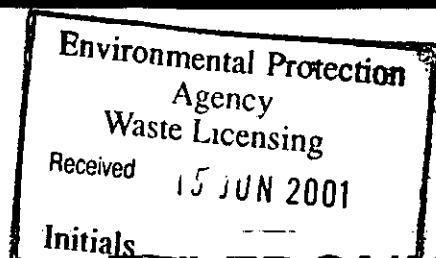


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# KTK SAND & GRAVEL LTD.



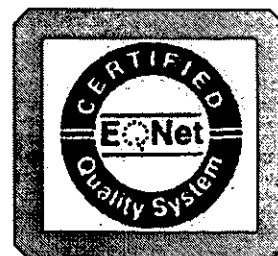
## ENVIRONMENTAL IMPACT STATEMENT VOLUME I TEXT

FOR A  
PROPOSED LANDFILL  
AT

BALLYMORE EUSTACE, CO. KILDARE.



JUNE 2001



# **VOLUME 1**

**KTK Sand and Gravel Ltd.  
Environmental Impact Statement (EIS)  
For a Proposed Landfill at  
Ballymore Eustace, Co. Kildare**

**Table of Contents**

**NON TECHNICAL SUMMARY**

**7 pages**

- 1. General**
- 2. Master Plan for the Company's Landholdings**
- 3. Description of the Proposed Development**
- 4. The Existing Environment**
- 5. Environmental Monitoring**

- Table 1 Proposed Facility Statistics**  
**Table 2 Potential impacts of the proposed facility**  
**Table 3 Mitigation measures and likely significant impacts**  
**Table 4 Environmental Monitoring**

- Figure 1 Regional Setting**  
**Figure 2 Landholding as of March 2000**  
**Figure 3 Application Site Boundary**  
**Figure 4 Overview of facility**  
**Figure 5 Proposed Monitoring Locations**

## **MAIN TEXT**

- 1 INTRODUCTION** **9 pages**
  - 1.1 Master Plan for the Company's Landholding**
  - 1.2 Overview of Restoration Plan for Western Part of the landholding**
  - 1.3 Requirement for an Environmental Impact Statement**
  - 1.4 The Applicants**
  - ~~**1.5 Need**~~
  - 1.6 Alternatives**
  - 1.7 Structure of the EIS**
  - 1.8 Contributors To The EIS**
- 2 THE PROPOSED FACILITY** **41 pages**
  - 2.1 The Application Site**
  - 2.2 The Proposed Facility**
  - 2.3 Waste Types and Quantities**
    - 2.3.1 Quantities**
    - 2.3.2 Nature of Materials**
  - 2.4 Proposed Site Infrastructure**
    - 2.4.1 Site Security**
    - 2.4.2 Site Roads**
    - 2.4.3 Hard-Standing Areas**
    - 2.4.4 Weighbridge**
    - 2.4.5 Wheelwash**
    - 2.4.6 Laboratory Facilities**
    - 2.4.7 Fuel Storage Areas**
    - 2.4.8 Waste Quarantine Areas**
    - 2.4.9 Waste Inspection Areas**
    - 2.4.10 Traffic and Traffic Control**
    - 2.4.11 Services**
    - 2.4.12 Sewerage and surface water drainage infrastructure**
    - 2.4.13 Plant sheds, garages and equipment compound**



- 2.4.14** Site Accomodation
- 2.4.15** Fire Control System

## **2.5 Engineered Design**

- 2.5.1** Overview of Design
- 2.5.2** Landfill Infrastructure
- 2.5.3** Void Space of Landfill
- 2.5.4** Landfill Phasing and Construction
- 2.5.5** Time Scales for Landfill Development and Completion
- 2.5.6** Liner System Details
  - 2.5.6.1** Design Concept
  - 2.5.6.2** Liner Specifications
  - 2.5.6.3** Method Statement for Construction
  - 2.5.6.4** Safety Statement for Construction
  - 2.5.6.5** Quality Control and Assurance Plans
  - 2.5.6.6** Leak Detection Survey
  - 2.5.6.7** Access Ramps to Lined Cells
- 2.5.7** Leachate Management Arrangements
  - 2.5.7.1** Leachate Management Plan
  - 2.5.7.2** Annual Quantities of Leachate
  - 2.5.7.3** Leachate Emissions
- 2.5.8** Landfill Gas Management
  - 2.5.8.1** Introduction
  - 2.5.8.2** Landfill Gas Volumes
  - 2.5.8.3** Landfill Gas Composition
  - 2.5.8.4** Landfill Gas Management Plan
  - 2.5.8.5** Risk Assessment
- 2.5.9** Landfill Capping System
  - 2.5.9.1** Capping System
  - 2.5.9.2** Specifications of Capping Materials
  - 2.5.9.3** Landfill Stability and Settlement
  - 2.5.9.4** Daily and Intermediate Cover
  - 2.5.9.5** Temporary Capping
- 2.5.10** Surface Water Management Arrangements

## **2.6 Facility Operations**

- 2.6.1** Operating Times
- 2.6.2** Personnel
- 2.6.3** Waste Acceptance Procedures
- 2.6.4** Landfill Operations
  - 2.6.4.1** Plant and Equipment
  - 2.6.4.2** Waste Handling
- 2.6.5** Landfill Construction

