0.019	0.0	-	-
2024								
2024 "Do Something" AM Peak	0.000	0.0	0.072	0.1	0.032	0.0	-	-
2024 "Do Something" PM Peak	0.000	0.0	0.097	0.1	0.026	0.0	-	-

* Q denotes the number of vehicles in a queue on a given junction arm

Table 1.17 indicates that the roundabout junction is significantly under capacity during the weekday peaks for all test years with the proposed MSA development. It is considered that queuing and delay is unlikely to occur at this junction. The junction is therefore expected to perform satisfactorily even with the proposed development in place.

1.3.8 Link Capacity

A link capacity assessment was undertaken of the road network in the study area.

The NRA's document "Road Link Design" TD 9/05 was used to establish the theoretical capacity of the road sections within the study area. This document givens a number of different road types and the corresponding theoretical capacity of each in Table 4 'Recommended Rural Road Layouts'. The M1 Motorway is considered to be a 'Wide Dual 2 Lane (7.5m) Motorway D2M' with a corresponding theoretical capacity of 55,500 AADT. However, the smallest road type in this document is a reduced single (7.0m) carriageway S2, as the local road (L1003-1) has an average cross section of 6m the theoretical capacity for the reduced single (7.0m) carriageway S2 will therefore require a reduction to reflect this.

The saturation flows for a 7.0m carriageway and a 6.0m carriageway were calculated using the Greater Manchester Transportation Unit guidelines. The ratio between a 7.0m carriageway and a 6.0m carriageway was calculated and this ratio was then applied to the 7.0m carriageway's theoretical capacity to establish the theoretical capacity for a 6.0m carriageway.

Using these theoretical capacities and the future AADTs on the road network it was possible to calculate the percentage link capacity, which will be used on the roads in the study area. **Table 1.18** overleaf summaries the results.

Table 1.18: Future AADT with and without Development Traffic

Year	Location	AADT without Development	Theoretical Capacity (AADT)	AADT with Development	% Increase due to Development	% Spare Capacity
2009	M1	28,977	55,500*	28,977	0%	47%
2009	CR182	1,645	8,381**	1,765	7.3%	78%
2024	M1	38,482	55,500*	38,482	0%	30%
2024	CR182	1,935	8,381**	2,055	6.2%	75%

*From NRA TD 9/05, "Road Link Design", Table 4

**From NRA TD 9/05 theoretical capacities reduced by applying reduced factor from the Greater Manchester Transportation Unit guidelines

Table 1.18 indicates that the road network surrounding the development is significantly under capacity with the proposed MSA development in place. It is considered that queuing and delays would be unlikely to occur on the road network. The road network is therefore expected to perform satisfactorily with the proposed development in place.

1.3.9 Summary of Traffic Impacts during the Operational Phase

The Motorway Service Areas will not result in traffic congestion or operational problems on the road network. All junctions have been proven to operate satisfactorily in the Opening Year 2009 and the Design Year 2024. The sensitivity testing has showed the road network has sufficient reserve capacity to accommodate Motorway Service Areas satisfactorily.

The overall impact of Motorway Service Areas in terms of traffic impact will be imperceptible (as defined under the EPA *Guidelines for Information to be Contained in Environmental Impact Statements*

1.4 OPERATIONAL MITIGATION MEASURES

The following measures shall be incorporated into the final design of the site:

- The local service access for the motorway service area on the CR182 and the CR185 for the western and eastern sites shall be a private controlled access and shall be restricted to staff cars. All other vehicles shall access the service area via the M1 motorway.

The results of the traffic assessment, which included the above measures, showed that no operational difficulties are anticipated. Mitigation measures as a result are not required for any of the junctions affected by MSAs.

1.5 CONSTRUCTION IMPACTS AND MITIGATION MEASURES

1.5.1 Construction Impacts

1.5.1.1 Description of construction process and phasing

The proposed M1 Motorway Service Area Scheme will involve the construction of two service areas on both sides of the M1 with a resting area and fuel, toilet and food facilities. The construction of the both MSAs is expected to take 12 months in total. The western and eastern sites are expected to be built simultaneously. Public access to the Service Areas will be restricted to direct access from the M1 Motorway via slip roads and at-grade roundabouts.

The construction of the infrastructure for the two MSAs will comprise of 4.5 kilometres of single carriageway road within the proposed sites and four slip roads and associated tapers to be constructed adjacent to the live M1 Motorway. The pavement works also include some 23,500 sq. m of vehicle parking and 11,500 sq. m of hard standing at the fuel service station forecourts.

It will not be permitted to use the existing local road network for any construction traffic, including personnel movements, and consequently all haulage and access to and from the site will have to be made from the M1 Motorway. To minimise any impacts on other road users and to maximise safety, comprehensive traffic management measures will be required to ensure that construction traffic can be segregated onto the hardshoulder of the motorway.

1.5.1.2 Construction Traffic Generation

It is assumed that construction will take approximately 12 months to undertake however this period could be extended depending on when earthworks for the scheme could be organised. It is considered that first six months will have the highest level of traffic activity with the majority of the construction HGVs traffic movements occurring during this time. This has been used as the worst case scenario of traffic levels during the construction period. A breakdown of the construction movements has been summarised in **Table 1.19.**

In addition to the earthworks fill material, the main road building material, the main road building materials that will be hauled to site in bulk include capping materials, granular sub-base material, bituminous pavement materials, concrete and drainage filter material. It was calculated that the roads and paved areas within the site would, in total, require the importation of approximately 25,500m^3 of material to the site.

Concreting operations will include the raft foundation for amenity building and the pavement construction for the hard standings for the lorry parks and the fuel service stations. It is estimated that the construction of these structures will involve pouring some 1,000m^3 of concrete, which could involve up to 200 truckloads of concrete.

In addition, material will also be required for the construction of the amenity buildings of the Service Area. It is envisaged that trips associated with this is likely to be considerably less than that previously described.

Table 1.19: Average Number of HGVs during the busiest Construction Period

Material Movement	Volume (cubic meter)	Total HGVs Required Deliveries	HGVs in the highest Month of Construction Stage	Maximum Daily HGVs**
Earthworks*				
Fill Material***	38,000	3,800	633	32
Pavement Material****	25,500	2,550	850	43
Concrete Works***		200	33	2
Total				**77**

*Assuming 10 cubic meter per lorry load
** Assuming 20 working days per month
***Movements over 6 months
****Movements over 3 months

It is estimated that an average of 76 HGVs (one way) trips would be expected on a daily basis during the peak construction period of the MSAs. There will be approximately 152 HGVs (two way) trips anticipated on a daily basis using the M1 motorway during the construction stage.

1.5.1.3 Construction Staff Movements

In addition to those vehicles construction material to the proposed development, there will also be construction site personnel movements. It is estimated by the Project Engineers that the highest number of construction staff will be in the last 6 months of the project with in the order of 50 workers per site.

1.5.2 Trip Distribution

The haulage route for all construction traffic travelling to and from the proposed sites must travel via the M1, as it will not be permitted to use the existing local road network. Exception maybe made with local authority approval.

1.6 CONSTRUCTION PHASE IMPACTS

1.6.1 Link Capacity

A link capacity assessment was undertaken of the road network in the study area during the construction period. This followed the same approach as described earlier in this report, which is based on the NRA document "Road Link Design" TD 9/05. **Table 1.20** summaries the results.

Table 1.20: Future AADT During Construction Phase

Year	Location	AADT without Development	Theoretical Capacity (AADT)	AADT with Development	% Increase due to Development	% Spare Capacity
2008	M1	28,098	55,500*	28,602	1.8%	48.5%

*From NRA TD 9/05, "Road Link Design", Table 4

Table 1.20 indicates that the M1 is under capacity during the construction stage of the proposed development. The proposed construction traffic will increase traffic on the M1 by 1.8%. It is considered that queuing and delays would be unlikely to occur on the road network as a result from the construction stage of the proposed development.

1.6.2 Summary of Construction Impacts

The construction of the both MSAs is expected to be undertaken simultaneously and take 12 months. The use of local road network will not be allowed for any construction traffic, including site personnel movements, consequently all movements to and from the site will be made via the M1 Motorway. It is estimated that an average of 152 HGVs (two way) trips and 200 site personnel (two way) trips would be expected on a daily basis during the peak construction period of the MSAs. The link capacity assessment showed that the road network surrounding the proposed sites can adequately cater for the projected traffic levels during the construction stage.

1.7 PROPOSED CONSTRUCTION MITIGATION MEASURES

While there are no requirements to improve existing junction layouts, the following restrictions are recommended to provide for an ordered and regulated system of traffic management for this operation. A number of measures have been proposed as follows:

- A Construction Traffic Management Plan shall be prepared and implemented by the Contractor to minimise any impacts on other road users and to maximise safety.
- All construction traffic, including light vehicles, travelling to and from the proposed sites must travel via the M1, as they will not be permitted to use the existing local road network for haulage of plant and materials to and from the site, due to the loading restriction that are in place.
- Wheel wash facilities will be provided on site to ensure that construction debris will not have an impact on the quality of roads in the surrounding area

- Construction vehicles shall not be permitted to park on the local road network or on the hard shoulder of the M1 motorway. Parking will be provided on the construction site for both employees and visitors.

1.8 RESIDUAL IMPACTS

The Motorway Service Areas have already been assessed with the recommended mitigation measures detailed in this TIA and the results showed that no operational difficulties are expected. It can be stated, therefore, that the overall impact of Motorway Service Areas in terms of traffic impact will be imperceptible (as defined under the EPA *Guidelines for Information to be Contained in Environmental Impact Statements)*.

1.9 CONCLUSIONS

The following can be concluded from the Traffic Impact Assessment:

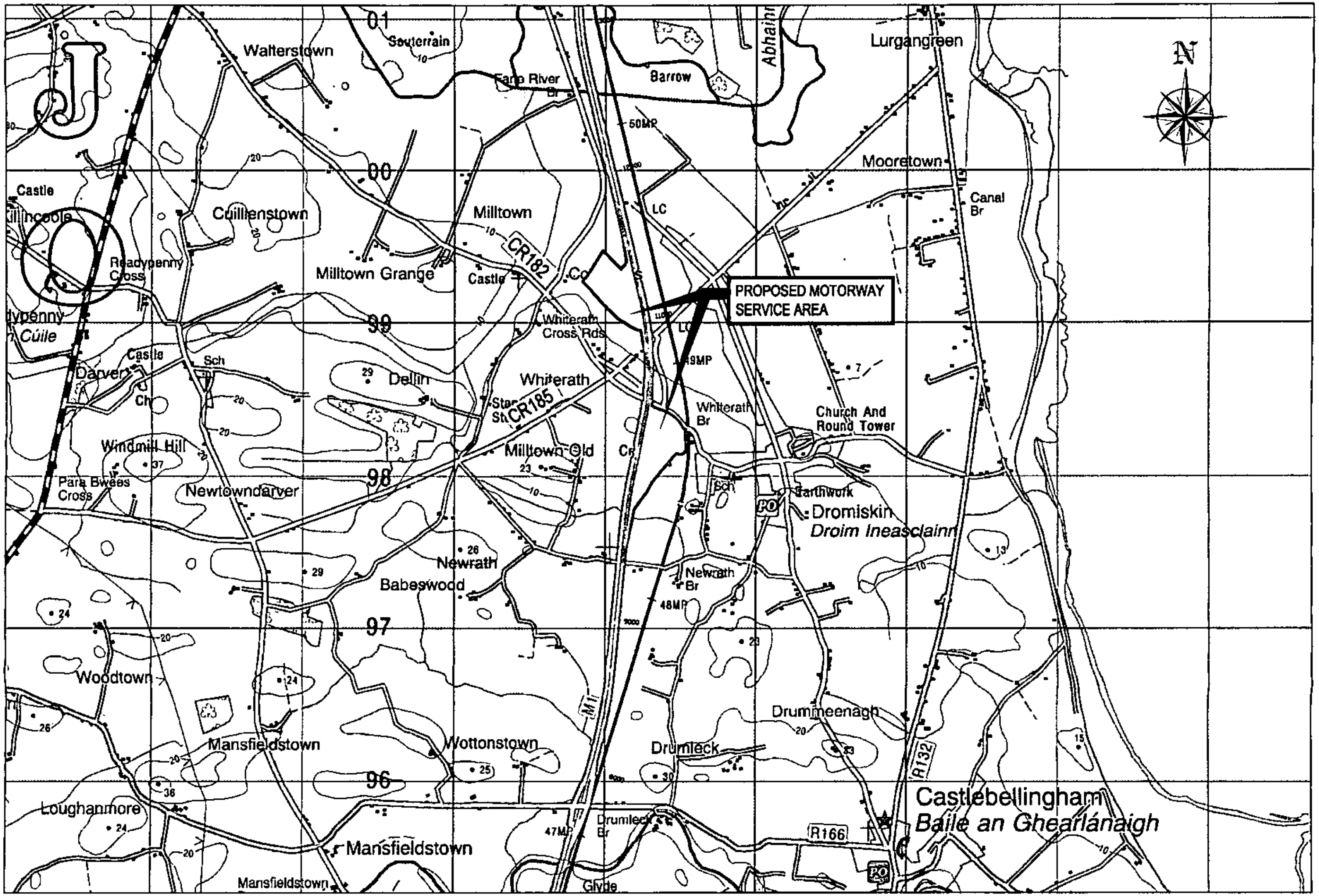
- The Motorway Service Areas will not result in traffic congestion or operational problems on the road network. All junctions have been proven to operate satisfactorily in the Opening Year 2009 and the Design Year 2024. The sensitivity testing has showed the road network has sufficient reserve capacity to accommodate Motorway Service Areas satisfactorily;

- The Motorway Service Areas construction traffic will be restricted to a specific haulage route where there is high quality road infrastructure, that is the M1 Motorway; and

The overall impact of Motorway Service Areas in terms of traffic impact will be imperceptible (as defined under the EPA *Guidelines for Information to be Contained in Environmental Impact Statements)*.

APPENDIX A

Figures



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								Checked: TD	File Ref: MDT0146TR1001	
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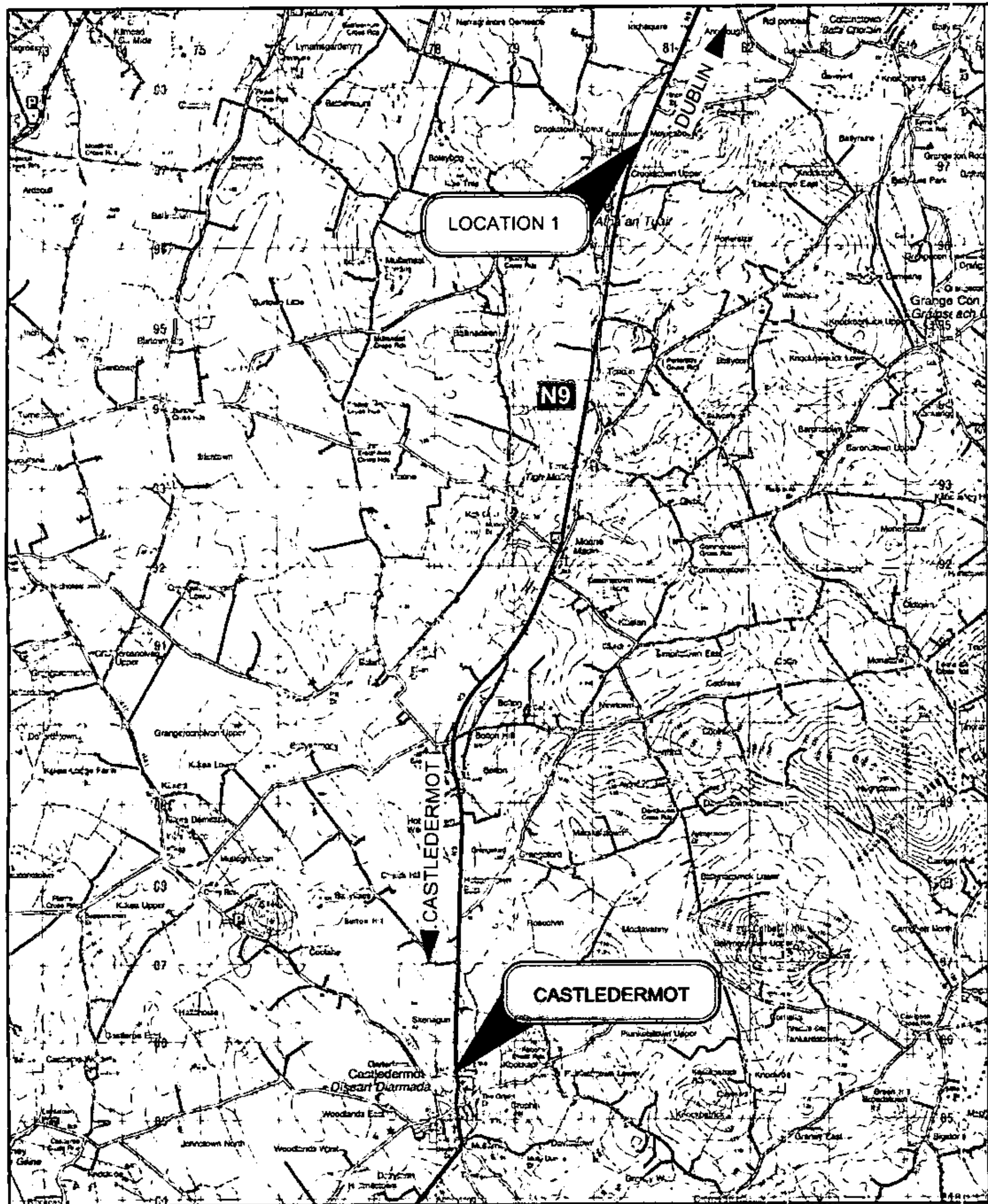

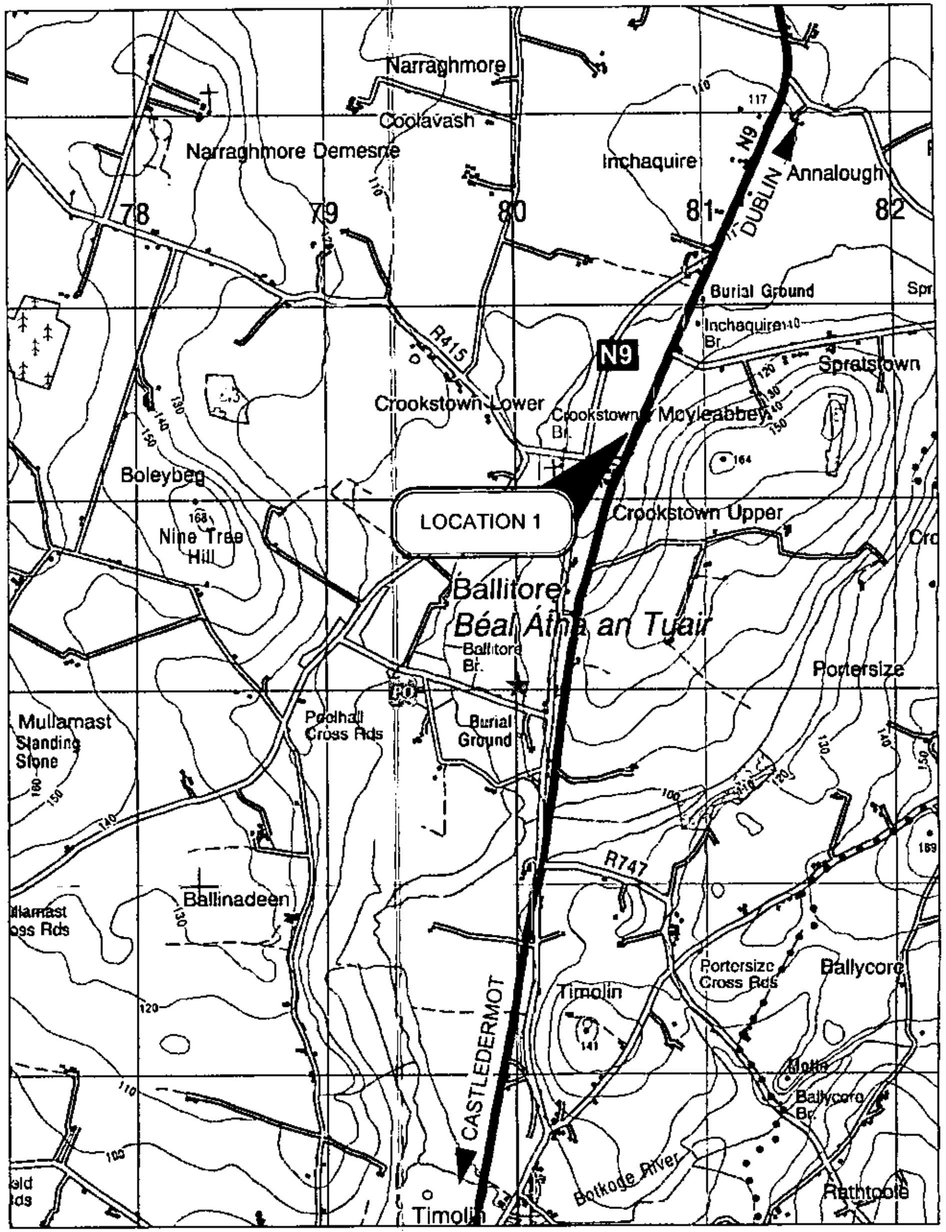

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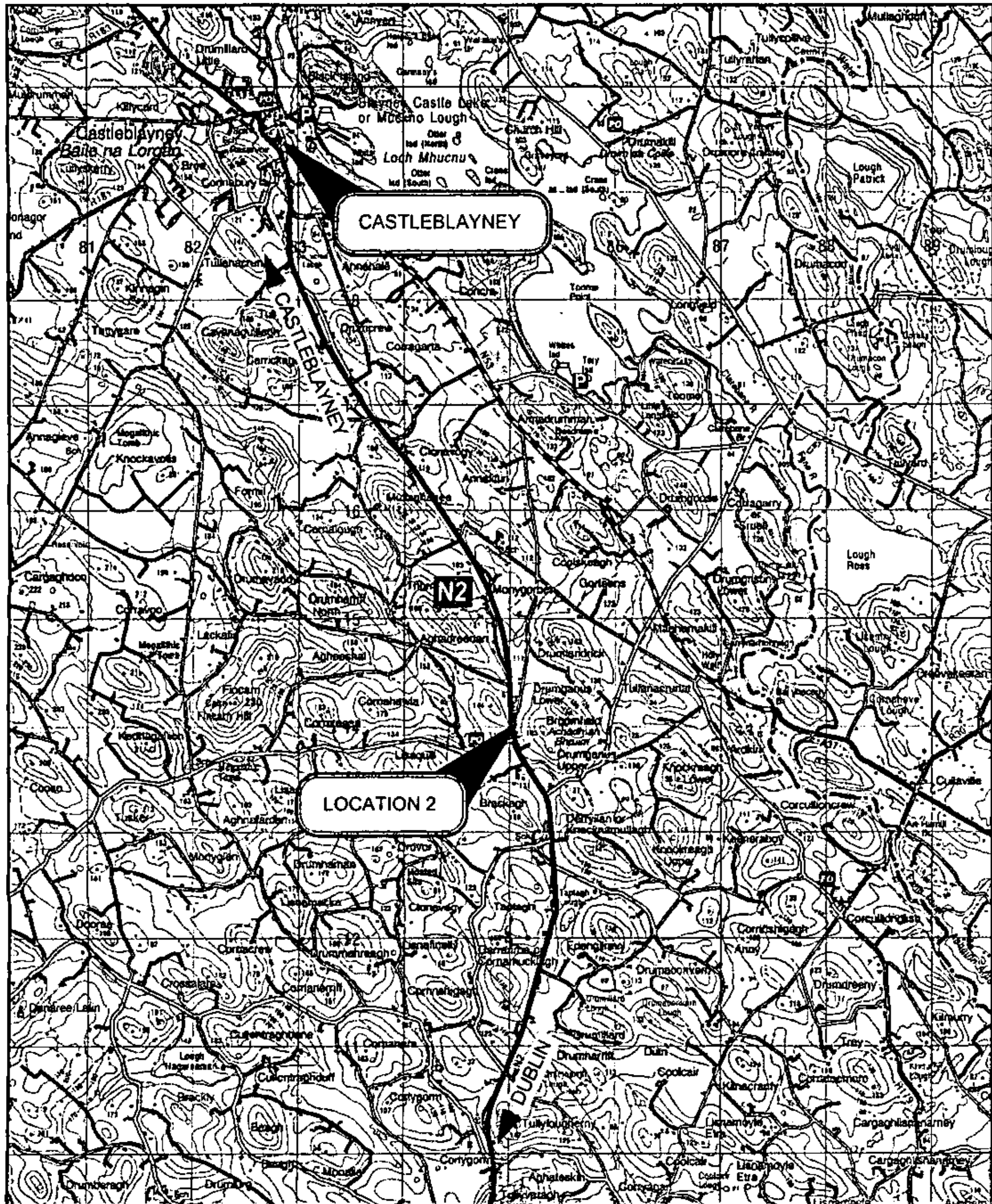

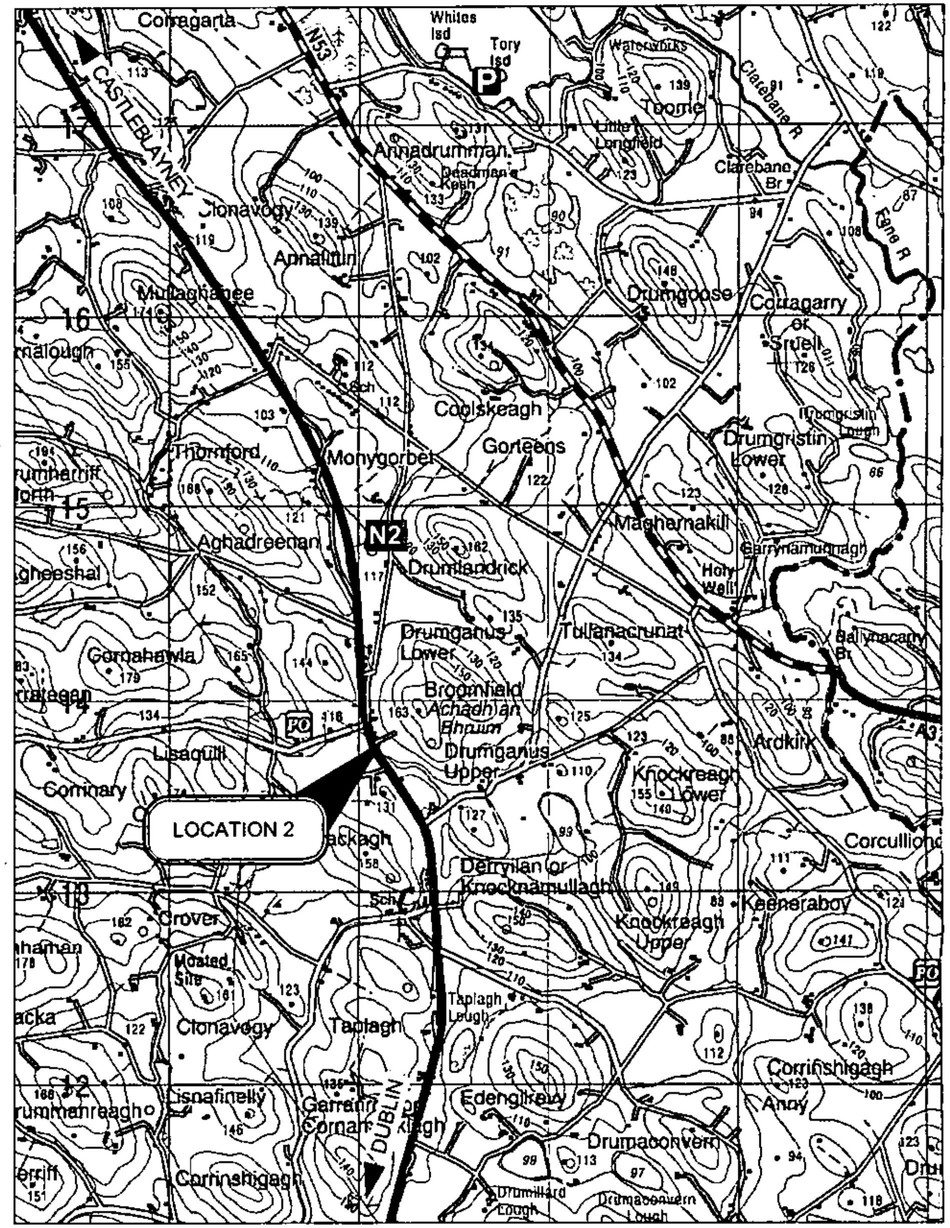

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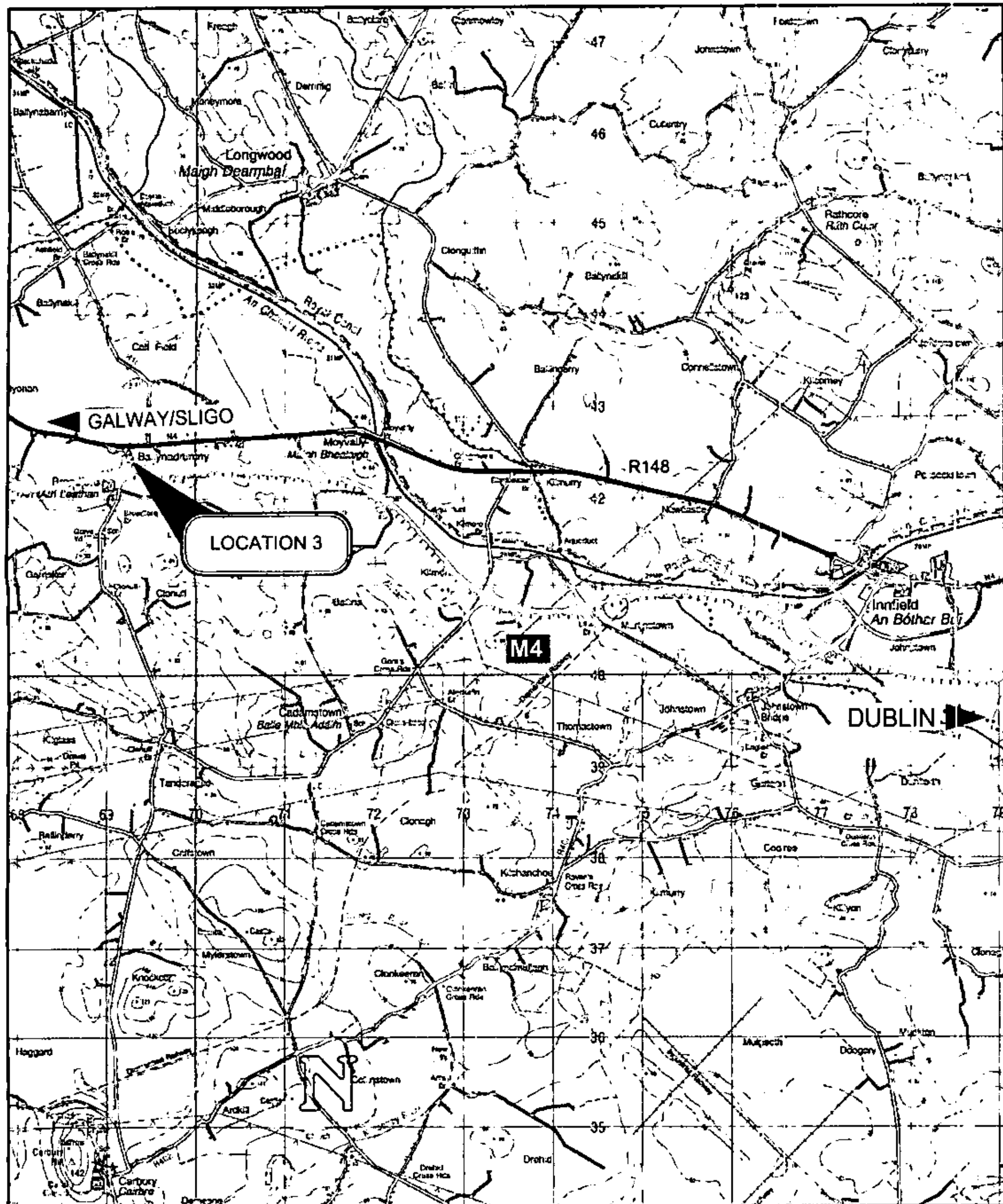

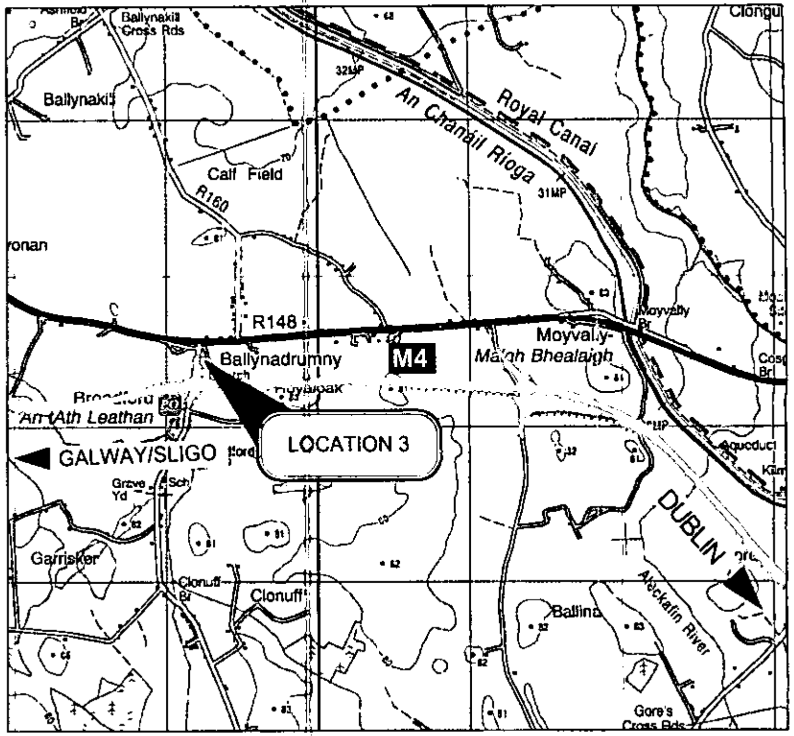

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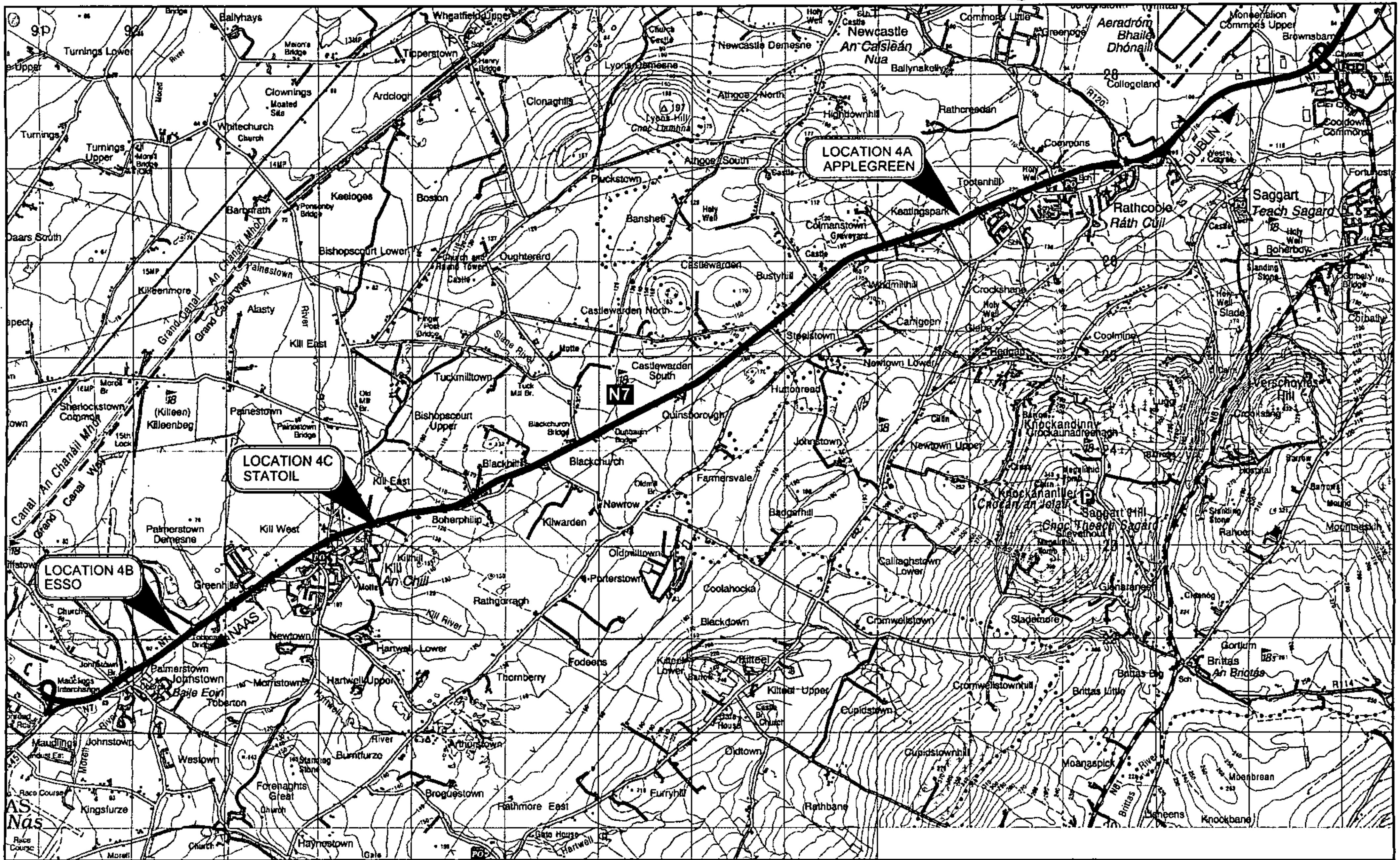

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				Checked: TD	File Ref: MDT0146TR1005
				Approved: CmcA	
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				Date: Sept.'07	Rev: A01

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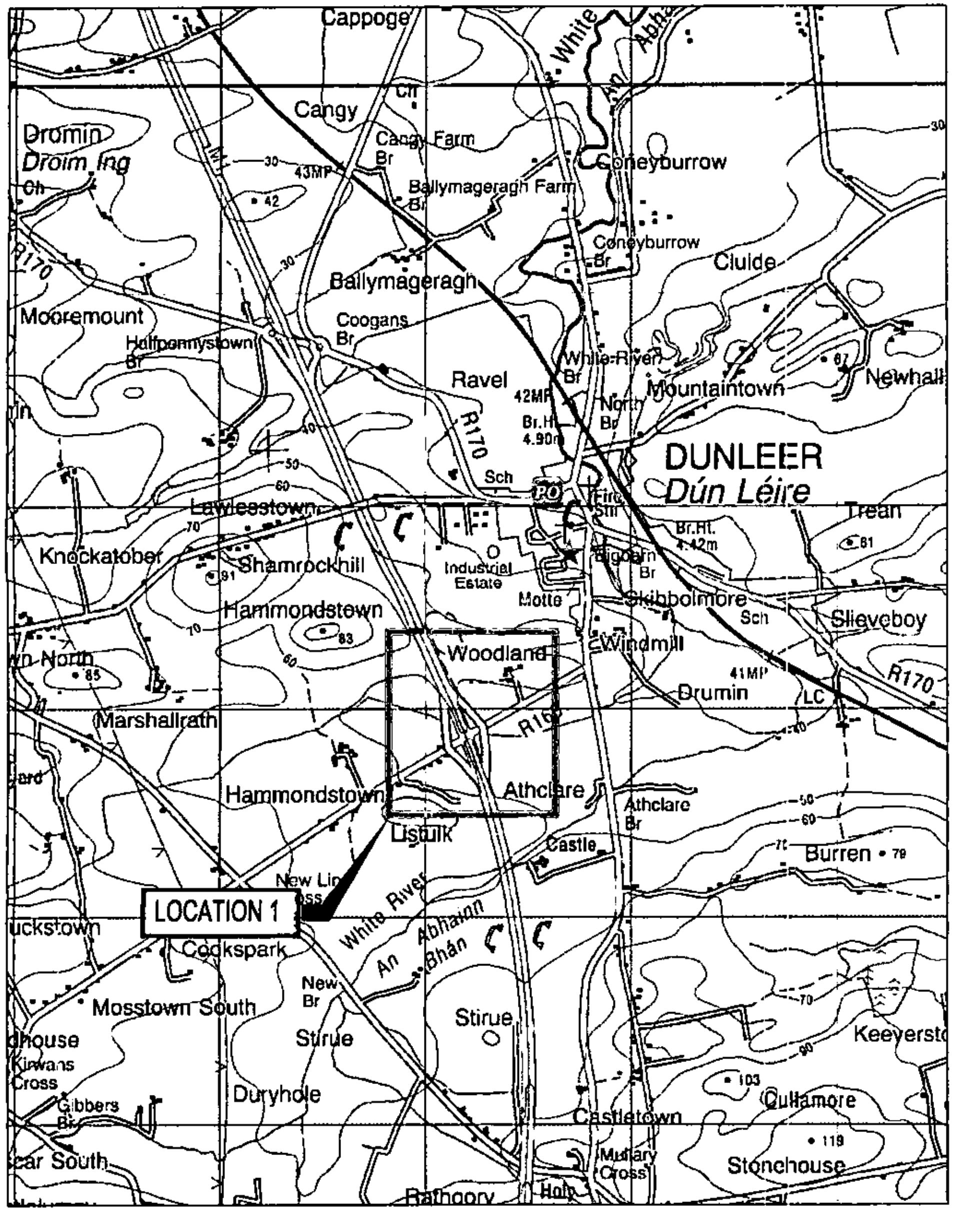