## **2.7 Environmental Nuisance Controls**

- 2.7.1** Aerosol Control
- 2.7.2** Bird Control
- 2.7.3** Dust Control
- 2.7.4** Fire Control
- 2.7.5** Litter Control
- 2.7.6** Odour Control
- 2.7.7** Road Cleansing
- 2.7.8** Traffic Control
- 2.7.9** Vermin Control

## **2.8 Restoration and Aftercare**

- 2.8.1** Restoration Plan
- 2.8.2** Proposed Contours
- 2.8.3** Restoration Layers
- 2.8.4** Landscaping Plan

## **2.9 Contingency Arrangements**

- 2.9.1** Fire Fighting Procedures
- 2.9.2** Contingency arrangements in case of breakdown or emergency situations
- 2.9.3** Contingency arrangements in case of contamination of air, surface water, groundwater or other environmental media.
- 2.9.4** Emergency contact numbers for staff with responsibility for the site

## **2.10 References**

# **3 THE EXISTING ENVIRONMENT**

**102 pages**

## **3.1 Air**

- 3.1.1** Existing Environment
- 3.1.2** Potential Emissions
  - 3.1.2.1** Construction
  - 3.1.2.2** Operation
- 3.1.3** Description of Likely Impacts
- 3.1.4** Mitigation Measures
- 3.1.5** Likely Significant Impacts

## **3.2 Climate**

- 3.2.1** Existing Environment
- 3.2.2** Potential Emissions
  - 3.2.2.1** Construction
  - 3.2.2.2** Operation
- 3.2.3** Description of Likely Impacts
- 3.2.4** Mitigation Measures

### **3.2.5 Likely Significant Impacts**

## **3.3 Cultural Heritage**

### **3.3.1 Existing Environment**

#### **3.3.1.1 Baseline Survey**

#### **3.3.1.2 Archaeological and Historical Background**

##### **3.3.1.2.1 Prehistory (c. 4000 BC – AD 500)**

##### **3.3.1.2.2 Medieval Period (c. AD 500- 1550)**

##### **3.3.1.2.3 The Late Medieval – Modern Period (AD c. 1550-1900)**

#### **3.3.1.3 Field Walking Survey**

### **3.3.2 Potential Emissions**

### **3.3.3 Description of Likely Impacts**

### **3.3.4 Mitigation Measures**

### **3.3.5 Likely Significant Impacts**

### **3.3.6 Bibliography**

## **3.4 Flora and Fauna**

### **3.4.1 Existing Environment**

#### **3.4.1.1 Methods**

#### **3.4.1.2 Habitats and Flora**

#### **3.4.1.3 Fauna**

#### **3.4.1.4 Aquatic Environment**

### **3.4.2 Description of Likely Impacts**

#### **3.4.2.1 Direct Impacts**

#### **3.4.2.2 Indirect Impacts**

#### **3.4.2.3 Residual Impacts**

### **3.4.3 Mitigation Measures**

#### **3.4.3.1 Mitigation by Avoidance**

#### **3.4.3.2 Mitigation by Remedy**

### **3.4.4 Likely Significant Impacts**

### **3.4.5 References**

## **3.5 Human Beings**

### **3.5.1 Introduction**

### **3.5.2 Existing Environment**

#### **3.5.2.1 Population Statistics**

#### **3.5.2.2 Land Use and Housing**

#### **3.5.2.3 Infrastructure**

#### **3.5.2.4 County Development and Waste Management Planning**

##### **3.5.2.4.1 County Kildare Development Plan**

##### **3.5.2.4.2 Waste Management Plan for County Kildare**

##### **3.5.2.4.3 Ballymore Development Plan**

#### **3.5.2.5 Local Industry**

#### **3.5.2.6 Tourism**

- 3.5.3** Potential Emissions
- 3.5.4** Description of Likely Impacts
- 3.5.5** Mitigation Measures
- 3.5.6** Likely Significant Effects
- 3.5.7** Traffic
  - 3.5.7.1** Existing Conditions
  - 3.5.7.2** Potential Emissions
  - 3.5.7.3** Likely Impacts
  - 3.5.7.4** Mitigation Measures
  - 3.5.7.5** Likely Significant Impact

### **3.6 Soils, Geology & Groundwater**

- 3.6.1** Existing Environment
- 3.6.2** Potential Emissions
- 3.6.3** Description of Likely Impacts
- 3.6.4** Mitigation Measures
- 3.6.5** Likely Significant Impacts

### **3.7 Landscape**

- 3.7.1** Existing Landscape
- 3.7.2** Potential Emissions
- 3.7.3** Likely Impacts
- 3.7.4** Mitigation Measures
- 3.7.5** Likely Significant Impacts

### **3.8 Noise**

- 3.8.1** Existing Environment
- 3.8.2** Potential Emissions
  - 3.8.2.1** Construction
  - 3.8.2.2** Operation
- 3.8.3** Description of Likely Impacts
- 3.8.4** Mitigation Measures
- 3.8.5** Likely Significant Impacts

### **3.9 Surface Water**

- 3.9.1** Existing Environment
- 3.9.2** Potential Emissions
- 3.9.3** Description of Likely Impacts
- 3.9.4** Mitigation Measures
- 3.9.5** Likely Significant Impacts

### **3.10 Material Assets**

- 3.10.1** Potential Emissions
- 3.10.2** Likely Impacts
- 3.10.3** Mitigation Measures
- 3.10.4** Significant Impacts

**3.11 Interactions**

**4 ENVIRONMENTAL MONITORING 2 pages**

**5 STATUTORY REQUIREMENTS 2 pages**

**5.1 Data Necessary to identify and Assess Environmental Effects of the Development**

**5.2 Forecasting Methods Used to Assess any Effects on the Environment**

**5.3 Difficulties In Compiling Specified Information**

**5.4 Compliance with Requirements of Environmental Impact Assessment Regulations – Second Schedule SI 93 of 1999**

# **Environmental Impact Statement (EIS)**

## **List of Tables**

<b>2.3.1</b>	Estimates of Quantities of Wastes to be Imported
<b>2.3.2</b>	European Waste Classes of Materials Proposed (P) to be Accepted at the Facility
<b>2.5.1</b>	Landfill Volumes
<b>2.5.2</b>	Indicative Filling and Restoration Programme
<b>2.5.3</b>	Leachate Volumes (m <sup>3</sup> )
<b>2.5.4</b>	Potential Leachate Composition
<b>2.5.5</b>	KTK Landfill (Kilcullen) Leachate Sample
<b>2.5.6</b>	Possible waste composition of wastes to be landfilled
<b>2.5.7</b>	<del>Potential Landfill Gas Production and Extraction over time</del>
<b>2.5.8</b>	Typical Landfill Gas Composition
<b>3.1.1</b>	Baseline Dust deposition survey, Ballymore Eustace
<b>3.2.1</b>	Percentage frequency of wind speed for Casement Aerodrome, (1992-1996)
<b>3.2.2</b>	Climate data for Casement Aerodrome (1992-1996)
<b>3.2.3</b>	Mean Monthly Rainfall for Blessington (1949-1990)
<b>3.3.1</b>	List of Archaeological Sites and Monuments in c. 2.5km Catchment
<b>3.3.2</b>	List of Archaeological Finds
<b>3.4.1</b>	Designated areas within 10km of the site
<b>3.4.2</b>	Aquatic invertebrates from the R. Liffey at Ballymore Eustace
<b>3.5.1</b>	Historic Traffic Data at Development Site
<b>3.5.2</b>	Summary of Peak Hour Traffic Survey Results R411 Naas Road/R413 Kilcullen Road Junction
<b>3.5.3</b>	Summary of Daily Traffic Attraction at Proposed Landfill
<b>3.5.4</b>	Summary of AM Peak Hour Traffic Attraction
<b>3.5.5</b>	Summary of PM Peak Hour Traffic Attraction
<b>3.5.6</b>	Summary of Peak Short-term Traffic Attraction (Phase 2 Construction Period - 2004)
<b>3.5.7</b>	Summary of Peak Traffic Attraction (End Phase 2 Operational Period - 2008)
<b>3.5.8</b>	Summary of Capacity Assessment (Site Access)
<b>3.5.9</b>	Summary of Forecast Queues & Delay (Site Access)
<b>3.6.1</b>	Recent water levels recorded in the monitoring boreholes
<b>3.6.2</b>	Chemical Analysis of Groundwater, Kimeens Pit, Ballymore Eustace (23/04/2001)
<b>3.7.1</b>	Grid references of Views into Site
<b>3.8.1</b>	Monitoring point locations for noise survey
<b>3.8.2</b>	Baseline environmental noise survey results, Ballymore Eustace, Co. Kildare

- 3.11.1** Interactions of the Foregoing
- 4.1** Proposed Monitoring at the Proposed Landfill
- 4.2** Surface Water, Groundwater and Leachate - Monitoring
- 5.1** EIS Checklist

# **Environmental Impact Statement (EIS)**

## **List of Figures**

### **In Text**

- 1.1** Site Location
- 1.2** Landholding as of March 2000
- 1.3** Master Plan Schematic
- 1.4** Application Site Boundary
- 2.1** Overview of Facility
- 2.5.1** Potential Landfill Gas Production and Extraction
- 3.5.2** Daily Distribution of Traffic Arriving at KTK Landfill Site, Kilcullen
- 3.5.3** Daily Distribution of Traffic Departing at KTK Landfill Site, Kilcullen
- 3.5.4** Forecast Traffic Arriving at Proposed Landfill
- 3.5.5** Forecast Traffic Departing Proposed Landfill
- 4.1** Proposed Monitoring Locations