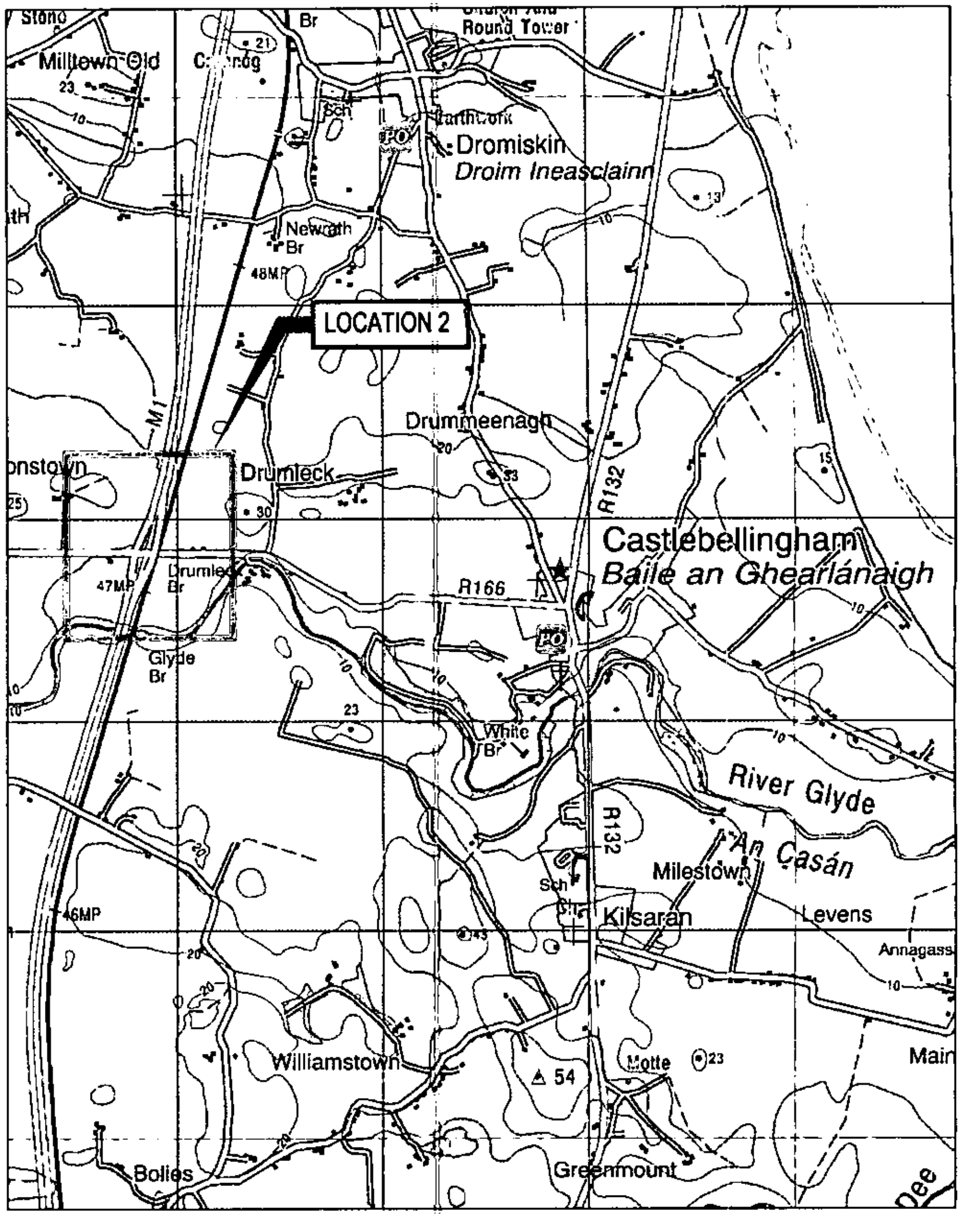

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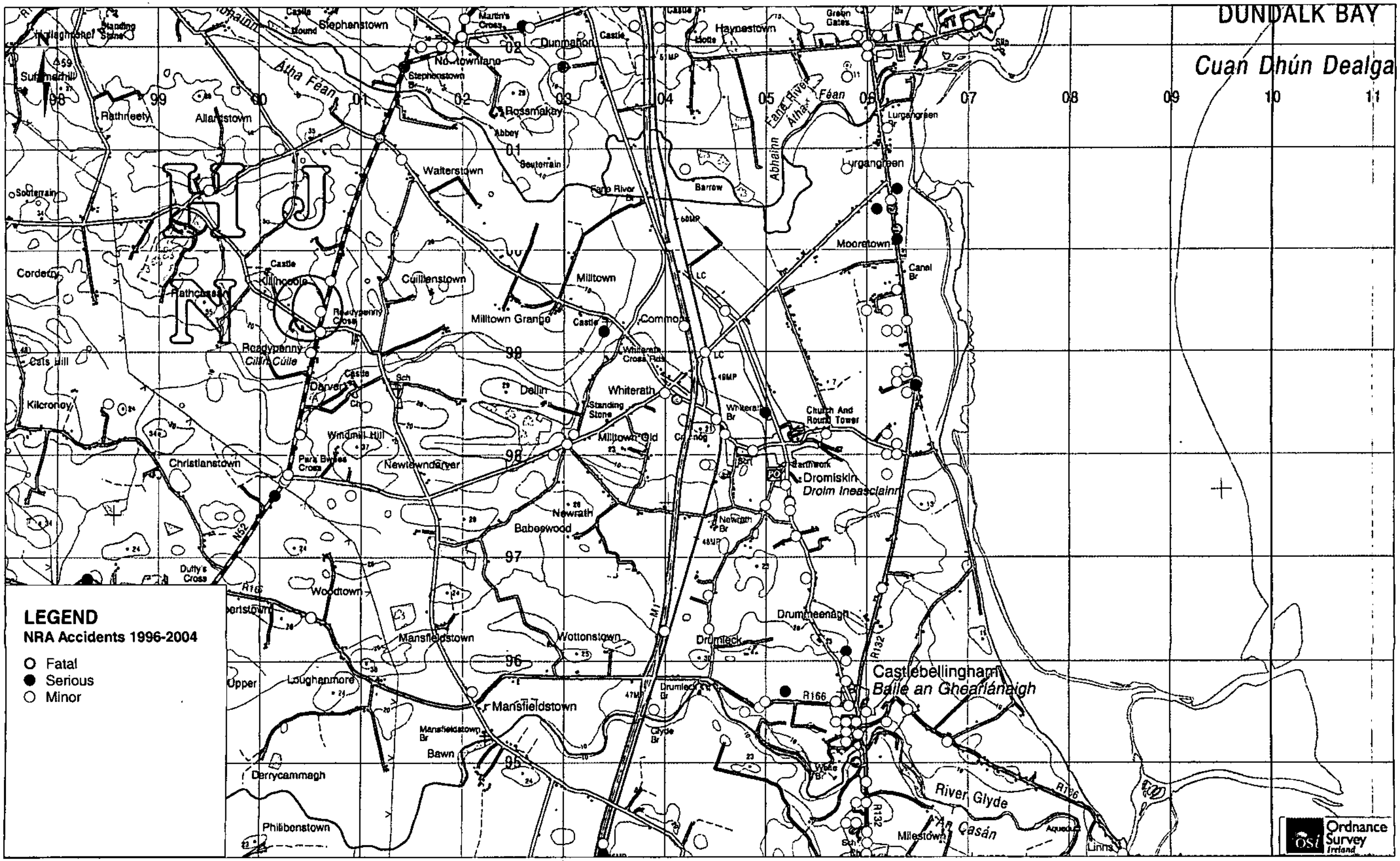

Project Title	M1 North Service Area
Drawing Title	ACCIDENT LOCATIONS

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Drawn: E.L.	Job No: MOT0146	
Checked: T.D.	Scale: 1:50,000	Figure No: TR1007 — Rev: D01
Approved: A.G.	Date: 06/11/2007	

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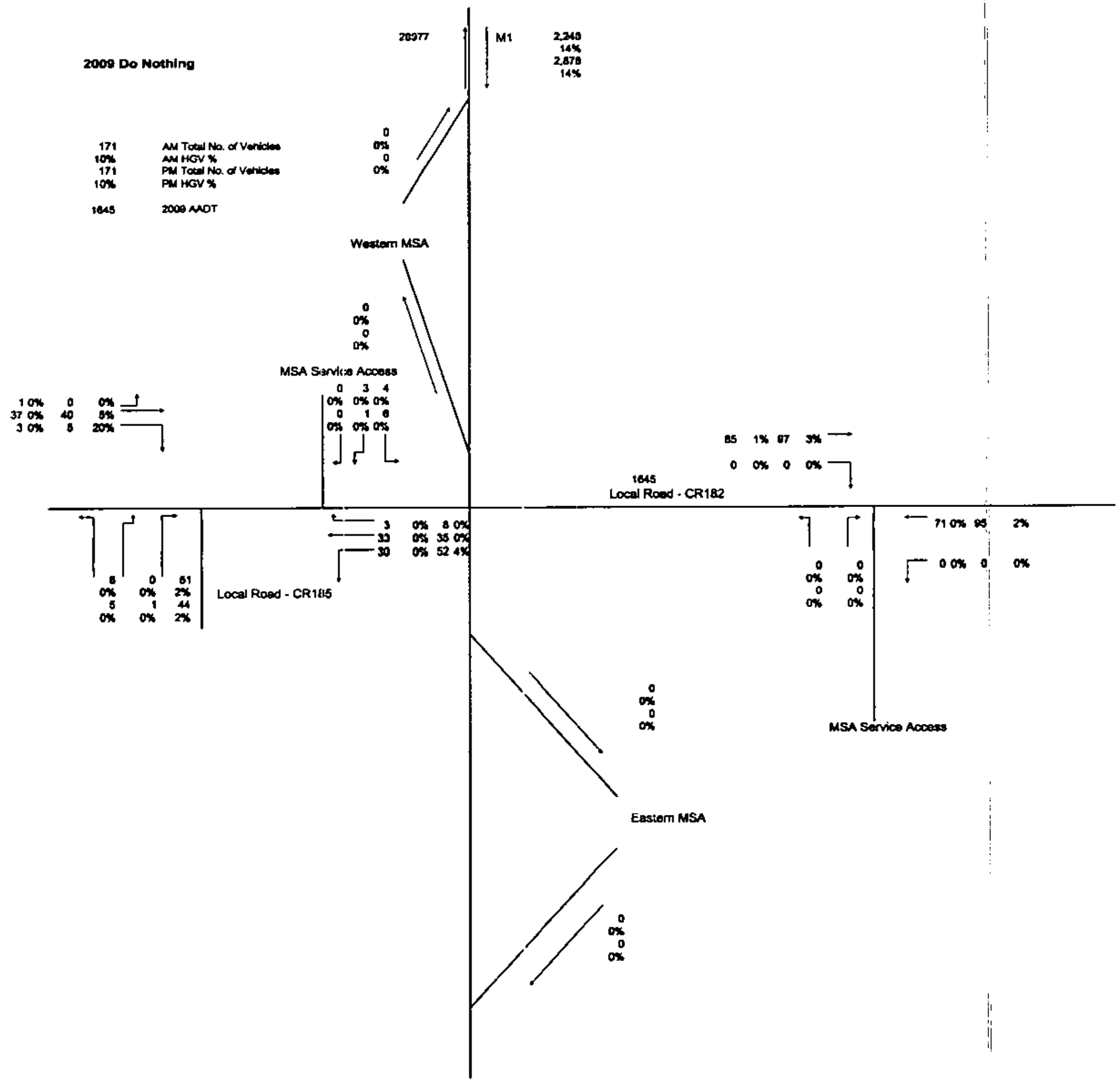
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

2009 Do Nothing

171	AM Total No. of Vehicles
10%	AM HGV %
171	PM Total No. of Vehicles
10%	PM HGV %
1645	2009 AADT



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NRA National Roads Authority An tÚdarás um Bóithre Náisiúnta	M1 NORTH SERVICE AREA	2009 DO NOTHING			

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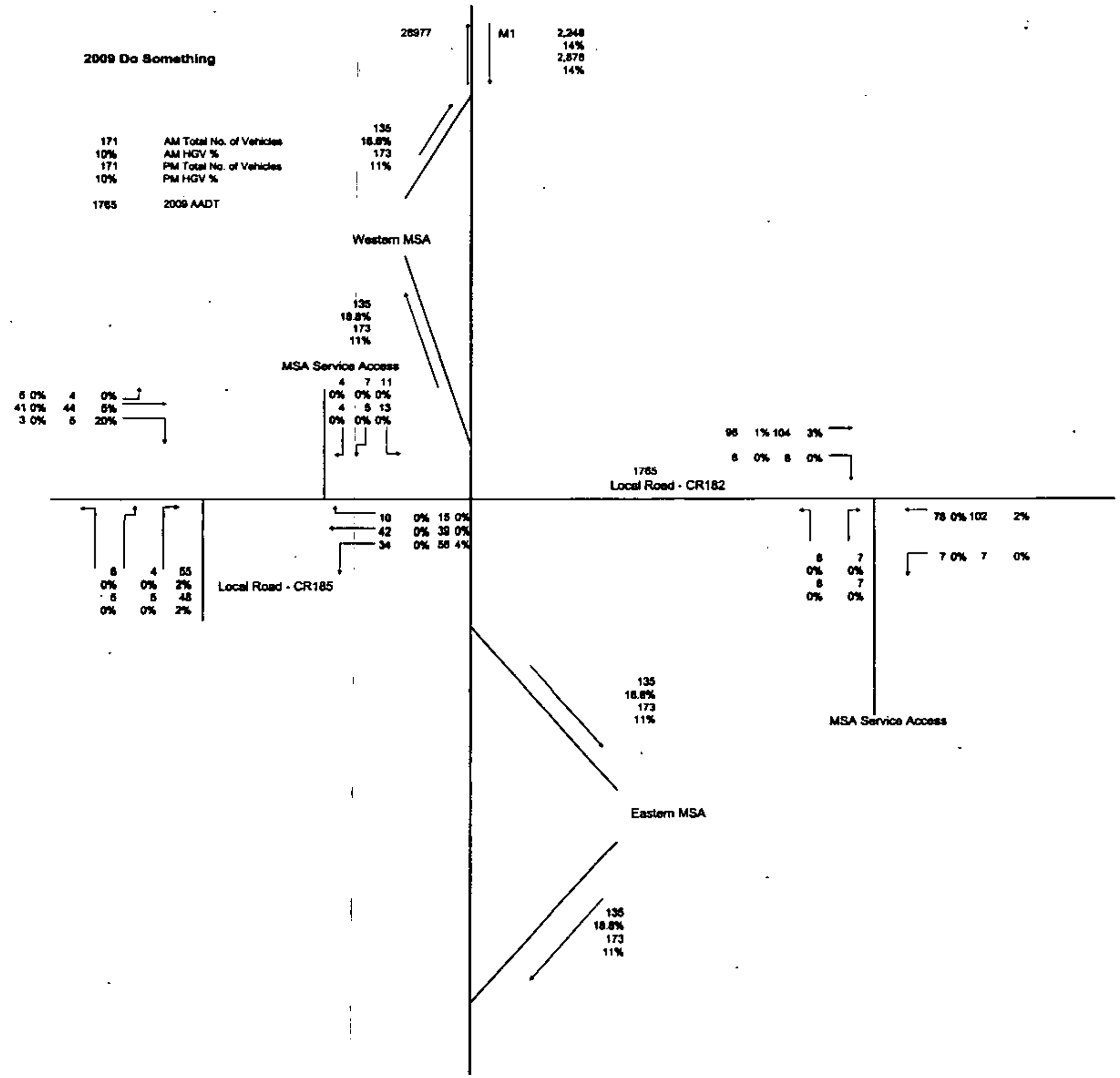

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NRA National Roads Authority — An tÚdarás um Bóithre Náisiúnta	M1 NORTH SERVICE AREA	2009 DO SOMETHING

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Fig No:	TR1009
Rev:	A01

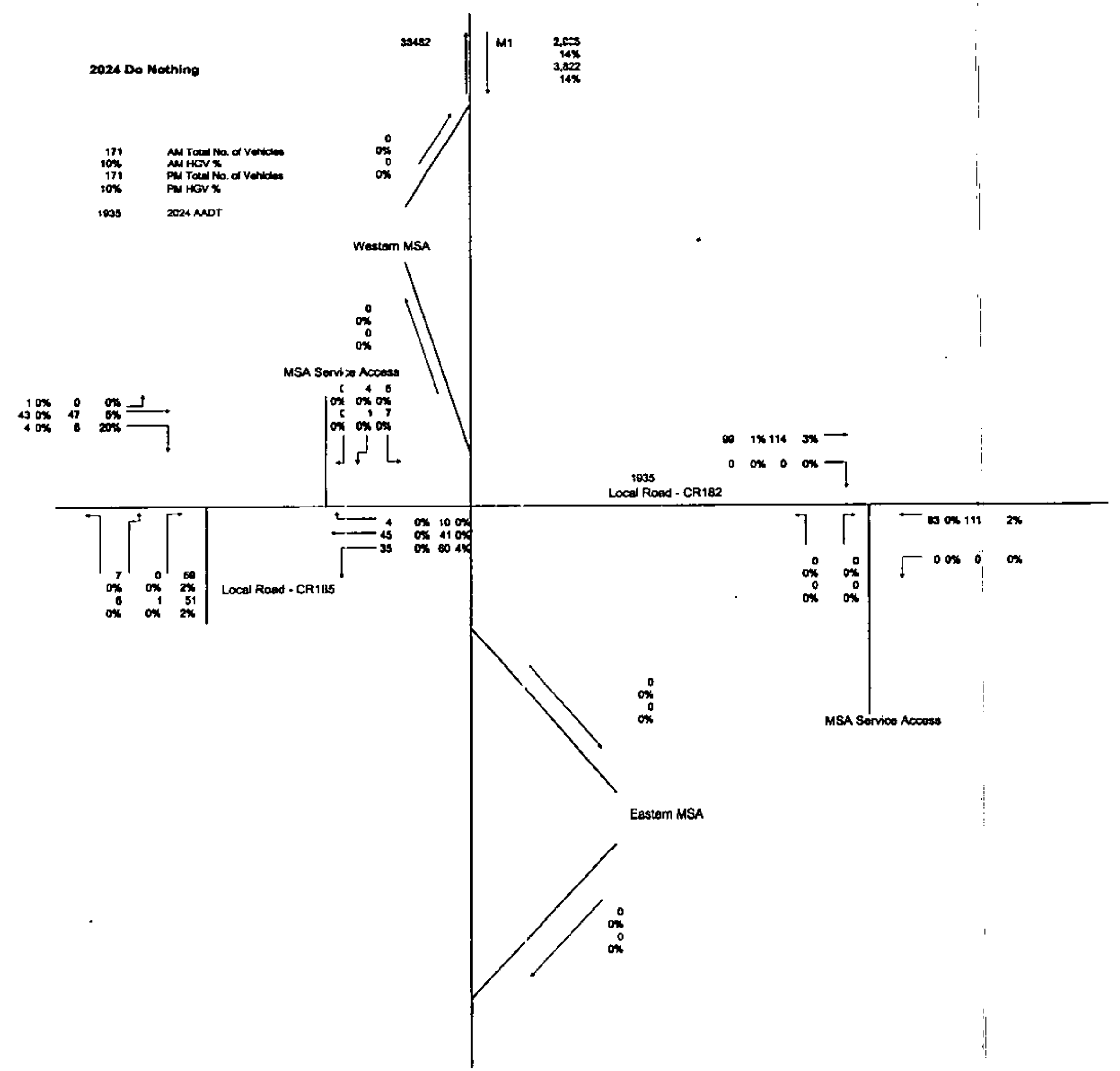

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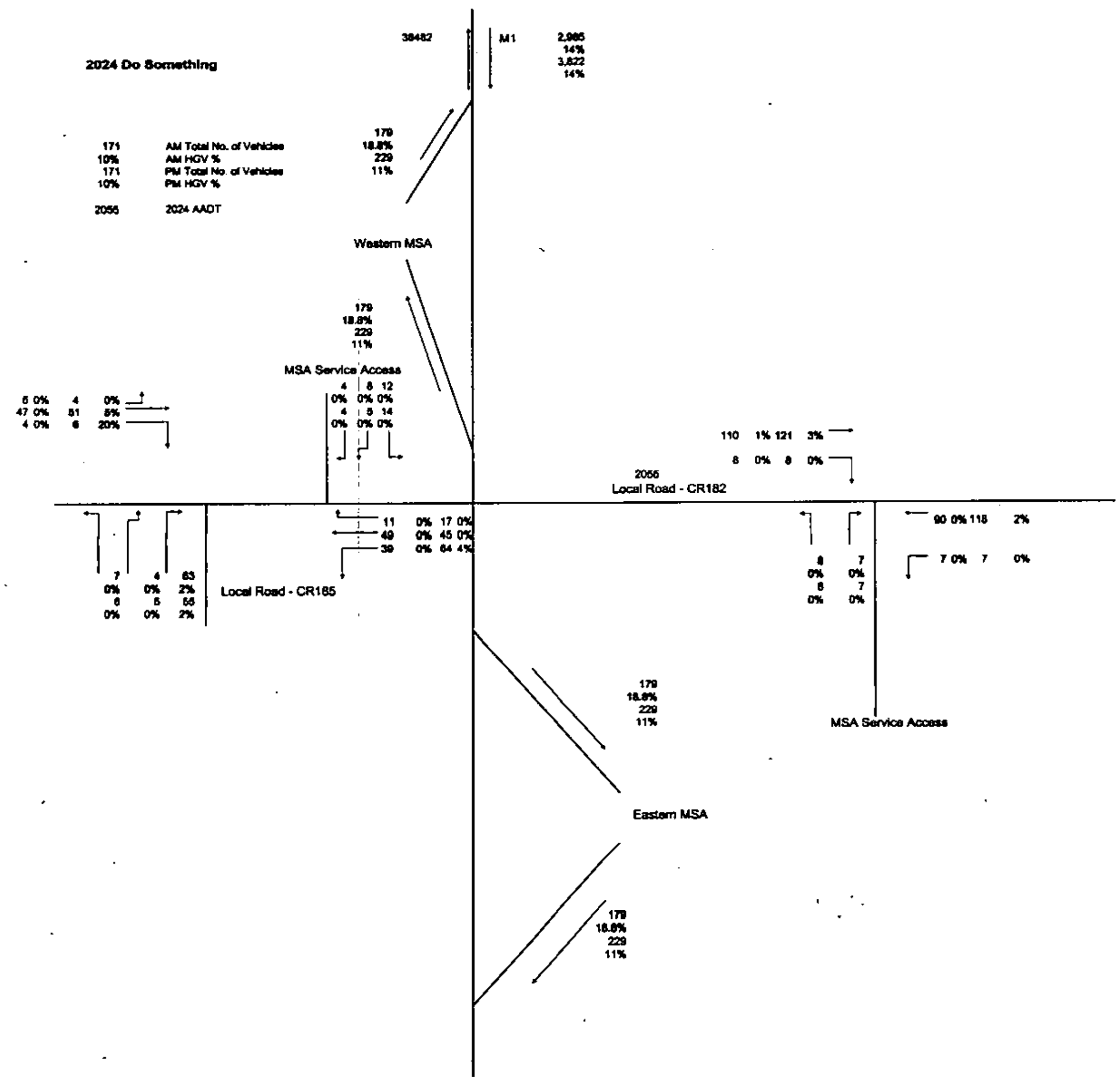
Fig No:	TR1010
Rev:	A01



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File Ref:	MDT0146TR1008
Fig No:	TR1011
Rev:	A01

APPENDIX B

Extracts of Transport Research Laboratory Document

"Turning Flows at Motorway Service Areas", 2000

Transport Research Laboratory (TRL) document 'Turning flows at Motorway Service Areas', 2000

Table 1 Services offered at 1994 survey sites

	Floor area (square metres)						
	94A		94B	94C		94D	
Service offered	*North -bound*	*South -bound*		*East -bound*	*West -bound*	*East -bound*	*West -bound*
Shop and shop store	257	213	288	174	199	122	297
Toilets (incl. showers, baby change etc.)	191	289	294	211	260	161	201
Restaurant (Back of House)	403	288	200	188	308	384	410
Restaurant servery	176	205	224 }	386	581	575	815
Restaurant seating	433	285	188 }				
Amusements	51	24	60	36	68	49	64
Circulation (Public)	91	117	349	143	178	396	599
Circulation (Back of House)	70	214	60 }	158	176	388	224
Staff areas	100	412	160 }				
Plant/Boiler room	148	323	126	-	-	-	-
Customer services/ATM	-	-	-	-	14	-	31
Roadside Diner (Back of House)	-	-	50	-	59	120	115
Roadside Diner (Public areas)	-	-	104	-	139	162	173
Fast Food (Back of House) }	341	191	143	73	-	-	-
Fast Food (Public areas) }				138	-	-	-
Total	2261	2561	2246	1507	1982	2357	2929

Table 2 Services offered at site 97A

	Floor area (square metres)	
Service offered	*Eastbound*	*Westbound*
Fast Food (Public and Back of House areas)	131	166
Shop and shop store	187	214
Toilets (including showers, baby change etc.)	241	176
Restaurant (Back of House)	421	421
Restaurant servery	202	202
Restaurant seating	333	385
Amusements	18	32
ATM	-	7
Circulation (Public)	218	200
Circulation (Back of House)	102	102
Staff areas	92	92
Phones	-	13
Roadside Diner (Back of House)	-	114
Roadside Diner (Public areas)	-	145
Total	1945	2269

Table 3 Services offered at site 97B

	Floor area (square metres)	
Services offered	*Northbound*	*Southbound*
Shop and shop store	193	282
Public toilets	144	146
Restaurant (Back of House)	217	212
Restaurant (Front of House)	505	496
Amusements	28	75
Customer services/ATM	9	39
Public circulation	226	225
General staff areas	258	259
Roadside Diner (Back of House)	93	-
Roadside Diner (Front of House)	92	-
Total	1765	1734

Table 4 Average turn-in flow and main flow (vehicles per half hour)

	Direction	*Turn-in 7:00am -7:00pm*	*Main flow 7:00am -7:00pm*	*Turn-in Percen -tage*[1]	*Number of cases Exam - ined*
94A	Southbound	165	1667	10.1	N=24
	Northbound	214	1628	14.1	N=24
94B	Eastbound	77	582	13.7	N=24
	Westbound	56	595	11.3	N=24
94C	Eastbound	149	1177	13.4	N=24
	Westbound	159	1110	15.6	N=24
94D	Eastbound	137	866	17.0	N=24
	Westbound[2]	173	701	25.1	N=20
97A	Eastbound	164	1934	8.9	N=24
	Westbound	187	1834	10.5	N=24
97B	Southbound	263	1493	17.8	N=24
	Northbound	226	1631	13.9	N=24
98A	Eastbound	193	1892	10.8	N=24
	Westbound	317	2033	16.5	N=24
98B	Southbound	166	1885	8.8	N=24
	Northbound	140	1883	7.5	N=24
98C	Southbound	117	1069	11.5	N=24
	Northbound	119	1132	10.9	N=24
98D	Eastbound[3]	173	1352	13.1	N=21
	Westbound	151	1475	10.5	N=24
98E	Southbound	343	1642	20.5	N=24
	Northbound	103	1553	7.0	N=24
98F	Southbound	154	1755	9.1	N=24
	Northbound	118	1769	6.8	N=24
	Averages	169	1450	12.6	N=569
	Averages[4]	169	1482	12.1	N=528

[1] *This is calculated by averaging the individual half hour percentages rather than by dividing the sum of turn-in flows by the sum of main flows.*

[2] *Due to missing observations during the period 7:00am to 9:00am the averages for both half hour main flow and turn-in flow are calculated for the period 9:00am to 7:00pm.*

[3] *Again, due to missing observations, the averages for both the main flow and turn-in flow are calculated for the period 7:00am to 7:00pm but excluding the periods 10:30am to 11:00am and 2:00pm to 3:00pm.*

[4] *This excludes the two sites 94D Westbound and 98D Eastbound where data was incomplete as explained above.*

APPENDIX C

AIR QUALITY

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APPENDIX A

Air Quality Standards

1.0 AIR QUALITY

1.1 INTRODUCTION

This section of the Environmental Impact Statement assesses the impact to air quality from the proposed M1 North Service Area scheme. This section should be read in conjunction with the site layout plans, construction strategy and project description sections of this EIS. This assessment was prepared in accordance with the EIA Directive 85/337/EEC (Amended by 97/11/EC) and having regard for the Guidelines on the Information to be Contained in Environmental Impact Statements (EPA 2002) and the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.

This study identifies and assesses the impact of the proposed M1-North Service Area scheme in terms of its impact on air quality.

A baseline air quality assessment was carried out in the vicinity of the proposed site, with particular focus on existing sensitive receptors. Air quality data available from the Environmental Protection Agency (EPA) monitoring network was also assessed. This survey identifies the existing pollutant trends in the area and establishes spatial information and pollutant concentrations for comparison with Air Quality Standards Regulations (S.I No. 271 of 2002). The Air Quality Standards are presented in Appendix A.

Future air quality trends for the key pollutants (nitrogen dioxide and particulate matter) as a result of traffic variations with and without the proposed scheme in place have been predicted using the screening air quality assessment from the U.K Highway Agency Design Manual for Roads and Bridges, Air Quality Assessment. Detailed mitigations measures for the Construction Phase of the proposed scheme are also presented.

1.2 LEGISLATION AND POLICY CONTEXT

The relevant Irish ambient air standards have been adopted from the European Commission Framework Directive (96/62/EC) and the associated Daughter Directives on air quality (1999/30/EC, 2000/69/EC, 2002/3/EC)) and are cited as the Air Quality Standards Regulations, which came into force on 17th June 2002 (Irish Legislation S.I. No. 271 of 2002). These regulations are presented in Appendix A as tables A1 and A2.

The Air Quality Standards Regulations specify limit values in ambient air for sulphur dioxide (SO_2), lead, particulate matter (PM_{10}) (Stage I) and carbon monoxide (CO). For oxides of nitrogen (NO_x), particulate matter (PM_{10} and PM_{25}) and benzene the effective date is 1st January 2010. Alert thresholds for SO_2 and NO_2 are specified. The Regulations also specify margins of tolerance for exceedance of the new limit values in the period prior to their entry into force, which have relevance to the air quality assessment responsibilities assigned to the Environment Protection Agency in the Regulations.

The Regulations provide for advice by the Agency to local authorities about the need for air quality management plans where the limit values, plus margins of tolerance, will be or may be exceeded, and the preparation of such plans by local authorities. Provision is also made for air pollution action plans for short-term risks of exceedances of the limit values and alert thresholds. Existing pollutant concentrations and pollutant concentrations as a result of the proposed scheme are compared to these limit values.

1.3 EXISTING ENVIRONMENT

1.3.1 Site Specific Monitoring

Passive diffusion tubes were used to assess the existing ground level concentrations of nitrogen dioxide (NO_2) in the vicinity of the proposal. Monitoring was carried out over a one-month period at 2 locations, which are presented in **Table 1.1.** The results are compared with the relevant air quality limits contained in the Air Quality Standards (Appendix A).

Table 1.1: Description of diffusion tube monitoring locations.

Location	Dates	Description
A1	14/06/07-27/07/07	Outside residential receptor on local road at south perimeter of proposed eastside service area. Approx. 50m from M1
A2	14/06/07-27/07/07	Outside residential receptor on local road at M1 slip road. Adjacent to south perimeter of proposed Westside service area. Approx 70m from M1.

Nitrogen dioxide is classed as both a primary pollutant and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants. Long-term exposure to high concentrations of NO_2 can cause a range of effects, primarily in the lungs, but also in the liver and blood.

Nitrogen oxides (NO_x) are also one of the precursors for ground level ozone formation. Elevated ozone concentrations affect the respiratory system and cause damage to vegetation.

NO_x concentrations also impact directly on ecosystems. Nitrate containing particles and nitric acid contribute to wet and dry deposition of nitrogen in areas both close to and remote from sources. Deleterious effects of deposited nitrogen on natural nitrogen-limited terrestrial ecosystems have been reported from across Europe.

At each of the monitoring locations, levels of NO_2 were measured using a specially prepared diffusion tube with adsorbent material. The tubes were then analysed using UV spectrophotometry, at a UKAS accredited laboratory (Gradko International, Winchester), giving an average concentration over the exposure period. The results of this monitoring are outlined in **Table 1.2.**

Table 1.2: Results of NO2 diffusion tube monitoring

Location	NO_2 Concentration ($\mu g/m^3$)
A1	10.82
A2	7.44
Limit Value(1)	40

(1) S.I No 271 of 2002 (as an annual average).

The concentration of NO_2 is highest at A1. Both locations are along a local road in the vicinity of the M1, which is the major source of traffic in the area. The monitoring locations were between 50 and 70m from the M1, with A1 located slightly closer to M1. These results suggest that the main source of nitrogen dioxide in the area is from motor vehicle exhausts. The results indicate that at both locations the levels determined are below the relevant annual air quality limit value for nitrogen dioxide ($40\mu g/m^3$).

1.3.2 EPA Monitoring

The EU Air Framework Directive deals with each EU Member State in terms of Zones and Agglomerations. For Ireland, four zones, A, B, C and D are defined in the Air Quality Regulations (2002). The Zones are defined in **Table 1.3:**

Table 1.3: Zones for air quality assessment as defined by Air Quality Regulation 2002.

Zone	Area
Zone A	Dublin Conurbation
Zone B	Cork Conurbation
Zone C	15 urban areas with populations greater than 15,000. Includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee and Dundalk
Zone D	Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

The proposed site is in Zone D. The EPA is the designated body with responsibility for monitoring ambient air quality in Ireland. In general, the EPA operates the mobile monitoring stations and local authorities operate the fixed stations in their area.

There is no EPA continuous monitoring station in the subject area. There are a number of monitoring stations in Zone D locations, which can be used as an indication of annual air quality for the proposed site.

The EPA monitoring station results for Zone D locations in 2006 are presented in **Table 1.4.**

The results of the monitoring indicate that the levels detected are all below the relevant air quality limit values.

Table 1.4: Results of NO_2 and PM_{10} monitoring at Zone D locations in 2006.

Location	Mean annual NO_2 ($\mu g/m^3$)	Mean annual PM_{10} ($\mu g/m^3$)
Ferbane, Co. Offaly	4	17
Glashaboy, Co. Cork	10	-
Killkitt, Co. Monaghan	3	10
Drogheda	-	18
Limit value (1)	40	40

(1) S.I No 271 of 2002 (as an annual average).

The results of the EPA monitoring at Zone D locations in 2006 indicate that ambient concentrations of nitrogen dioxide and PM_{10} are well within the relevant air quality limit values.

In general the results from the site-specific baseline survey carried out in the vicinity of the proposed site indicate that concentrations of NO_2 at the rural locations are similar to those experienced in Glashaboy, Co Cork. In general, the results are typical of Zone D rural concentrations with higher concentrations recorded in the vicinity of major traffic sources.

1.4 ASSESSMENT OF IMPACTS

1.4.1 Impact on residential receptors

The DMRB screening air dispersion model was used to assess the impact of the Service Areas on local air quality. The traffic figures associated with the development were used to predict the concentrations of the key traffic-derived pollutants in future years, with and without the development in place. The parameters assessed were nitrogen dioxide (NO_2) and particulate matter (PM_{10}). These are the pollutants of most concern with regard to road traffic emissions.

Using the DMRB local assessment spreadsheet, the pollutant concentrations with and without the scheme in place in 2009 and 2024 were predicted at a number of sensitive receptors adjacent to the proposed site. Background concentrations of pollutants were added to the predicted concentrations from the M1 and the Service Areas.

The background concentrations used are from the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, Appendix 2.

The DMRB screening air quality dispersion model was applied, to assess the impact on air quality of the traffic associated with the scheme. The model is used to predict future air quality at sensitive local receptors. The residential receptors assessed were:

- R1. Residential property north of east Service Area site, adjacent to rail line. Approximately 100m north of HCV parking area.
- R2. Residential property southwest of west side Service Area site. Approximately 70m from HCV parking area.

The impact of the Service Areas were assessed at the residential receptors in the vicinity of the Service Areas. Increases in ambient NO_2 and PM_{10} concentrations with the Service Areas in place (do-something) are compared with the concentrations without the Service Areas in place (do-minimum).

In order to quantify the magnitude of change in pollutant concentrations, the descriptors in **Table 1.5** are used. **Table 1.6** is then used to describe the significance of the impact.

These descriptor tables are from the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes and are based on the descriptors from the UK NSCA, Development Control, Planning for Air Quality, 2006.

The results of the screening assessment for each receptor are presented in **Tables 1.7 and 1.8.**

Table 1.5: Descriptors for changes in concentrations of nitrogen dioxide and particulate matter.

Magnitude of change (Negative/positive)	Annual Average Nitrogen Dioxide/Particulates (PM_{10}) ($\mu g/m^3$)
Very large	Increase/decrease >25%
Large	Increase/decrease >15<25%
Medium	Increase/decrease >10<15%
Small	Increase/decrease >5<10%
Very Small	Increase/decrease >1<5%
Extremely Small	Increase/decrease <1%

Table 1.6: Descriptors for Impact Significance for NO_2 and PM_{10}.

Absolute concentration in relation to Standard	Change in Concentration					
	Extremely small	Very small	Small	Medium	Large	Very large
Above Standard without scheme	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below Standard without scheme Above with scheme	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below Standard with scheme, but not well below	Negligible	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
Well below Standard with scheme	Negligible	Negligible	Slight adverse	Slight adverse	Slight adverse	Moderate adverse

Well below the standard= <75% of standard level.

Table 1.7: Screening Air Quality Assessment for R1. Residential property north of east Service Area site, adjacent to rail line

Scenarios	Nitrogen Dioxide ($\mu g/m^3$)		Particulates (PM_{10}) ($\mu g/m^3$)	
	Annual Average	Increase/decrease (%)	Annual Average	Increase/decrease (%)
2007 existing	7.15	-	17.06	
2009 Do minimum	6.77	3.2	16.37	0.30
2009 Do something	6.96		16.42	
2024 Do minimum	6.13	2.1	15.68	0.20
2024 Do something	6.26		15.71	
Air Quality Limit Values	40		40	

Table 1.8: Screening Air Quality Assessment for R2. Residential property southwest of west side Service Area site.

Scenarios	Nitrogen Dioxide ($\mu g/m^3$)		Particulates (PM_{10}) ($\mu g/m^3$)	
	Annual Average	Increase/decrease (%)	Annual Average	Increase/decrease (%)
2007 existing	7.82	-	17.22	
2009 Do minimum	7.35	4.8	16.50	0.60
2009 Do something	7.70		16.60	
2024 Do minimum	6.52	4.0	15.77	0.38
2024 Do something	6.78		15.83	
Air Quality Limit Values	40		40	

The DMRB screening assessment was used to predict changes in pollutant concentrations at the nearest sensitive receptors (R1 and R2) in future years with and without the proposal in place. The descriptors presented in **Tables 1.5 and 1.6** were used to apply significance to any increases in pollutant concentrations.

The results of this assessment indicate:

For both modelled receptors, the predicted concentrations of key pollutants decrease in future years both with and without the proposed Service Area in place. This is as a result of legislative and technological advances, which will lead to more efficient vehicles and less polluting fuels. These planned improvements are factored into the model to reflect future emissions from road vehicles.

At receptor R1 (north of eastern Service Area), the increase in NO_2 concentrations is very small and there is a negligible impact on NO_2 concentrations with the scheme in place in 2009 and 2024. The increase in PM_{10} concentrations is extremely small with the scheme in place in 2009 and 2024 and there is a negligible impact on air quality at R1. This is worst-case scenario, assuming that all traffic using the east service area passes the HCV parking area (area closest to R1) at 20km/hr. In reality, the traffic will be spread out over the service area site and not all traffic will pass as close to R1 as defined in the screening model.

For Receptor 2, the approximate distance to the Service Area is 70m. The primary source of traffic-derived pollutants in the area is the M1. As distance increases from the M1, pollutant concentrations tend to return to background levels. For R2, the impact on NO_2 concentrations in 2009 and 2024 with the scheme in place is negligible. R2 is closer to the proposed western Service Area, hence the higher absolute concentrations and increase in concentrations as compared to R1. The M1 is the dominant source of traffic-derived pollutants and the contribution to the absolute concentration from the proposed scheme is very small to extremely small.

Due to the distances between source and receptor the cumulative effect of the traffic on the M1 and the traffic using the proposed M1 Service Areas will have a negligible adverse impact on ambient air quality at the local residential receptors.

The predicted pollutant concentrations at all receptors with and without the Service Area in place are well below the annual mean limit values (AQS) for NO_2 and PM_{10}.

Table 1.9: Summary table of predicted air quality impacts at selected receptors (R1, R2).

Receptor	NO_2 2009 with Service Area in place	PM_{10} 2009 with Service Area in place	NO_2 2024 with Service Area in place	PM_{10} 2024 with Service Area in place
R1	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible

The increase in concentrations of nitrogen oxides and resultant nitrogen deposition as a result of the proposed scheme are extremely small and very small, and are very unlikely to impact on vegetation at the proposed site. The ecology section of this EIS deals in detail with impacts on vegetation.

1.4.2 Impact on Climate

The measures designed to reduce Ireland's greenhouse gas emissions from road transport are detailed in the national Climate Change Strategy 2007. The Strategy lists measures for reduction in transport emissions which include modal shift, fuel efficiency, VRT changes, biofuels use etc. Climate change issues and the mitigation measures planned are the subject of specific policies and strategies as set out in the Climate Change Strategy and no scheme specific measures are recommended.

The proposed Service Area will not result in greater numbers of vehicles using the existing M1. Therefore, the potential impact on climate through additional CO_2 emissions will not be significant.

With regard to microclimate, no mitigation measures are considered necessary although care should be taken in landscape and structure design to minimise any impacts on the local microclimate.

1.5 CONSTRUCTION PHASE MITIGATION MEASURES

In order to mitigate construction dust emissions during the construction phase, a dust minimisation plan will be prepared as part of the Environmental Management Plan. The dust minimisation plan will be cognisant of the industry guidelines such as the Building Research Establishment document entitled 'Control of Dust from Construction and Demolition Activities' and the Construction Industry Research and Information Association (CIRIA) 'Environmental Good Practice on Site' as well as the NRA Environmental Construction Guidelines.

The NRA recommends a semi-quantitative approach to determine the likelihood of a significant impact. The assessment criteria for this approach are presented in **Table 1.10.**

Table 1.10: Assessment criteria for the impact of dust from construction, with standard mitigation in place

Source		Potential distance for significant effects (distance from source)		
Scale	Description	Soiling	PM_{10}	Vegetation effects
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

From the Assessment criteria table it is clear that for a project of this scale, with major use of haul roads, the potential for soiling extends up to 100m from the source. The prevailing wind direction should also be taken into account when locating stockpiles with the preferred stockpile location upwind of nearest sensitive receptor. Where the minimum setback distance is not achievable or the location relative to prevailing wind is unfavourable, then additional mitigation measures must be employed, such as screening.