### **In Volume II, Appendix 9**

- 3.1.1** Monitoring Locations
- 3.2.1** Windrose for Casement Aerodrome, 1992-1996
- 3.3.1** Extract from the R.M.P Map for County Kildare (Sheets 24 and 29), showing the location of the proposed development and of archaeological sites and monuments in the area.
- 3.3.2** Extract from R.M.P Map for County Kildare (Sheet 29), showing the results of the field survey.
- 3.4.1** Ballymore Eustace Industrial Park: Habitat Map
- 3.5.1** Local Infrastructure and Development
- 3.6.1** Monitoring Well Location Plan
- 3.6.2** Cross Section MW2 – MW1
- 3.6.3** Cross Section River Liffey – MW1
- 3.7.1** Landscape Assessment – Existing Site Survey (contours only)
  - 3.7.1 a** Existing Ground Profile Sections
  - 3.7.1 b** Existing Landscape
  - 3.7.1 c** Views into Site and Photo Locations
  - 3.7.1 d** Visual Boundary of Site
  - 3.7.1 e** Local Setting / Site Views
  - 3.7.4 a** Enabling Landscape Works
  - 3.7.4 b** State of Works at Completion of Phase 1 Landfill
  - 3.7.4 c** Sections at Completion of Phase 1 Landfill
  - 3.7.4 d** State of Works at Completion of Phase 2 Landfill
  - 3.7.4 e** State of Works at Completion of Landscaping
  - 3.7.4 f** Sections at Completion of Landscaping



# **Environmental Impact Statement (EIS)**

## **List of Plates & Photoviews**

### **In Volume II, Appendix 9**

- 3.3.1** View of proposed development from Ballymore Eustace to Harristown Road, facing northeast.
- 3.3.2** Spring, ditch and townland boundary, from Ballymore Eustace to Harristown Road, facing south (outside of proposed development)
- 3.3.3** View of derelict house, with quarry bunding in background; taken from Ballymore Eustace to Harristown Road, facing south

### **In Volume II, Appendix 7**

- View 1** Towards site from adjacent field looking southwest
- View 2** From site across Liffey Valley looking southwest
- View 3** Along south boundary within site looking northeast
- View 4** 1 of 2 looking southwest from within site (west end)
- View 4** 2 of 2 looking southwest from within site (west end)
- View 5** Across top of watermain indicating willow thicket
- View 6** Across front of site at roadway looking south
- View 7** From front of site at roadway looking west
- View 8** From centre of landfill site looking north.
- View 9** 1 of 2 Panoramic view facing north from centre of site
- View 10** 2 of 2 Panoramic view facing south from centre of site

# **Environmental Impact Statement (EIS)**

## **List of Drawings**

	<b>In Volume II, Appendix 10</b>	<b>Scale (A1)</b>
<b>101</b>	Existing Conditions Survey	1 to 1000
<b>102</b>	Overview of Proposed Landfill Development	1 to 1000
<b>103</b>	Site Infrastructure	1 to 1000
<b>104</b>	Landfill Surface Contours	1 to 1000
<b>105</b>	Restoration Works and After Use Plan	1 to 500
<b>106</b>	Landform Cross - Sections	1 to 1000
<b>107</b>	Landfill Boundary Cross Sections	1 to 250
<b>108</b>	Landfill Details	As Shown

# **Environmental Impact Statement (EIS)**

## **List of Appendices**

<b>Appendix</b>	<b>Reference Section</b>	<b>Description</b>
<b>1</b>	<b>1</b>	Planning Permission
<b>2</b>	<b>2</b>	Material Balance Calculations
<b>3</b>	<b>3</b>	Clay Test Data
<b>4</b>	<b>3.1</b>	Dust Assessment Report
<b>5</b>	<b>3.5</b>	Public Consultation Information
<b>6</b>	<b>3.6</b>	Borehole Logs
<b>7</b>	<b>3.7</b>	Photo views
<b>8</b>	<b>3.8</b>	Noise Assessment
<b>9</b>	<b>-</b>	Figures
<b>10</b>	<b>-</b>	Drawings

## **NON TECHNICAL SUMMARY**

### **1. General**

This EIS accompanies a Waste Licence Application.

An EIS must be submitted with a waste license application in order to satisfy Article 13(1) of the Waste Management (Licensing) Regulations 2000, SI 185 of 2000. In accordance with Article 13(4) the EIS submitted to the Agency must comply with Article 25 of the Environmental Impact Assessment Regulations 1989 to 1999. In this case SI No. 93 of 1999 is particularly relevant.

### **2. Master Plan for the Company's Landholdings**

KTK Sand & Gravel Ltd. (KTK S&G or the company or the applicant) operates a sand and gravel extraction and processing business in County Kildare. In March 2000, the company acquired approximately 18.2 acres of land near Ballymore Eustace, Co. Kildare. The lands had been used for sand and gravel extraction for approximately 30 years. The lands comprised deep excavations, random stockpiles of waste overburden, stockpiles of topsoil, approximately 50,000 tonnes of illegally fly tipped domestic refuse and construction and demolition wastes. A number of pieces of derelict plant and scrap equipment were also left on the site.

When the lands were acquired conditions 15, 22 and 23 of the planning permission 1332/80) had not been fulfilled by previous owners. These conditions required that the lands be reinstated, rehabilitated and landscaped.

The site location is depicted on Figure 1 and the lands purchased by KTK S& G in March 2000 are outlined on Figure 2.