The dust minimisation plan should also include the following mitigation measures:

- Site roads will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only.

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential).

- All vehicles exiting the site will make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Wheel washes will be self-contained systems that do not require discharge of the wastewater to water bodies.

- Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.

- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind.

- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

- The contractor will be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.

- The transport of soils should be undertaken in covered vehicles.

- The siting of temporary stockpiling during construction (with the exception of materials for berms) will follow best practice and shall consider the location of its proximity to sensitive receptors. The prevailing wind direction shall also be taken into account when locating stockpiles with the preferred stockpile location upwind of the nearest sensitive receptor. Where the minimum setback distance is not achievable or the location relative to prevailing wind is unfavourable, then additional mitigation measures shall be employed, e.g. screening.

In order to ensure that any dust nuisance is minimised, a series of mitigation measures have been listed above. If the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated are assessed to be minimal and are unlikely to cause an environmental nuisance. The construction contractor will be required to maintain monthly dust levels below the guideline of 350mg/m^2/day as an annual average at sensitive receptors. Where dust levels are measured to be above this guideline the mitigation measures in the area must be reviewed as part of the dust minimisation plan.

1.6 RESIDUAL IMPACTS

Table 1.11: Summary of Residual Impacts for Air Quality and Climate.

Description of impact	Significance of residual impact
Construction Phase Following the implementation of appropriate environmental management controls, only minor, localised and temporary adverse effects are anticipated, at worst (during dry conditions), from construction related dust. Appropriate mitigation measures will be implemented where significant stockpiling of material is planned	Negligible to short term minor adverse impact
Operational Phase A total of 2 representative receptors were assessed for future air quality. The operational effects of the scheme on local air quality are predicted to be negligible. The predicted increase in pollutant concentrations is very small to extremely small and absolute concentrations are well within current air quality limits and additional mitigation measures are not required. Additional CO_2 emissions are unlikely to be significant with the scheme in place. The impact on climate will be negligible	Negligible impact on air quality Negligible impact on climate

APPENDIX A.

AIR QUALITY STANDARDS

Pollutant	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	50% until 2001 reducing linearly to 0% by 2010	200 $\mu g/m^3$ NO_2
	Annual limit for protection of human health	50% until 2001 reducing linearly to 0% by 2010	40 $\mu g/m^3$ NO_2
	Annual limit for protection of vegetation	None	30 $\mu g/m^3$ $NO + NO_2$
Sulphur Dioxide	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	43% until 2001 reducing linearly until 0% by 2005	350 $\mu g/m^3$
	Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 $\mu g/m^3$
	Annual & Winter limit for the protection of ecosystems	None	20 $\mu g/m^3$
Particulate Matter Stage 1	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50% until 2001 reducing linearly to 0% by 2005	50 $\mu g/m^3$ PM_{10}
	Annual limit for protection of human health	20% until 2001 reducing linearly to 0% by 2005	40 $\mu g/m^3$ PM_{10}

Particulate Matter Stage 2	24-hour limit for protection of human health - not to be exceeded more than 7 times/year	To be derived from data and to be equivalent to Stage 1 limit value	50 $\mu g/m^3$ PM_{10}
	Annual limit for protection of human health	50% until 2005 reducing linearly to 0% by 2010	20 $\mu g/m^3$ PM_{10}
Benzene	Annual limit for protection of human health	100% until 2003 reducing linearly to 0% by 2010	5 $\mu g/m^3$
Carbon Monoxide	8-hour limit (on a rolling basis) for protection of human health	50% until 2003 reducing linearly to 0% by 2005	10 mg/m^3

APPENDIX D

NOISE & VIBRATION

NOISE TERMINOLOGY

dB(A) A logarithmic noise scale (decibel). The "A" indicates that a frequency weighting has been applied to take account of the variation in the sensitivity of the human ear as a function of frequency.

L_{Aeq} Is the A-weighted equivalent continuous sound level during a sample time period and effectively represents an average value i.e. the average level recorded over the sampling period and includes all noise events. The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of noise on the background. The L_{Aeq} value has been found to correlate well with human tolerance of noise, and is the value normally used in setting and monitoring industrial noise limits.

L_{AF10} Refers to those levels in the top 10 percentile of the sampling interval; it is the level that is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise, i.e. the higher noise levels present in the ambient noise. The L_{A10} parameter is used in the U.K. traffic noise model (CRTN).

L_{AF90} Refers to those levels in the lower 90 percentile of the sampling interval; it is the level that is exceeded for 90% of the measurement period. It is used to estimate a background level. It is used in BS 4142 as being representative of the steady background noise at a location. It tends to exclude short events such as cars passing, dogs barking, aircraft flyovers etc.

L_{AMax} The L_{AMax} is the maximum reading measured at the sound level meter. It gives an indication of the highest noise produced by a varying noise source.

L_{AMin} The L_{AMin} is the minimum reading measured at the sound level meter. It gives an indication of the highest noise produced by a varying noise source.

Ambient Noise The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far, i.e. the total noise level due to all noise sources.

A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing.

METHOD STATEMENT

Vibration Significance Criteria

Operational Vibration Criteria

In the case of nominally continuous sources of vibration, such as traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example blasting and piling, two of the primary sources of vibration during construction are typically tolerated at vibration levels up to 12 mm/s and 2.5 mm/s respectively.

Therefore, the National Roads Authority guidelines identify 2.5mm/s as the vibration level that may be considered tolerable due to piling works. The potential vibration levels that could be generated by rock breaking works, if required would be expected to be comparable to the level of vibration that may be generated by piling works. The vibration level of 2.5 mm/s is substantially below the guideline values for protection of properties against cosmetic damage. The NRA limits for protection against cosmetic damage are given as a function of vibration frequency, and are outlined in **Table 1.1**.

Table 1.1 Allowable Vibration During Road Construction in Order to Minimise the Risk to 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 50 Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

The NRA 2.5mm/s limit is for piling, which is a continuous activity. This limit provides for protection against the vibration nuisance, and is comfortably within the limits for cosmetic damage. It is considered that the potential impact is therefore likely to be minor.

Construction Vibration Criteria

The potential damaging effects of ground vibration on buildings are greatest at low frequencies. At higher frequencies, greater vibration levels can be tolerated. This is acknowledged in British Standard 7385, which specifies a guide value of 15mm/s (peak vibration velocity) at low frequencies, rising to 50mm/s at frequencies in excess of 40Hz (referred to as "Line 2" in BS 7385). These guideline values are set to protect against cosmetic damage in residential buildings.

The Environmental Protection Agency guideline limit for blast vibration is 12 mm/s (at houses or other sensitive locations with a maximum peak overpressure of 125 dB (*EPA Guidance Notes on Noise In Relation To Scheduled Activities*). Due to the high sensitivity of human response to ground vibration, complaints could be expected at vibrations levels lower than the cosmetic building damage limits of BS 7385. Human response to vibration in buildings is addressed in BS 6472 "*Evaluation of human exposure to vibration in buildings*".

In BS 6472, a base value of 0.15 mm/s is given, which corresponds approximately to the threshold of human perception. Guidelines for human exposure are expressed as multiples of this base value, depending on the duration of exposure and the nature of the building (home, office, etc.). For infrequent vibration events in residential areas a multiplying factor of 60 to 90 is recommended. This would result in a vibration level of 9 to 14 mm/s (rounded from 13.5mm/s), which according to the standard constitutes a satisfactory vibration magnitude with respect to human response. Taking the lower exposure criterion from BS 6472, gives an assessment criterion of 9mm/s, above which adverse reactions could be expected.

APPENDIX E

LANDSCAPE & VISUAL

1.0 LANDSCAPE AND VISUAL

1.1 Introduction

This section of the EIS sets out to make an assessment of the landscape and visual impacts associated with the construction and operation of the proposed M1 North Motorway Service Area. The assessment begins with a description of the existing landscape setting and visual resources to establish baseline conditions. The proposed M1 North Motorway Service Area is then applied to the baseline and the impacts of the scheme upon the existing landscape setting and visual resources are then predicted.

1.2 Methodology

1.2.1 General Approach

The landscape and visual assessment methods are derived from the *Design Manual for Roads and Bridges* (DMRB); the *Guidelines for Landscape and Visual Impact Assessment* (The Landscape Institute and Institute of Environmental Management & Assessment, 2002) and the DOE and Local Government *Landscape and Landscape Assessment Guidelines* (June 2000). The landscape has been appraised to allow it to be described and classified into landscape character areas that in turn enable the categorisation of landscape quality. The capacity of a landscape to accept change of the type proposed is assessed. The key landscape components are landform, vegetation and historical and cultural components. Landform relates to topography, drainage characteristics and geology. Historical and cultural components include historic landscapes, protected structures, conservation areas and historic designed landscapes. Vegetation plays an important role in how the landscape and visual resources of an area are viewed and is an integral component of a landscape character.

Assessment was undertaken through analysis of up to date digital copies of OSI Discovery Series raster and OSI vector maps and aerial photography, in conjunction with preliminary design details of the proposed development. Site visits were undertaken during summer 2007 to assess the existing environment and the landscape and visual impacts associated with the proposed service area.

Existing visual resources are established along with sensitive receptors, i.e. residential properties, scenic viewpoints and visitor amenity areas.

The proposed scheme is then applied to this landscape and visual baseline and potential impacts predicted.

1.2.2 Landscape Assessment Methodology

Landscape Assessment Definitions

The following text describes the key criteria and terminology used in the landscape assessment.

<u>Landscape Resource</u>
The combination of elements that contribute to landscape context, character and value.

<u>Landscape Value</u>
The relative value or importance attached to a landscape that expresses national, regional or local consensus because of intrinsic characteristics.

<u>Landscape Character</u>
The distinct and homogenous pattern that occurs in the landscape reflecting geology, landform, soils, vegetation and man's impact.

Landscape Quality
The assessment of the landscape quality assesses the value of the landscape in relation to its rarity, location and landscape character attributes. In general, the higher the quality of landscape the more sensitive it will be to change.

Based on information gathered as part of the classification of the landscape, it is possible to assess the landscape quality of the study area using the methodology described in the DMRB. This has been completed using a 5-point scale as follows:

a) Highest quality - the landscapes of highest quality are, by definition, landscapes of an 'awe inspiring' or 'sublime' nature and are important on an international and national level.
b) Very attractive - this definition relates to landscapes which are still of high value nationally and can be defined as highly scenic.
c) Good landscape - this category contains areas that, although still attractive, have less significant and more common landscape features.
d) Ordinary landscape - this category contains areas that have only common landscape features and some intrusive elements such as conspicuous infrastructure with scope for improvement in management.
e) Poor landscape – this category includes areas that contain frequent detracting aspects and/or lack of management results in a degraded landscape with very few valued features.

Landscape sensitivity is used to establish the capacity of the landscape to accommodate the type of development proposed and is defined as follows:

High Highest/Very Attractive landscape quality with highly valued or unique characteristics susceptible to relatively small changes;
Medium Good landscape quality with moderately valued characteristics reasonably tolerant of changes;
Low Ordinary/Poor landscape quality with common characteristics capable of absorbing substantial change.

Magnitude of Landscape Resource Change: Direct resource changes on the landscape character of the study area are brought about by the introduction of the proposal and its effects on the key landscape characteristics. The following categories and criteria have been used:

Category	**Criteria**
High	Total loss or alteration to key elements of the landscape character, which result in fundamental and / or permanent long-term change.
Medium	Partial or noticeable loss of elements of the landscape character and / or medium-term change.
Low	Minor alteration to elements of the landscape character and / or short-term/ temporary change.

Significance of Landscape Impact: The level of significance of impact on landscape character is a product of landscape sensitivity and the magnitude of change in landscape resource as indicated in the Table 1.1.

Table 1.1 Significance of Landscape Impact

Magnitude of landscape resource change	**Landscape Sensitivity**		
	Low	**Medium**	**High**
No change	No change	No change	No change
Low	Slight	Slight / moderate	Moderate
Medium	Slight / moderate	Moderate	Moderate / substantial
High	Moderate	Moderate / substantial	Substantial

1.2.3 Visual Assessment Methodology

Visual Assessment Criteria and Terminology

The following text describes the key criteria and terminology used in the visual assessment.

Visual Amenity
Visual amenity is the value of a particular area or view in terms of what is seen by the viewer. This value may be influenced by the physical condition of the landscape viewed and the contribution the characteristics of the view make to the local environment.

Visual Resources
Visual resources are the overall key elements/features/characteristics that combine to make a view.

Viewer Sensitivity
Viewer sensitivity is a combination of the sensitivity of the human receptor (i.e. resident; commuter; tourist; walker; recreationist; or worker) and the quality of view experienced by the viewer.

Category	**Typical criteria**
High sensitivity	e.g. users of an outdoor recreation feature which focuses on the landscape; valued views enjoyed by the community; tourist visitors to scenic viewpoint; occupiers of residential properties with a high level of visual amenity.
Medium sensitivity	e.g. users of outdoor sport or recreation which does not offer or focus attention on landscape; occupiers of residential properties with a medium level of visual amenity.
Low sensitivity	e.g. regular commuters, people at place of work; occupiers of residential properties with a low level of visual amenity.

Magnitude of Visual Resource Change: the magnitude of change in visual resource or amenity results from the scale of change in the view with respect to the loss or addition of features in the view and changes in the view composition, including proportion of the view occupied by the proposed development. Distance and duration of view must be considered. Other infrastructure features in the landscape and the backdrop to the development will all influence resource change.

Category	Criteria
High	Total loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements considered totally uncharacteristic when set within the attributes of the receiving landscape or view.
Medium	Partial loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic when set within the attributes of the receiving landscape/view.
Low	Minor loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape/view.
No change	Very minor loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that are not be uncharacteristic when set within the attributes of the receiving landscape/view.

Significance of Visual Impact: Significance of visual impact can only be defined on a project by project basis responding to the type of development proposed and its location. The principal criteria for determining significance are magnitude of visual resource change and viewer sensitivity.

Table 1.2 illustrates significance of visual impact as a correlation between viewer sensitivity and magnitude of visual resource change.

Table 1.2 Significance of Visual Impact

Magnitude of visual resource change	**Visual Sensitivity**		
	Low	**Medium**	**High**
No change	No change	No change	No change
Low	Slight	Slight / moderate	Moderate
Medium	Slight / moderate	Moderate	Moderate / substantial
High	Moderate	Moderate / substantial	Substantial

Zone of Visual Influence (ZVI)

The visual assessment is assisted by the production of a ZVI. The ZVI is the area within which views of the proposed scheme and associated works during construction and operation can be obtained. The extent of the ZVI is determined primarily by the topography of the area.

The ZVI is then refined by field studies to indicate where relevant buildings, woodlands, hedges or other local features obscure visibility from the main roads, local viewpoints/landmarks and settlement etc and it is through such field studies that prediction of visual impacts take place.

The ZVI for the proposed service area is illustrated in **Figure 1.1**.

1.3 Existing Environment

1.3.1 General Overview

The proposed M1 North Motorway Service Area is located immediately east and west of the M1 motorway approximately 1km west of Dromiskin. The M1 motorway extends from Dundalk to Dublin along a north south axis. The motorway is a recognised feature of the existing landscape. The R132 (old N1) road is located 2km east of the motorway extending from Dundalk through Castlebellingham towards Dublin. The Belfast to Dublin railway line also crosses this landscape in a north south direction. Existing local roads cross the motorway via overbridges at various locations along its length allowing elevated views across the surrounding agricultural landscape at these locations.

The predominantly agricultural landscape consists of gently undulating fields located on a broad plain that extends inland from the County Louth coastline as far as Tallanstown. The River Glyde and Fane meander from west to east on the south and north side of Dromiskin respectively. Views north to the Cooley Mountains are available at slightly elevated locations on the M1 motorway but there are no significantly elevated hills in close proximity to the proposed site.

The landscape character of the study area can be described by use of two distinctive landscape character areas as illustrated in **Figure 1.2** and described below.

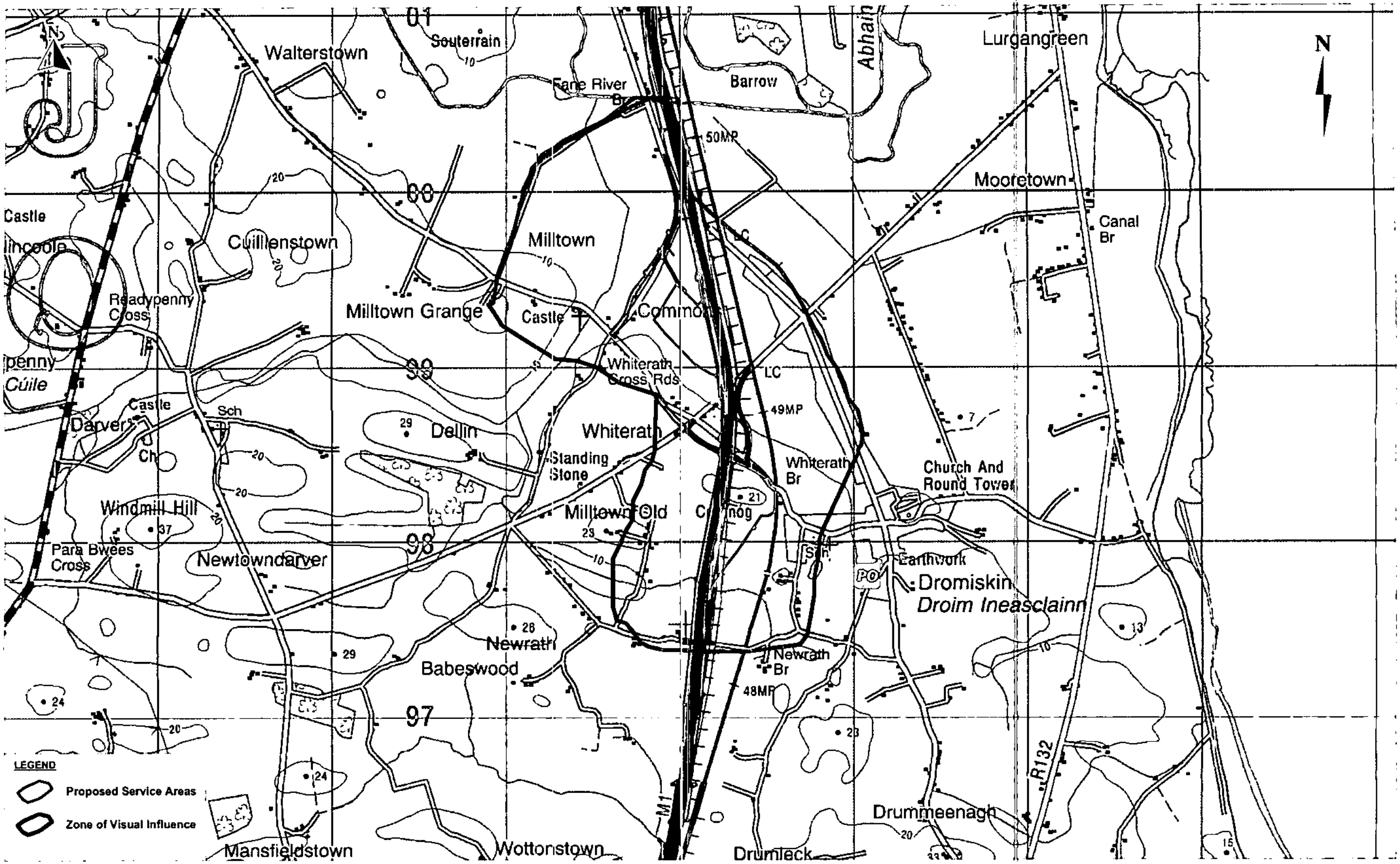
- Muirhevna Plain
- Dundalk Bay Coastline

1.3.2 Landscape Character

Muirhevna Plain

This landscape character area covers an extensive part of County Louth from the Boyne Valley to Dundalk. Its key feature is the flat nature of the topography with meandering rivers (Fane, Glyde, White and Dee) flowing eastwards to Dundalk Bay. The fertile soil has been exploited by man and the agricultural landscape has a well kept appearance with large pastoral and arable fields with strong mature hedgerows with trees. The motorway and railway are prominent features crossing this landscape. The area is rich in archaeological features illustrating mans influence over this landscape for centuries. The area is associated with the mythological events of Cuchulainn. Occasional wooded areas occur, particularly associated with demesnes and estate houses such as at Glyde Court. Hedgerow removal has taken place and is evident in fields that run along the M1 motorway. Rural houses are scattered throughout this landscape with particular concentrations around the environs of Dromiskin.

This landscape has been assessed as of "Good" Landscape Quality as it contains some features worthy of conservation but contains intrusive and common elements. The Muirhevna Plain landscape character area has a medium sensitivity to change of the type proposed.



NDP NATIONAL DEVELOPMENT PLAN

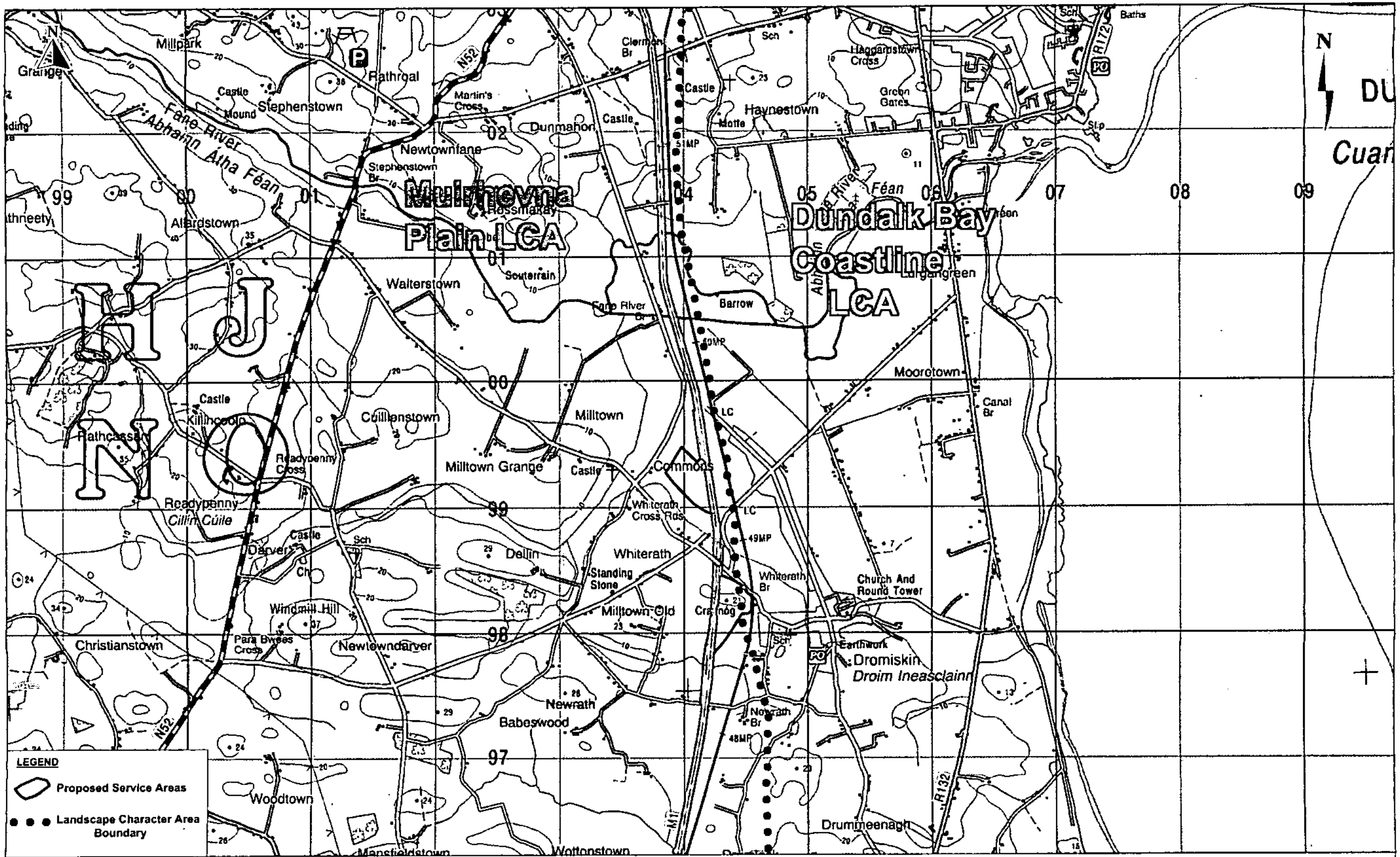
NRA National Roads Authority

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

Project Title: M1 NORTH MOTORWAY CASTLEBELLINGHAM SERVICE AREAS

Drawing Title: ZONE OF VISUAL INFLUENCE

Designed:	RH			Status:	Final
Drawn:	SMcA	Job No:	N0972	Drawing No:	1.1
Checked:	AMcK	Scale:	1cm:0.3km @ A3		
Approved:	RH	Date:	03 Dec 07	Rev:	A



LEGEND

- Proposed Service Areas
- ● ● ● Landscape Character Area Boundary

NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

Project Title	M1 NORTH MOTORWAY CASTLEBELLINGHAM SERVICE AREAS
Drawing Title	LANDSCAPE CHARACTER AREAS
Designed:	RH
Drawn:	SMcA
Checked:	AMcK
Approved:	RH
Job No:	N0972
Scale:	1cm:0.26km @ A3
Date:	03 Dec 07
Status:	Final
Drawing No:	1.2
Rev:	A

Dundalk Bay Coastline Landscape

This flat landscape extends 1-2km inland from the County Louth coast and barely rises above 20m OD. The fertile soils are used for large-scale arable and pastoral uses. The coast consists of expansive salt marshes and sandy bays. The fields are bounded by well defined hedgerows and occasional country house estates where broadleaf woodland occur. The amount of traffic on the R132 (old N1) roadway has greatly reduced with the opening of the M1 motorway, which has added to the landscape quality of the area, particularly at Castlebellingham. Scattered rural housing is frequent and conspicuous in this landscape.

This landscape has been assessed as of "Good" Landscape Quality as it contains some features worthy of conservation but contains intrusive and common elements. The Dundalk Bay Coastline landscape character area has a medium sensitivity to change.

1.3.3 Landscape Designations

A review of the Louth County Council County Development Plan 2003-2009 took place to ascertain any relevant landscape designations to assist in the appraisal of important landscape and visual features and landscape quality.

The Natural environment
The proposals are not located within 10 km of any Areas of Outstanding Natural Beauty or Areas of High Scenic Quality, which are to the northeast of Dundalk City. Policy 2.2 states "it is the policy of the council to afford protection to the landscapes and natural environments of the county by permitting only those forms of development that are considered sustainable in rural areas and do not irreparably damage or unduly detract from the character of the landscape or natural environment".

Scenic Routes

The proposals are approximately 2km west of the Seabank, Castlebellingham Scenic route (SR8) running south along the Coastline. It is an objective of the development plan to continue to protect views and prospects of special and amenity value.

Views & Prospects of Special Amenity Value

The options are approximately 2.5 km west of Seabank View (VP9). It is an objective of the planning authority to prevent development that would block or otherwise interfere with a view or prospect, considered to be of special amenity value or interest and to preserve prominent landscapes of similar significance.

Trees and Woodlands

There are no trees protected by Tree Preservation Orders or Trees and Woodlands of Special Amenity Value within the vicinity of the proposals. Darver Castle Woods (TP13) is approximately 3km to the west. Corderry House, Readypenny (TP26) is approximately 3.5 km to the west.

1.4 Potential Impact

1.4.1 Potential Sources of Impact

The proposed M1 North Service Area will result in new built elements in the local landscape. The principal sources of impact of such a development include:

i) disturbance from construction and during operation;
ii) imposition of new features in the landscape; and
iii) movement in a static landscape.

The following features have been taken into account during the prediction of impacts: the level of new roads, buildings and car parks; slip roads; junctions or structures; gantries and road signs; lighting; traffic on associated roads including headlight glare; loss of trees and open space.

1.4.2 Landscape Character Impact Assessment

An assessment of the significance of the impact of the proposed scheme on the landscape character has been completed and summarised below.

Muirhevna Plain

The proposed M1 North Service Area is located directly within this landscape character area immediately west of the railway line. The impact of the proposals are limited to the landscape in close proximity to the scheme due to the flat nature of the topography combined with well defined hedgerows and trees in the wider landscape. The fields west of the M1 have been enlarged with hedgerows removed resulting in a localised open landscape and the M1 with its associated traffic is a prominent feature. East of the M1 the hedgerows are stronger and trees also occur that restrict the influence of the proposals eastwards to Dromiskin. In part the proposals will read with the M1 and its traffic but the new buildings will be prominent features at a local level.

The landscape quality of this landscape has been identified as "Good".

This landscape character has been identified as having a medium sensitivity. The predicted magnitude of change in landscape resource is high. Therefore, using the criteria in Table 1.2, the predicted significance of landscape impact at a local level for this landscape is substantial/moderate. The wider Muirhevna Plain landscape will have no significant landscape impacts.

Dundalk Bay Coastline Landscape

The proposed M1 North Service Area is not located within this landscape character area and therefore does have a direct impact on the Dundalk Bay Coastline landscape. The proposed site is located on the western edge of this landscape character area, but due to its location on the western side of the railway and the combination of low hills and trees around Dromiskin the proposal will have no indirect landscape impact either. The motorway and its associated traffic, lights and overbridges are an existing feature of the low lying lands west of the coastline.

The landscape quality of this landscape has been identified as "Good".

This landscape character has been identified as having a medium sensitivity. The predicted magnitude of change in landscape resource is no change. Therefore, using the criteria in Table 1.2, the predicted significance of landscape impact for this landscape is no change.

Table 1.3 Summary of Landscape Character Impact Assessment

Key Landscape Character	**Impact Assessment**
Muirhevna Plain	Substantial/Moderate Negative
Dundalk Bay Coastline Landscape	No Change

1.4.3 Visual Impact Assessment

The assessment of the existing environment and the impact of the proposed scheme on visual receptors has established that there will be no important views from visitor amenity areas or tourist

sites effected by the proposed development. The visual impact on protected views is assessed in Section 1.4.4, below.

Table 1.4 below summarises the number of residential properties that will experience a visual impact from the proposed development. The locations of all properties affected are illustrated in **Figure 1.3** and details are provided in Table 1.5. Specific Landscape Mitigation (SLM) has been identified in Section 1.5 to address the significant impacts established. The residual impact column assumes that the SLM has been implemented and attained 10 years growth.

Table 1.4 Summary of Visual Impact (without mitigation)

Degree of Visual Impact	Number of properties
Substantial negative impact	20
Moderate negative impact	6
Slight negative impact	18
No change	50
Slight positive impact	0
Moderate positive impact	0
Substantial positive impact	0

NATIONAL DEVELOPMENT PLAN

NRA National Roads Authority

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

Project Title	M1 NORTH MOTORWAY CASTLEBELLINGHAM SERVICE AREAS
Drawing Title	RESIDENTIAL PROPERTIES
Designed	RH
Drawn	SMcA
Checked	AMcK
Approved	RH
Job No	N0072
Scale	1cm:0.09km @ A3
Date	03 Dec 07
Status	Final
Drawing No.	1.3
Rev	A

No	Revision	Date	By	Chk'd	App'd

	Stage	Date / App'd
PRELIMINARY		
APPROVAL		
TENDER		
CONSTRUCTION		

Table 1.5 Visual Impact Table

Ref	Qty	Existing View	Proposed View	Visual Impact (without mitigation)	Residual Impact (with mitigation)
1	1	Rear view to across open fields to motorway.	Intervening topography and hedgerows limit views.	Slight	NC
2	2	Rear view to across open fields to motorway.	Intervening topography and hedgerows limit views.	Slight	NC
3	1	Rear view to across open fields to motorway.	Intervening topography and hedgerows limit views.	Slight	NC
4	3	Front view across local road to trees and hedgerows.	No direct view to proposals.	NC	NC
5	3	Front view across existing road with hedgerows to adjacent houses	No direct view to proposals.	NC	NC
6	1	Front view across existing road with hedgerows to adjacent houses	No direct view to proposals.	NC	NC
7	1	Front view across existing road with hedgerows to adjacent houses	No direct view to proposals.	NC	NC
8	1	Front and side view through hedgerow and trees to fields and motorway.	Partial view to east service area with nighttime visibility occurring.	Moderate	Slight
9	9	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
10	5	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
11	7	Front and rear view through hedgerows to fields and motorway and overbridge.	Direct front views to west service area across fields.	Substantial	Moderate
12	5	Elevated rear view through	Direct front views to west service	Substantial	Moderate

Ref	Qty	Existing View	Proposed View	Visual Impact (without mitigation)	Residual Impact (with mitigation)
		hedgerows/trees to fields and motorway.	area across fields.		
13	2	Slightly elevated view across road to agricultural landscape with motorway.	Direct front views to west service area across fields.	Substantial	Moderate
14	2	Front and side view across road to existing houses and fields through hedgerows.	Views to proposal restricted by adjacent buildings and vegetation.	Slight	NC
15	3	Front and side view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
16	2	Rear and side view through garden vegetation, hedgerows and trees to fields and motorway.	Direct front views through vegetation to west service area across fields.	Substantial	Moderate
17	1	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
18	1	Rear and side view through garden vegetation, hedgerows and trees to fields and motorway.	Direct views to west service area. Direct impact from lighting proposed for service area.	Substantial	Substantial
19	10	Rear views across countryside to M1.	Partial view to east service area across motorway with nighttime visibility occurring.	Slight	NC
20	12	Front and side views across road towards railway line.	No direct view to proposals.	NC	NC
21	3	Rear views to existing garden vegetation.	No view to buildings but lights and HGV's visible.	Substantial	Moderate
22	4	Rear views to existing garden vegetation.	No direct view to proposals.	NC	NC
23	2	Rear views across countryside to M1.	Partial view to east service area	Moderate	Slight

Ref	Qty	Existing View	Proposed View	Visual Impact (without mitigation)	Residual Impact (with mitigation)
			across motorway with nighttime visibility occurring.		
24	3	Rear views across countryside to M1.	Partial view to east service area across motorway with nighttime visibility occurring.	Moderate	Slight
25	5	Front view across road to existing houses and fields through hedgerows.	No direct view to proposals.	NC	NC
26	1	Front view through hedgerows to open fields.	No direct view to proposals.	NC	NC
27	1	Front view through hedgerows to strong roadside vegetation.	No direct view to proposals.	NC	NC
28	1	Front view through hedgerows to strong roadside vegetation.	No direct view to proposals.	NC	NC
29	2	Rear views through hedgerows to motorway.	Partial view to east service area across motorway with nighttime visibility occurring.	Slight	NC
30	1	Front view through hedgerows to strong roadside vegetation.	No direct view to proposals.	NC	NC

1.4.4 Landscape Designations

An assessment of the policies and designation within the Louth County Council County Development Plan 2003-2009 has taken place.

The Natural environment

The proposals are not located within 10 km of any Areas of Outstanding Natural Beauty (AONB) or Areas of High Scenic Quality (AHSQ), which are to the northeast of Dundalk City. The proposals will not result in any landscape or visual impacts on AONB or AHSQ due to distance of designations from the application sites.

Scenic Routes

The proposals are approximately 2km west of the Seabank, Castlebellingham Scenic route (SR8) running south along the Coastline. The proposals will not result in any landscape or visual impacts on Scenic Routes due to distance and direction of views and intervening topography/trees.

Views & Prospects of Special Amenity Value

The proposals are approximately 2.5 km west of Seabank View (VP9). The proposals will not result in any landscape or visual impacts on views and prospects of special amenity value due to distance and direction of views and intervening topography/trees.

Trees and Woodlands

There are no trees protected by Tree Preservation Orders or Trees and Woodlands of Special Amenity Value within the vicinity of the proposals.

1.4.5 Earthen Bunds

As described in **Volume 2 Chapter 3** of this EIS, there will be earthworks and excavated material that will be re-used on site. Some of this material is likely to be classified as unsuitable for reuse in engineering embankment construction. This material, subject to hydrogeological testing, will be deposited in earthen bunds within the service areas as shown in **Figure 3.5 (Volume 2, Chapter 3)** or shall be removed from site for appropriate disposal. The earthen bunds will be developed in sympathy with the local environment and as such will have a natural profile with a maximum of 1:4 side slopes. The maximum height of the bunds will be 2 metres above the existing ground level.

1.5 Mitigation

1.5.1 Landscape Aims and Objectives

Mitigation measures are those taken to help reduce the significant landscape and visual impacts arising as a result of the proposed service areas (See Section 1.4).

Landscape Aims

The physical and visual integration of the proposed development and associated features into surrounding landscape.

Screening to minimise visual intrusion and to reduce any significant negative aspects regarding the visual impact of the new buildings, access roads, road structures and traffic on sensitive receptors.

General Objectives

In line with the NRA Guide to landscape treatments of National Road Schemes in Ireland it is a core objective of the landscape mitigation to use native plants and seed from indigenous sources. The implementation of the landscape mitigation measures must be in accordance with the NRA Guide to landscape treatments.

The retention of the existing hedgerows and trees as far as possible will be an overriding objective. Use of larger size trees and evergreen shrubs will be required to reduce visual impacts at significantly affected properties, i.e.. locations where substantial or moderate/substantial negative impacts have been predicted (See Specific Landscape Mitigation below). Planting at close proximity to the proposed roads and buildings can be controlled by use of upright growing trees (*fastigiata* varieties).

1.5.2 Planting

Specific Landscape Measures (SLM)

Woodland Screening Mix with Individual Trees

The woodland screening mix will be composed of strong growing native species that should reflect the species found in adjacent hedgerows in this part of the North County Dublin landscape.

Suitable woodland species within the mix will include – *Fraxinus excelsior*, *Quercus robur*, *Betula pendula*; *Alnus glutinosa* and *Corylus avellana*.

Suitable evergreen species will include *Ligustrum vulgare*; *Ilex aquilfolium* and *Ulex europaeus*.

Individual native woodland trees will be planted as semi mature trees within the woodland screening mix for additional screening at densities that will reflect the distribution of scattered trees within woodland and hedgerows in the surrounding landscape.

The woodland should establish a closed canopy within five years. The woodland trees and shrubs will be managed and monitored as it develops.

Table 1.6 - Specific Landscape Measures (SLM)

Location	Description of SLM
SLM 01:- Along eastern and southern boundary of the east service area and within the development (semi mature tree planting)	Minimum 10 metres wide belt of woodland planting with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property references; 8 and 21, 23 and 24 (See Figure 1.3 for location of properties)
SLM 02:- (Along southern eastern and western boundary of the western service area and within the development(semi mature tree planting)	Minimum 10 metres wide belt of woodland planting with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property references; 11, 12, 13, 16 and18 (See Figure 1.3 for location of properties)
SLM 03:- (Around remaining boundaries of the site boundary of both east and west service areas)	Minimum 10 metres wide belt of woodland planting to form a woodland framework with a high proportion of evergreen species and semi mature trees, as well as semi mature trees planted around and within proposed car parks necessary to mitigate significant landscape impacts on the surrounding Muirhevna Plain Landscape.
SLM 04 Along the lands adjacent to the merge lane of the western service area	Minimum 10 metres wide belt of woodland planting to form a woodland framework with high proportion of evergreen species and semi mature trees necessary to mitigate significant visual impacts at residential property reference 18. (See Figure 12.3 for location of properties)

1.5.3 Monitoring and Maintenance

Maintenance of the landscape works will be an integral part of the on-going site management. This will include the defects liability period during which any defective plant material (as stated above) is to be replaced to insure the healthy establishment of mitigation planting described above. Litter picking and weed control shall be carefully monitored during the early growing seasons of the landscape maintenance contract. Contractors will comply with all health and safety standards, in particular with regard to maintenance works during the operational phase of the development.

1.5.4 Earthen Bunds

Should the design of the earthen bunds change during the detailed design stage from that described in this EIS the Project Engineer shall consult with the Landscape Architect to ensure no adverse visual impact.

The material to be re-used for earthen bunds shall only be used if deemed appropriate subject to hydrogeological testing.

1.6 Construction Impacts and Mitigation

The construction of the proposed service areas will necessitate the removal of existing trees and hedgerows along with earth moving activities, creation of stockpiles, construction traffic and erection of cranes and structures. The construction stage impacts have been included in the predicted impacts outlined in section 1.4 above for both landscape character and visual receptors. The impacts caused by construction activities (movement of construction traffic, creation of stockpiles and erection of cranes) will be temporary in nature and duration. Despite their

temporary nature it is recommended that several mitigation measures be implemented. Construction compounds should not be located in close proximity to residential properties. If construction activities take place during dry weather is recommended that dust control measures are implemented to avoid dust arising that may draw attention to construction activities.

1.7 Residual Impacts

This section of the report assesses the impact of the proposed service areas on the landscape character and visual receptors (previously identified in Section 1.4), after the mitigation (described above in Section 1.5) has attained 10 years of growth.

After 10 years of growth the proposed planting will help to integrate the development into the existing landscape. The woodland framework will limit the extent of the influence of the facilities associated with both service areas on the Muirhevna Plain Landscape with a resultant reduction in impact from Substantial/Moderate Negative Impact to Moderate Negative Impact.

With regards to visual impact on sensitive receptors loss of existing views will remain for one property and the visual impacts are significantly reduced. The predicted residual visual impacts for all properties are provided in detail in Table 1.5 above and summarised below in Table 1.7.

Table 1.7 Residual Visual Impacts (after mitigation)

Degree of Visual Impact	Number of properties before mitigation	Number of properties after mitigation
Substantial Negative Visual Impact	20	1
Moderate Negative Visual Impact	6	19
Slight Negative Visual Impact	18	6
No Change	50	69

1.8 Interactions

1.8.1 General

This landscape and visual assessment has a direct interaction with the Ecology Section of the EIS. The loss of habitats is described fully in the Ecology Section and is not elaborated on in this landscape and visual assessment. The mitigation proposed will provide new and more extensive woodland and grassland habitats in and around the new development that will result in a beneficial impact on biodiversity. In completing the landscape and visual assessment liaison has taken place between the landscape architect and the ecologist.

The provision of noise barriers can create visual impacts while mitigating noise increases. The landscape and visual assessment has interacted with the noise assessment to insure that all potential landscape and visual impacts have been incorporated into the assessment.

APPENDIX F

TERRESTRIAL ECOLOGY

SITE SYNOPSIS

SITE NAME: DUNDALK BAY

SITE CODE: 000455

Dundalk Bay, Co. Louth, is a very large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16km from Castletown River on the Cooley Peninsula in the north to Annagassan/Salterstown in the south. The bay encompasses the mouths and estuaries of the Rivers Dee, Glyde, Fane, Castletown and Flurry. The site contains five habitats listed under the EU Habitats Directive, i.e. perennial vegetation of stony banks, tidal mudflats, salt marshes, *Salicornia* mudflats and estuaries.

Saltmarsh vegetation occurs in four main areas: at Lurgangreen, Marsh South, Dundalk Harbour and Bellurgan. These are dominated by wide expanses of Common Cord-grass (*Spartina anglica*), while Sea Purslane (*Halimione portulacoides*) is common along the numerous channels. Common Saltmarsh-grass (*Puccinellia maritima*) is also abundant in places. Glasswort (*Salicornia* spp.) occurs on the lower zones of the salt marshes and in places extends out onto the sand flats. The salt marshes at Lurgangreen and Marsh South are partially fenced and grazed by sheep.

Shingle beaches are particularly well represented in Dundalk Bay, occurring more or less continuously from Salterstown to Lurgan White House in the south bay, and from Jenkinstown to east of Giles Quay in the north bay. The shingle is mostly stable, occurring on post-glacial raised beaches. The shingle often occurs in association with intertidal shingle, salt marsh and or shingle based grassland. The shingle supports species such as Spear-leaved Orache (*Atriplex prostrata*), Sea Mayweed (*Matricaria maritima*), Sea Beet (*Beta vulgaris*), Sea Rocket (*Cakile maritima*), Wild Carrot (*Daucus carota*), Sea Holly (*Eryngium maritimum*), Sea sandwort (*Honkenya peploides*) and Sea Radish (*Raphanis maritimus*). Yellow Horned-poppy (*Glaucium flavum*) and Sea Scutch (*Leymus arenarius*) occur here at their most northerly locality on the east coast, while the Red Data Book species Sea-kale (*Crambe maritima*) has recently been recorded.

The extensive sand flats and mud flats (over 4,000 ha) have a rich fauna of bivalves molluscs, marine worms and crustaceans and are the main food resource of the tens of thousands of waterfowl (including waders and gulls) which feed in the intertidal area of Dundalk Bay. The salt marshes are used as high-tide roosts by all these species, while the grazing birds (notably Brent Geese and Wigeon) feed on the salt marsh grasses, areas of *Zostera* and other grassland vegetation. The Brent Geese also feed on the mats of green algae on the mudflats. At night the wintering Greylag and Greenland White-fronted Geese, and Whooper Swans, from Stabannan/Braganstown (inland from Castlebelligham) roost in Dundalk Bay.

The site is internationally important for waterfowl (nos. in brackets refers to the average max. over the period 1994/95 to 1997/98) because it regularly holds over

20,000 birds (up to 57,000 have been recorded) and supports over 1% of the North-West European/East Atlantic Flyway populations of Brent Goose (366), Bar-tailed Godwit (2312) and Knot (11,948). Additionally, it is nationally important for Golden Plover (4266), Great Crested Grebe (193), Greylag Goose (312), Shelduck (463), Mallard (657), Pintail (100), Red-breasted Merganser (148), Oystercatcher (6940), Grey Plover (218), Ringed Plover (133), Wigeon (565), Dunlin (9112), Black-tailed Godwit (754), Curlew (1593), Lapwing (4822), Greenshank (20) and Redshank (1,455). Both Golden Plover and Bar-tailed Godwit are Annex I species. The site has been designated a Special Protection Area under the EU Birds Directive and is also a designated Ramsar site.

25.06.01

SITE SYNOPSIS

SITE NAME: DUNDALK BAY SPA

SITE CODE: 004026

Dundalk Bay is a large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16 km from Castletown River on the Cooley Peninsula, in the north, to Annagassan/Salterstown in the south. The bay encompasses the mouths and estuaries of the Rivers Dee, Glyde, Fane, Castletown and Flurry. The site contains five habitats listed under the EU Habitats Directive, i.e. perennial vegetation of stony banks, tidal mudflats, salt marshes, *Salicornia* mudflats and estuaries.

The extensive sand flats and mud flats (over 4,000 ha) have a rich fauna of bivalves, molluscs, marine worms and crustaceans which provides the food resource for most of the wintering waterfowl. The salt marshes, which occur in four main areas at Lurgangreen, Marsh South, Dundalk Harbour/Ballymascanlan Bay and Bellurgan, are used by the roosting birds at high tide. The marshes are dominated by wide expanses of Common Cord-grass (*Spartina anglica*), while Sea Purslane (*Halimione portulacoides*), Common Saltmarsh-grass (*Puccinellia maritima*) and Glasswort (*Salicornia* spp.) are other common species. The herbivorous waterfowl (notably Brent Geese and Wigeon) feed on the salt marsh grasses, as well as on areas of *Zostera* and green algae on the mudflats.

Shingle beaches are particularly well represented in Dundalk Bay, occurring more or less continuously from Salterstown to Lurgan White House in the south bay, and from Jenkinstown to east of Giles Quay in the north bay. The shingle supports such species as Spear-leaved Orache (*Atriplex prostrata*), Sea Mayweed (*Matricaria maritima*), Sea Beet (*Beta vulgaris*), Sea Rocket (*Cakile maritima*) and Sea Holly (*Eryngium maritimum*), as well as scarcer plants including Yellow Horned-poppy (*Glaucium flavum*), Sea Scutch (*Leymus arenarius*) and the Red Data Book species Sea-kale (*Crambe maritima*). At high tide, many birds roost on the shingle beaches.

The outer part of the bay provides excellent shallow-water habitat for divers, grebes, and sea duck. In summer, it is thought to be a major feeding area for auks from the Dublin breeding colonies. At night the wintering Greylag and Greenland White-fronted Geese, and Whooper Swans, from Stabannan/Braganstown (inland from Castlebelligham) and other inland sites roost in Dundalk Bay.

The site is internationally important for waterfowl on the basis that it regularly holds over 20,000 birds (average peak of 40,781 over five winters 1995/96-1999/00). In the same period it also qualifies as a site of international importance for supporting populations of Brent Goose (337), Black-tailed Godwit (1,067) and Bar-tailed Godwit (1,950). There is also a range of other species which occur in numbers of national importance – these are Great Crested Grebe (302), Greylag Goose (435), Shelduck (492), Mallard (763), Pintail (117), Red-breasted Merganser (121) (over 500 have

been recorded in August/September), Oystercatcher (8,712), Ringed Plover (147), Golden Plover (5,967), Grey Plover (204), Lapwing (4,850), Knot (9,710), Dunlin (11,515), Curlew (1,234) and Redshank (1,489) (all figures are average peaks over the period 1995/96 to 1999/00). Other wintering species which occur regularly in regionally important numbers include Red-throated Diver, Great Northern Diver, Cormorant, Grey Heron, Mute Swan, Wigeon, Teal, Goldeneye, Greenshank and Turnstone.

The site also supports large numbers of gulls during winter. In the 1995/96 to 1999/00 period, the following were recorded (figures are average peaks over the five winters): Black-headed Gull (6,630), Common Gull (551), Herring Gull (751) and Great Black-backed Gull (185).

In spring and autumn the site attracts a range of passage migrants, including Little Stint, Curlew Sandpiper and Ruff.

This site is one of the most important wintering waterfowl sites in the country and one of the few which regularly supports more than 20,000 waterfowl. It supports three species in numbers of International Importance and a further 15 species in numbers of National Importance. The populations of Golden Plover, Bar-tailed Godwit, Red-throated and Great Northern Divers are of particular note as these species are listed on Annex I of the EU Birds Directive. The site is also a designated Ramsar site. The site is monitored annually as part of I-WeBS.

04.03.2002

SITE SYNOPSIS

SITE NAME: STABANNAN-BRAGANSTOWN SPA

SITE CODE: 004091

Stabannan-Braganstown SPA, situated approximately 4 km inland from Dundalk Bay in Co. Louth, is a small, very flat alluvial plain adjacent to the River Glyde. It is bounded to the north and south by low, rolling hills. Much of the site was formerly marshland or wet grassland, but is now drained and agriculturally improved. It is farmed intensively for grass, cereals and root crops.

The site is of high ornithological importance as a feeding area for wintering waterfowl. In particular, it supports an internationally important wintering population (1,391) of Greylag Goose, with over 35% of the national total. (bird numbers given here and below are the average maximum figures in the winters 1995/96-1999/00). It also has a regular population of Greenland White-fronted Goose, though numbers are relatively low (24). It formerly supported an internationally important population of Whooper Swan though numbers have declined in recent years and the flock now (60) is only of regional importance. Numbers of Bewick's Swan have dwindled to only a few each winter, reflecting a decline throughout Ireland. Other species typical of agricultural land also occur, notably Golden Plover (878) and Lapwing (300). At night most of the geese and swans roost in Dundalk Bay.

While the site is privately owned and actively farmed, it is not under threat as there is a management agreement in place to benefit the waterfowl.

The site is of most importance as the largest Greylag Goose site in the country, but it also regularly supports three species which are listed on Annex I of the E.U. Birds Directive – Greenland White-fronted Goose, Whooper Swan and Golden Plover.

8.2.2004

APPENDIX G

AQUATIC ECOLOGY

An Assessment Of Potential Impacts Of The Proposed M1 Service Area Development At Castlebellingham, Co. Louth

Final Report

compiled by

AQUENS Ltd.

commissioned by

RPS.

November 2007

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1.0 INTRODUCTION

AQUENS Ltd. was commissioned by RPS Environment Ltd. to undertake a water quality assessment on the aquatic environment within the site of a proposed service area on the M1 motorway at Castlebellingham, Co. Louth. The potential impacts of the development and mitigation measures have been included in this report.

Table 1: Presents the main legal constraints on the proposed development in relation to aquatic flora, fauna, habitats and fisheries.

The Local Government (Water Pollution) Act, 1977 (and associated regulations)	Prohibits the entry of unlicensed polluting matter into waters
The Local Government (Water Pollution) Act, 1977 (Water quality standards for phosphorus regulations 1998)	Requires the local authority to maintain the water quality where satisfactory water quality exists, and in cases of unsatisfactory water quality to improve the quality to a status specified in the regulations. In the case of the present project, the regulations require that the water quality in the streams be improved to a Q4 unpolluted biological quality rating.
The Fisheries (Consolidation) Act, 1959 as amended by the Fisheries (Amendment) Act, 1962	Prohibits: 1. The entry of deleterious matter into waters. (Deleterious matter is defined as any substance that is liable to injure fish, their spawning grounds or their food, or to injure fish in their value as human food.) 2. Obstructing the passage of salmon, trout or eels or their smolts and fry 3. Injury or disturbance of the spawn or fry of salmon or trout or to their spawning or nursery areas
Fisheries (Amendment) Act 1999	Requires the regional fisheries board to have regard for the need for the conservation of fish and other species of fauna & flora, habitat and biodiversity of inland fisheries and ecosystems.
The Wildlife Act 1976	Prohibits damage to protected species which includes certain freshwater aquatic species.
Water Framework Directive (2000/60/EC)	The Water Framework Directive requires the maintenance/achievement of good ecological, hydrochemical and hydromorphological quality for all surface waters.

2.0 STUDY AREA

Watercourses potentially affected by the proposed development were identified using the drawings provided by RPS. The 1:50,000 O.S. Discovery Series map were also consulted but none of the watercourses sampled were marked on the map. The proposed points of discharge arising from the proposed constructed wetlands were identified on the schematic layout. All watercourses draining the proposed development were small streams, most of which were largely dry ditches, heavily vegetated and silted with some pockets of open water where it was possible to take a sample. All watercourses which may potentially be impacted by the development were considered and sampled where possible. A number of watercourses, as identified on the schematic layout, when ground truthed were completely dry ditches. The land use in the Castlebellingham area was mixed, arable and beef and dairy farming (site specified in Table 2). Two sites were selected on the stream draining each development area, one upstream of the proposed points of discharge and one downstream. Other criteria adopted in site selection included access and the presence of water to obtain a sample.

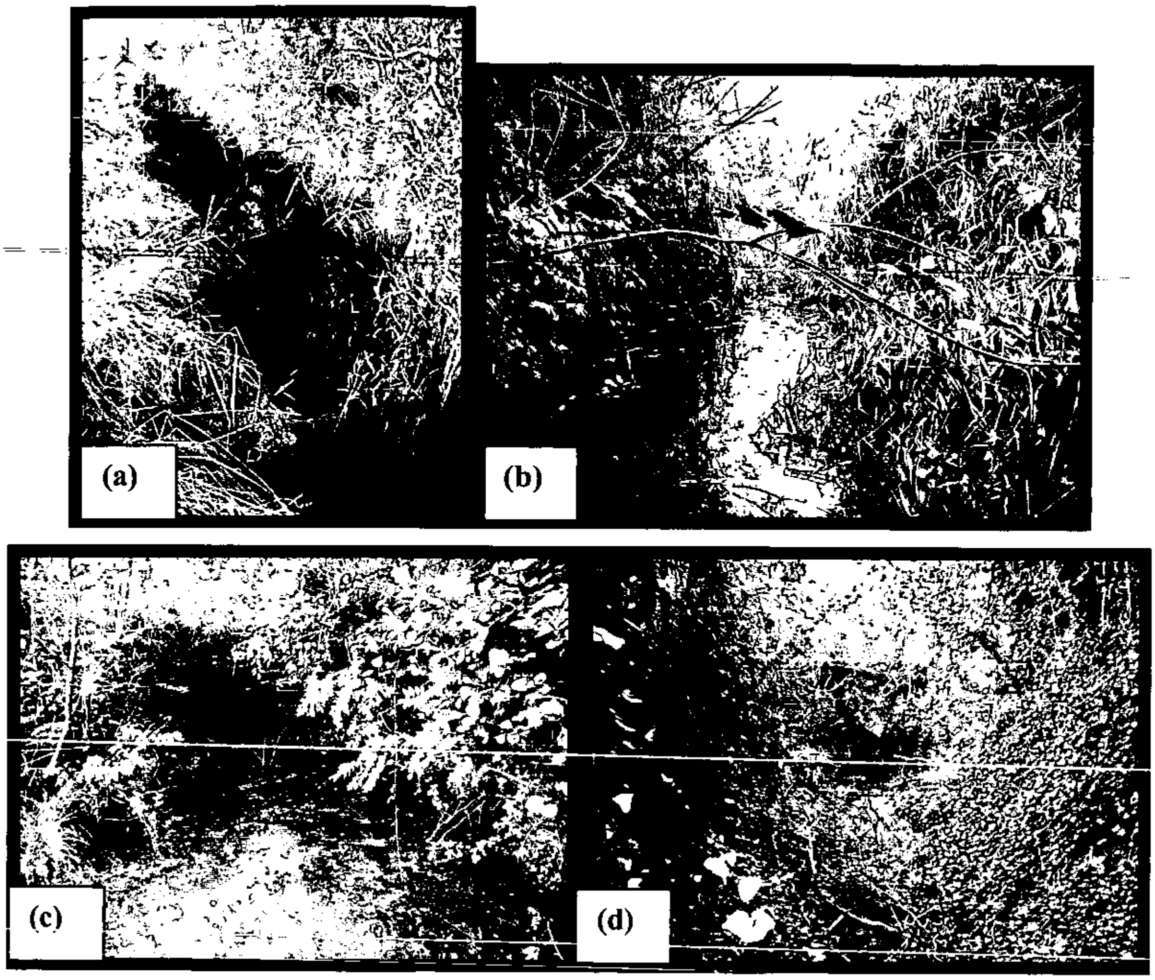
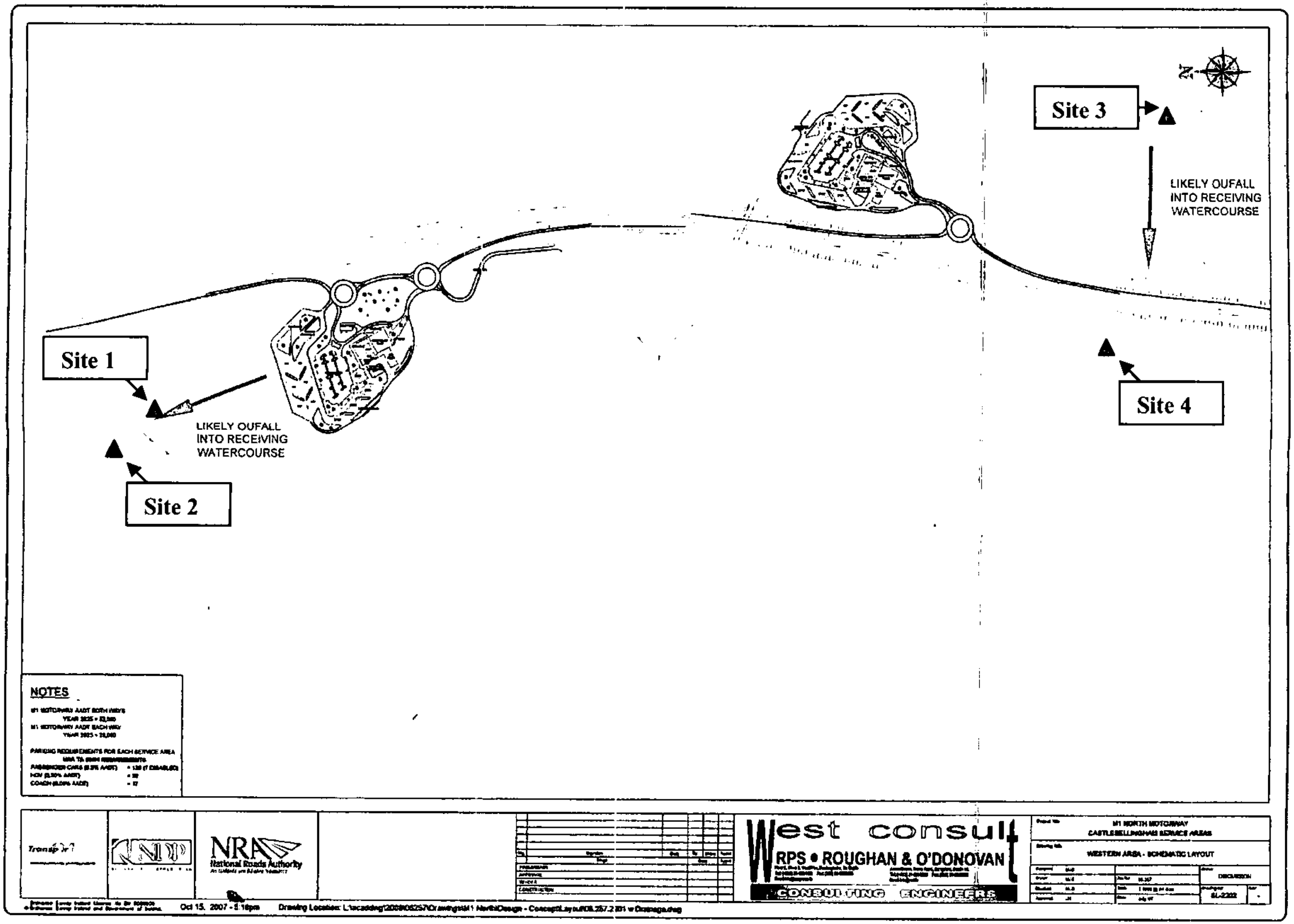


Fig. 1 (a)Site 1 – Castlebellingham West u/s; (b) Site 2 – Castlebellingham West d/s; (c)Site 3 – Castlebellingham East u/s; (d Site 4 – Castlebellingham East d/s.

Table 2: Characteristics of the habitat recorded at each site surveyed in the Castlebellingham West and East Service Areas.

Parameter	Castlebellingham West u/s	Castlebellingham West d/s	Castlebellingham East u/s	Castlebellingham East d/s
Grid Reference	O 04105 99353	O 03811 99698	O 04477 97688	O 03956 97761
Sampling Station	u/s proposed pt. discharge	d/s proposed pt. discharge (d/s road)	u/s proposed pt. discharge; east side rail track	d/s proposed pt. discharge
Physical:				
Stream Width (m)	1.7	1	1-2	1-2
Bank Height (m)	2.3	3-4	<1m	3-4
Depth (cm)	31	40	70	4
Flow	none	none	none	none
Shade	20	20	10	60
Open Water	10	10	5	15
Substrate: (% composition)				
Boulder	-	-	-	-
Cobble	-	-	-	10
Pebble	-	-	-	-
Coarse gravel	-	-	-	20
Fine gravel	-	-	-	-
Sand	-	-	-	-
Mud	100	100	100	70
Habitat: (%)				
Riffle	-	-	-	-
Glide	-	-	-	-
Pool	-	-	-	-
Vegetation:				
Aquatic	*Lemna* spp; *Berula* spp.; *Rorripa* spp.; *Phalaris* spp.; *Typha* spp.; and *Calitriche* spp.	*Sparganium* spp.; *Lemna* spp.	*Lemna* spp.; *Callitriche* spp.; and *Phalaris* spp.	none
Riparian	*Crataegus* spp.; *Philependula* spp.; various grasses; *Rubus* spp.; and *Rannunculus* spp.	*Phalaris* spp; *Salix* spp.; *Rubus* spp.; *Fraxinus* spp.; *Hedera* spp.; Bryophytes; *Ulex* spp.	*Fagus* spp.; *Hedera* spp.; *Rubus* spp.; *Fraxinus* spp.; *Salix* spp.; *Dryopteris* spp.; *Rumex* spp.; and *Epilolobium hirsutum*	*Crataegus* spp.; *Hedera* spp.; and *Dryopteris* spp.
Physicochemical:				
Conductivity mS/cm @ 25°C	868	773	910	820
pH	7.95	7.45	7.24	7.72
Oxygen Saturation (%)	96	48.6	32.1	45.2
Dissolved Oxygen (mg/l O_2)	9.3	5.79	4.00	5.59
Temperature (°C)	-	8.5	6.8	6.4
Land Use:	Arable farming	Arable farming	Dairy farming	Arable farming
Other:		Iron leaching from left bank		Badger sett
****Salmonid Habitat Quality:***				
Salmonid Adult Habitat	none-poor	none-poor	none-poor	none-poor
Salmonid Nursery Habitat	none-poor	none-poor	none-poor	none-poor
Salmonid Spawning Habitat	none-poor	none-poor	none-poor	none-poor
Classification**:	E - low value	E - low value	E - low value	E - low value

* Salmonid habitat quality classification (Kennedy, 1984); **Importance of Freshwater Classification (NRA, 2004)



Drawing showing the approximate locations of the four macroinvertebrate sampling sites at the two proposed service areas along the M1 motorway, Castlebellingham; Site 1-Castlebellingham West u/s; Site 2-Castlebellingham West d/s; Site 3-Castlebelingham East u/s; Castlebellingham East d/s.

3.0 Materials and Methods

3.1 Macroinvertebrate Surveillance

Marcoinvertebrates are an excellent tool when assessing water quality and they are the most common biotic component in bioassessment. They are easy to collect, are widespread and abundant and more importantly they exhibit differential responses to physical and chemical changes in their environment. Some macroinvertebrates are sensitive to pollution while others are tolerant. The benthic macroinvertebrates respond rapidly to organic and physical disturbances but also provide a realistic record of the prevailing conditions, integrating the biological signal over a period of time.

Macroinvertebrate sampling took place on 25th October and 8th November, 2007 at four locations. Two sites were selected on each watercourse within the proposed service area, one located upstream of the proposed point of discharge and one downstream (Grid References included in Table 2). The method adopted was that which is routinely applied by the EPA in the national river monitoring program (McGarrigle *et. al.*, 2002). An FBA (Freshwater Biological Association) pond net (1mm mesh) was used to collect a 2-minute multi-habitat kick-sample. In addition, a one minute stone-washing was also undertaken. The sample was preserved in 70% IMS and processed in the laboratory. It was sorted in an illuminated tray and all the macroinvertebrates were identified to the lowest taxonomic resolution using appropriate FBA taxonomic keys. A Q-value was then assigned using the EPA methodology (McGarrigle *et al.*, 2002). This Q-value system is a five point score (Q1-Q5: with intermediate scores obtainable, e.g. Q3-4) based on the proportions of five groups of macroinvertebrates, with different pollution tolerances (see Appendix I). In order to achieve Water Framework Directive compliant, the Q-value system has been changed slightly. This amended version was made available to AQUENS Ltd. by EPA personnel and was applied to the macroinvertebrate data, but as of yet it is not published (C. Bradley pers. comm.). Therefore, the Q-value system contained in Appendix I of this report refers to the 2002 version as referenced (McGarrigle *et. al.*, 2002). Furthermore, this version applies to eroding sites only and some differences exist when using the system for depositing sites as in all 4 of the sites in the current survey.

It is always advisable to calculate several metrics when assessing the state of the environment, freshwater being no exception. Therefore, two additional indices the BMWP (Biological

Monitoring Working Party) score and the ASPT (Average Score per Taxon), were also determined (Appendix II). The BMWP score is based on the presence of pollution-tolerant to pollution-sensitive families. Each family is assigned a score. The BMWP score is the sum of these scores. Families that are sensitive to pollution are assigned higher scores than pollution-tolerant families. A high overall score indicates that the water quality is good. The ASPT is determined by dividing the BMWP score by the number of scoring taxa yielding a score between 1 and 10, values >6 usually indicate good water quality.

In addition, the taxon richness and the percentage of Ephemeroptera/Plecoptera/Trichoptera (%EPT) were calculated. The timing of the Q-assessment was not ideal since some key macroinvertebrates may be absent from the sample due to emergence. However, this is taken into account in our assessment. Sampling in spring/summer gives a more robust reflection of water quality.

3.2 Physico-chemical Survey

A range of physicochemical characteristics (dissolved oxygen, temperature, conductivity and pH) were taken on site using automatic field probes and the results are presented in Table 2. A number of physical characteristics were noted at each of the sampling sites, they included; stream width and depth; substrate type and percentage composition; nature of flow; instream habitat, riffle, glide and pool in the sampling area; aquatic vegetation; dominant bankside (riparian) vegetation, listing the main species overhanging the stream; and estimated degree of shade of the sampling site by bankside vegetation.

3.3 Salmonid Habitat Asssessment

A salmonid habitat assessment was carried out at each of the four sites on the 25th October and 8th November 2007. The results of the assessment are contained in Table 2. Salmonid habitat quality (adult, nursery and spawning) was rated on a scale of None/ Poor/ Fair/ Good/ Very Good/ Excellent broadly based on a qualitative procedure described by Kennedy (1984). This rating takes into account both field observations and available data. A rating of "none" was assigned if it was considered as impossible that the stream could support salmonid fish in the relevant life stage. A rating of "None - Poor" indicates the watercourse could possibly support salmonid fish in the relevant life stage but that it is extremely unlikely. This assessment consisted of walking the stream bank within a couple of hundred metres of each sampling site.

Salmonid habitat quality was assessed, taking into account the physical characteristics of the site as listed above and presented in Table 2. Based on these observations and more detailed criteria outlined below, the value of each stream section for salmonid spawning, as a nursery area for juvenile salmonids, and as an area for adult salmonids, was estimated. The following criteria were used for assessment of salmonid habitat quality:

i. Salmon prefer to spawn where the gradient of a river is 3% or less (Mills 1989).

ii. The selected current velocity for spawning is within the range 25–90 cm s^{-1}, with a water depth in the range 17–76 cm (Hendry & Cragg-Hine 1997).

iii. Typical spawning sites have gravel of suitable coarseness where interstices are kept clean by up-welling flow (Peterson 1978, Bjorn & Reiser 1991).

iv. Salmonid fry and parr inhabit shallow, fast-flowing water with a moderately coarse substrate with cover (Symons & Heland 1978, Baglinière & Champigneulle 1986).

v. Deep or slow-moving water with a sand or silt substrate is not usually inhabited by resident juvenile salmonids (Wankowski & Thorpe 1979, Baglinière & Champigneulle 1986).

vi. All salmonid life history stages require cover but it is especially important for the older age classes. Heterogeneity in cover types will allow a river to support several age classes. Cover includes areas of deep water, surface turbulence, loose substrate, woody debris, rocks, undercut banks, overhanging and aquatic vegetation (Heggenes 1990; Bjorn & Reiser 1991; Haury et al. 1995).

vii. Habitat heterogeneity provides for a variety of age classes.

3.4 Classification of the Watercourses

Below is a list of guidelines produced by the NRA and used to classify the importance of freshwaters. These guidelines were applied to the sampling sites and a rating was assigned accordingly, these are presented in Table 2.

Table 3: Guidelines used for classification of importance of freshwaters

Rating	
A	**Internationally Important** Habitats designated as SACs for Annex II species under the EU Habitats Directive. Major Salmon river fisheries. Major salmonid lake fisheries.
B	**Nationally or Regionally Important** Other major salmonid waters and waters with major amenity fishery value. Commercially important coarse fisheries. Waters with important populations of species protected under the Wildlife Act and/or important populations of Annex II species under the EU Habitats Directive. Waters designated or proposed as Natural Heritage Areas by NPWS (formerly Dúchas).
C	**High Local Value** Small water bodies with known salmonid populations or with good potential salmonid habitat, or any population of species protected under the Wildlife Act and/or listed Annex II species under the EU Habitats Directive. Large water bodies with some fisheries value.
D	**Moderate Local Value** Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any stream with an unpolluted Q-value rating.
E	**Low value** Water bodies with no current fisheries value and no significant potential fisheries value. Habitat diversity low and degraded.

(NRA 2004)

4.0 Potential Impacts

4.1 Assessment of the Significance of the Potential Impacts

Impacts are defined on the basis of severity of impact on salmonid fish, macroinvertebrate diversity in particular any rare, protected, or commercially significant species and/or habitats. The assessment of potential considered not only site specific effects but potential downstream impacts. Salmonid fish are given priority but due consideration is also given to other aquatic biota.

Table 4: Outlines the significance of extensive and localised impacts as they apply under each classification rating.

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

(NRA 2004)

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 to 7 years
Medium-term: 7 to 15 years
Long-term: 15 – 60 years
Permanent: over 60 years.

In line with other reports on motorway developments this report considers 'localised' impacts on rivers as impacts measurable no more than 250 metres 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 habitat 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.

5.0 Existing Environment

Since all the watercourses sampled are small streams/ditches, no information was available. They do not occur on the 1:50000 Discovery Series. No EPA water quality data are available as they are not monitored as part of the national monitoring program. It is also very unlikely and assumed that the relevant Local Authorities and Fisheries Boards do not have data on these watercourses. Therefore, the Q-assessments undertaken cannot be compared to other data and are representative of baseline conditions (i.e. prior to discharge from constructed wetland). The watercourses at Castlebellingham West and East eventually enter a little tributary of the larger River Fane. The Fane and its tributaries hold good stocks of brown trout, salmon and sea trout (www.erfb.ie). Water quality ratings along the 38mile River Fane ranged from Q2/0 to Q4 when assessed by the EPA in 2006.

6.0 Results

6.1 Biological Water Quality Assessment of potential affected Watercourses

The percentage representation of the key macroinvertebrate taxa used in the EPA Q-value system is presented in Table 5. Figures 2-5 illustrate the relative percentage representation of each Q-faunal group for all sites. The water quality rating assigned to the sites along with results of the other biological metrics used are presented in Table 6. The complete list of macroinvertebrates recorded at all sites is presented in Table 7.

Table 5: The percentage representation of the key macroinvertebrate taxa at the sampling sites.

		Castlebellingham West u/s	Castlebellingham West d/s	Castlebellinghem East u/s	Castlebellingham East d/s
Family/Genus/Species	**Group**	**Site 1**	**Site 2**	**Site 3**	**Site 4**
Group A - Sensitive Fauna					
Absent	A	0.00	0.00	0.00	0.00
Group C - Less Sensitive Fauna					
Baetidae	B	0.00	0.00	0.00	0.00
Odonata	B	2.76	0.19	0.57	0.00
Cased Trichoptera	B	0.00	0.77	0.00	1.06
Group C - Tolerant Fauna					
Sialidae	C	0.00	6.53	0.00	0.00
Mollusca	C	67.74	0.96	10.34	1.28
Platyhelminthes	C	0.00	0.00	0.57	0.00
Piscicola geometra (L.)	C	0.00	0.77	0.00	0.00
Hydracarina	C	0.00	0.00	0.00	0.00
Gammaridae (excl. *Crangonyx* spp.)	C	0.00	44.91	0.00	1.91
Hemiptera (all except *A. aestivalis*)	C	0.00	0.00	0.00	0.00
Coleoptera (excl. *A.aestivalis*)	C	0.92	0.38	3.45	0.21
Chironomidae (excl. *Chironomus* spp.)	C	3.23	18.04	28.16	30.21
Simuliidae	C	0.00	0.00	0.00	0.00
Tipulidae	C	0.92	0.00	0.00	0.00
Group D - Very Tolerant Fauna					
Sphaeriidae	D	0.00	0.00	10.92	13.40
Hirudinea (excl. *P.geometra*)	D	0.46	0.00	3.45	0.43
Asellidae	D	17.05	23.03	33.33	50.43
Group E - Most Tolerant Fauna					
Tubificidae	E	0.92	3.07	2.30	1.06
Chironomus spp.	E	5.99	1.34	6.90	0.00

6.1.1 CASTLEBELLINGHAM SERVICE AREA WEST - SITES 1 (U/S) AND 2 (D/S)

The taxon richness at Site 1 was 11, while a total of 14 taxa was recorded further downstream at Site 2. The molluscs (snails) dominated the fauna at Site 1 and were the most diverse group, being represented by 3 taxa. At this site, the insects were dominated by the Diptera (truefly), more specifically by the Chironomidae (non-biting midge). The crustacean *Asellus aquaticus* (L.) (water louse) was numerous at this site. Other faunal groups represented here included, Coleoptera (beetles), Oligochaeta (worms), and Odonata (dragonfly/damselfly), each by a single taxon. At Site 2, the Crustacea dominated the fauna with a high abundance of *A. aquaticus* and *Gammarus duebeni* (Lilljeborg) (shrimp). The Diptera were also well represented at this site with high numbers of Chironomidae, including *Chironomus* spp. The mollusc, though not as numerous at this site, were the most diverse, being represented by 3 taxa. The Sialidae (alderfly) were recorded at this site in good numbers. Other faunal groups present included, Oligochaeta, Hirudinea (leeches) and Odonata. The Coleoptera were represented by 2 taxa. The Trichoptera (caddisfly) were poorly represented by only small numbers of cased caddis.

Q-faunal Groups B, C, D and E were present at both sites. No Group A (Sensitive taxa) fauna were recorded. Group B (Less Sensitive taxa) fauna were poorly represented at both sites, <3% at Site 1 and <1% at Site 2. A single taxon, namely, the Odonata represented the Group B fauna at Site 1, while the cased Trichoptera also represented this group at Site 2. The Group C (Tolerant taxa) dominated across both sites. At Site 1, Group C fauna were represented by 4 taxa, the Mollusca accounting for much of the dominance due mainly to high numbers of 2 taxa, *Planorbis* spp. and *Physa* spp. The Group C fauna at Site 2 were represented by 6 taxa. *G.duebeni* and the Chironomidae, combined accounted for 63% of the total fauna at this site. The sialidae contributed 75 to the composition while the remaining Group C taxa constituted <2% of the total fauna. The Group D fauna (Very Tolerant taxa) fauna were represented by 2 taxa at Site 1, namely the Hirudinea and *A. aquaticus*, which combined accounted for 18% of the total fauna. At Site 2, the Group D fauna were represented by a single taxon, *A. aquaticus* which occurred in high numbers, constituting 23% of the total fauna. The Group E (Most Tolerant taxa) were recorded at both sites by the presence of the Tubificidae and *Chironomus* spp. Combined they accounted for <7% of the total fauna at Site 1 and <5% at Site 2.

A Q-value of Q3 was assigned to Sites 1 and 2 which is interpreted as representing a poor quality water body. The following criteria were met in assigning this value; Group A taxa absent; Group B fauna were present in few (<1%) to small (<5%) numbers; Group C fauna were dominant (<75%); Group D fauna were numerous (25-50%) to dominant (50-75%) and Group E fauna occurred in few to fair numbers (1-10%).

The total BMWP score of 28 for Site 1 and 46 for Site 2, were considered low scores. The ASPT score was then calculated by dividing these scores by the number of scoring families present to give low values of 3.1 and 3.8 respectively. These results compare well with the Q-value assigned. The % EPT was very low at Site 2 (<1%), while no Ephemeroptera (mayfly), Plecoptera (stonefly) or Trichoptera were recorded at Site 1.

6.1.2 Castlebellingham Service Area East - Sites 3 (u/s) and 4 (d/s)

A total of 13 taxa were recorded from Site 3 and 10 from Site 4. The insects were represented by the Diptera and Coleoptera. The former group dominated the fauna, specifically the Chironomidae. The Coleoptera were represented by a single taxon, namely, *Agabus* spp. larvae. The most diverse group recorded were the mollusc, being represented by 4 taxa, the most numerous of which was the bivalve *Pisidium* spp. Other fauna present included the Hirudinea, Oligochaeta and Platyhelminthes. The Crustacea were represented by 2 taxa, but mainly by good numbers of *A. aquaticus*. In contrast, some distance downstream the Crustacea dominated the fauna due to high numbers of *A. aquaticus*, followed closely by high numbers of the Chironomidae. The Trichoptera were recorded at this site, and were represented by the Limnephilidae family of cased caddis fly, albeit in low numbers. The, molluscs were represented by 2 taxa, *Planorbis* spp. and *Pisidium* spp., the latter occurred in high numbers. The Hirudinea and Coleoptera were also recorded at this site but in low numbers and poor diversity.

Q-faunal B, C, D and E were recorded. No Group A fauna were present. The Group B fauna were poorly represented <1%, the Odonata were the only contributing taxon at Site 3, likewise at Site 4, the cased Trichoptera were the only contributing taxon from this group. Group C fauna on the other hand were well represented in terms of percentage representation and diversity. At Site 3 they accounted for 42% of the total fauna and were represented by 4 taxa. The Chironomidae constituted the bulk of this at 28%. Site 4 Group C fauna were also represented by four taxa and similarly, the Chironomidae contributed most to this representation (30%). The Group D fauna

were also well represented although not as diverse. This group accounted for 48% of the total fauna at Site 3 and 65% at Site 4. Represented by 3 taxa, the two main contributors were *A. aquaticus* and the Sphaeridae. The Group were represented by the Tubificidae and *Chironomus* spp. which combined accounted for <10% of the total fauna. This group was represented by the *Chironomus* spp. only at Site 4 (1%).

A Q-value of Q3 was assigned to Sites 3 and 4 which is interpreted as representing a poor quality water body. The following criteria were met in assigning this value; Group A taxa absent; Group B fauna were present in few (<1%) to small (<5%) numbers; Group C fauna were dominant (<75%); Group D fauna were numerous (25-50%) to dominant (50-75%) and Group E fauna occurred in few to fair numbers (1-10%).

In terms of BMWP a score of 26 was calculated for Site 3 and 33 for Site 4, both are considered low scores. The ASPT scores were 2.9 and 3.7, respectively. These results compare well with the Q-value assigned. No Ephemeroptera (mayfly), Plecoptera (stonefly) or Trichoptera were recorded at Site 3, while, the % EPT was found to be very low at Site 4 (<2.3%).

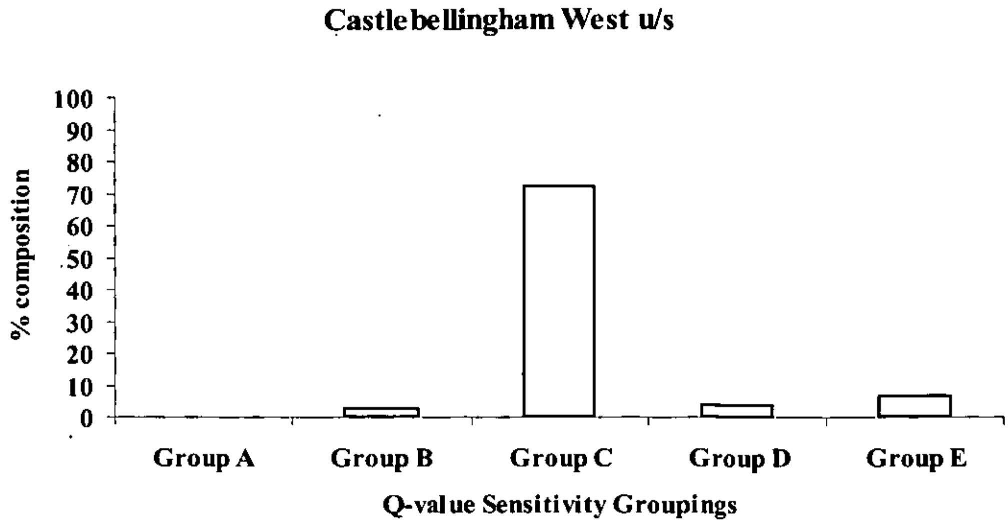


Fig. 2: The percentage representation of the Q-value faunal groups at Site 1 indicating a dominance of Group C taxa (see McGarrigle *et al.*, 2002).

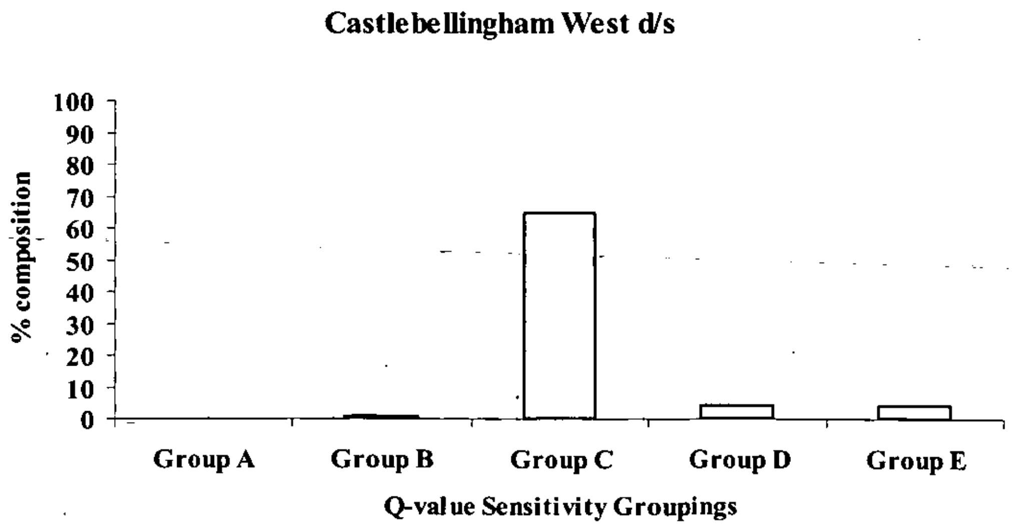


Fig. 3: The percentage representation of the Q-value faunal groups at Site 2 indicating a dominance of Group C taxa (see McGarrigle *et al.*, 2002).