As shown on Figure 2, the Dublin Corporation watermain that feeds Dublin from the Ballymore Eustace water treatment works crosses the landholding. It was apparent to the company, and its the consulting engineers and architects that the western part of the landholding, which contained the illegally tipped wastes and the deep excavations, would require significant resources and engineering to reshape the ground and reinstate the levels to tie into the surrounding field levels. The eastern part of the landholding, however, was left in a less challenging state from the point of site works, as it was a rough field gently sloping away towards the watermain right off way.

The Master Plan for the landholding is to use the lands lying to the east of watermain for a development of office/industrial units and to restore lands to the west of the watermain to allow development of amenity/sporting facilities for the local community.

The subject of this Environmental Impact Statement (EIS) is the restoration of the western part of the landholding. The restoration work will involve waste management activities and as such will require a Waste Licence pursuant to Section 39 of the Waste Management Act, 1996. The EIS has been prepared to fulfill the requirements of the Waste Licensing regulations. In the context of the waste licence application 'the site' does not include the entire landholding or the company or lands that are available for use by the company.

### **3. Description of the Proposed Development**

The Application Site is shown on Figure 3. An overview of the site development is presented in Figure 4.

The Applicant proposes the following activities:

- Developing a fully engineered lined landfill
- Receiving imported Builders'/C&D wastes and other commercial and industrial wastes
- Recovery of some of the Builders'/C&D wastes for engineering purposes
- Disposal of C&D wastes and commercial/industrial wastes

It is proposed that the site and ancillary infrastructure will be engineered to include:

- Paved access roads and hardstands with adequate lighting
- Security fences and gates
- Weigh bridge
- Wheel wash
- Site offices
- Foul sewage treatment works
- Waste inspection and quarantine areas
- Equipment compounds
- Temporary fuel storage areas
- A fully engineered landfill meeting the standards set out by the EPA which include:

- Engineered liner on base and side slopes of the pit
- Leachate collection system
- Leachate recovery and holding systems
- Landfill gas management systems

Final capping layers comprising soil and possibly geosynthetic materials

Site statistics are presented in Table 1.

**Table 1 Proposed Facility Statistics**

<b>Item</b>	<b>Units</b>	<b>Values</b>	<b>Comments</b>
<b>Area Phase 1 (Hectares)</b>	ha	4.0	Development takes place in 2002 if regulatory requirements have been met.
<b>Area Phase 2 (Hectares)</b>	ha	6.1	Development takes place in 2004 if regulatory requirements have been met.
<b>Annual waste deposition (Range)</b>	tonnes	200,000-242,000	Solid, non-hazardous commercial and industrial wastes, and builders/construction and demolition wastes
<b>Daily waste deposition</b>	tonnes	720-880	Based on 275 working days per year
<b>Estimated Annual Planning Operations Leachate Generation-Range Post Closure</b>	m <sup>3</sup>	12,700-37,400	Leachate will be collected and tankered to a waste water treatment facility. Leachate may also be recirculated on-site
<b>Estimated Daily Leachate Generation-Range (m<sup>3</sup>-cubic metres)</b>	m <sup>3</sup>	35-103	Leachate will be recirculated on the site.
<b>Total Daily Traffic Generation-Range</b>	No.	42-190	A vehicle makes one movement entering the facility and one movement leaving the facility
<b>HGV Movements - Range</b>	No.	110-142	

#### 4. The Existing Environment

Environmental impact of the proposed facility was evaluated. Research was undertaken at the site. Specialist contractors were retained as required. Table 2 describes the potential impacts (i.e. prior to implementing mitigation measures) of the proposed facility.

**Table 2. Potential impacts of the proposed facility**

Item	Work completed	Potential impact of proposed facility
<b>Air quality</b>	Dust sampling completed April-May 2001	<ul style="list-style-type: none"> <li>Dust generation during construction and Landfilling</li> </ul>
<b>Climate</b>	Regional meteorological information collection	<ul style="list-style-type: none"> <li>No impacts predicted</li> </ul>
<b>Cultural Heritage</b>	Studies undertaken in August 2000 and May 2001	<ul style="list-style-type: none"> <li>No impacts predicted</li> </ul>
<b>Flora and Fauna</b>	Study undertaken April 2001	<ul style="list-style-type: none"> <li>Temporary removal of grassland habitat of low ecological value (approx. 1.2 ha)</li> <li>Temporary (during construction) and permanent (upon completion of site restoration of sand martin habitat</li> <li>Potential indirect impact on River Liffey</li> </ul>
<b>Human Beings</b>	Traffic study undertaken April-May 2001	<ul style="list-style-type: none"> <li>21-95 vehicles per day (42-190 vehicle movements)</li> <li>Approximately 55 of those vehicles will be HGV</li> <li>90% will access the site from the north</li> </ul>
<b>Soils, Geology and Groundwater</b>	Study undertaken in March/April 2001	<ul style="list-style-type: none"> <li>There is no aquifer under the site</li> <li>The vulnerability rating of the groundwater beneath the pit floor would in general be high to extreme</li> <li>Changes in the static water</li> <li>Reduction in groundwater quality</li> </ul>
<b>Landscape</b>	Study undertaken in May 2001	<ul style="list-style-type: none"> <li>Due to the close visual envelope of the site and the lack of significant views into the site, the landscape impact of the proposed facility will be minimal</li> </ul>
<b>Noise</b>	Study undertaken April-May 2001	<ul style="list-style-type: none"> <li>Noise levels during construction is of limited duration and noise levels will be well below acceptable limits.</li> <li>Noise levels during Landfilling will be below permissible levels</li> <li>There is the potential for noise nuisance to arise from incidental activities such as tonal reversing warning indicators, excessive engine revving and use of air brakes.</li> <li>The calculation of the predicted change in noise levels expressed as <math>L_{A10,18hr}</math> as a result of the traffic movement is determined to be substantially less than 1dB(A)</li> </ul>
<b>Surface water</b>	Study undertaken March-May 2001	<ul style="list-style-type: none"> <li>Potential localised negative effect on groundwater</li> </ul>