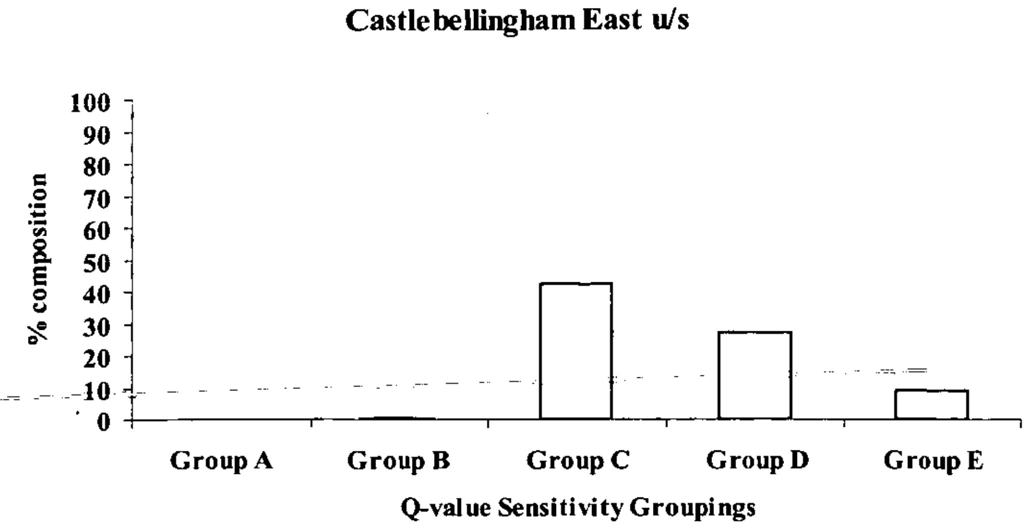


Fig. 4: The percentage representation of the Q-value faunal groups at Site 3 indicating a dominance of C Group taxa (see McGarrigle *et al.*, 2002).

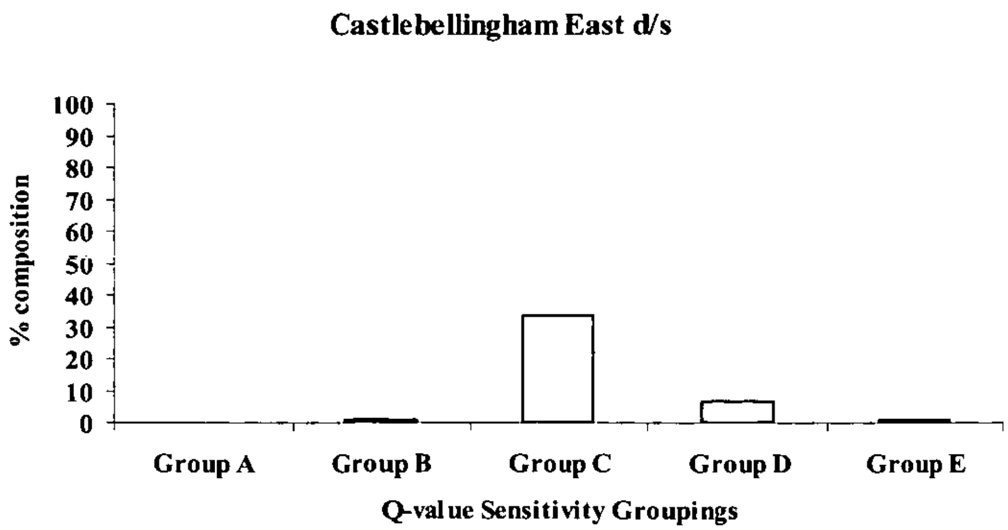


Fig. 5: The percentage representation of the Q-value faunal groups at Site 4 indicating a dominance of Group C taxa (see McGarrigle *et al.*, 2002).

Table 6: Results of the Biological Metrics applied to the data.

	Site 1	Site 2	Site 3	Site 4
Taxon Richness	11	14	13	10
%EPT	0.00	0.92	0.00	2.30
Q-value	Q3	Q3	Q3	Q3
Status	Poor	Poor	Poor	Poor
BMWP	28	46	26	33
ASPT	3.11	3.83	2.89	3.67

Table 7: Complete macroinvertebrate list for all sites surveyed 25/10/07 and 8/10/07. Numbers represent total abundance in a 2min kick sample.

Taxon	Family	Genus/species	Site 1	Site 2	Site 3	Site 4
Gastropoda	Planorbidae	*Planorbis* spp.	160	3	14	12
	Valvatidae	*Valvata piscinalis* (Müller)	-	1	2	-
		Valvata macrostoma Steenbuch	-	-	-	-
	Physidae	*Physa* spp.	116	-	-	-
	Lymnaeidae	*Lymnaea peregra* (Müller)	18	-	2	-
		Lymnaea stagnalis (L.)	-	1	-	-
Bivalvia	Sphaeriidae	*Pisidium* spp.	-	-	19	126
		Sphaerium spp.	-	-	-	-
Oligochaeta	Tubificidae	spp. indet.	4	16	4	10
Platyhelminthes	spp. indet.		-	-	1	-
Hirudinea	Erpobdellidae	*Erpobdella octoculata* (L.)	-	-	-	-
	Glossiphoniidae	*Hellobdella stagnalis* (L.)	2	-	3	-
		Glossiphonia complanata (L.)	-	-	3	4
	Piscicolidae	*Piscicola geometra* (L.)	-	4	-	-
Hydracarina	spp. indet.		-	-	-	-
Crustacea	Asellidae	*Asellus aquaticus* (L.)	74	120	58	474
	Gammaridae	*Gammarus duebeni* Lilj.	-	234	-	18
Odonata		indet.	12	1	1	-
Megaloptera	Sialidae	spp. indet.	-	34	-	-
Ephemeroptera	Baetidae	*Baetis rhodani* (Pictet)	-	-	-	-
Hemiptera	Corixidae	spp. indet.	-	-	-	-
Coleoptera	Gyrinidae	*Gyrinus* spp.	-	1	-	-
	Dytiscidae	*Agabus* spp.	4	1	6	2
		Hydroporus palustris (L.)	-	-	-	-
Trichoptera	Limnephilidae	*Limnephilus* spp.	-	4	-	-
		Potamophylax spp.	-	-	-	4
		spp. indet.	-	-	-	6
Diptera	Chironomidae	spp. indet.	14	94	49	284
		Chironomus spp.	26	7	12	-
	Simuliidae	spp. indet.	-	-	-	-
	Tipulidae	*Tipula* spp.	4	-	-	-
	Psychodidae	spp. indet.	-	-	-	2
		Total Abundance	*434*	*521*	*174*	*942*

6.2 Fishery Importance

The habitat and water quality in the potentially affected watercourse severely limits its value for salmonids. However, all watercourses were seen to support stickleback *Gasterosteus aculeatus* (L.) and as such it can not be definitively stated that they could not support salmonids. It is considered highly unlikely, due to lack of suitable habitat, flow, water and acceptable dissolved oxygen levels (>9mg/l O_2 Salmonid Water Regulation Limit, Flanagan, 1992). No salmonids were observed on site at any of the locations sampled and walked. Following salmonid habitat assessment at all sites surveyed, all were considered to have 'none-poor' salmonid habitat (adult, nursery and spawning. See Table 2).

6.3 Ecological Importance

Salmon (*Salmo salar),* Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*L. fluviatilis*) and the white-clawed crayfish (*Austropotamobius pallipes*) are all listed in Annex II of the Habitats Directive. All things considered it is unlikely that these protected species occur in any of the watercourses sampled. The potentially affected section of all the watercourses were classified as of being of 'low value'(water bodies with no current fisheries value and no significant potential fisheries value. Habitat diversity low and degraded).

7.0 POTENTIAL IMPACTS

7.1 Potential Impacts from the Proposed Development in the absence of Mitigation Measures

The main potential impacts from the proposed development would arise from:

- Inputs from construction activities (e.g. suspended solids, oil)
- drainage from the completed development including car parking areas and services
- leakage or spillage of stored fuels
- loss of riverine habitat due to culverting
- loss of riparian vegetation due to construction.
- obstruction to upstream movement of fish and other aquatic fauna
- increased runoff from roofed and paved areas and other hard surfaces
- seepage from the constructed wetland
- insufficient capacity of the constructed wetland, to cater for high flood events
- impact of contaminated discharge on the aquatic environment

7.2 Impact of Construction Activities in the Absence of Adequate Mitigation

7.2.1 Pollution with suspended solids

Suspended material can be generated during construction of the services areas, wetland or from drainage pipes outside of the main development as well as disturbance of instream sediments. In a study in North America Wolman and Schick (1967) reported that the equivalent of many decades of natural or even agricultural erosion may take place during a single year from areas cleared for construction. Sand, concrete and other construction materials are further potential sources of suspended solids. Suspended material can impact on the habitat and life history of aquatic biota in several ways:

- Fine particles may settle out on the stream bottom or become entrapped in small gravel thus reducing intergravel flow which is essential as it supplies dissolved oxygen to the eggs and removes metabolic wastes from the developing alevins (Soulsby *et al.*, 2001).
- Fine sediments can adhere to and abrade the chorion of salmonid ova (Adam & Beschta, 1980) and may even suffocate the eggs (Reiser and White, 1988). Accumulation of fines material may trap the alevin and reduce their living space and escape cover (Dill & Northcote, 1970).
- Suspended sediment can reduce water clarity and visibility, impairing the ability of fish to find food items.
- Settled fine sediments can reduce the availability of clean surfaces for clinging macroinvertebrates reducing taxon richness as well such as the amount of food items available to fish.
- Increased levels of sediment can displace fish out of prime habitat into less suitable areas (Chilibeck *et al.*, 1992).
- Low concentrations of suspended solids can irritate the gills of salmonid fish (Solbe 1988).

7.2.2 Other potential polluting substances associated with the construction process

A range of other pollutants may potentially enter the river/stream during construction and impact on aquatic biota. These include:

- Raw concrete and grouts
- Lubricants, hydraulic fluids and fuels for equipment used on the development site
- Bitumen and silanes used for waterproofing concrete surfaces
- Waste from on site toilet and wash facilities

7.3 Impact from Drainage from the Completed Development in the Absence of Adequate Mitigation

The nature and amount of pollutants originating from the completed development is likely to be site specific depending on the nature and volume of traffic and the drainage system used. However, the proposed development is likely to generate similar potential pollutants as are associated with major roads. In addition, proposed refuelling facilities are a potential major source of pollutants.

7.3.1 Types of pollutants in runoff and their biological impact

The run-off from major roads contains contaminants from various sources (Maltby *et al.* 1995a & b). They are derived from:

- degradation of road surface
- wear and tear of vehicle parts.
- the products of combustion from vehicle exhausts
- salts used for de-icing
- accidental spillages of fuels and transported goods
- sediment carried by vehicles
- detergents from car wash facilities
- chemicals from site maintenance including herbicides

Luker and Montague (1994) summarise the pollutants that are of most concern in highway drainage as (i) sediments, (ii) hydrocarbons, (iii) heavy metals, (iv) salts and nutrients, (v) others. Included here are polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds such as benzene, toluene, ethylbenzene, xylene and methyl tert-butyl ether (MTBE).

7.3.1.1 (i) Sediments

The potential impacts of increased sediment inputs will be outlined later. It is also important to note that the finest fraction of sediment load (<63μm), which has been reported as only 6% of the total mass, can constitute up to 50% of the pollution load of metals, hydrocarbons, oxygen demand, nutrients and herbicides (Collins & Ridgeway 1980, cited in Luker & Montague 1994).

7.3.1.2 (ii) Oil Products

Oil products or their combustion products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids, xylene and PAHs (polyaromatic hydrocarbons) which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. It is generally agreed that the lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars) (Svobodova et al 1993). Bruen *et al* (2006) state that PAHs carried by the sediment are responsible for the majority of the toxicity exhibited by highway runoff.

In recent years MTBE (methyl tertiary-butyl ether) has been added to petrol to replace lead as an octane enhancer. It is one of a group of chemicals commonly known as "oxygenates" because they raise the oxygen content of gasoline. According to the US EPA, at room temperature, MTBE is a volatile, flammable and colourless liquid that dissolves rather easily in water. MTBE is generally more resistant to natural biodegradation than other gasoline components, however studies of surface water lakes and reservoirs have shown that MTBE volatilizes (evaporates) relatively quickly (www.epa.gov/mtbe/faq.htm). Limited bioassay studies of the toxicity of MTBE to aquatic organisms indicate that levels of contamination found in surface waters are not toxic to aquatic life (Johnson 1998; Werner & Hinton 1998).

7.3.1.3 (iii) Metals

Ten metals have been identified as having a significant presence in highway runoff but only five of these pose a significant threat to receiving waters: cadmium, lead, copper, zinc and iron (Luker & Montague 1994).

Cadmium: Cadmium is the only one of the five that is on the EU blacklist of dangerous substances (i.e. it is categorised as a List 1 substance under the Dangerous Substances framework directive (76/464/EEC)). This means that its use for all purposes is controlled and is reducing substantially (Luker & Montague 1994). Svobodova *et al* in EIFAC Technical Paper No. 54 (1993) state: "*The maximum admissible cadmium concentration in water is 0.0002 mg/l*". Although cadmium bioaccumulates in tissues it does not appear to biomagnify along food chains (Spry & Weiner 1991). Cadmium and zinc have an additive but not synergistic toxic effect (Mason 1996).

Lead: Lead is categorised as a List II substance under the Dangerous Substances framework directive (76/464/EEC). Lead concentrates in organisms, bioconcentration factors in mosses, for example, being in the order of 3000-5000. There appears, however, to be no biomagnification along food chains (Spry & Weiner 1991). The EIFAC maximum admissible lead concentrations in water is 0.004 to 0.008 mg/l for salmonids (Svobodova *et al* 1993).

In recent years the concentration of lead in runoff waters has shown a sharp decrease following the ban of tetra-ethyl lead (TEL), a gasoline additive. With the reduction in lead content in fuels it is unlikely to be a significant issue in the future (Luker & Montague 1994) but it is known to accumulate in biological tissues.

Zinc: Because Zinc is such an ubiquitous metal in the automotive industry and is moderately soluble in water it appears in highway runoff at significant (mg/l) levels (Luker & Montague 1994). The toxicity of zinc to aquatic life is dependent on the hardness of the water; it decreases with rising hardness. EU salmonid waters regulations give a maximum admissible concentration (MAC) of zinc for varying levels of hardness, ranging from an MAC of <0.03 mg/l at hardness of 10 mg/l $CaCO_3$ to MAC of <0.5 mg/l at hardness of 500 mg/l $CaCO_3$.

Svobodova *et al* in EIFAC Technical Paper No. 54 (1993) state: "*The lethal concentrations for salmonid fish are around 0.1 mg/l (some authors even suggest a level of 0.01mg/l*". The EIFAC lethal level of 0.1 mg/l or lower seems at variance with the EU salmonid regulations which give maximum admissible concentrations well in excess of this figure for hardness levels over 50 (mg/l CaCO3). Mason (1996) states that Zinc and Cadmium have an additive but not synergistic toxic effect.

Copper: Copper is an algicide and fungicide and can be toxic to plants at higher concentrations (Luker & Montague 1994). Copper is highly toxic to fish; however, as with zinc the toxicity of copper to aquatic life is dependent on the hardness of the water; it decreases with rising hardness. EU salmonid regulations give the maximum admissible concentration of copper as 0.005mg/l at hardness of 10 mg/l $CaCO_3$ to MAC of <0.112 mg/l at hardness of 300 mg/l $CaCO_3$. Svobodova *et al* in EIFAC Technical Paper No. 54 (1993) state that "*the maximum admissible copper concentration in water for the protection of fish is in the range 0.001 to 0.01 mg per litre, depending on the physical and chemical properties of the water and the species of fish*".

Iron: Laboratory studies indicate that this metal is quite harmful to aquatic life., but in nature the degree of toxicity may be lessened by the interaction of the iron with other constituents of water. Should the metal be converted to an insoluble form then the iron deposits will interfere with fish food and spawning (Flanagan 1992).

7.3.1.4 (iv) Salts and Nutrients: Luker & Montague (1994) state that although sodium chloride can be present in runoff at very high concentrations during winter, it does not usually cause an environmental problem because dilution in the receiving water reduces this to acceptable values. Nutrients such as nitrogen and phosphorus may cause eutrophication in the receptor water body. Bruen *et al* 2006 highlighted that maximum levels of many contaminants could be expected during the first heavy rains after a prolonged dry period. This is known as the 'first flush effect'. In periods of regular or prolonged rainfall, relatively low levels of contamination could be expected, as contaminants would be washed away as soon as they are deposited, rather than accumulating. In contrast, more extensive rainfall would have less impact due to the greater dilution of pollutants in the runoff and the higher flows in the receiving waters.

7.3.2 Accidental Spillages

In refuelling areas there is a high potential for spillage from fuel transporters as well as smaller vehicles. Leaking storage facilities are also a significant source of pollutants. These can have serious effects on receiving surface waters as well as groundwater.

7.4 Impact of Leakage or Spillage of Stored Fuels and other Potential Pollutants

Leakage or spillage can be due to petrol, fuel oils, lubricating oils and hydraulic fluids. In unmodified form these are liquid, virtually insoluble and lighter than water. Some hydrocarbons, such as bitumen and heavy fuel oil, become heavier than water when affected by naturally occurring bacteria and can then be treated as sediments. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence (Luker & Montague 1994).

Harmful effects include:

- The prevention of gaseous exchange at the water surface, leading to reduced dissolved oxygen in the underlying water (Solbe 1988)

- In the case of turbulent waters the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al* 1993).

Leaking fuel storage facilities seem to be the most significant source of MTBE contamination of groundwater, and heavy usage of two stroke outboard engines seems to be a main route into surface waters. Luker & Montague (1994) state that *"the product of the combustion of these additives are gaseous rather than particulate and so should not contribute to pollution from highway drainage. However, research should be carried out into the concentration of these materials in highway runoff."* Analyses of the road runoff in a major Irish study (Bruen *et al* 2006) showed that contaminants include suspended solids, heavy metals, hydro-carbons including PAHs, chlorides, nitrates and phosphorus. However, no MTBE was detected in the samples analyzed.

7.5 Loss of Habitat due to Culverting and Bankside Development or Construction.

7.5.1 Culverting

Culverts can interfere with the movement of fish as well as invertebrates. Changes in flow following culverting can also affect the distribution of aquatic biota and their preferred habitats.

7.5.2 Loss of Riparian Habitat

Riparian habitats, particularly those that support an established tree canopy are key habitats for a diversity of terrestrial invertebrates, and other wildlife, including bird species. They also represent the lateral dimension of riverine systems, providing significant organic inputs and habitat for emerging aquatic insects.

Loss of natural riparian vegetation, particularly native trees, shrubs and herbaceous vegetation can have a significant negative impact on the ecological quality of rivers by:

- Decreasing plant, invertebrate and bird biodiversity by habitat removal or fragmentation
- Decreasing the inputs of organic detritus (leaf litter etc.) to rivers which sustains shredding and collector feeding groups of invertebrates.

- Removing important feeding and breeding area for emerging aquatic insects. This has implications for the maintenance of aquatic macroinvertebrate communities and the provisions of fish food organisms.
- Removing overhanging bank-side cover for fish.
- Destroying the protective function of natural riparian habitat which intercepts nutrient and suspended solids runoff from surrounding land, and anchors the bankside soils, protecting them from erosion, particularly during high winter water levels.

7.6 Obstruction to Upstream Movement of Fish and other Aquatic Fauna due to Construction of Culverts

7.6.1 Habitat Fragmentation

Habitat fragmentation, the splitting of natural habitats and ecosystems into smaller and more isolated patches, is recognised as one of the most important global threats to the conservation of biological diversity. Habitat fragmentation is mainly a result of changes in land use, but a major impact also results from the barrier effect caused by the construction and use of linear infrastructure of transportation systems. (Bekker & Iuell 2004)

Stream continuity has in the past frequently been ignored in the design and construction of stream crossings (culverts and bridges). Many crossings are barriers to fish and wildlife. Even crossings that were not barriers when originally constructed may now be barriers because of stream erosion, mechanical breakdown of the crossings, or changes in the upstream or downstream channel shape. (Singler & Graber 2005)

Effective stream protection requires consideration of the needs of all species, including invertebrates such as crayfish and insects, fish such as trout, salmon and eels, amphibians such as frogs, and mammals such as otters. Streams and the interconnectedness of different parts of a stream or watershed are essential to these animals. For reasons as simple as escaping random disaster or as complex as maintaining genetic diversity, animals living in or along streams, ephemeral watercourses and linear wetlands need to be able to move unimpeded through the watershed.

Through the combined effects of dams and poorly designed bridges and culverts, streams can be partitioned and wildlife forced to cope with harmful restrictions such as the following examples based on Singler & Graber (2005):

- **Restricted access to feeding areas**: Different habitats provide different feeding opportunities throughout a day or season, and species regularly travel to exploit these resources. Seatrout swim up tidal creeks to feed during high tide. Insect communities in small ponds and riparian wetlands can be abundant at times, and stream fish will move into these habitats to feed. Eels which start their lives on the far side of the Atlantic Ocean return to these shores and swim upstream as small elvers. Restricting access to prime feeding areas will ultimately hurt the fishery.
- **Restricted access to breeding and spawning areas**: Some species need to travel miles to reach spawning areas in streams. The best examples are anadromous species that live in the ocean but spawn in freshwater, such as Atlantic salmon, sea lamprey and seatrout. Fish may encounter many barriers when adults travel to spawning areas, offspring disperse into juvenile and eventually adult habitat, and juvenile anadromous species swim to the ocean.
- **Restricted natural dispersal**: Some species such as frogs may spend most of their lives near streams and travel in and along a stream's length. Poorly designed crossings may force them to climb over an embankment and cross a road, where they are vulnerable to road mortality and predators. Freshwater mussels disperse by having larvae that attach to fish, so if a stream crossing blocks fish then it may also prevent upstream dispersal of mussels. If a stream is damaged by a catastrophic event (such as pollution, flooding, or severe drought), then natural dispersal will return the stream to a healthy productive environment.

7.6.2 Obstruction to upstream movement of aquatic fauna

Culverts and other artificial channels, if not appropriately designed and constructed with the aquatic ecosystem in mind, can totally prevent any upstream movement, of many aquatic organisms including fish. Even in the case of watercourses unsuitable for fish, movement of other aquatic organisms in field drains or ephemeral watercourses can be disrupted by unsuitable culverts.

7.6.2.1 Small Fish Including Juvenile Eels

Obstruction to fish upstream movement in culverts is primarily due to the fact that most culverts do not offer an irregular natural boundary which can provide an occasional resting place. Long undersized culverts with smooth surfaces tend to pose greatest challenges for migrating fish. Some culverts are elevated at one or both ends, and even minor drops may be enough to block small fish. Young eels migrating upstream from the sea are remarkable in their ability to bypass obstacles by moving through damp marginal vegetation etc.; however drops of only a few centimeters at the entrance to a road culvert may be enough to block their upstream movement. (Singler & Graber 2005) Culverts can also impede eels because they concentrate flow and create high water velocities that may exceed the limited swimming speed of juvenile eels. At water velocities of 0.3 meters per second , elvers generally cannot swim further than 3 meters. Older juveniles can swim 1.5 meters per second but cannot swim far against fast water. (McCleave 1980)

7.6.2.2 Salmonid Fish (Trout & Salmon)

Negative effects of culverts on salmonid upstream movement have been well documented (e.g. Jackson 1950; Dane 1961; Stuart 1964; Evans and Johnston 1980; Powers and Orsborn 1985; Chilibeck 1992; Fitch, G.M. 1995). The effect of a particular culvert will depend on water depth, speed and volume, length of culvert, type of culvert, species of fish, size and condition of fish etc. Above a critical flow velocity fish can only sustain progress for a limited period of time without resting. The faster the current velocity above this critical speed, the shorter the distance the fish can travel against the current. This can be compared with a person trying to run up a down escalator. If the person is fit and strong and the escalator is short and slow it will be possible. The longer and faster the escalator the fewer will make it. If an escalator is long enough and fast enough, it will pose an insurmountable obstacle even if the possibility of ever mating depends on getting to the top! The impact of a culvert on fish movement is therefore primarily due to changes in hydrological conditions. Other factors such as the length of the structure and light are commonly used as significant criteria in determining the fish passage capability of an installation. However, Baker & Votapka (1990) state that light is not a major consideration in determining fish passage conditions. They also state that the "*length is not a single criterion by itself. Velocity over a given length in relation to fish capabilities is a more appropriate consideration.*" A consultation paper published by the Scottish Executive in 2000 titled "River Crossings and Migratory Fish Design Manual" states that; "*Long culverts do not in themselves represent an*

increased obstruction to fish as long as appropriate conditions for fish passage are maintained throughout. Lack of light in a culvert does not appear to influence fish passage". (Anon 2000)

In addition to current velocity, turbulence and depth in culverts play a critical role. Jackson (1950) noted that turbulence deflects a swimming fish from its course, causing it to expend energy resisting upwellings, eddies, entrapped air and vortices, which in turn make it impossible for a fish to use its swimming power effectively. Stuart (1964) noted that the reduced density of the air-water mixture reduces the propulsive power of the fish's tail. Because of uniform channel bottom, culverts may have inadequate depth to allow fish movement. Partial submergence impairs the ability of the fish to generate thrust, normally accomplished by a combination of body and tail movement. Also, if gills are not totally submerged, they cannot function efficiently, promoting oxygen starvation while also reducing the fish's ability to maintain burst activity (Powers & Orsborn 1985).

7.6.2.3 Aquatic Invertebrates

In a review of the impact of road culverts on the upstream movement of invertebrates Vaughan (2002) states: "*The studies we reviewed on molluscs, crustaceans, and other macroinvertebrates indicate that these organisms may travel long distances within a stream, either attached to the gills of fish in the case of mussels or by their own power in the case of snails, amphipods, crayfish and other crustaceans. Because many of these species are confined to the water, any barrier to their dispersal impacts their populations more than insects.*"

7.7 Hydrological Impacts due to Increased Runoff from Paved and Roofed Areas.

Increased peak discharge from the developed site could alter instream habitats and impact on the distribution, richness and biomass of aquatic biota.

7.8 Potential Impacts on Watercourses in the Absence of Mitigation

There is a potential for negative impacts on the watercourses in the study due to contamination by pollutants in runoff to the streams during the construction and operation of the proposed development. Listed in Table 8 below are the potential impacts as they apply to the proposed development and the watercourses potentially affected.

Table 8: Summary of potential impacts in the absence of mitigation.

Potential Impacts	All Watercourses
Impacts from construction activities	Major
Impact from drainage from the completed development	Major
Impact of leakage or spillage of stored fuels and other potential pollutants	Major
Loss of habitat due to culverting, and bankside development or construction	Major
Obstruction to upstream movement of fish and other aquatic fauna.	Major
Hydrological impacts due to increased runoff from paved and roofed areas.	Major
Impact from inadequate retention of pollutants within constructed wetland	Major

8.0 Mitigation Measures

8.1 Mitigation of Impacts from Construction Activities

8.1.1 Reduction and prevention of suspended solids pollution

Release of suspended solids to all watercourses should be kept to a minimum and total suspended solids in discharges should not exceed 25mg/l. Efforts should be concentrated at preventing suspended material from entering the development site during construction.

The following general guidelines for erosion and sediment control are largely based on Goldman *et al* (1986):

i. Earth moving or excavation works close to watercourses should not be carried out between the end of September and the beginning of May.

ii. Retain existing vegetation where possible, especially in riparian areas.

iii. Revegetate denuded areas, particularly cut and fill slopes and disturbed slopes as soon as possible. Use mulches or other organic stabilisers to minimise erosion until vegetation is established on sensitive soils.

iv. Cover temporary fills or stockpiles which are likely to erode into nearby watercourses with polyethylene sheeting.

v. Divert runoff away from bare soil especially on slopes.

vi. Minimise the length and steepness of slopes where possible.

vii. Minimise runoff velocities and erosive energy by maximising the lengths of flow paths for precipitation runoff, constructing interceptor ditches and channels with low gradients to minimise secondary erosion and transport, and lining unavoidably steep interceptors or conveyance ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.

viii. Retain eroded sediments on site with erosion and sediment control structures such as sediment traps, silt fences and sediment control ponds.

ix. Access roads should be constructed or topped with a suitable coarse granular material/non-woven geotextile, and if possible organic topsoil should be stripped prior to access road construction.

x. If possible instream work should be avoided. If unavoidable keep instream work to a minimum and as far as possible protect the natural stream conditions and structure to promote stability of bank and bed structures and retain riparian vegetation.

xi. If significant alterations to the existing stream/river bank, or instream works are to be carried out, the works area should be isolated from the river/stream by coffer dams or other suitable containment methods. Water within the contained area contaminated with suspended solids or other potential pollutants should never be released directly to the stream/river, but should be pumped to a land site to allow sediment removal before it re-enters the river.

xii. Temporary stream diversions (such as to facilitate culvert installation) should only be carried out in consultation with the Regional Fisheries Board. The diversion should be excavated in isolation of stream flow, starting from the bottom end of the diversion channel and working upstream to minimise sediment production. The temporary channel should be constructed in such a way as to minimise suspended solids released when the river is re-routed. Upon completion the bank should be stabilised around the temporary diversion.

xiii. If unavoidable, permanent stream diversions should be completed as far in advance as possible. The channel should be constructed in such a way as to minimise suspended solids released when the river is re-routed. Use of loose fine grained materials in the new channel construction should be strictly limited.

xiv. Sediment control ponds should be designed for a minimum retention time of 15 hours.

xv. It is important that at the planning stage provision is made for a sufficient land area to accommodate the necessary sediment control measures.

xvi. Other than single span temporary bridges with no instream structures, strictly no temporary stream crossings or temporary culverting should take place without the prior agreement of the Regional Fisheries Board.

xvii. Machinery should never cross a watercourse by entering it.

8.1.2 Prevention of pollution with other substances associated with the construction process

The following guidelines based on Chilibeck *et al* (1992), NRA (2005) and SRFB (2007) should be followed:

i. Raw or uncured waste concrete should be disposed of by removal from the site or by burial on the site in a location and in a manner that will not impact on the watercourse.

ii. Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks should be trapped on-site to allow sediment to settle out and reach neutral pH before clarified water is released to the stream or drain system or allowed to percolate into the ground.

iii. Fuels, lubricants and hydraulic fluids for equipment used on the construction site should be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice (Enterprise Ireland BPGCS005).

iv. Fuelling and lubrication of equipment should not be carried out on sites close to water courses.

v. Any spillage of fuels, lubricants or hydraulic oils should be immediately contained and the contaminated soil removed from the site and properly disposed of.

vi. Oil booms and oil soakage pads should be kept on site to deal with any accidental spillage.

vii. Waste oils and hydraulic fluids should be collected in leak-proof containers and removed from the site for disposal or re-cycling.

viii. Prior to any instream work ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.

ix. All pumps using fuel or containing oil should be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.

x. Foul drainage from site offices etc. should be removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines.

8.1.3 Translocation of fish and crayfish (if present)

In all watercourses, within the proposed development area, it is not considered necessary to check for salmonids, lampreys and crayfish if sections of any of the streams to be dewatered for culverting, however, the Fisheries Board should be contacted prior to dewatering works whereby they will make the final appropriate judgement call. If electrofishing operations are considered necessary by the relevant Fisheries Board then adequate time must be allowed prior to the commencement of works as seasonal constraints apply to fish and crayfish surveys. All fish (particularly salmonid fish if present) and crayfish (if present) must be removed and transferred to suitable adjacent habitat by suitably qualified and experienced operators in close consultation with the Regional Fisheries Board and the National Parks and Wildlife Service. Electrofishing will require a Section 14 Permit from the Department of the Marine; crayfish capture and relocation will require a license from the National Parks & Wildlife Service, although it is highly unlikely that crayfish are present in any of the watercourses sampled. Removal of crayfish should not be carried out in late May or June, when crayfish are releasing their young. Fish removal is not usually permitted between the end of September and the beginning of May.

8.1.4 Requirements for Contractors

Contractors should establish contact with the Regional Fisheries Board before works commence, and there should be ongoing liaison with the Board throughout the construction process. Contractors should be in possession of, and familiar with the contents of "*Control of water pollution from construction sites - Guidance for consultants and contractors*" published by the Construction Industry Research and Information Association (CIRIA 2001) (e-mail enquiries@ciria.org.uk).

8.2 Mitigation of Potential Significant Long-Term Effects of the Existence and Operation of the Proposed New Road

8.2.1 Mitigating permanent loss of habitat

The most effective method of mitigating habitat loss is to minimise it and where this is not possible to create new habitat.

In the event of culverting, loss of habitat should be minimised by keeping the length culverted to the absolute minimum necessary. Where bridging is not practicable and culverts are unavoidable, open bottomed culverts at least 1.2 times the bankfull width of the stream are the best method of minimising habitat loss as they retain the natural stream flow and substrate.

One of the most effective methods of minimising loss of stream and riparian habitat during developments such as new road construction is the establishment of Leave Strips. Leave strips are the areas of land and vegetation adjacent to watercourses that are to remain in an undisturbed state, throughout and after the development process (Chilibeck *et al* 1992). Leave strips are valuable not only because riparian vegetation is a vital component of a healthy stream ecosystem, but because this vegetation acts as an effective screen/barrier between the stream and the development area, intercepting runoff and acting as an effective filter for sediment and pollutants from the development area. Except where impracticable such as at proposed road crossings, a riparian leave strip of at least five metres and where possible 10 m should be fenced off along both sides of the affected watercourses. This area should be left undisturbed during the construction phase and retained as a wildlife corridor after the completion of the development. All native trees and bushes within the leave strip should be retained and additional native trees particularly willow, alder, ash and oak should be planted to as to provide wildlife cover and intermittent shade to the stream and river. The long-term management of these wildlife corridors should include periodic consultation with the Regional Fisheries Board and the National Parks & Wildlife Service.

8.2.2 Mitigation of obstruction to upstream movement of fish and other aquatic fauna due to construction of culverts

Fishery Guidelines for Local Authority Works published by the Department of the Marine and Natural Resources recommends that *long stretches of river or stream should never be culverted* and that rivers or streams should be culverted for *essential reasons only* (Anon 1998).

Any culverts planned for any of the watercourses sampled in this study should be designed and constructed in such a way as to ensure that streams remain passable for fish and other aquatic fauna. This can only be reliably achieved by crossing methods which retain or provide 'natural' rough substrates which will slow currents near the bottom and create flow refuges, enabling invertebrates and juvenile fish to migrate upstream in otherwise impassable water velocities. Based on Baker & Votapka (1990), Singler & Graber (2005), Speirs & Ryan (2006) and U.S.F.W.S (2007), river crossings can be ranked as follows in order of increasing impact:

1. **Single Span Bridge**. If constructed with no instream bridge aprons and with support structures set back from the river bank, bridges are the most effective method of avoiding fragmentation of habitat and obstruction of the movement of aquatic fauna. If the bankfull width is more than 6m or if the stream slope is more than 6% a single span bridge should be used (U.S.F.W.S 2007).

2. **Open (bottomless) arch.** If at least 1.2 times the bankfull width of the stream these achieve similar benefits to bridges such as retaining the natural stream hydrology and substrate, though usually with greater impact on riparian habitat. Open arch culverts are suitable for stream slopes up to 6% but bottom material inside culverts should include boulders large enough to withstand current flows at sites with slopes from 3% to 6%. This means utilising rocks equivalent in size to the largest 10% of the naturally occurring boulders in the stream (U.S.F.W.S 2007)

3. **Single barrel arch culvert (flattened floor).** Should be embedded at least 30cm below the existing stream bed. The arch shape allows for a wide base which can accommodate the full width of the waterway and allow for a natural stream bed to develop within the barrel. Suitable for gradients up to 3% above which it is very difficult to maintain natural substrates on the metal or concrete bottom.

4. **Circular pipe culverts or Box culvert.** Should only be considered if bridges, open bottom or arch culverts are not a viable option. Unless oversized, circular culverts tend to reduce the waterway area and so increase water velocities at high and medium lows which can prevent fish passage. If pipe culverts must be used, the culvert diameter must be at least 1.2 times the bankfull width of the stream and culverts should be embedded to a depth of at least 25% of the pipe diameter. While box culverts can often accommodate the full natural width of a waterway, they may also result in a uniform depth of water and a uniform flow within the barrel. During low flow periods box culverts do not concentrate flows to maintain water depth and consequently result in a thin sheet of water covering the full width of the culvert. The outcome can be an insufficient depth of water for the passage of fish during low flows. If used box culverts should be embedded at least 30cm below the existing stream bed with cross walls not less than 8 cm to collect natural streambed material. Circular pipe or box culverts are not suitable for gradients above 3% because at higher flows it is very difficult to maintain natural substrates on the metal or concrete bottom.

The following guidelines should be taken into consideration when designing culverts:

1. Ideally, a culvert should not change the hydrological conditions that existed prior to that installation. This means that the cross-sectional area should not be restricted by the culvert; the slope should not change, and the roughness coefficients should remain the same. Any change in these conditions will result in a velocity change which could alter the sediment transportation capacity of the stream.

2. Fish passage problems can usually be avoided if culverts are constructed without a bottom or are installed well below stream grade.

3. If concrete bottoms are used, they should be at least 30 cm below the stream grade with cross walls not less than 8 cm to collect natural streambed material.

4. Culverts should be installed at the stream gradient otherwise they may result in a change in water velocities which may create a drop below the culvert or may create a hydraulic jump at the end of the culvert.

5. Culverts should not be aligned so that culvert outflows are directed into a stream bank. If a road crossing is not perpendicular to the stream, the culvert installation should be skewed.

6. The culvert should be installed so that it has a constant slope through its length except for the appropriate camber allowance where settlement is anticipated.

If necessary to maintain the desired water level within the culvert and backwater the culvert at higher flows to reduce culvert velocities, an outlet pool with tailwater control should be provided at the culvert exit. The dimensions of the outlet pool can be varied to create specific hydraulic conditions in response to unusual site constraints. Usually, the recommended width of the pool approximates the natural width of the stream, and the sides will coincide with the stream banks, which can be appropriately armoured to prevent erosion. The bottom elevation of the pool should be at least 0.61 m below the invert elevation of the culvert at the outlet. A tailwater control device should be constructed at the downstream end of the outlet pool to provide a minimum depth of 0.23m throughout the culvert during the lowest conditions of stream discharge anticipated at the site, or at least 0.23m above the lowest elevation of the culvert. A low flow channel or notch, 0.61m wide and 0.31m in depth, should be provided in the tailwater control structure, and should extend downstream connecting with the deepest part of the natural stream bed. The outlet pool should control erosion at the downstream end of the culvert by dissipating the energy of the flow and provide a transition zone between the culvert and the natural stream channel. (Chillibeck *et al* 1992).

Regardless of the culvert design selected, the following criteria for allowing adult fish passage through culverts from Dane (1978) should be met except in situations where the natural stream velocity exceeds these guidelines. (Major changes in water velocity may have detrimental effects on the streambed conditions upstream or downstream of the culvert (Baker & Votapka 1990)).

i. The average water velocity in the culvert should not exceed the following values: 1.2 m/s for culverts less than 24.4 m in length; 0.9 m/s for culverts between 24.4 and 61 m in length. Culverts with higher water velocities or greater length require installation of baffles to allow fish passage.

ii. The depth of the water should not be less than 0.23 m at any point within the culvert.

iii. Any sudden drop in the water surface profile at any point within the culvert influence should not exceed 0.31 m.

iv. During the period of upstream fish migration, the length of time during which the foregoing conditions are not met at the culvert site should not exceed 3 consecutive days in the average year.

v. The effective slope (mean slope of the water surface from the culvert inlet to the tailwater control point) of the culvert should not exceed: 0.5% for a culvert greater than 24 m in length, unless baffles are added; 1.0% for a culvert less than 24 m in length unless baffles are added; 5.0% at any time even with the addition of baffles.

8.2.3 Mitigation of pollution of streams with contaminated water draining from the development during its operation

A sustainable drainage system should be installed for all surface waters draining from the proposed development (including roofs). The system installed (constructed wetland planned) should have a proven capability of achieving and sustaining at least the following percentage pollution reduction in runoff:

Total Suspended Solids	85%
Heavy Metals	50 – 80%
Chemical Oxygen Demand	50%
Hydrocarbons	90%

Best management practices for treatment of runoff would include:

- Constructed Wetlands
- Vegetated lagoons
- Swales
- Filter strips
- Filter drains
- Infiltration devices
- Oil/grit separators

In a major EPA funded study of the impact of road runoff on water quality in Ireland (Bruen *et al* 2006) it is concluded that "*Each of the Best Management Practices outlined have individual advantages in the removal of pollutants from highway runoff. Therefore, a combination of these systems should be used for enhanced and more uniform overall pollutant removal performance. In fact a combination of runoff management and control measures is recommended whenever it is feasible.*" This is also the conclusion of the CIRIA Report C608 on SUDS (Wilson *et al* 2004) which concludes that the more techniques used in a runoff treatment and attenuation system, the better the performance is likely to be.

Specifically the Irish study (Bruen *et al* 2006) states that: "*A combination wetland incorporating an upstream sedimentation pond is a good precursor to a downstream vegetated infiltration structure. ... A review of worldwide experience with alternative forms of treatment which can be incorporated into road drainage design showed that constructed wetlands would be the best all-round option for treatment, although it is clear they should not be used alone. Combinations of systems to suit local conditions should be used. The combination of a swale and wetland showed promise for Irish conditions. A wetland was constructed adjacent to the N8 at Monasterevin and the treatment efficiencies so far measured and reported for the typical road runoff contaminants are uniformly high.*"

Petrol/oil and grit interceptors should be located at outfalls to watercourses. Design of those interceptors should conform to the recommendations of CIRIA Report No. 142 (Luker & Montague 1994).

As virtually all treatment options require proper maintenance in order to function properly, and as some such as oil interceptors can become a source of pollution if not properly maintained, a program of regular cleaning, maintenance and inspection of the runoff treatment system should be put in place to ensure it functions correctly.