**Table 3. Mitigation measures and likely significant impacts**

<b>Item</b>	<b>Mitigation Measures</b>	<b>Likely Significant Impacts</b>
<b>Air quality</b>	<ul style="list-style-type: none"> <li>Construction of screening mounds at an early stage in the construction phase and retention and enhancement of existing vegetation at the site perimeter</li> <li>Use of dust suppression measures including wheelwash facilities and water sprays at the site entrance/exit to prevent material being transferred to external roads (during both construction and operational phases).</li> </ul>	<ul style="list-style-type: none"> <li>None if mitigation measures are put into place</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>None Required</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
<b>Cultural Heritage</b>	<ul style="list-style-type: none"> <li>None Required</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
<b>Flora and Fauna</b>	<ul style="list-style-type: none"> <li>Negative impacts on the River Liffey will be avoided by ensuring no possibility of contamination of river by landfill leachate or polluting surface water runoff. During construction temporary mitigation measures will be put in place to ensure no surface runoff will flow into the River Liffey resulting in siltation.</li> <li>The sand martin colony will not be disturbed during the breeding season (April to July inclusive).</li> <li>Trees around the perimeter of the site will be retained. This includes Beech trees on the southern boundary and other mature trees on the hedgerows around the perimeter of the site.</li> <li>All trees to be retained within the site will be afforded protection during the landfill construction and operation</li> <li>The scrub/thicket containing the badger sett on the south-east side of the site will be retained.</li> <li>Additional planting of native trees (such as ash, oak) and shrubs (such as hawthorn, blackthorn) around the perimeter of the site</li> <li>Ongoing water quality monitoring of the River Liffey</li> </ul>	<ul style="list-style-type: none"> <li>None if mitigation measures are put into place and the landfill is constructed to meet EPA guidelines</li> </ul>
<b>Human Beings (traffic)</b>	<ul style="list-style-type: none"> <li>It is proposed that almost all of the HGV traffic (50 of 55 vehicles per day) to the site will arrive from Naas to the North thus avoiding the need to travel through the village.</li> </ul>	<ul style="list-style-type: none"> <li>None if mitigation measures are put into place</li> </ul>
<b>Soils, Geology and Groundwater</b>	<ul style="list-style-type: none"> <li>Emplacement of a composite liner system</li> <li>Leachate collection infrastructure</li> <li>To facilitate existing groundwater movement a high permeability drainage layer will be installed outside and beneath the landfill liner.</li> <li>Indoor fuel and lubricant storage</li> <li>Installation of oil interceptor</li> </ul>	<ul style="list-style-type: none"> <li>None if mitigation measures are put into place</li> </ul>



	<ul style="list-style-type: none"> <li>• Installation of proprietary system for treatment of sewage generated on-site</li> <li>• Regular monitoring of groundwater (levels and chemical parameters)</li> </ul>	
<b>Landscape</b>	<ul style="list-style-type: none"> <li>• Enabling landscape works to provide enhanced screening through hedge-plantings, woodland maintenance and berms</li> <li>• Phased landscaping plans will be integrated with plans to develop the completed site into an amenity area.</li> </ul>	<ul style="list-style-type: none"> <li>• None if mitigation measures are put into place</li> </ul>
<b>Noise</b>	<ul style="list-style-type: none"> <li>• Screening berms</li> </ul>	<ul style="list-style-type: none"> <li>• None if mitigation measures are put into place</li> </ul>
<b>Surface water</b>	<ul style="list-style-type: none"> <li>• Surface water that could potentially contain contaminants is to be directed to an oil interceptor</li> <li>• Clean surface water from completed and capped landfill areas and roof runoff will be directed to conventional soakaways</li> <li>• Maintenance programmes will be in place to ensure surface water runoff does not erode the capping soils and flow into the waste.</li> <li>• A surface water sampling programme at the will monitor any potentially associated changes in water chemistry.</li> </ul>	<ul style="list-style-type: none"> <li>• None if mitigation measures are put into place</li> </ul>

## 5. ENVIRONMENTAL MONITORING

A number of waste licenses for landfills have been issued in the country. A similar landfill to the proposed is the KTK Landfill, in Kilcullen, County Kildare. It is proposed that a similar sampling regime is utilised for this proposed facility. The proposed monitoring regime is presented in Table 4.