8.2.4 Mitigation of Impact of Major Accidental Spillages

This problem is addressed through the operation of regulations made under the Dangerous Substances Act 1972 and other amending legislation. The regulations govern the conveyance by road of scheduled substances which include flammable substances, oxidising agents, toxic substances, etc. The Water Pollution Act 1977 and 1990 would apply to point spillages.

Shut-off Valves should be constructed on all outfall pipes. In the event of an accidental spillage (e.g. milk, petrol etc.) these valves can be shut. This will prevent contaminants reaching streams where serious environmental damage could be caused.

8.2.5 Mitigation of Hydrological Impacts

Flow attenuation should be included in the design of the proposed development to ensure that no significant increase in peak stream/river flows is caused by the proposed road development.

8.2.6 Mitigation of potential pollution from proposed refuelling facilities

Comprehensive guidance on the design, construction, modification and maintenance of petrol filling stations is given in a publication known as the 'Blue Book' (Association for Petroleum and Explosives Administration/Institute of Petroleum 1999). The EPA are in the process of drawing up a groundwater protection response which will include guidelines for petrol stations (M.F. Rochford, EPA, pers comm.). The following recommendations are based on Scottish EPA documents PPG7 & PPG27 (www.sepa.org.uk/guidance/ppg/pdfs/ppg27.pdf & ditto ppg7.pdf) and Scottish Executive Environment Group (2003). These references should be consulted for detailed recommendations.

1. All areas within the curtilage of the filling station/s should be positively drained on an impervious surface. Any joint in the surface must be adequately sealed and those sealants must be resistant to attack from petrol and oil products.

2. Surface water drainage from all areas, except uncontaminated roof water, must discharge through a full retention oil/petrol separator. The capacity of the separator should be adequate to contain at least the maximum contents of a compartment of a road tanker likely to deliver petrol at the filling station. Note that by-pass type separators are not suitable for use on petrol station forecourts.

3. Oil separators require regular maintenance in order to ensure they remain effective. Routine inspections should be undertaken at least every six months and a log maintained of inspection date, depth of oil and any cleaning that is undertaken.

4. Access to the separator should be kept clear and not used for storage.

5. A separator will not work properly for dissolved (soluble) oils or if detergents or degreasers are present. Such discharges should be drained to the foul sewer.

6. The correct handling, storage and disposal of separator waste is vital if pollution is to be avoided. Waste should be passed only to a registered waste carrier for disposal at a suitably licensed facility.

7. Unless forecourts drain to sewers which discharge to a treatment plant, degreasing or steam cleaning of the forecourt shall not take place unless: i) Any liquid is soaked up using absorbent material which is suitably disposed of off-site. Sealing of gullies may be appropriate to prevent liquid or absorbent entering the drainage system. Or ii) A closure valve is fitted at the oil separator outlet, which is closed during the cleaning operation and all accumulated washings removed for suitable disposal off-site. An alarm should be installed to indicate that the closure valve is in the 'shut' position.

8. All underground fuel storage tanks should be designed, installed and maintained in accordance with guidelines of Association for Petroleum and Explosives Administration/Institute of Petroleum (1999). USTs should be double-skinned (that is, have an inner and outer skin) and have an interstitial monitoring device with automatic alarms. All USTs should be provided with overfill prevention. Ongoing wetstock monitoring/inventory should also be carried out to detect leakages.

9. All above ground fuel storage tanks should comply with current regulations and be bunded.

A pollution incident response plan (PIRP) should be in place including as a minimum, the following:

i. details of the plan owner and procedures for keeping it up to date;
ii. emergency contact details for site operators etc and for all holders of the PIRP;
iii. emergency contact details for third parties (e.g. Fire Brigade, EPA, specialist contractors, environment section of Local Authority etc);
iv. product inventory and site layout plan;

v. site drainage plan;

vi. emergency procedures;

vii. location of emergency response equipment (e.g. fire extinguishers, absorbents, emergency bunding, temporary fencing etc); and location of buried services, including water supply pipes

Table 9 gives a summary of the mitigation measures as they apply to all watercourses in the study for the proposed development. If these are adhered to then the residual impacts will be as presented in Table 10.

Table 9: A summary of the recommended Mitigation Measures as they apply to all Water courses sampled.

	Mitigation Measures
i.	Minimise pollution generated during construction process
ii.	Consult Fisheries Board regarding, checking for salmonid fish and crayfish prior to construction of culverts and undertake translocation to suitable habitat if these species are found
iii.	Apply appropriate culvert design in accordance with guidelines outlined above
iv.	Establish Leave Strips of >10m from river bank where possible
v	Use sustainable drainage systems and petrol/oil interceptors on all surface water runoff from the development
vi.	Create flow attenuation to ensure that no significant increase in peak stream/river flows is caused by the proposed development.
vii.	Apply special measures to prevent contamination from proposed refuelling facilities
viii.	Use lined constructed wetland to ensure no leakage of contaminated water
ix	Ensure sufficient capacity of wetland in a flooding event
x.	Undertake frequent monitoring of wetland discharge and receiving waterbody to ensure no contamination
xi.	Undertake frequent monitoring of the sediment at the points of discharge to the ditches/streams in case of heavy metal and hydrocarbon accumulation

8.2.7 Residual Impacts

If all recommended mitigation measures are implemented in full, the impact of the proposed development on aquatic ecology will be as follows:

Table 10: Presents the residual impacts of the proposed development on the aquatic environment if all mitigation measures are adhered to.

Residual Impacts	**All Water courses**
Impacts from construction activities	Not Significant
Impact from drainage from the completed development	Not Significant
Impact of leakage or spillage of stored fuels and other potential pollutants	Not Significant
Loss of habitat due to culverting, and bankside development or construction	Minor
Obstruction to upstream movement of fish and other aquatic fauna	Not Significant
Hydrological impacts due to increased runoff from paved and roofed areas	Not Significant

9.0 NON TECHNICAL SUMMARY

9.1 Existing Environment

The proposed development will have a potential impact on the four watercourses. Although, they are not considered to hold any of the protected Annex II listed (Habitats Directive) species; salmonids, lamprey or crayfish due consideration must be given to other aquatic biota.

The potentially affected watercourses were found to be of bad or poor water quality status (Q2 – Q3). All were considered of low value (E) in accordance with the classification of importance of freshwater guidelines (NRA, 2004) . In addition, following the salmonid habitat assessment, none of the watercourse affected was considered to hold salmonid habitat, including, adult, nursery and spawning habitat (none-poor). It is highly unlikely that any of the watercourses sampled contain salmonids, however, prior to works this judgement must be agreed by the Fisheries Board through consultation.

9.2 Potential Impacts

The main potential impacts from the proposed development would be:

1. Impacts from construction activities (suspended solids and other construction generated pollutants).

2. Impact from drainage from the completed development including car parking areas, maintenance areas, etc.

3. Impact of leakage or spillage of stored fuels and constructed wetlands.

4. Loss of habitat due to culverting, and bankside development or construction.

5. Obstruction to upstream movement of fish and other aquatic fauna.

6. Hydrological impacts due to increased runoff from paved and roofed areas.

7. Stream and sediment contamination due to ineffective constructed wetland.

In the absence of adequate mitigation measures the potential impact of the proposed development is classified as major.

9.3 Mitigation Measures

1. Stringent measures are specified to minimise pollution generated during the construction process.

2. Construction likely to generate suspended solids, works should not take place between the beginning of October and the end of April without the prior agreement of the Regional Fisheries Board.

3. As mentioned previously it is unlikely that any of the watercourses studied contain salmonids or crayfish, however, the Fisheries Board should be consulted prior to construction of culverts (if planned). If they deem electrofishing operations necessary, and any of the following; salmonids, lamprey and crayfish, are present, then they must be translocated to suitable adjacent habitat.

4. The design of any necessary culverts should be carefully considered so as not to interfere with flow and impact on the movement of fish and aquatic invertebrates.

5. Except where impracticable such as at proposed road crossings, a riparian leave strip of at least five metres and where possible 10 m should be fenced off along both sides of the watercourse sections which run adjacent to the proposed development works. These areas should be left undisturbed during the construction phase and retained as wildlife corridors after the completion of the development. All native trees and bushes within the leave strips should be retained and additional native trees, particularly willow, alder, ash and oak, should be planted to as to provide wildlife cover and intermittent shade to the stream and river. The long-term management of these wildlife corridors should include periodic consultation with the Eastern Regional Fisheries Board and the National Parks & Wildlife Service.

6. All surface water runoff from the completed development should be passed through a sustainable drainage system which can as a minimum achieve the following reduction of pollutants in runoff: Total Suspended Solids 85%; Heavy Metals 50 – 80%; Chemical

Oxygen Demand 50%; Hydrocarbons 90%. The system should include flow attenuation to ensure that no significant increase in peak stream flows is caused by the proposed development.

7. Stringent measures are specified to prevent pollution from the proposed refuelling facility.

8. All surface water drainage should be directed to the constructed wetland prior to discharging to the watercourses.

9. Use lined constructed wetland to ensure no leakage of contaminated water

10. Ensure sufficient capacity of the wetland to prevent flooding events flushing the potentially contaminated materials into the receiving watercourses

11. Undertake frequent monitoring of wetland discharge and receiving waterbody to ensure no contamination.

12. Undertake frequent monitoring of the sediment at the points of discharge to the ditches/streams in case of heavy metal and hydrocarbon accumulation.

9.4 Residual Impacts

If all mitigation measures are implemented in full the impact of the proposed development will be minor.

10.0 References

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APPENDIX I

Table 1: Macroinvertebrates grouped according to their sensitivity to organic pollution (taken from McGarrigle *et al.*, 2002).

TAXA	Group A-*Sensitive*	Group B-*Less Sensitive*	Group C-*Tolerant*	Group D-*Very Tolerant*	Group E-*Most Tolerant*
Plecoptera	All except *Leuctra* spp.	*Leuctra* spp.			
Ephemeroptera	Heptageniidae	Baetidae *(excl. B. rhodani)*	*Baetis rhodani*		
	Siphlonuriidae	Leptophlebidae	Caenidae		
	Ephemera danica		Ephemerellidae		
Trichoptera		Cased spp.	Uncased spp.		
Odonata		All taxa			
Megaloptera				Sialidae	
Hemiptera		*Aphelochierus aestivalis*	All except *A. aestivalis*		
Coleoptera			Coleoptera		
Diptera			Chironomidae (excl. *Chironomus* spp.)		*Chironomus* spp.
			Simuliidae		*Eristalis* spp.
			Tipulidae		
Hydracarina			Hydracarina		
Crustacea			*Gammarus* spp.	*Asellus* spp.	
			Austropotamobius pallipes	*Crangonyx* spp.	
Gastropoda			Gastropoda	*Lymnaea peregra*	
			(excl. *L. peregra* & *Physa* spp.)	*Physa* spp.	
Lamellibranchiata	*Margaritifera margaritifera*		*Anodonta* spp.	Sphaeriidae	
Hirudinea			*Piscicola* sp.	All except *Piscicola* sp.	
Oligochaeta					Tubificidae
Platyhelminthes			All		

APPENDIX I contd.

Table 2: Biotic Indices (Q-Values) and typical associated macroinvertebrate community structure and abundance levels (taken from McGarrigle *et al.* 2002).

Faunal Groups	Q5	Q4	Q3-4	Q3	Q2	Q1
Group A	At least 3 taxa well represented	At least I taxon in reasonable numbers	At least 1 taxon Few - Common	Absent	Absent	Absent
Group B	Few to Numerous	Few to Numerous	Few/Absent to Numerous	Few/Absent	Absent	Absent
Group C	Few	Common to Numerous Baetis rhodani often Abundant Others never Excessive	Common to Excessive (usually Dominant or Excessive)	Dominant to Excessive	Few or Absent	Absent
Group D	Few or Absent	Few or Absent	Few/Absent to Common	Few/Absent to Common	Dominant to Excessive	Few or Absent
Group E	Few or Absent	Few or Absent	Few or Absent	Few or Absent	Few / Absent to Common	Dominant

Table 3 Abundance categories and relationship to percentage frequency of occurrence (After McGarrigle *et al.*, 2002).

Abundance Category	Approx. Percentage frequency of occurrence
Absent	no specimens
Present	1 or 2 individuals
Scarce/few	<1% of the total fauna
Small numbers	<5%
Fair Numbers	5-10%
Common	10-20%
Numerous	25 -50%
Dominant	50 -75%
Excessive	>75%

Table 4 Interpretation of quality ratings (After McGarrigle *et al.*, 2002).

Quality ratings	Pollution status
Q5, Q4-5 and Q4	Unpolluted
Q3-4,	Slightly polluted
Q3 and Q2-3	Moderately polluted
Q2, Q1-2 and Q1	Serious pollution

APPENDIX II

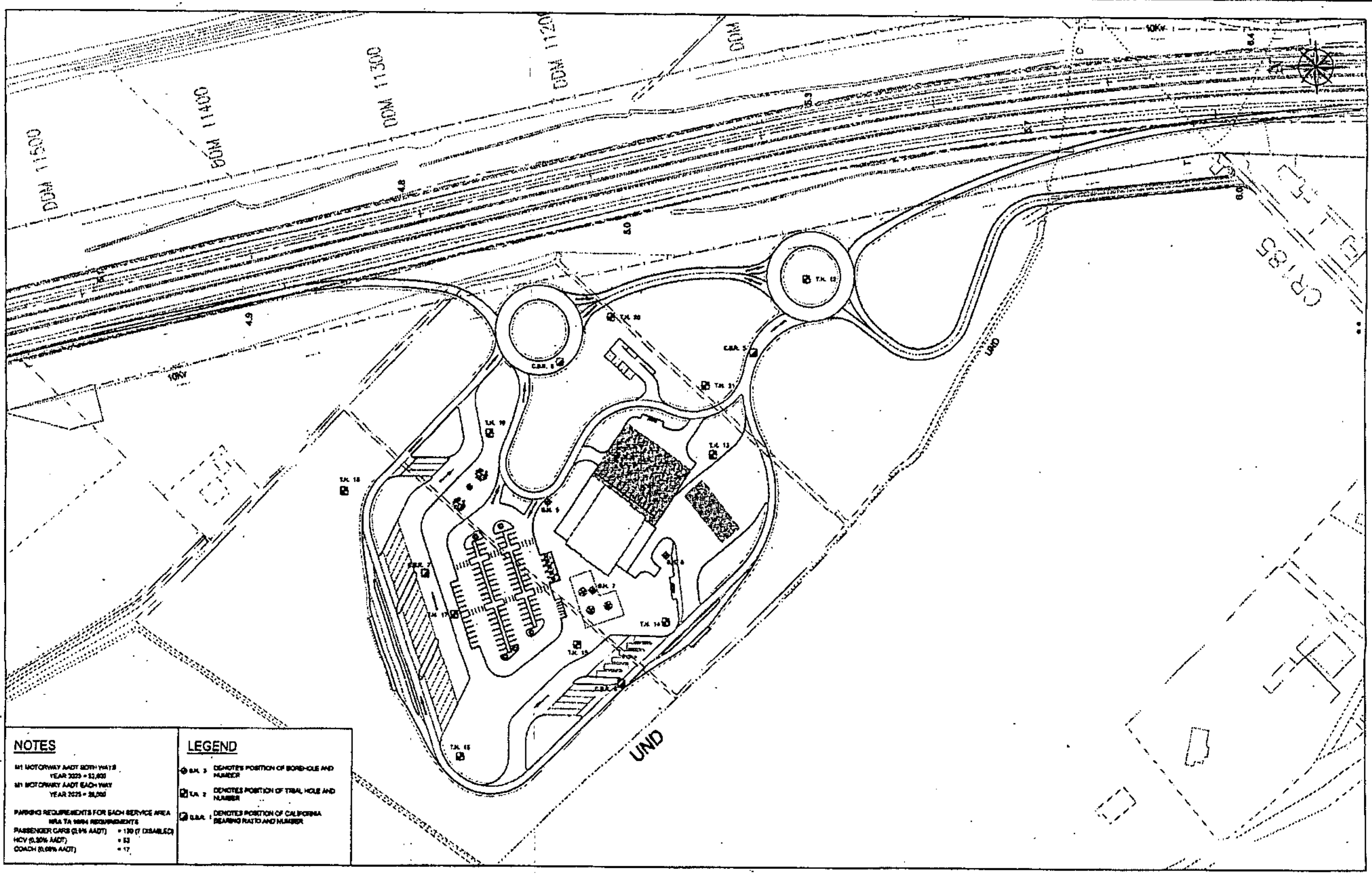
BMWP (Biological Monitoring Working Party) Score (after Armitage *et al.,* 1983).

Families	Score
Siphlonuridae, Heptageniidae, Ephemerellidae, Leptophlebiidae, Potamanthidae, Ephemeridae, Taeniopterygidae, Leuctridae, Capniidae, Perlididae, Chloroplidae, Aphelocheiridae, Phyrganidae, Molannidae, Beraeidae, Odontoceridae, Leptoceridae, Goeridae, Lepidostomatidae, Brachycentridae, Sericostomatidae, Perlodidae	10
Astacidae, Lestidae, Agriidae, Gomphidae, Cordulegarsteridae, Aeshnidae, Cordulliidae, Libellulidae, Psychomyidae, Philopotamidae	8
Caenidae, Nemouridae, Rhyacophilidae, Polycentropodidae, Limnephilidae	7
Neritidae, Viviparidae, Ancylidae, Hydroptilidae, Unionidae, Corophidae, Gammaridae, Platycnemididae, Coenagriidae	6
Mesovelidae, Hydrometridae, Gerridae, Nepidae, Naurcoridae, Notonectidae, Pleidae, Corixidae, Halipildae, Hygrobiidae, Dytiscidae, Gyrinidae, Hydrophilidae Clambeidae, Helodidae, Dryopidae, Elmidae, Chrysomelidae, Curculonidae, Hydropschyidae, Tipulidae, Simuliidae, Planariidae, Dendrocoelidae	5
Baetidae, Sialidae, Piscicolidae	4
Valvatidae, Hydrobiidae, Lymnaeidae, Physidae, Planorbidae, Sphaeridae, Glossophoniidae, Hirudinidae, Eropbellidae, Asellidae	3
Chironomidae	2
Oligochaeta	1

List the families present in the sample, assign the appropriate BMWP score to each family present. Sum these to get the total BMWP score. The average score per taxon (ASPT) value is then computed by dividing the total BMWP score by the number of scoring taxa present in the sample. The resulting ASPT value is between 1 and 10.

APPENDIX H

SOILS, GEOLOGY, HYDROGEOLOGY



NOTES

M1 MOTORWAY AADT BOTH WAYS
YEAR 2025 = 52,600
M1 MOTORWAY AADT EACH WAY
YEAR 2025 = 26,000

PARKING REQUIREMENTS FOR EACH SERVICE AREA
NRA TA 100/04 REQUIREMENTS
PASSENGER CARS (0.5% AADT) = 130 (7 DISABLED)
HCV (0.20% AADT) = 52
COACH (0.06% AADT) = 17

LEGEND

B.H. 3 DENOTES POSITION OF BOREHOLE AND NUMBER

T.H. 2 DENOTES POSITION OF TRIAL HOLE AND NUMBER

C.B.R. 1 DENOTES POSITION OF CALIFORNIA BEARING RATIO AND NUMBER

NRA National Roads Authority

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

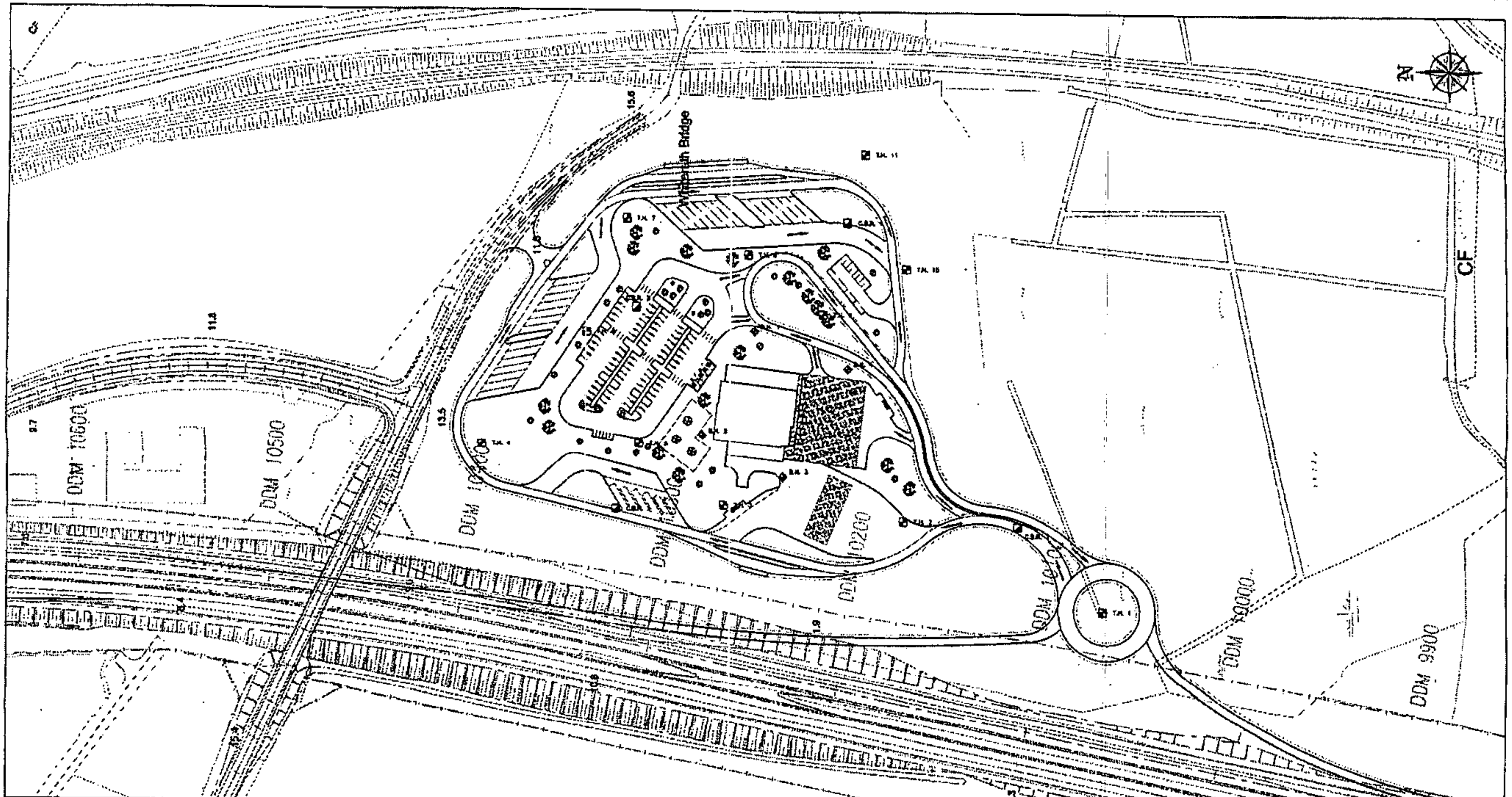
Project Title: M1 NORTH MOTORWAY CASTLEBELLINGHAM SERVICE AREAS

Drawing Title: WESTERN AREA - SITE INVESTIGATION

Status: DISCUSSION

Drawing No.: SI-2221

Nov 20, 2007 - 2:13pm Drawing Location: L:\acaddwg\2006\06257\Drawings\M1 North\Advance Works\Site Investigation\SI-2221.dwg



NOTES

M1 MOTORWAY AADT BOTH WAYS
YEAR 2025 = 53,000
M1 MOTORWAY AADT EACH WAY
YEAR 2025 = 26,000

PARKING REQUIREMENTS FOR EACH SERVICE AREA
NRA TA 69/94 REQUIREMENTS
PASSENGER CARS (6.5% AADT) = 130 (7 DISABLED)
HGV (0.30% AADT) = 82
COACH (0.06% AADT) = 17

LEGEND

B.H. 3 — DENOTES POSITION OF BOREHOLE AND NUMBER

T.H. 7 — DENOTES POSITION OF TRIAL HOLE AND NUMBER

C.B.R. 1 — DENOTES POSITION OF CALIFORNIA BEARING RATIO AND NUMBER

NRA National Roads Authority

NDP

West consult
RPS • ROUGHAN & O'DONOVAN
CONSULTING ENGINEERS

PRELIMINARY
APPROVAL
TENDER
CONSTRUCTION

Project Title: M1 NORTH MOTORWAY CASTLEBELLINGHAM SERVICE AREAS

Drawing Title: EASTERN AREA - SITE INVESTIGATION

Drawing No. SI-2220

Nov 20, 2007 - 2:09pm   Drawing Location: L:\acaddwg\2006\06257\Drawings\M1 North\Advance Works\Site Investigation\SI-2220.dwg

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH01

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	200mm cased to 9.60m			07-933
	Location	**Dates** 29/10/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
							Soft to firm light brown slightly sandy slightly gravelly CLAY with many subrounded to angular cobbles
0.50	D1						
1.00-1.45 1.00-1.30	SPT N=24 B1			2,3/3,10,5,6			
						(3.10)	
2.00-2.45 2.00-2.30	SPT N=13 B2			2,2/3,3,3,4			
3.00-3.45 3.00-3.30	SPT N=25 B3			2,3/6,7,7,5		3.10	Firm to stiff light brown very sandy very gravelly CLAY with many angular to rounded cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse
4.00-4.30 4.00-4.50	D4 U1			17 blows		(2.00)	
5.00-5.30	B5			29/10/2007:DRY m		5.10	Soft grey CLAY with small cobbles
5.00-5.45	SPT N=12			6,1/1,2,4,5		(0.30) 5.40	Firm to stiff brown very sandy very gravelly CLAY with many cobbles and some boulders
6.00-6.30	B6					(1.20)	
6.50-6.60 6.50	SPT 7*/50 50/50 U2 failed			7/50 water seepage (1) at 6.60m.		6.60	Dense grey gravelly angular COBBLES with pockets of firm grey gravelly clay
7.00-7.30	B7					(0.90)	
7.50-7.80	B8					7.50 (0.40)	Soft yellow brown grey very sandy CLAY. Sand is fine
8.00-8.30 8.00-8.50	B9 U3			water seepage (2) at 7.90m. 30 blows		7.90 (0.70)	Loose to medium dense brown medium SAND
8.70-9.00	B10					8.60 (0.50)	Soft yellow brown grey sandy CLAY. Sand is fine
9.10-9.40	B11					9.10 (0.50)	Dense grey sandy gravelly subrounded to angular COBBLES. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse
9.50-9.60	SPT 11*/50 50/50			11/50		9.60	end of @ 9.6m on possible large boulder

Legend / Water:

Remarks
Chiselling from 1.40m to 1.60m for 0.5 hours. Chiselling from 1.70m to 1.90m for 0.5 hours. Chiselling from 4.60m to 4.80m for 0.5 hours. Chiselling from 6.60m to 7.10m for 1.5 hours. Chiselling from 9.10m to 9.30m for 0.5 hours. Chiselling from 9.60m to 9.60m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH01

Glover Site Investigations Ltd

Site M1 North Motorway - Castlebellingham Service Area			**Borehole Number** BH01
Installation Type Water Monitoring	**Dimensions** Internal Diameter of Tube [A] = 50 mm; Diameter of Filter Zone = 150 mm	**Client**	**Job Number** 07-933
Location	**Ground Level (mOD)**	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.30	Concrete
	∇1				Bentonite Seal
	∇2				
				9.10	Slotted Standpipe
				9.60	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		6.60		water seepage					
		7.90		water seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
29/10/07							5.00		dry	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH02

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	200mm cased to 8.20m			07-933
	Location	**Dates**	**Engineer**	**Sheet**
		07/11/2007-08/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.60)	Firm brown sandy gravelly CLAY with some angular cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
						0.60	Soft to firm bluish grey with some brown slightly sandy gravelly CLAY with many angular cobbles and occasional roots. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
1.00-1.45	SPT N=12			2,2/3,3,3,3		(0.80)			
1.00-1.30	B1								
						1.40	Soft to firm light brown slightly sandy very gravelly CLAY with many subrounded to angular cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
2.00-2.30	B2								
2.00-2.30	U1			17 blows					
3.00-3.45	SPT N=8			1,2/2,2,2,2		(3.50)			
3.00-3.30	B3								
4.00-4.30	B4								
4.00-4.50	U2			67 blows					
						4.90	Medium dense brown clayey very gravelly fine to coarse SAND with many subrounded to angular cobbles. Gravel is subrounded to angular fine to coarse.		
5.00-5.45	SPT N=19			4,5/5,6,4,4		(0.70)			
5.00-5.30	B5								
						5.60	Medium dense brown slightly clayey sandy gravelly subrounded to angular COBBLES. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
6.00-6.30	B6								
				Water strike(1) at 6.30m.					∇1
6.50-6.95	SPT N=18			3,4/4,5,4,5		(2.30)			
7.00-7.30	B7								
						7.90	Stiff grey brown sandy gravelly CLAY with many subrounded to subangular cobbles. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse		
8.00-8.20	SPT 25*/140 50/60			7,18/50		(0.30)			
8.00-8.20	B8			08/11/2007:7.10m		8.20			
							End of borehole @ 8.2m on possible large boulder or bedrock Complete at 8.20m		

Remarks	Scale (approx)	Logged By
Chiselling from 3.60m to 3.80m for 0.5 hours. Chiselling from 4.50m to 4.70m for 0.75 hours. Chiselling from 7.30m to 7.50m for 0.5 hours. Chiselling from 7.60m to 7.80m for 0.75 hours. Chiselling from 8.00m to 8.20m for 0.75 hours. Chiselling from 8.20m to 8.20m for 1.5 hours.	1:50	JC/KL
	Figure No.	
	07-933.BH02	

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH02

Installation Type	Dimensions	Client	Job Number
Water monitoring	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		07-933

Location	Ground Level (mOD)	Engineer	Sheet
		RPS / Roughan & O'Donovan Consulting Engineers	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.20	Concrete
				2.20	Bentonite Seal
	∇1			8.20	Slotted Standpipe

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		6.30							

Groundwater Observations During Drilling

Date	Start of Shift: Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift: Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
08/11/07							8.20		7.10	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area			**Borehole Number**	BH03
Boring Method Cable Percussion	**Casing Diameter** 200mm cased to 5.10m	**Ground Level (mOD)**	**Client**	**Job Number**	07-933
	Location	**Dates** 06/11/2007-07/11/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet**	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(1.10)	Stiff brown sandy slightly gravelly CLAY with many subangular to rounded cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
1.00-1.45	SPT N=12			4,2/3,3,3,3		1.10			
1.00-1.30	B1						Firm greyish brown slightly sandy gravelly CLAY with occasional subangular to rounded cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
2.00-2.10	U1 No Recovery			12 blows		(1.70)			
2.00-2.30	B2								
						2.80			
3.00-3.45	SPT N=16			2,3/3,5,6,2			Firm bluish grey sandy gravelly CLAY with many angular to subrounded cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
3.00-3.30	B3								
						(2.10)			
4.00-4.30	B4								
4.00-4.50	U2			16 blows					
				06/11/2007:DRY					
				07/11/2007:DRY		4.90			
5.00-5.10	SPT 2*/50 50/50			2/50 07/11/2007:DRY		(0.20) 5.10	Soft to firm brown sandy gravelly CLAY with many subrounded to angular cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
5.00-5.10	B5								

End of borehole @ 5.1m on possible large boulder or bedrock
Complete at 5.10m

Remarks
Chiselling from 0.60m to 0.90m for 0.75 hours. Chiselling from 2.10m to 2.30m for 0.5 hours. Chiselling from 2.60m to 2.80m for 0.5 hours. Chiselling from 3.50m to 3.80m for 0.75 hours. Chiselling from 4.40m to 4.60m for 0.5 hours. Chiselling from 5.10m to 5.10m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH03

Glover Site Investigations Ltd

Site M1 North Motorway - Castlebellingham Service Area				**Borehole Number** BH03
Installation Type Water monitoring	**Dimensions** Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		**Client**	**Job Number** 07-933
	Location	**Ground Level (mOD)**	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.30	Concrete
				2.10	Bentonite Seal
				5.10	Slotted Standpipe

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
06/11/07							4.50		dry	
07/11/07		4.50		dry			5.10		dry	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH04

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	200mm cased to 7.90m			07-933

Location	Dates	Engineer	Sheet
	30/10/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							Soft to firm brown slightly sandy slightly gravelly CLAY with some subrounded to angular cobbles		
1.00-1.45 1.00-1.30	SPT N=11 B1		2.00	3,2/3,3,2,3					
						(2.80)			
2.00-2.45 2.00-2.30	SPT N=11 B2			2,3/3,2,3,3					
						2.80	Firm light brown sandy gravelly CLAY with many cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine		
3.00-3.30 3.00-3.40	B3 U1 No recovery			31 blows					
4.00-4.45 4.00-4.30	SPT N=13 B4			2,3/3,4,3,3		(2.60)			
5.00-5.30 5.00-5.50	B5 U2			42 blows					
						5.40	Medium dense brown slightly clayey medium SAND (damp)		
6.00-6.30	B6								
6.50-6.95	SPT N=15			2,3/3,4,4,4		(2.30)			
7.00-7.30	B7								
				water seepage (1) at 7.80m.		7.70 (0.10)	Soft yellow brown grey mottled sandy CLAY. Sand is fine		∇1
						7.80 (0.10) 7.90	Dense grey angular COBBLES [illegible] possible large boulder		
							Complete at 7.90m		

Remarks	Scale (approx)	Logged By
Chiselling from 3.60m to 3.80m for 0.5 hours. Chiselling from 4.70m to 4.90m for 0.5 hours. Chiselling from 7.80m to 7.90m for 1 hour.	1:50	JC/KL
	Figure No. 07-933.BH04	

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH04

Installation Type	Dimensions	Client	Job Number
Water monitoring	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		07-933

Location	Ground Level (mOD)	Engineer	Sheet
		RPS / Roughan & O'Donovan Consulting Engineers	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.30	Concrete
					Bentonite Seal
	∇1			7.80 7.90	Slotted Standpipe

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		7.80		water seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH06

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	200mm cased to 10.00m			07-933
	Location	**Dates**	**Engineer**	**Sheet**
		14/11/2007-15/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.20) 0.20	TOPSOIL		
						(0.80) 1.00	Firm grey brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subrounded to subangular fine		
1.00-1.30	B1			14/11/2007:DRY					
1.00-1.45	SPT N=14			15/11/2007: 2,3/3,3,4,4		(0.80) 1.80	Medium dense slightly gravelly coarse SAND. Gravel is subrounded fine		
2.00-2.45 2.00-2.30	SPT N=17 B2			2,3/4,4,4,5			Medium dense grey fine SAND		
3.00-3.45 3.00-3.30	SPT N=18 B3			3,3/4,5,5,4		(2.30)			
4.00-4.45 4.00-4.20 4.20-4.40	SPT N=12 B4 B5			3,3/3,3,3,3		4.10			
						(0.10) 4.20	Medium dense grey fine SAND with some cobbles		
						(0.20) 4.40	Firm brown pseudofibrous PEAT		
4.60-4.80	B6					(0.20) 4.60	Soft grey SILT / CLAY		
5.00-5.20 5.00-5.50	B7 U1			40 blows		(0.20) 4.80	Firm to stiff blue grey very sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
						(0.40) 5.20	Stiff blue grey mottled brown slightly sandy very gravelly CLAY with many cobbles. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse		
6.00-6.30	B8					(1.00) 6.20	Stiff mottled brown CLAY with thin bands of blue fine sand		
6.50-6.95	SPT N=20			3,4/5,5,5,5			Firm to stiff brown sandy CLAY. Sand is fine		
7.00-7.30	B9								
8.00-8.30 8.00-8.50	B10 U2			23 blows water seepage (1) at 8.30m.		(3.80)			∇1
9.00-9.45 9.00-9.30	SPT N=19 B11			4,5/3,5,6,5					
				15/11/2007		10.00			

Remarks	Scale (approx)	Logged By
Hand dug pit to 1.2 metres - 1 hour	1:50	JC/KL
	Figure No. 07-933.BH06	

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH06

Installation Type	Dimensions	Client	Job Number
Water Monitoring	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		07-933

Location	Ground Level (mOD)	Engineer	Sheet
		RPS / Roughan & O'Donovan Consulting Engineers	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
					Concrete
				1.00	
					Bentonite Seal
				2.00	
					Slotted Standpipe
	∇1				
				10.00	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		8.30		water seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
14/11/07							1.00		dry	
15/11/07		1.00					10.00			

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area			**Borehole Number**	BH07
Boring Method Cable Percussion	**Casing Diameter** 200mm cased to 6.70m	**Ground Level (mOD)**	**Client**	**Job Number**	07-933
	Location	**Dates** 21/11/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet**	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
						(0.20) 0.20	Loose brown clayey SAND
						(0.40) 0.60	Medium dense grey slightly clayey fine SAND
1.00-1.45 1.00-1.30	SPT N=12 B1			2,2/3,3,3,3		(1.00) 1.60	Loose brown fine to medium SAND with occasional small cobbles
2.00-2.45 2.00-2.30	SPT N=8 B2			2,2/2,2,2,2			Medium dense black grey silty fine SAND with some small sea shells
3.00-3.45 3.00-3.30	SPT N=10 B3			2,2/2,3,2,3		(2.90)	
4.00-4.45 4.00-4.30	SPT N=10 B4			2,2/2,2,3,3		4.50	
						(0.60) 5.10	Medium dense black grey silty fine SAND with some cobbles and some small sea shells
5.00-5.45 5.00-5.10	SPT N=30 B5			2,5/8,8,7,7			Stiff light brown sandy gravelly CLAY with many angular to subrounded cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse
6.00-6.30	B6					(1.60)	
6.50-6.60	SPT 8*/0 50/100			8/50 21/11/2007:5.30m		6.70	
							End of borehole at 6.7m on possible large boulder Complete at 6.70m

Remarks
Hand dug starter pit 1.2m - 1 hour
Chiselling from 5.40m to 5.50m for 1 hour. Chiselling from 5.70m to 5.90m for 0.5 hours. Chiselling from 6.30m to 6.50m for 0.5 hours. Chiselling from 6.60m to 6.70m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH07

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH07

Installation Type	Dimensions	Client	Job Number
Water Monitoring	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		07-933

Location	Ground Level (mOD)	Engineer	Sheet
		RPS / Roughan & O'Donovan Consulting Engineers	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.50	Concrete
				1.50	Bentonite Seal
				6.70	Slotted Standpipe

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift: Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift: Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
21/11/07							6.70		5.30	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A]: Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area
Borehole Number	BH08
Boring Method	Cable Percussion
Casing Diameter	200mm cased to 6.10m
Ground Level (mOD)	
Client	
Job Number	07-933
Location	
Dates	16/11/2007-19/11/2007
Engineer	RPS / Roughan & O'Donovan Consulting Engineers
Sheet	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40) 0.40	Loose brown very clayey fine SAND		
1.00-1.45 1.00-1.30	SPT N=7 B1			1,1/1,2,2,2		(1.80)	Loose red brown fine SAND		
2.00-2.45 2.00-2.30	SPT N=16 B2			1,2/3,4,4,5 water seepage (1) at 2.20m.		2.20			▽1
3.00-3.45 3.00-3.30	SPT N=20 B3			3,3/4,5,5,6		(2.00)	Medium dense blue grey fine SAND with some small sea shells		
4.00-4.45 4.00-4.20	SPT N=8 B4			3,2/2,2,2,2		4.20			
				16/11/2007:4.20m		(0.30) 4.50	Uncompact grey sandy SILT with some cobbles. Sand is fine		
				17/11/2007:1.70m			COBBLES with much sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse		
5.00-5.20 5.00-5.30	SPT 50/50 B5			10,11/50		(1.60)			
				17/11/2007:1.70m		6.10	End of borehole at 6.1m on possible large boulder Complete at 6.10m		

Remarks
1 hour standing time while farmer sprayed crop adjacent to BH
Hand dug pit to 1.2m - 1 hour
Chiselling from 4.50m to 4.80m for 1 hour. Chiselling from 5.20m to 5.50m for 0.75 hours. Chiselling from 6.10m to 6.10m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH08

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area
Borehole Number	BH08
Installation Type	Water monitoring
Dimensions	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm
Client	
Job Number	07-933
Location	
Ground Level (mOD)	
Engineer	RPS / Roughan & O'Donovan Consulting Engineers
Sheet	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
					Concrete
				0.50	Bentonite Seal
				1.00	
	▽1				Slotted Standpipe
				6.10	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		2.20		water seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
16/11/07							4.50		4.20	
17/11/07		4.50		1.70			6.10		1.70	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area
Borehole Number	BH09
Boring Method	Cable Percussion
Casing Diameter	200mm cased to 8.30m
Ground Level (mOD)	
Client	
Job Number	07-933
Location	
Dates	12/11/2007-13/11/2007
Engineer	RPS / Roughan & O'Donovan Consulting Engineers
Sheet	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.60)	TOPSOIL: Firm brown sandy gravelly CLAY with some cobbles		
						0.60	MADE GROUND: Firm brown sandy gravelly CLAY FILL with some cobbles and boulders, pieces of burnt wood, steel wires and pieces of brick		
1.00-1.45 1.00-1.30	SPT N=4 B1			1,1/1,1,1,1		(1.20)			
						1.80 (0.40)	Soft dark brown pseudofibrous PEAT with some subangular cobbles		
2.00-2.45 2.00-2.30	SPT N=4 B2			1,1/1,1,1,1		2.20 (0.50)	Soft grey silty amorphous PEAT with some steel wires		▼1 ▽1
3.00-3.30 3.00-3.45	B3 SPT N=29			Water strike(1) at 2.70m, rose to 2.30m in 20 mins. 5,6/6,8,7,8		2.70 (0.30) 3.00	Dense blue grey COBBLES with some slightly sandy very gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse		
						(1.10)	Dense grey COBBLES with a little gravelly sand. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse		
4.00-4.45 4.00-4.30	SPT N=29 B4			6,7/8,7,7,7		4.10	Medium dense angular fine to coarse GRAVEL with some cobbles. Sand is fine to coarse. ...with many cobbles below 4.5m		
5.00-5.30	B5			12/11/2007:2.40m					
5.00-5.45	SPT N=23			13/11/2007:2.40m 4,5/5,6,6,6		(2.50)			
6.00-6.30	B6								
6.50-6.95 6.60-6.90	SPT N=12 B7			4,4/3,3,3,3		6.60 (0.30) 6.90	Soft to firm blue grey sandy very gravelly SILT / CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse		▽2
7.00-7.30	B8			strong water flow (2) at 6.90m.		(1.20)	Dense grey brown COBBLES with some sandy gravel. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
8.00-8.30 8.10-8.20	SPT 50/150 B9			6,8/10,40 13/11/2007:6.40m		8.10 (0.20) 8.30	Stiff blue grey sandy very gravelly CLAY with many cobbles. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
							Complete at 8.30m		

Remarks
Chiselling from 0.80m to 1.00m for 0.75 hours. Chiselling from 1.40m to 1.60m for 0.5 hours. Chiselling from 2.80m to 2.90m for 0.5 hours. Chiselling from 3.20m to 3.40m for 0.75 hours. Chiselling from 3.80m to 3.90m for 0.5 hours. Chiselling from 7.10m to 7.30m for 0.75 hours. Chiselling from 7.60m to 7.80m for 0.5 hours. Chiselling from 8.30m to 8.30m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH09

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area
Borehole Number	BH09
Installation Type	Water monitoring
Dimensions	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm
Client	
Job Number	07-933
Location	
Ground Level (mOD)	
Engineer	RPS / Roughan & O'Donovan Consulting Engineers
Sheet	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				0.30	Concrete
	▼1 ∇1				Bentonite Seal
	∇2			7.00	
				8.30	Slotted Standpipe

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		2.70 6.90		strong water flow				2.30	

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
12/11/07							5.00		2.40	
13/11/07		5.00		2.40			8.30		6.40	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area		**Borehole Number**	BH10
Boring Method Cable Percussion	**Casing Diameter** 200mm cased to 5.30m	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 08/11/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.70)	Firm brown sandy slightly gravelly CLAY with occasional subrounded to angular cobbles. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse .		
						0.70	Dense brown very clayey very gravelly medium SAND with many subangular to subrounded cobbles. Sand is subrounded to angular fine to coarse		
1.00-1.45 1.00-1.30	SPT N=14 B1			2,4/3,3,4,4					
2.00-2.30 2.00-2.50	B2 U1			43 blows					
3.00-3.40 3.00-3.30	SPT 50/250 B3			6,8/7,7,8,28		(4.60)			
4.00-4.30 4.00-4.50	B4 U2			82 blows					
5.00-5.30 5.00-5.30	SPT 50/150 B5			6,7/9,41 slow water seepage (1) at 5.20m.					∇1
						5.30	Dense brown slightly clayey sandy gravelly subangular to subrounded COBBLES. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
				08/11/2007:5.30m		(0.50)			
						5.80	End of borehole @ 5.8m on possible large boulder or bedrock Complete at 5.80m		

Remarks
Chiselling from 2.50m to 2.70m for 0.5 hours. Chiselling from 3.40m to 3.60m for 0.5 hours. Chiselling from 5.30m to 5.60m for 0.75 hours. Chiselling from 5.70m to 5.80m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH10

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH10

Installation Type	Dimensions	Client	Job Number
Water monitoring	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		07-933

Location	Ground Level (mOD)	Engineer	Sheet
		RPS / Roughan & O'Donovan Consulting Engineers	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
				1.00	Concrete
	∇1			5.30	Bentonite Seal
				5.80	Slotted Standpipe

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)
		5.20		slow water seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
08/11/07							5.80		5.30	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH11

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	200mm cased to 2.60m			07-933

Location	Dates	Engineer	Sheet
	09/11/2007-12/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30) 0.30	TOPSOIL		
						(0.30) 0.60	Firm to stiff brown sandy gravelly CLAY with many subrounded to angular cobbles and boulders. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
1.00-1.45 1.00-1.30	SPT N=37 B1			5,7/8,8,11,10		(0.70) 1.30	Dense light brown very clayey medium to coarse SAND with many angular to rounded cobbles		
2.00-2.20 2.00-2.30	U1 No recovery B2			09/11/2007:DRY		(1.10) 2.40	Dense yellow brown slightly clayey fine SAND with some rounded cobbles contains some pockets of grey brown coarse gravelly medium to coarse sand		
				12/11/2007:DRY 12/11/2007:DRY		(0.20) 2.60	Dense grey brown COBBLES & BOULDERS		
							Complete at 2.60m		

Remarks
Chiselling from 0.50m to 0.70m for 1 hour. Chiselling from 1.10m to 1.20m for 0.5 hours. Chiselling from 2.20m to 2.40m for 1 hour. Chiselling from 2.40m to 2.60m for 1 hour.

Scale (approx)	Logged By
1:50	JC/KL

Figure No. 07-933.BH11

Glover Site Investigations Ltd

Site	Borehole Number
M1 North Motorway - Castlebellingham Service Area	BH11

Installation Type	Dimensions	Client	Job Number
Water monitoring	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 200 mm		07-933

Location	Ground Level (mOD)	Engineer	Sheet
		RPS / Roughan & O'Donovan Consulting Engineers	1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
					Concrete
				0.30	Bentonite Seal
				0.60	Slotted Standpipe
				2.60	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	10 min	15 min	20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift: Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	End of Shift: Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
09/11/07							2.20		Dry	
12/11/07		2.20		dry			2.60		dry	

Instrument Groundwater Observations

Inst. [A] Type :

Date	Instrument [A] Time	Depth (m)	Level (mOD)	Remarks

Remarks
Upright cover fitted

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area
Trial Pit Number	TP01
Excavation Method	JCB 3CX
Dimensions	
Ground Level (mOD)	
Client	
Job Number	07-933
Location	
Dates	24/10/2007
Engineer	WSP Consulting Engineers
Sheet	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
0.50	B				(0.50) 0.70	Very soft light grey CLAY/SILT		
2.00	B				(1.50) 2.20	Spongy brown PEAT		
2.70	B				(0.60) 2.80	Soft to firm light grey CLAY/SILT		▽1
			Fast Inflow(1) at 2.80m. 24/11/2007			Pit terminated at 2.80m due to infilling with water Complete at 2.80m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP01

Glover Site Investigations Ltd

Site	M1 ~~North~~ Motorway - Castlebellingham Service Area		**Trial Pit Number**	TP02
Excavation Method JCB 3CX	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
0.50	B				0.30 (0.50)	MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.00	B				0.80	MADE GROUND: Firm grey brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles and occasional pieces of wood and plastic		
2.50	B				(2.20)	.... becoming soft from 1.60m		
			24/10/2007:DRY		3.00	Complete at 3.00m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP02

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX				07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30			
0.70	B				(0.70)	MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY with occasional angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
					1.00			
1.30	B				(0.50)	MADE GROUND: Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional pieces of wood. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
					1.50			
					(1.50)	Firm to stiff brown slightly sandy slightly gravelly CLAY with some subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
3.00	B		24/10/2007:DRY		3.00			
						Complete at 3.00m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP03

Glover Site Investigations Ltd

Site: M1 North Motorway - Castlebellingham Service Area			**Trial Pit Number**: TP04
Excavation Method: JCB 3CX	**Dimensions**	**Ground Level (mOD)**	**Client**
	Location	**Dates**: 24/10/2007	**Engineer**: WSP Consulting Engineers
Job Number: 07-933	**Sheet**: 1/1		

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
0.50	B				(0.50) 0.70	Firm grey brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.00	B				(0.90) 1.60	Firm to stiff light brown very friable sandy gravelly CLAY with occasional subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
2.00	B				(0.70) 2.30	Medium dense grey brown slightly silty slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse		
3.00	B		24/10/2007:DRY		(0.80) 3.10	Soft to firm grey slightly friable slightly sandy slightly gravelly CLAY with some angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
						Complete at 3.10m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP04

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX				07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
0.50	B					MADE GROUND: Firm to stiff grey brown very friable sandy gravelly CLAY with some subrounded cobbles and boulders. Sand is fine to coarse		
1.00	B				(1.00) 1.20			
2.00	B				(1.50) 2.70	MADE GROUND: Soft to firm grey slightly sandy gravelly CLAY with occasional subrounded cobbles and pieces of wood and roots		
3.00	B		24/10/2007:DRY		(0.30) 3.00	Firm brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
						Complete at 3.00m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP05

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area		**Trial Pit Number**	TP06
Excavation Method JCB 3CX	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
					0.20	Firm grey brown very friable slightly sandy gravelly CLAY with some angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
0.50	B							
					(1.20)			
1.00	B							
					1.40	Firm grey brown very friable slightly sandy slightly gravelly CLAY with some subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
2.00	B				(1.30)			
					2.70	Medium dense grey brown slightly silty slightly gravelly fine to coarse SAND with some subrounded cobbles and boulders		
					(0.40)			
3.00	B				3.10			
			24/10/2007:DRY			Complete at 3.10m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP06

Glover Site Investigations Ltd

Site M1 North Motorway - Castlebellingham Service Area				**Trial Pit Number** TP07
Excavation Method JCB 3CX	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30			
0.50	B					Firm brown very friable slightly sandy slightly gravelly CLAY with some angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.00	B				(1.70)			
					2.00			
2.20	B				(0.50)	Soft grey slightly sandy slightly gravelly CLAY with some angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
			24/10/2007:DRY		2.50			
						Refusal met at 2.50m on possible boulders Complete at 2.50m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP07

Glover Site Investigations Ltd

Site M1 North Motorway - Castlebellingham Service Area			**Trial Pit Number** TP08
Excavation Method JCB 3CX	**Dimensions**	**Ground Level (mOD)**	**Client**
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers

Job Number 07-933

Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					(0.30)	TOPSOIL
					0.30	
0.80	B				(0.90)	Firm brown slightly sandy gravelly CLAY with occasional subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse
					1.20	
1.50	B				(0.60)	Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse
					1.80	
					(1.20)	Soft to firm grey slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse
3.00	B		24/10/2007:DRY		3.00	
						Complete at 3.00m

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP08

Glover Site Investigations Ltd

Site M1 North Motorway - Castlebellingham Service Area				**Trial Pit Number** TP09
Excavation Method JCB 3CX	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
0.60	B					Soft to firm brown very friable slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
					(1.40)			
1.30	B				1.60			
					(1.60)	Soft to firm grey brown slightly sandy slightly gravelly CLAY with some subrounded cobbles and boulders and occasional pockets of sand. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
3.00	B		24/10/2007:DRY		3.20			
						Complete at 3.20m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP09

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX				07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	TOPSOIL		
0.50	B					Soft to firm brown slightly sandy slightly gravelly CLAY with occasional subrounded to angular cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.20	B				(1.20) 1.50			
2.00	B				(0.90) 2.40	Firm brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and boulders. Sand is fine. Gravel is subangular to subrounded fine to coarse		
					(0.60) 3.00	Soft to firm grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and boulders. Sand is fine. Gravel is subangular to subrounded fine to coarse		
3.00	B		24/10/2007:DRY			Complete at 3.00m		

Plan

Remarks

Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP10

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP11

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX				07-933
	Location	**Dates** 24/10/2007	**Engineer** WSP Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30	Firm brown slightly sandy slightly gravelly CLAY with occasional angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
0.80	B				(0.90)			
					1.20	Soft grey brown slightly sandy slightly gravelly CLAY with occasional angular to subrounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.50	B				(1.80)			
3.00	B		24/10/2007:DRY		3.00	Complete at 3.00m		

Plan

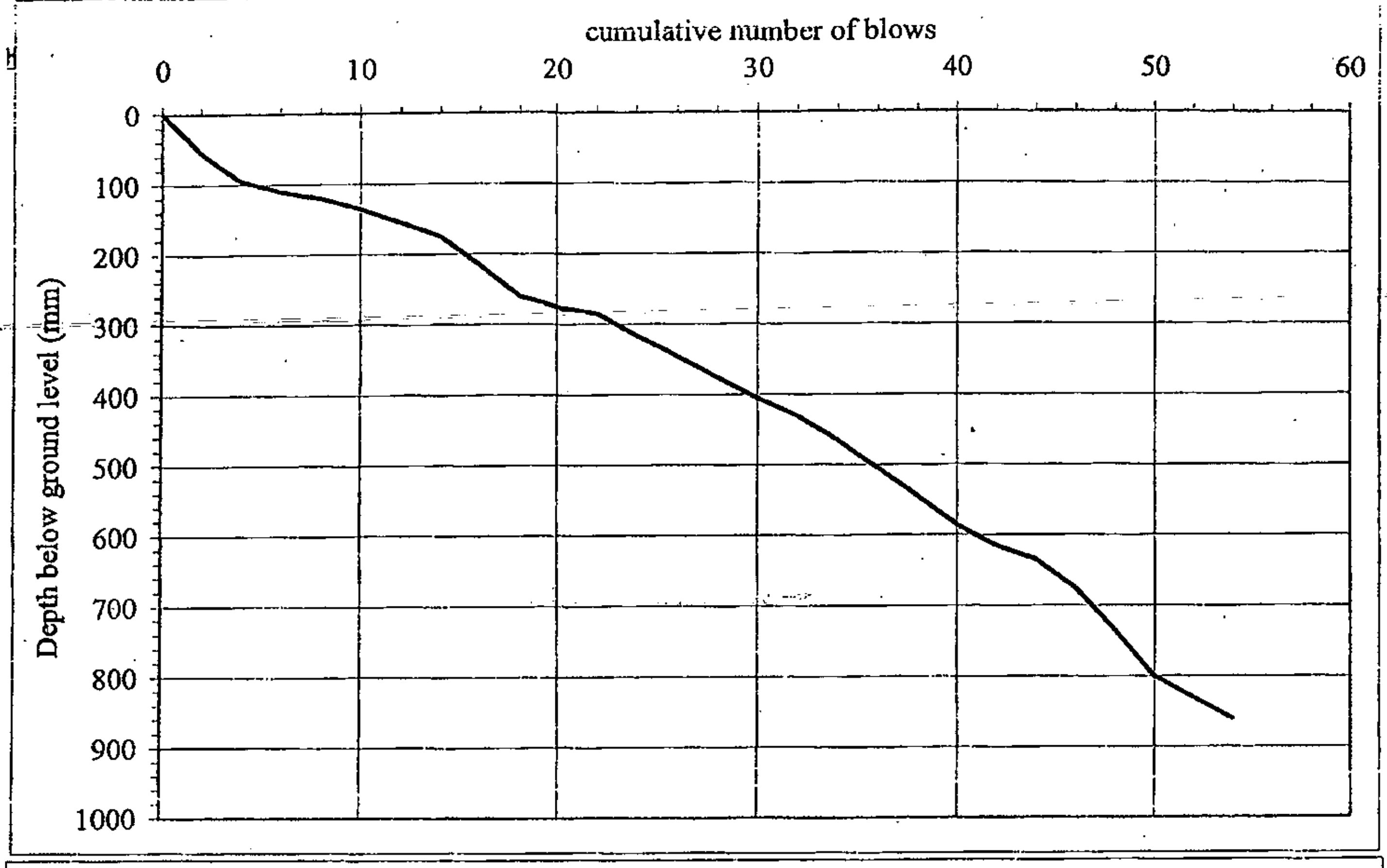
Remarks

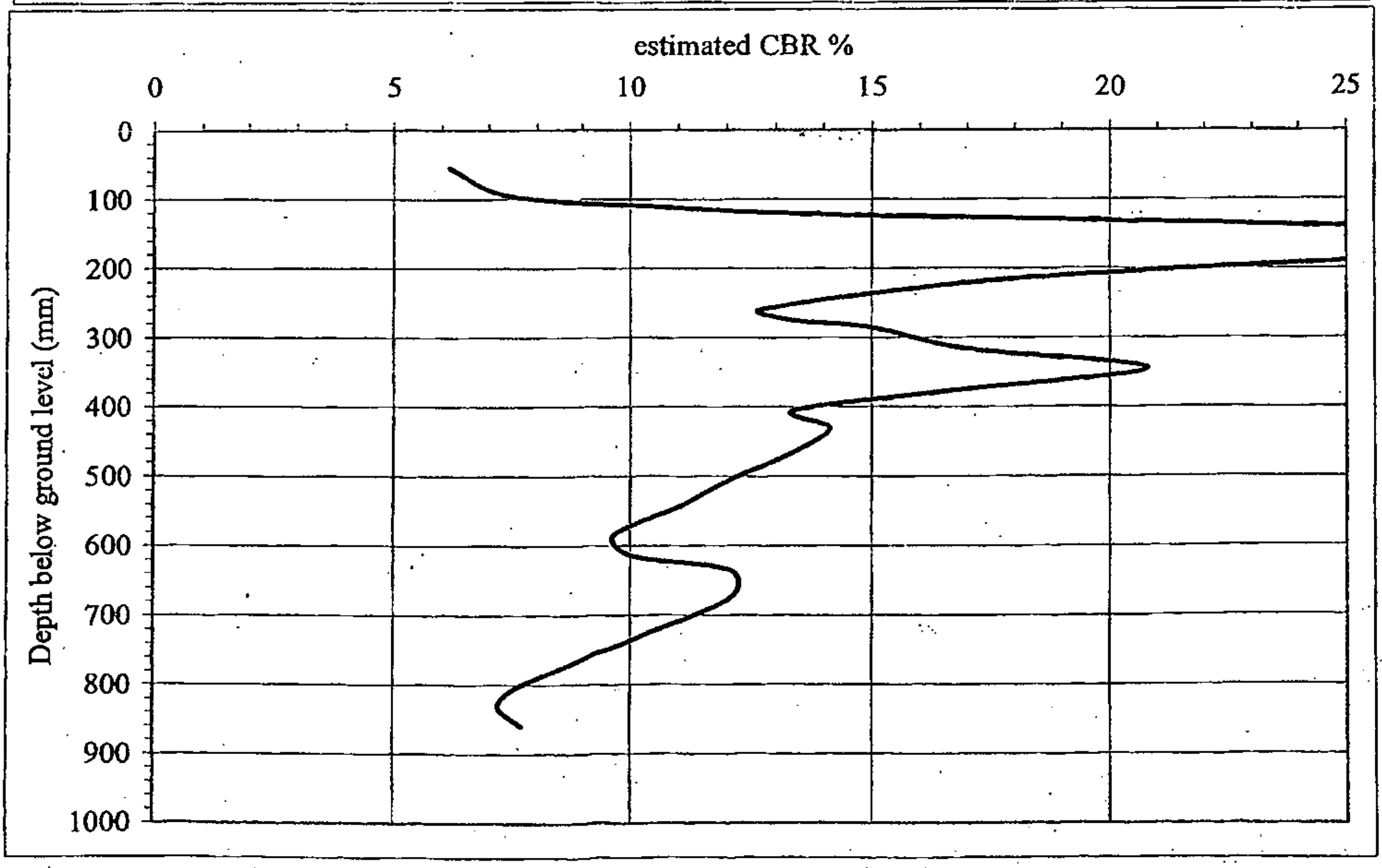
Pit sides stable on completion.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP11

Glover Site Investigations Ltd.
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

Project:	M1 Motorway Services - County Louth	**Report No:**	07-933
Test Number:	DCP 01	**Date:**	24-Oct-07

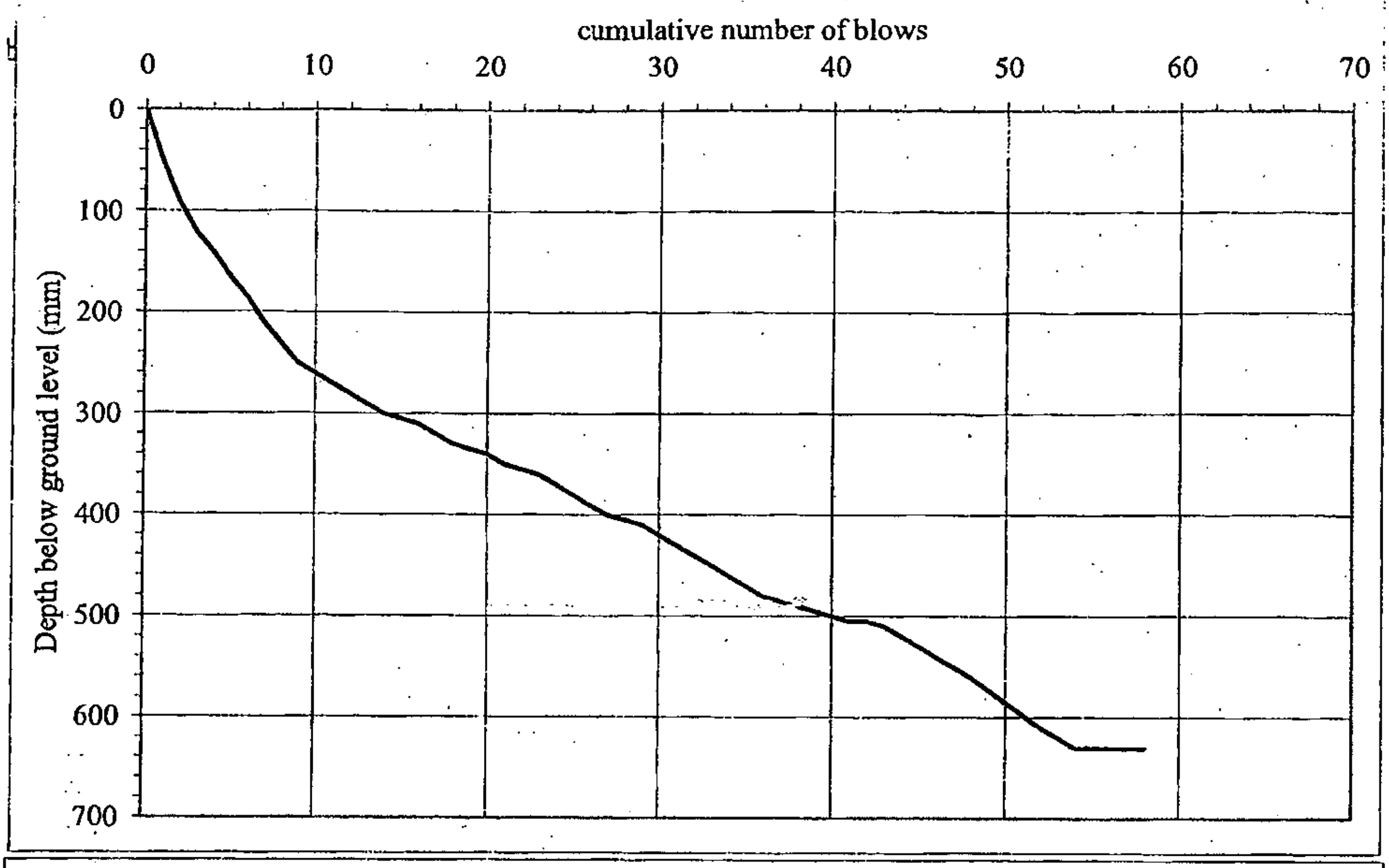


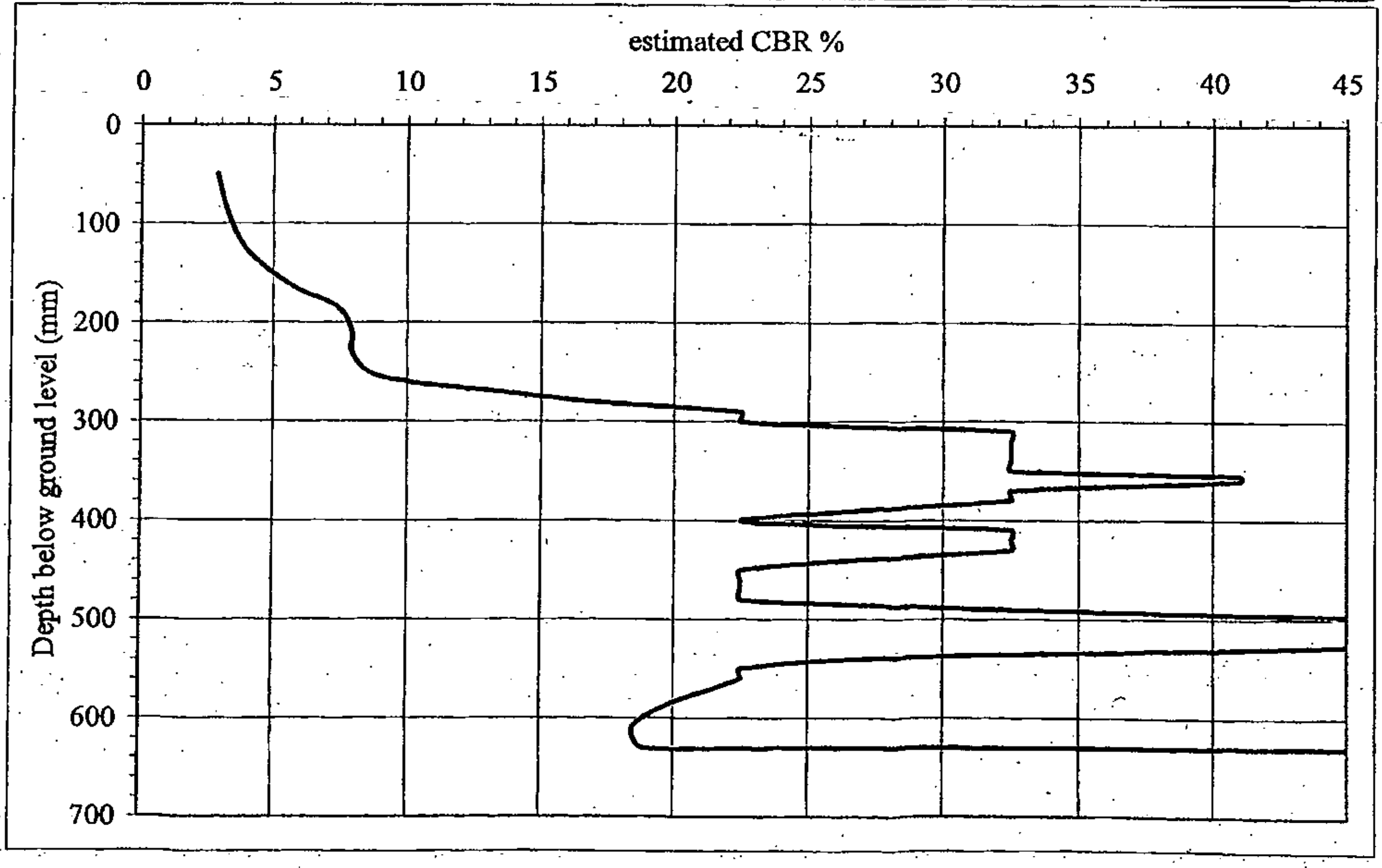


Glover Site Investigations Ltd.

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

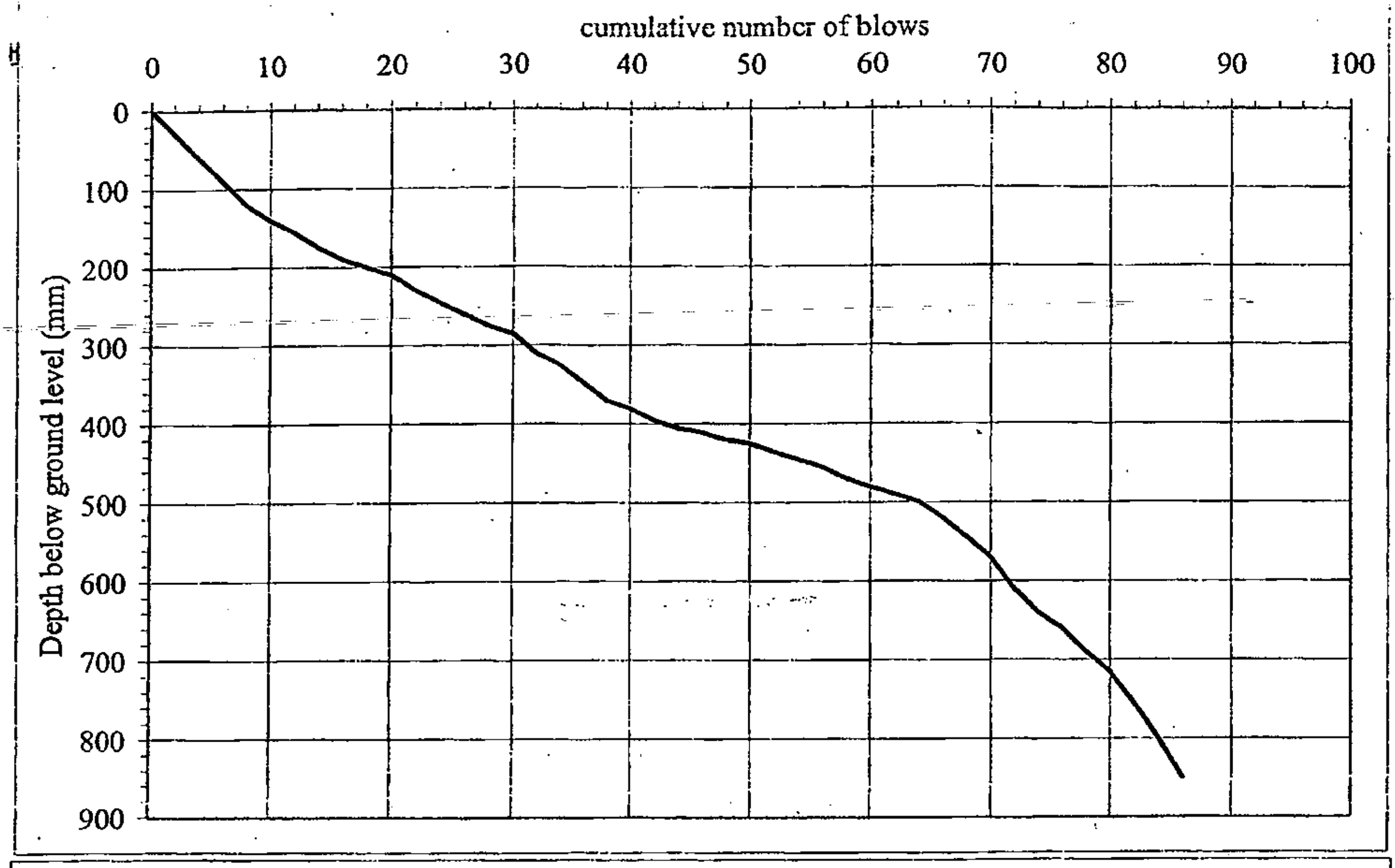
Project:	M1 Motorway Services - County Louth	**Report No:**	07-933
Test Number:	DCP 02	**Date:**	24-Oct-07

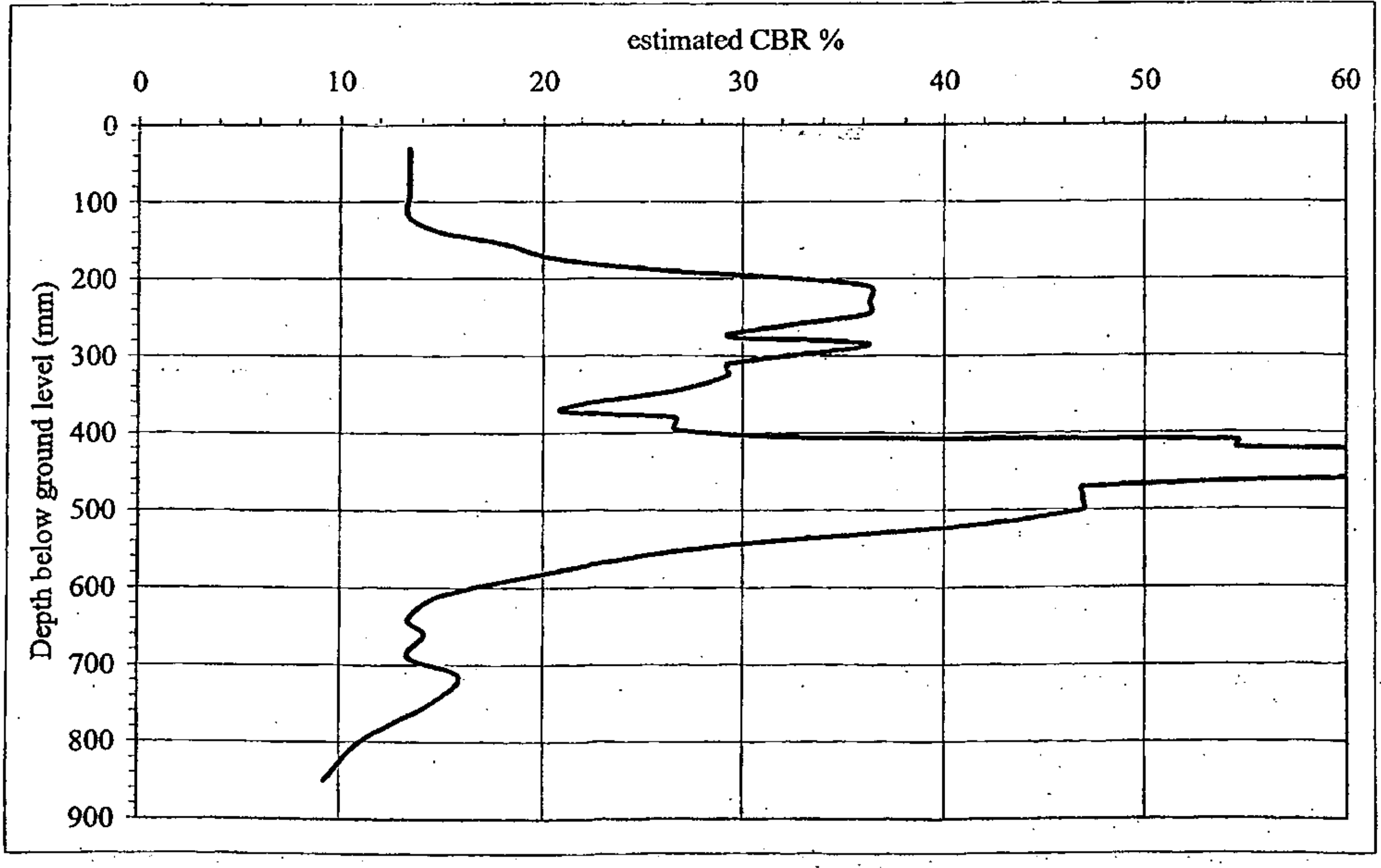




Glover Site Investigations Ltd.
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

Project:	M1 Motorway Services - County Louth	**Report No:**	07-933
Test Number:	DCP03	**Date:**	24-Oct-07

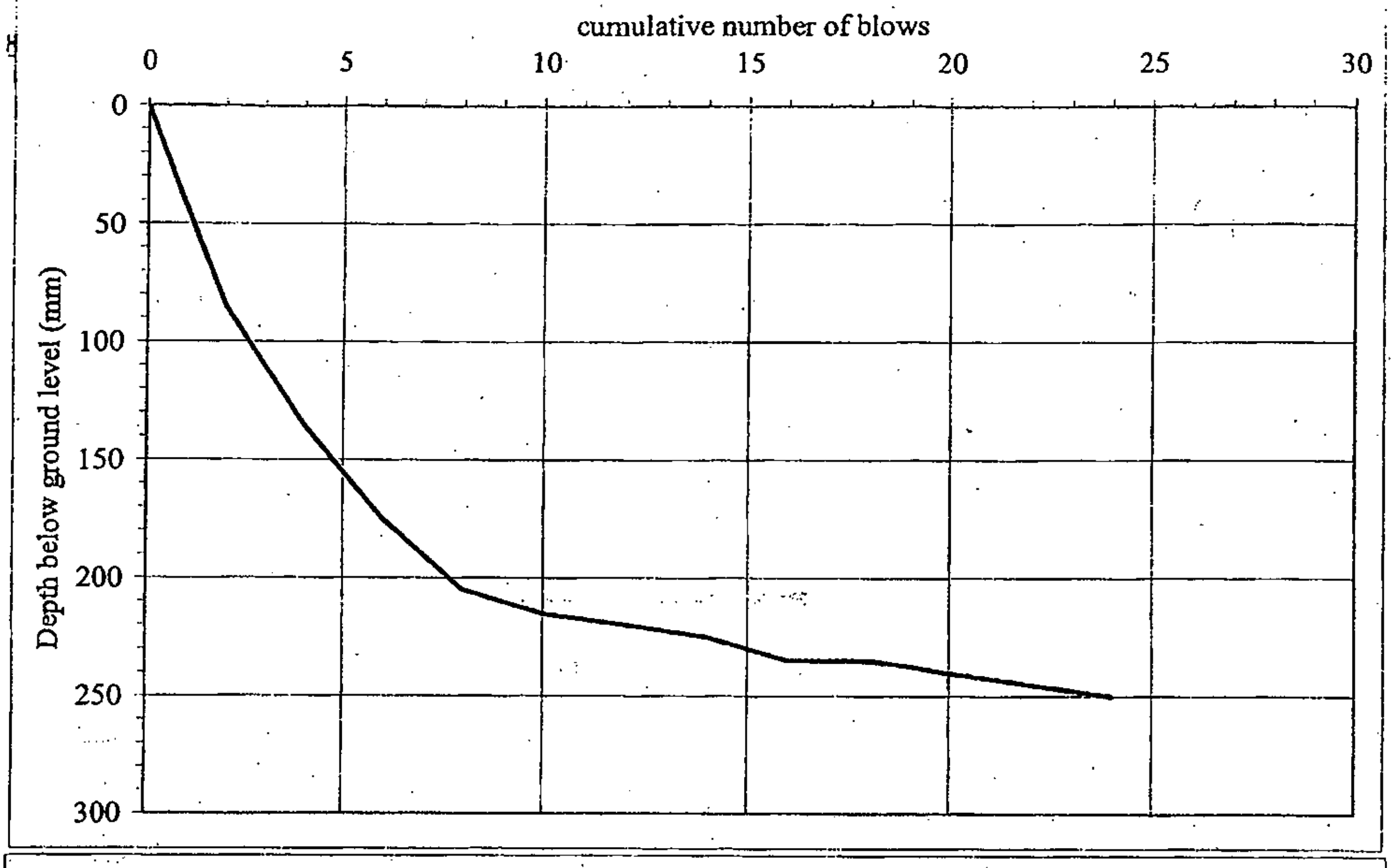


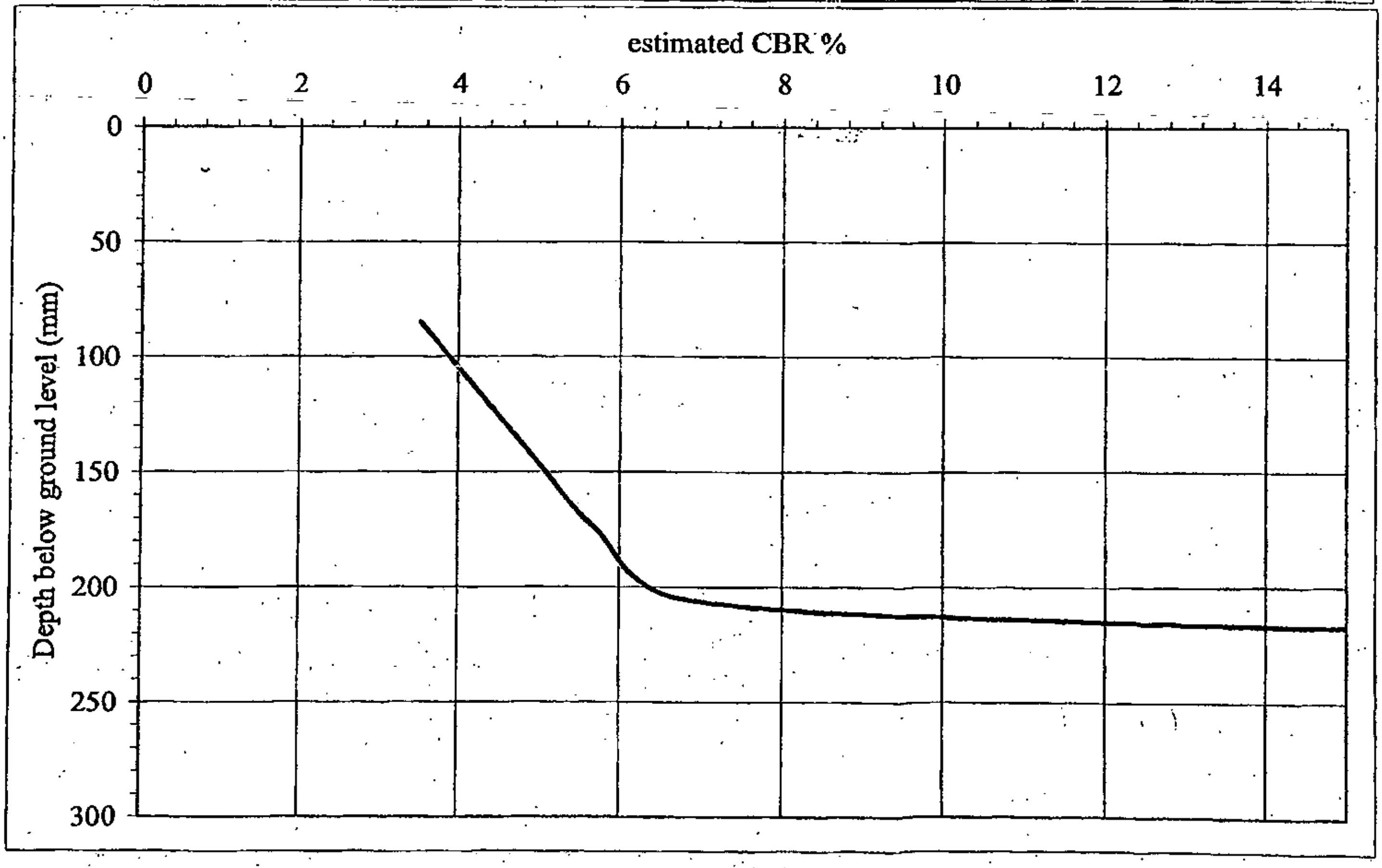


Glover Site Investigations Ltd.