**Table 4 Proposed Monitoring at the Proposed Landfill**

Monitoring Parameter	Frequency	Emission Limits	Comments
Dust	Annual	240 mg/m <sup>3</sup> /day	It is proposed to monitor dust at the locations shown in Figure 4. In addition the site manager will observe and record dust generation daily. Complaints will be recorded and appropriate actions taken.
Ecological Monitoring	None proposed		
Noise	Annual	55 dB(A) L <sub>Aeq</sub> daytime 45 dB(A) L <sub>Aeq</sub> nighttime	It is proposed to monitor noise at the locations shown in Figure 5.
Groundwater monitoring	Quarterly	Not applicable	A minimum of one upgradient and three downgradient boreholes will be sampled and analysed quarterly
Landfill gas	Monthly in Gas Boreholes and Wells Weekly in Site Office	Methane 20% LEL (1%v/v) Carbon Dioxide 1.5% v/v	The concentration of methane, carbon dioxide, and oxygen will be measured in landfill perimeter gas monitoring boreholes and in shallow gas monitoring boreholes near the offices and canteen.
Leachate monitoring	Quarterly	For leachate tankered to a Wastewater Treatment Plant: pH 6-8 COD 25,000 ppm	<b>Standard and extensive list of parameters</b> Leachate composition will be monitored at the leachate holding tank.
Meteorological Data	Daily	Not applicable	A meteorological station will be installed. Evaporation and evapotranspiration data will be obtained from a nearby Met station
Odour	Annual (proposed)	Not applicable	Parameters tested will include VOCs, mercaptans, hydrogen sulphide.
Surface Water	Weekly/Quarterly	To be determined	<b>Standard and extensive list of parameters</b> The discharge from site drains will be inspected weekly and sampled quarterly.





211000mN

210500mN

AREA= 17.7 ha.

RIVER LIFFEY

292000mE

292500mE

BALLYMORE  
EUSTACE

# LEGEND

- FORESTRY
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- LAND HOLDING [MARCH 2000]
- POWER LINE
- DUBLIN CORPORATION WATER MAIN

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

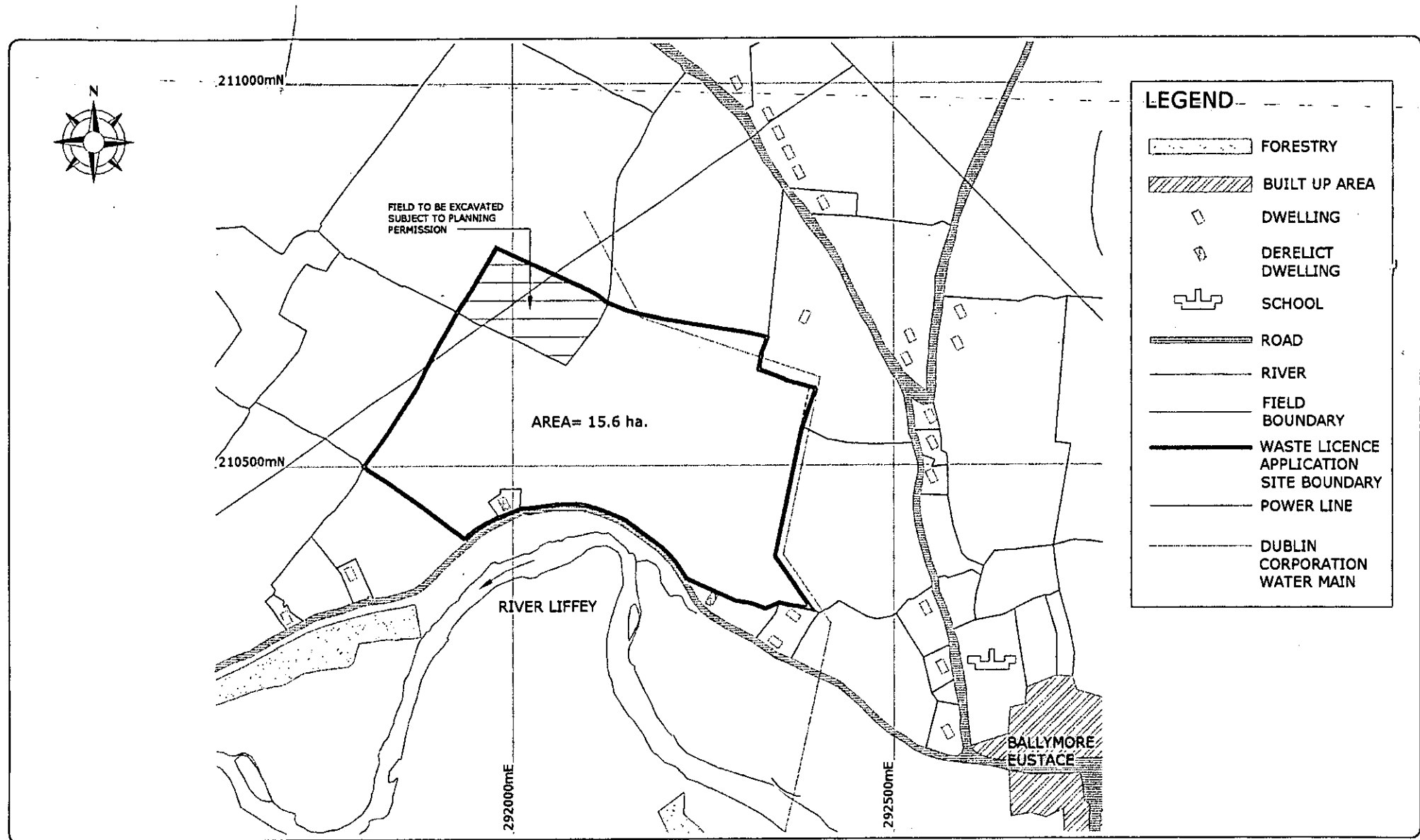
## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 2