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

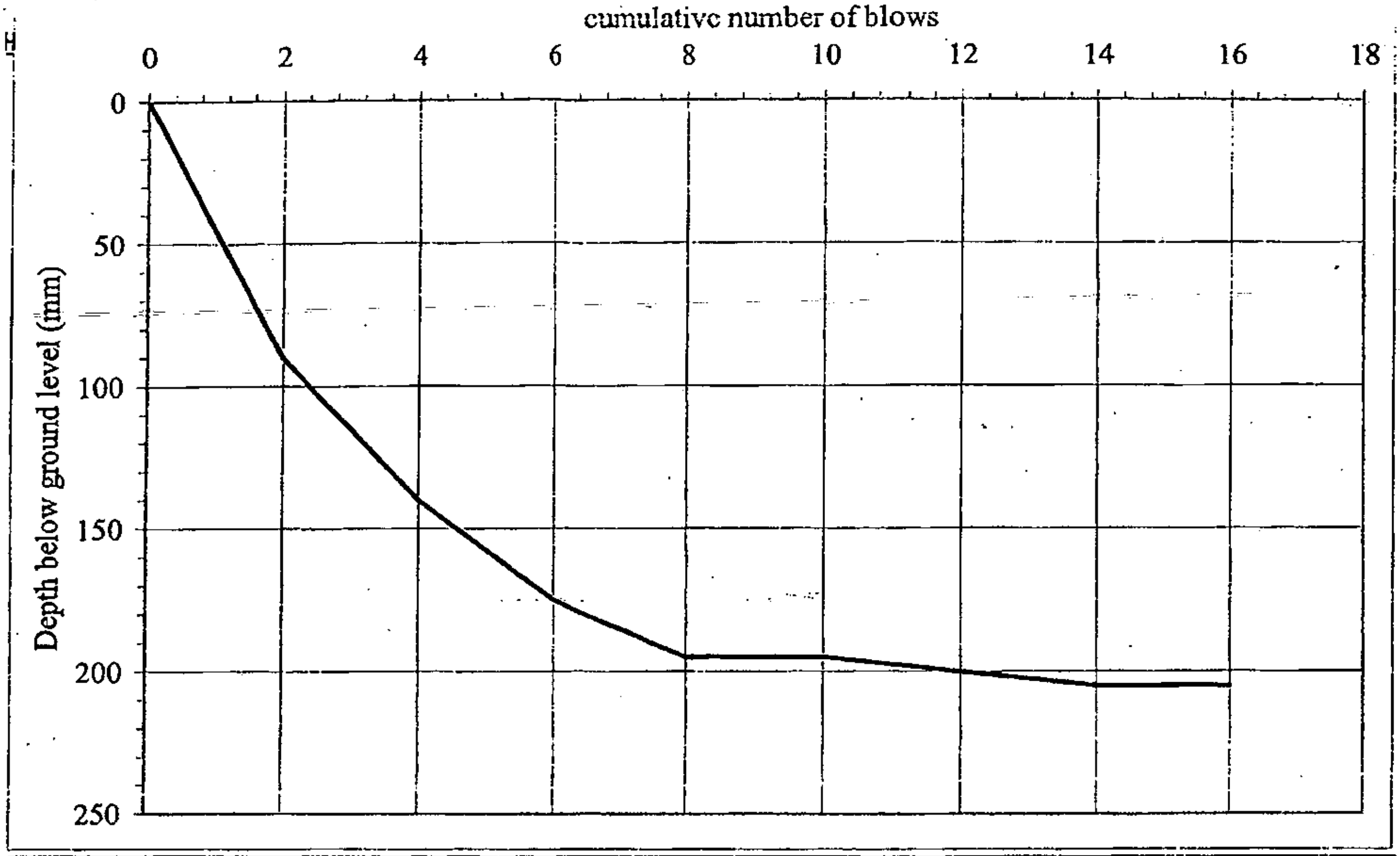
Project:	M1 Motorway Services - County Louth	**Report No:**	07-933
Test Number:	DCP 04	**Date:**	24-Oct-07

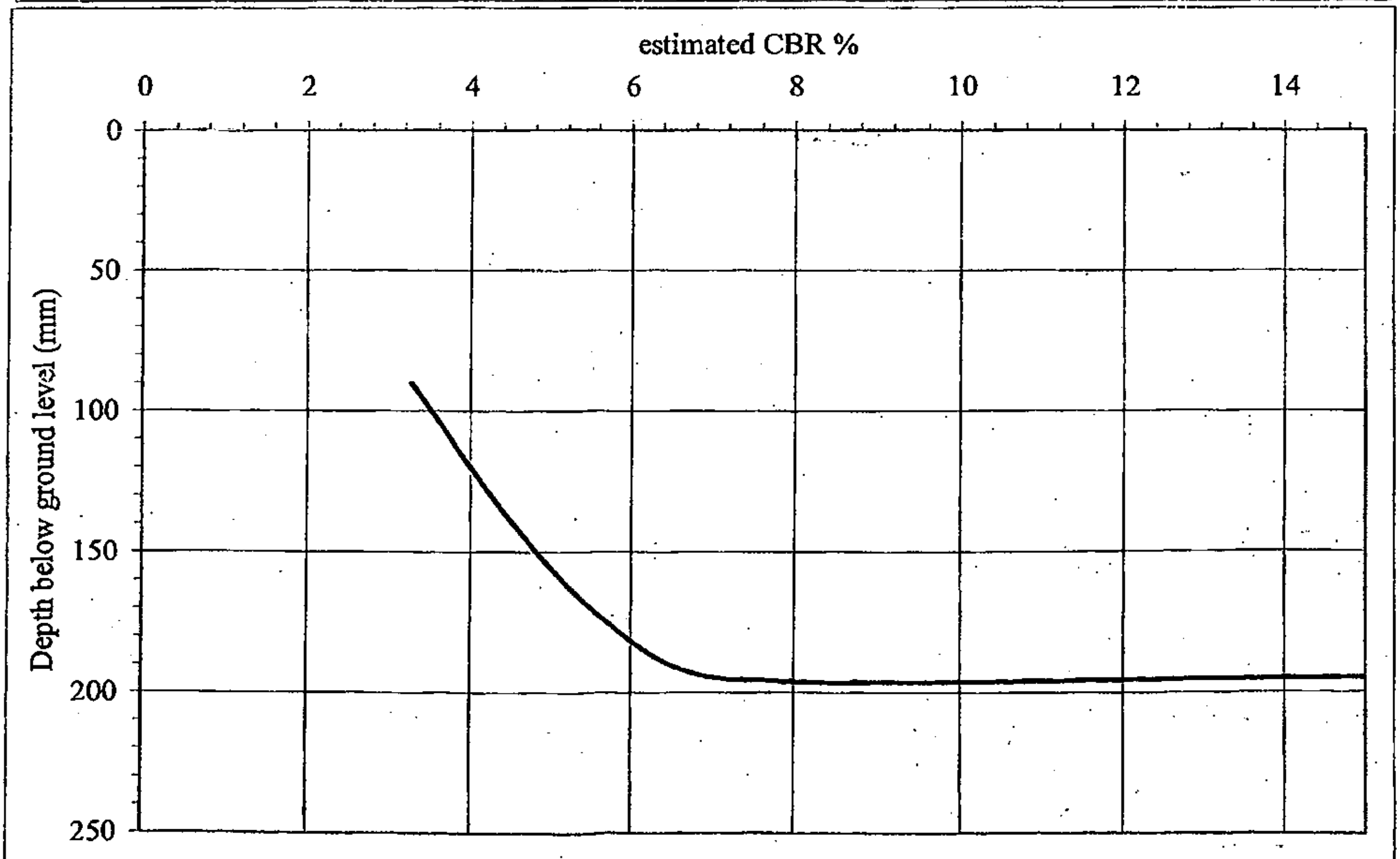




Glover Site Investigations Ltd.
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

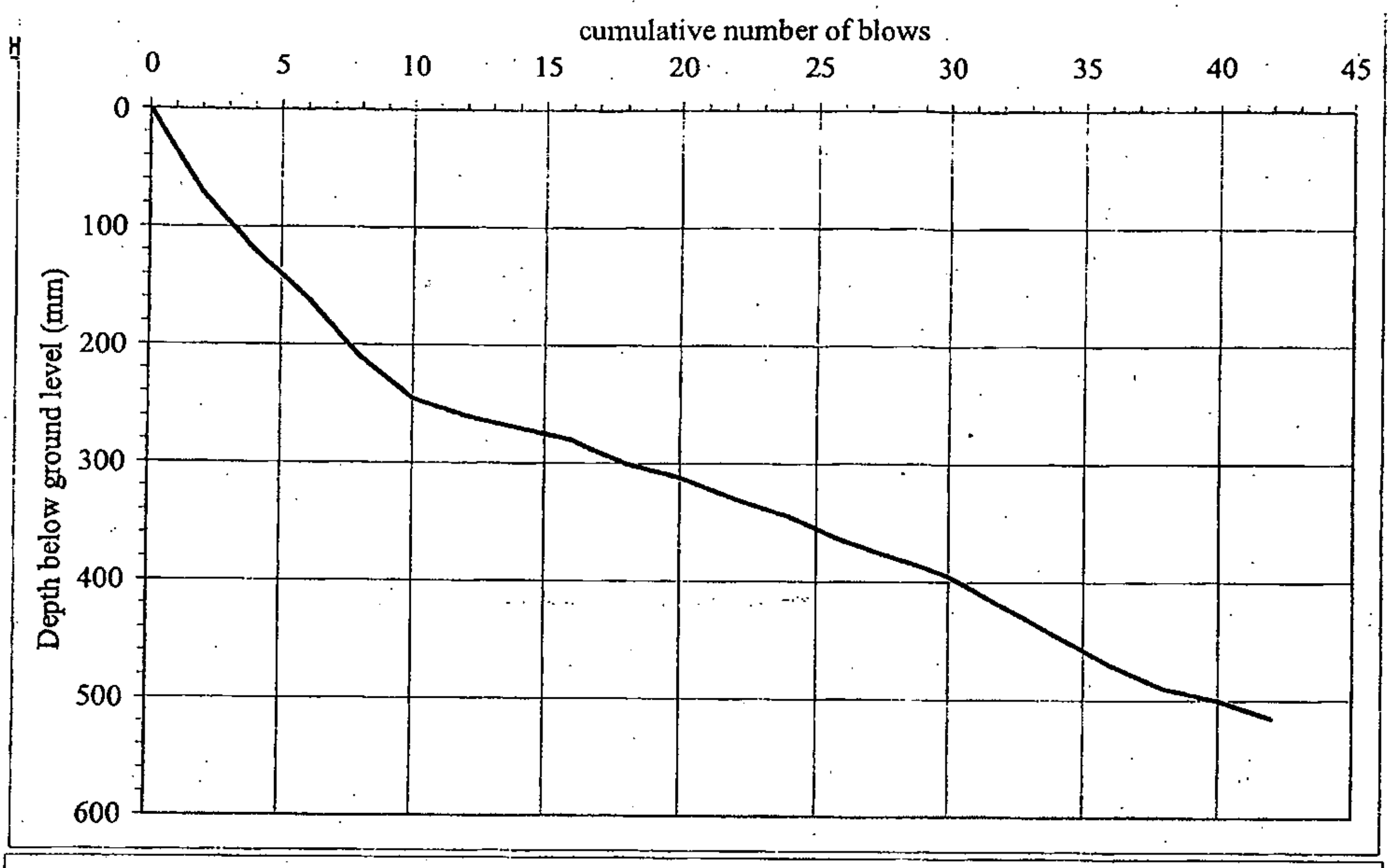
Project:	M1 Motorway Services - County Louth	**Report No:**	07-933
Test Number:	DCP 04a	**Date:**	24-Oct-07

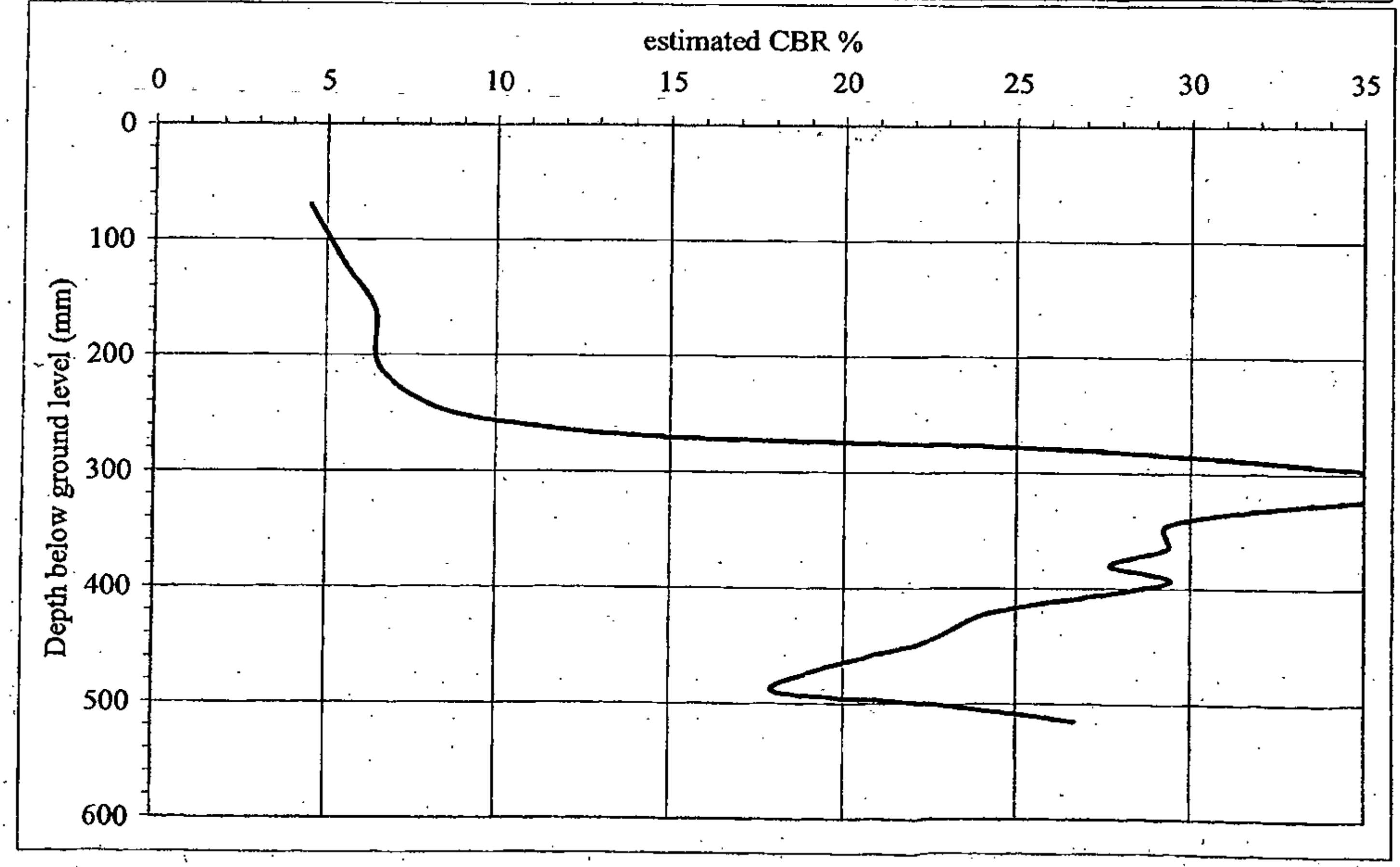




Glover Site Investigations Ltd.
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

Project:	M1 Motorway Services - County Louth	**Report No:**	07-933
Test Number:	DCP 04b	**Date:**	





Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area			Trial Pit Number: TP12
Excavation Method: 7 Tonne Tracked Excavator	Dimensions	Ground Level (mOD)	Client	Job Number: 07-933
	Location	Dates: 22/11/2007	Engineer: RPS / Roughan & O'Donovan Consulting Engineers	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
					0.40			
1.00	B1				(1.30)	Loose light brown slightly silty fine SAND		
					1.70			
					(0.10)	Loose grey slightly silty fine SAND with occasional seashells		
1.80	B2		22/11/2007:DRY		1.80			
						Trial pit terminated at 1.80m due to collapse of sides Complete at 1.80m		

Plan

Remarks

Pit sides unstable from ground level to 1.80m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP12

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP13

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
7 Tonne Tracked Excavator				07-933
	Location	**Dates**	**Engineer**	**Sheet**
		22/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
					0.40	Loose light brown slightly silty fine SAND with occasional rootlets		
1.00	B1				(1.00)			
					1.40	Loose grey slightly silty fine SAND with some seashells		
2.00	B2				(1.10)			
			22/11/2007:DRY		2.50	Trial pit terminated at 2.50m due to collapsing of sides Complete at 2.50m		

Plan

Remarks

Pit sides unstable from ground level to 2.50m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP13

Glover Site Investigations Ltd

Excavation Method 7 Tonne Tracked Excavator	**Dimensions**	**Ground Level (mOD)**	**Site** M1 North Motorway - Castlebellingham Service Area	**Trial Pit Number** TP14
	Location	**Dates** 23/11/2007	**Client**	**Job Number** 07-933
			Engineer RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
					0.40			
1.00	B1				(1.00)	Loose light brown slightly sandy fine SAND		
					1.40			
1.50	B2				(0.60)	Loose grey slightly silty fine SAND with some seashells		
			23/11/2007:DRY		2.00	Trial pit terminated at 2.00m due to collapse of sides . Complete at 2.00m		

Plan

Remarks

Pit sides unstable from ground level to 1.40m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP14

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP15

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
7 Tonne Tracked Excavator				07-933
	Location	**Dates**	**Engineer**	**Sheet**
		23/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30	Loose light brown slightly silty fine SAND and some rootlets		
0.80	B1				(0.80)			
					1.10	Loose grey slightly silty fine SAND with some seashells		
2.00	B2				(1.40)			
			23/11/2007:DRY		2.50	Trial pit terminated at 2.50m due to collapse of sides Complete at 2.50m		

Plan

Remarks

Pit sides unstable from ground level to 2.50m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP15

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area		**Trial Pit Number**	TP16
Excavation Method 7 Tonne Tracked Excavator	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 23/11/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30			
0.50	B1				(0.70)	Firm light grey CLAY with occasional rootlets		
					1.00			
2.00	B2				(2.00)	Loose grey slightly silty fine SAND with some seashells		
3.00	B3		23/11/2007:DRY		3.00			
						Trial pit terminated at 3.00m due to collapse of sides Complete at 3.00m		

Plan

Remarks

Pit sides unstable from ground level to 3.00m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP16

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area		**Trial Pit Number**	TP17
Excavation Method 7 Tonne Tracked Excavator	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number** 07-933
	Location	**Dates** 23/11/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
1.00	B1				(0.90) 1.10	Firm light grey CLAY with some rootlets		
2.00	B2		Slow Seepage(1) at 1.10m.		(1.90)	Loose grey slightly silty fine SAND with some seashells		▽1
3.00	B3		23/11/2007		3.00	Trial pit terminated at 3.00m due to collapse of sides Complete at 3.00m		

Plan

Remarks

Pit sides unstable from ground level to 2.50m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP17

Glover Site Investigations Ltd

Site	M1 North Motorway - Castlebellingham Service Area
Trial Pit Number	TP18
Excavation Method	7 Tonne Tracked Excavator
Dimensions	
Ground Level (mOD)	
Client	
Job Number	07-933
Location	
Dates	23/11/2007
Engineer	RPS / Roughan & O'Donovan Consulting Engineers
Sheet	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
0.30	B1				0.20 (0.20)	Firm light grey CLAY		
0.80	B2				0.40 (0.60)	Loose light brown slightly silty fine SAND		
2.00	B3				1.00 (1.70)	Loose grey slightly silty fine SAND with some seashells		
			23/11/2007:DRY		2.70	Trial pit terminated at 2.70m due to collapse of sides Complete at 2.70m		

Plan

Remarks

Pit sides unstable from ground level to 2.70m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP18

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP19

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
7 Tonne Tracked Excavator				07-933
	Location	**Dates** 22/11/2007	**Engineer** RPS / Roughan & O'Donovan Consulting Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30	Firm light grey CLAY with some rootlets		
0.50	B1				(0.40)			
					0.70	Loose light brown slightly silty fine SAND		
					(0.40)			
1.00	B2							
					1.10	Loose grey slightly silty fine SAND with some seashells		
					(1.40)			
2.00	B3							
					2.50			
			22/11/2007:DRY			Trial pit terminated at 2.50m due to collapse of sides Complete at 2.50m		

Plan

Remarks

Pit sides unstable from ground level to 2.50m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP19

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP20

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
7 Tonne Tracked Excavator				07-933
	Location	**Dates**	**Engineer**	**Sheet**
		22/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
0.50	B				0.30 (0.50)	Firm light grey CLAY with some rootlets		
0.90	B				0.80 (0.20)	Loose light brown slightly silty fine SAND		
1.50	B				1.00 (1.50)	Loose grey slightly silty fine SAND with some seashells		
			22/11/2007:DRY		2.50	Trial pit terminated at 2.50m due to collapse of sides Complete at 2.50m		

Plan

Remarks

Pit sides unstable from ground level to 2.50m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP20

Glover Site Investigations Ltd

Site	Trial Pit Number
M1 North Motorway - Castlebellingham Service Area	TP21

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
7 Tonne Tracked Excavator				07-933
	Location	**Dates**	**Engineer**	**Sheet**
		22/11/2007	RPS / Roughan & O'Donovan Consulting Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30 (0.30)	Firm light grey CLAY with some rootlets		
0.50	B1							
					0.60 (0.40)	Loose light brown slightly silty fine SAND		
0.70	B2							
					1.00 (1.30)	Loose grey slightly gravelly slightly silty fine SAND with some seashells. Gravel is subrounded to rounded fine to coarse		
1.50	B3							
			22/11/2007:DRY		2.30	Trial pit terminated at 2.30m due to collapse of sides Complete at 2.30m		

Plan

Remarks

Pit sides unstable from ground level to 2.30m.

Scale (approx)	Logged By	Figure No.
1:25	MA/HH	07-933.TP21

APPENDIX I

CULTURAL HERITAGE

Cultural Heritage Assessment
M1 North Service Area
Dromiskin
County Louth

Final Report

Author:	Gerard Skehan
Job No.:	1347-07-100
Client:	RPS Group
Date:	September 2007

Valerie J. Keeley Ltd.

SUMMARY

This assessment was commissioned by RPS Group on behalf of the NRA to provide a general background narrative on the archaeology, history and landscape of the lands affected by the proposed M1 North Service Area directly west of the village of Dromiskin in County Louth.

The development comprises two separate areas of land on either side of the M1 – The proposed development to the west of the M1 makes no impact on known sites of cultural heritage. The proposed development on the east side of the M1 makes an indirect impact on the site of a crannóg, and a direct impact on an area of bogland where a fragment of a bronze vessel was discovered in the early 80s. This site is also located approximately 1km west of an early medieval monastic site in the village of Dromiskin.

The parcel of land on the west side of the M1 is of limited archaeological potential. However, the parcel of land on the east side of the M1 is of high archaeological potential in the wetland areas surrounding the crannóg in the south and southwest areas of the site.

A full list of mitigation measures has been provided below.

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3.0 EXITSTING ENVIRONMENT	4
4.0 OPERATIONAL IMPACTS	6
5.0 CONSTRUCTION IMPACTS	6
6.0 RESIDUAL IMPACTS	9

APPENDIX A – CATALOGUE OF FINDS FROM NATIONAL MUSUEM TOPOGRAPHICAL FILES

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Figure 1: Proposed service area sites showing archaeological site and area of archaeological potential

List of Plates

Plate 1: looking northeast to site of crannog, A1 and surrounding bogland, AP1. Raised, probably reclaimed, area in foreground marks boundary of proposed development.

Plate 2: looking south across study area with bogland, Site AP1, in the background.

1.0 INTRODUCTION

This assessment was commissioned by RPS Group on behalf of the NRA to provide a general background narrative on the archaeology, history and landscape of the lands affected by the proposed M1 North Service Area directly west of the village of Dromiskin in County Louth.

RPS Group proposes to construct a Service Area comprising parking, restaurant, shop and toilets off the M1 near the village of Dromiskin, County Louth. The development comprises two separate areas of land on either side of the M1 – The proposed development to the west of the M1 makes no impact on known sites of cultural heritage. The proposed development on the east side of the M1 makes an indirect impact on the site of a crannóg, and a direct impact on an area of bogland where a fragment of a bronze vessel was discovered in the early 80s. This site is also located directly west of an early medieval monastic site in the village of Dromiskin

The parcel of land on the west side of the M1 is of limited archaeological potential. However, the parcel of land on the east side of the M1 is of high archaeological potential in the wetland areas surrounding the Crannóg in the south and southwest areas of the site.

A full list of mitigation measures has been provided below.

The information regarding the nature of the development contained in this report is based on information and cartographic material provided by RPS Group.

2.0 METHODOLOGY

An archaeological desk-based study of existing archaeological records and other potentially relevant literary and cartographic sources was undertaken. A list of all consulted sources is provided in bibliographic form.

2.1 Paper Survey

A thorough search of existing archaeological records, related documentation and cartographic sources was conducted in order to identify all known archaeological, architectural heritage and industrial archaeological sites within the study area that may be impacted by the proposed development. Sources consulted include the Record of Monuments and Places (RMP) /Sites and Monuments Record (SMR), Ordnance Survey 6" Maps, the National Museum of Ireland's topographical files, the County Development Plan, relevant literary sources, the annual *Excavations* bulletin and earlier cartographic material including the Down Survey and aerial photography.

2.1.2 Sources Consulted

Record of Monuments & Places

The Record of Monuments & Places (RMP) is a list of archaeological sites known to the National Monuments Service, Department of the Environment, Heritage and Local Government, with accompanying RMP Maps, based on OS 6" Sheets, which indicate the location of each recorded site. This RMP list is based on the earlier Sites and Monuments Record (SMR) files housed in the National Monuments Services offices. The SMR was derived from cartographic, documentary and aerial photographic sources, revised through fieldwork and forms the basis of the statutory RMP. The record is updated on a constant basis and focuses on monuments that predate AD1700.

National Museum of Ireland's Topographical Files

The National Museum of Ireland's topographical files are the national archive of all known antiquities recorded by the National Museum. These files relate primarily to artefacts but also include references to monuments and also contain a unique archive of records of previous archaeological excavations. The Museum's files present an accurate catalogue of objects reported to that institution from 1928. There is a

computerised database of finds from the 1980's onwards. The find-spots of artefacts can also be an important indication of the archaeological potential of the related or surrounding area.

National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is an ongoing survey within the Department of the Environment, Heritage and Local Government. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from AD1700 to the present day and includes vernacular and country houses, churches, mills, bridges and other buildings of note. The NIAH for Louth has not been published yet.

Louth County Development Plan

Each county's Development Plan is compiled in accordance with the requirements of the Local Government (Planning and Development) Acts (1963-2000) and is an important source for identifying protected sites and structures. The majority of sites recorded in the Register of Historic Monuments are generally listed for protection in the County Development Plan. The 2000 Local Government (Planning & Development) Act introduced a range of new measures for the protection of architectural heritage, including a Record of Protected Structures; a list of buildings which may not be materially altered or demolished without grant of permission under the Act.

Literary Sources

These are a valuable means of completing the written archaeological and architectural record of an area and gaining insight into the history of the receiving environment. The principal sources consulted are listed in the bibliography.

Cartographic Sources

A wide range of maps were consulted, a full list of which is provided in the bibliography. Information gathered from cartographic sources is fundamental to the identification of archaeological sites, many of which are now located based on cartographic records alone. For example, the earliest Ordnance Survey maps date to the late 1830's and early 1840's. Across the country much change has occurred in the use

and the treatment of the landscape in the intervening years, with the destruction rate increasing rapidly during the second half of the 20th century. This information is equally important to the identification of architectural and industrial archaeological sites, particularly the former; sometimes the large and extensive associated demesnes and/or gardens are no longer defined and are now in use as agricultural land.

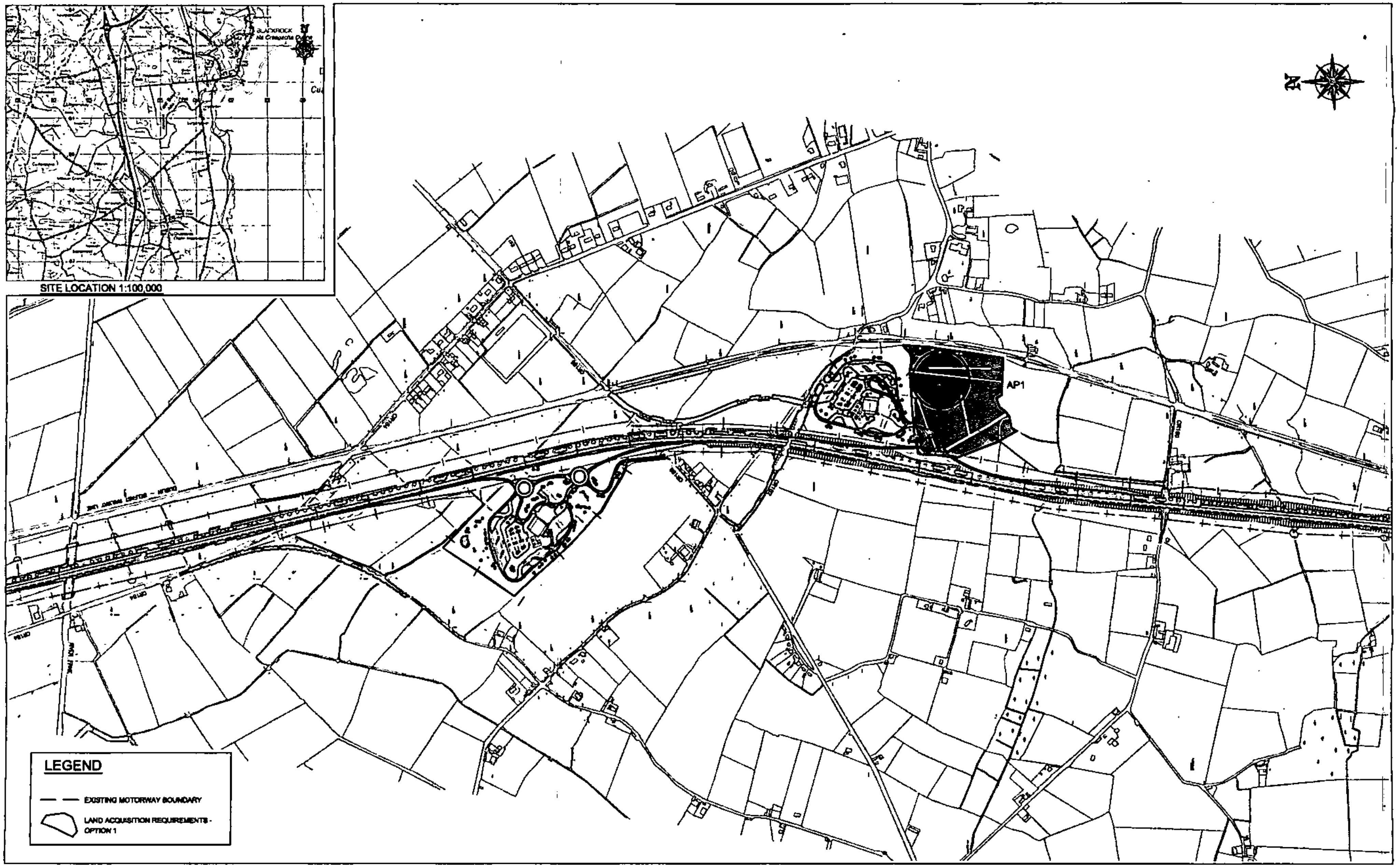
2.2 Site Inspection

Site inspection offers the opportunity to observe the landscape/ streetscape of the study area. This is essential in determining the nature and extent of the surviving aboveground evidence and in projecting the potential impact of the proposed development. Field walking offers the opportunity of observations on the topography/ Inspection offers the opportunity of observations on the building environment, which often leads to the discovery of hitherto unrecorded sites. The aim of this site inspection was threefold: to examine known sites within the study area, to identify any previously unknown sites and areas of archaeological potential through topographical evidence, and to highlight any structures of architectural merit. The site inspection took place on 30h of August 2005 in clear weather. It involved walking the entire area of the proposed development and photographs were also taken.

3.0 EXISTING ENVIRONMENT

3.1 Archaeological and Historical Overview

The village of Dromiskin is situated c. 10km of Dundalk in County Louth. This is the site of a monastery founded in the late 5th or early 6th century by Lughaidh, a disciple of St. Patrick. St. Ronan, a victim of the great plague of 664 later became its patron and in 801 his relics were placed in a richly decorated shrine. In the 10th and 11th century the monastery was plundered by both Irish and Viking armies. The round Tower, the monastery's bell-tower, is now relatively short and squat, but it was originally much taller. The conical roof and two rectangular windows below it were added in 1879. Its doorway is a fine example of the round-arched *Romanesque* style which was popular in the 12th century. The ruined church close by may date from the 13th century, but its present east window was inserted in the 15th century. The head of a 10th century High Cross was re-erected in 1918 on a granite base and shaft to the east of the Round Tower. The cross was carved will illustration of stories from the bible, but these cannot now be identified.



Title	Notes		Job/Exc No.	Compiled by	CAD reference	Client
Proposed Service Area Sites Showing Archaeological Site and Area of Archaeological Potential	●	Archaeological Site	1347-07-100	BK	Tera\Survey\1347	RPS Consulting Engineers
	⬟	Area of Archaeological Potential	Date: 03/12/07	Scale: 1:10000	Drawing No.: FIG 1 Rev A	Project: M1 Service Area North

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3.2 Specific Archaeological Features

A crannóg site, Site A1, in the townland of Whiterath, is partially within the landtake of the proposed development but will not be directly affected. Site A1's confines, as outlined by the DoEHLG, is located 42m south of the proposed works. No evidence of the crannóg was visible during the field inspection, but it is heavily overgrown and inaccessible. Records state that the last time traces of the crannóg were visible was during a dry summer in 1976 when some stakes could be seen protruding from the bog.

A crannóg is a defensive habitation site constructed on a natural or artificial island in a lake, river, or marshy area. They were usually constructed by building up layers of wood and /or stone to form a raised platform which is higher than the surrounding water or bog. The majority of these sites have been dated to the early medieval period.

3.3 Specific Architectural Features

No site of architectural heritage was noted during the field inspection. A 19th century railway bridge, heavily altered in the past 10 years, is located outside the confines of the proposed development, northwest of Site A1.

3.4 Specific Areas of Potential

The bogland area, known locally as the Red Bog, was identified during the field inspection and paper study as an area of potential, Site AP1. Parts of the Red Bog will be directly affected and it is proposed to construct a roundabout in the northwestern corner of it. A fragment of sheet bronze was discovered in the Red Bog in 1984 and donated to the National Museum.

Lowlying boggy and marshy areas are considered archaeologically sensitive; potential wetland sites can vary from trackways, platforms and bridges, to fishweirs and *fulachta fiadh*. The site of a crannog and the discovery of a fragment of sheet bronze indicate the use of this wetland area in the past. Anaerobic conditions can lead to high quality preservation of organic remains, such as wooden structures, palaeoenvironmental material, human and animal remains and artefacts of organic material, including cloth and manuscripts. Wetland margins are also of high archaeological potential, however the boundaries of these areas are likely to have changed over time. It is likely that some of the land directly north of site A1 was reclaimed and the Red Bog was originally more extensive.

4.0 OPERATIONAL IMPACTS

An operation impact is an impact which would result from long-term operation of a project and negatively affect the setting of sites of archaeological and/ or architectural heritage.

There will be no operational impacts with relation to cultural heritage.

4.1 Operational Mitigation Measures

No ameliorative measures apply

5.0 CONSTRUCTION IMPACTS

A construction impact is an impact where disturbance and potential damage to unknown subsurface remains or the removal and/or damage to known surface or subsurface remains may occur.

A number of potential sites which may be impacted during the construction phase have been outlined below.

Archaeological Sites

Site	Site Type	Description	Impact	Recommendation
A1	Crannóg	Site of a crannóg, originally noted by General Stubbs in 1889. No visible surface remains surviving today	Indirect	Avoidance/ test-trenching of vicinity

Areas of Potential

Site	Site Type	Description	Impact	Recommendation
AP1	Bogland	Marshy ground known locally as the Red Bog. Site of Crannóg and possible early medieval find spot.	Direct	Avoidance/ test-trenching

5.1 Construction Mitigation Measures

The aim of the assessment has been to identify the potential impact of the proposed development on the archaeology located within or in proximity to the site. Where it is not possible to avoid impacting on the archaeological sites identified, mitigation measures have been provided to reduce the impact. Mitigation measures, both at pre-construction and construction phases, shall be undertaken in compliance with national policy guidelines and statutory provisions for the protection of the archaeological and cultural heritage, including:

National Monuments Acts 1930-2004

Architectural Heritage Protection, Guidelines for Planning Authorities (Draft 2001). Department of Arts, Heritage, Gaeltacht & the Islands

Framework & Principles for the Protection of the Archaeological Heritage (1999). Department of Arts, Heritage, Gaeltacht & the Islands

Policy & Guidelines on Archaeological Excavation (1999). Department of Arts, Heritage, Gaeltacht & the Islands

Mitigation Proposals

This report recommends that any work undertaken within the proposed development avoid direct impacts with the identified elements of the known archaeological landscape. Should this not be possible, a series of mitigation measures has been offered in order to reduce any such impact. These recommendations include pre-construction and during construction measures.

Recommendations and Mitigation Measures – Prior to Construction

It is recommended that the following measures be undertaken in advance of the construction phase. This is aimed at allowing a satisfactory time frame in which the mitigation measures can be conducted and the results assessed without causing delays to the construction program.

Avoidance

It is firstly recommended that all known sites of cultural heritage within the footprint of the development, including sites A1 and AP1, be avoided. The project design has managed to avoid impact with recorded monument A1, but complete avoidance of the area of potential, AP1, was not possible. Where avoidance is not possible, a full set of mitigation measures have been provided below.

Controlled Test Trenching

It is recommended that development be preceded by archaeological investigative excavation at **AP1** and in the vicinity of site **A1**, where they are directly affected by ground works associated with the development. Should any features or material of archaeological significance be uncovered, further mitigation measures should be provided prior to the construction phase.

Recommendations and Mitigation Measures – During Construction

Mitigation measures at construction phase shall be undertaken in compliance with national policy guidance and statuary provisions for the protection of the archaeological and cultural heritage.

Archaeological Monitoring

Archaeological monitoring shall be undertaken during the ground works phase of the development. This will include any associated earthworks and drainage works, where and as required by the Statutory Authority. There would be a provision for preservation *(in situ)* or preservation by record of any archaeologically significant material that was uncovered at this time.

Discovery of Archaeological Material

In the event of archaeological features or material being uncovered during the construction phase, the machine work shall cease in the immediate area to allow the archaeologist to inspect any such material. Initial assessment will determine the nature, extent and significance of the archaeology present. As a result of the assessment, decisions on the most appropriate mitigation strategy will be taken with the approval of the DoEHLG. The discovery of any archaeological object will be reported to the Director of the National Museum of Ireland or the Garda Síochána within 96 hours of discovery (Section 23 of the National Monuments Acts 1930 (as amended)).

Preservation in situ

Strategies for the preservation *in situ* of archaeological remains as described above should be considered on a case-by-case basis, in consultation with the Statutory Authority.

Construction Works

The positioning of temporary site offices, access roads, haul roads, spoil heaps and borrow pits shall take into account the location of identified sites and areas of archaeological potential.

PLEASE NOTE: All of the above recommendations are based on the maps provided by the client (RPS Group) at the time of writing. Should any alterations be made to these plans further assessment may be necessary.

PLEASE NOTE: Recommendations are subject to approval by The Department of the Environment, Heritage and Local Government.

Mitigation measures, both at pre-construction and construction phases, are required to be undertaken in compliance with national policy guidance and statutory provisions for the protection of the archaeological heritage, including: *National Monuments Acts 1930-2000*

Should it be established that archaeological potential does exist at this location further specific recommendations and ameliorative measures will be made. The implementation of these recommendations must be conducted well in advance of the construction phase.

6.0 RESIDUAL IMPACTS

A residual impact is the degree of the environmental change that will occur after the proposed mitigation measures have taken effect.

There will be no residual impacts with relation to cultural heritage.

6.1 Residual Mitigation Measures

No ameliorative measures apply

APPENDIX A - CATALOGUE OF FINDS FROM NATIONAL MUSEUM TOPOGRAPHICAL FILES

Catalogue of Artefacts Discovered in Affected Townlands taken from National Museum of Ireland Topographical Files

Reg Number	Find	Acquired	Description
1984:126	Fragment of sheet bronze	Gift of Mr. Michael McKeown	Bogland discovery near site of Crannóg. Discovered in 1984

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Plate 1: looking northeast to site of crannóg, A1 and surrounding bogland, AP1. Raised, probably reclaimed, area in foreground marks boundary of proposed development.

Plate 2: looking south across study area with bogland, Site AP1, in the background.

NRA
National Roads Authority
An tÚdarás um Bóithre Náisiúnta

St. Martin's House / Waterloo Road / Dublin 4
Tel: +353 1 660 2511 / Fax: +353 1 668 0009

Date	19th March 2008	Our Ref.	Your Ref.

M1 North Service Area Scheme 2008

To: An Taisce
of: Tailor's Hall
Back Lane
Dublin 8

1. The National Roads Authority (the Authority), has applied under section 51(2) (as amended by section 9(1)(e)(i) of the Roads Act, 2007) to An Bord Pleanála ('the Board') for approval in relation to a proposed road development consisting of the proposed provision of motorway service area facilities on both the northbound and southbound carriageways of the existing M1, approximately 2.5km north of the Castlebellingham junction and approximately 5km south of the Dundalk (South) junction. Access to and from the facility will be directly off the M1 motorway. The facility is being provided in the townland of Whiterath in County Louth.

The Scheme consists of the provision of service area facilities located in areas of approximately 9.3 Ha on the east of the M1 motorway and 10.3 Ha on the west side, and as listed below:

On each side of the motorway it is proposed to provide:

- Fuel storage and dispensing facilities for both cars and heavy commercial vehicles;
- A service building including:
  - Fuel payment and shop facilities
  - Restaurant facilities
  - Toilet facilities
  - Showers
  - Baby changing room
  - Indoor childrens' play areas
  - Travel / tourist information booth
  - ATM
- Parking for cars, heavy goods vehicles and coaches

- Picnic area
- Outdoor children's play area
- Slip roads on and off the motorway together with circulatory roads within the service areas
- Access points for employees from the CR182 local road to the eastern facility, and from the CR185 local road for the western facility
- Layby for use by agencies enforcing road traffic legislation
- Associated ancillary works, including foul and surface water drainage, water supply.

and has submitted to the Board the environmental impact statement prepared in accordance with section 50 (as amended by section 9(1)(d) of the Roads Act, 2007) in respect of the proposed road development.

2. A copy of the environmental impact statement is enclosed.

3. Submissions may be made in writing to the Board at 64 Marlborough Street, Dublin 1 in relation to the likely effects on the environment of the proposed road development between Wednesday 19th March 2008 and Wednesday 7th May 2008.