LANDHOLDING AS OF MARCH 2000

Scale: 1:3,500 Approx. | Drawn By: NH | Date: 02/05/01



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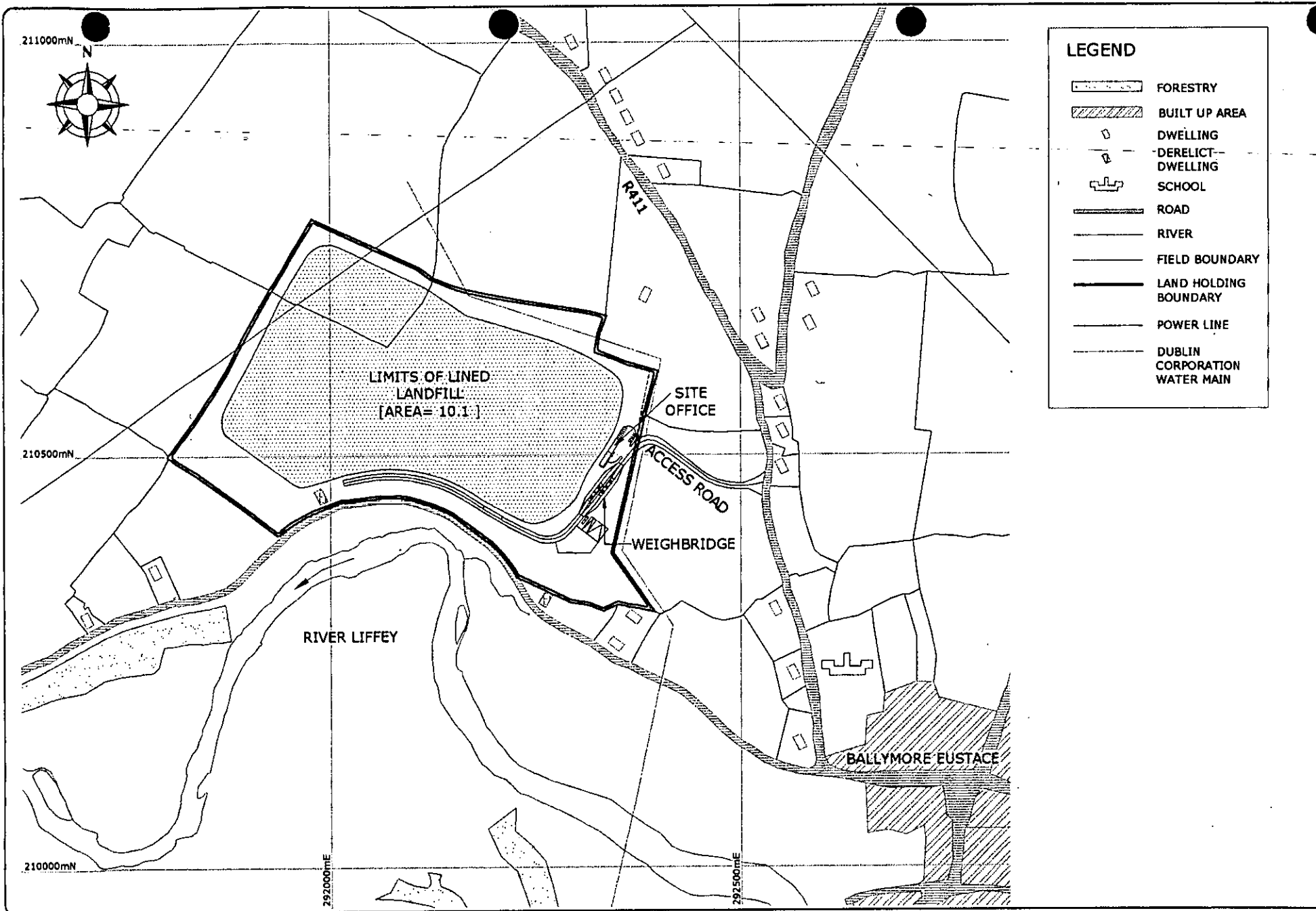
## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 3

APPLICATION SITE BOUNDARY

Scale: 1:3,500 Approx. Drawn By: NH Date: 02/05/01



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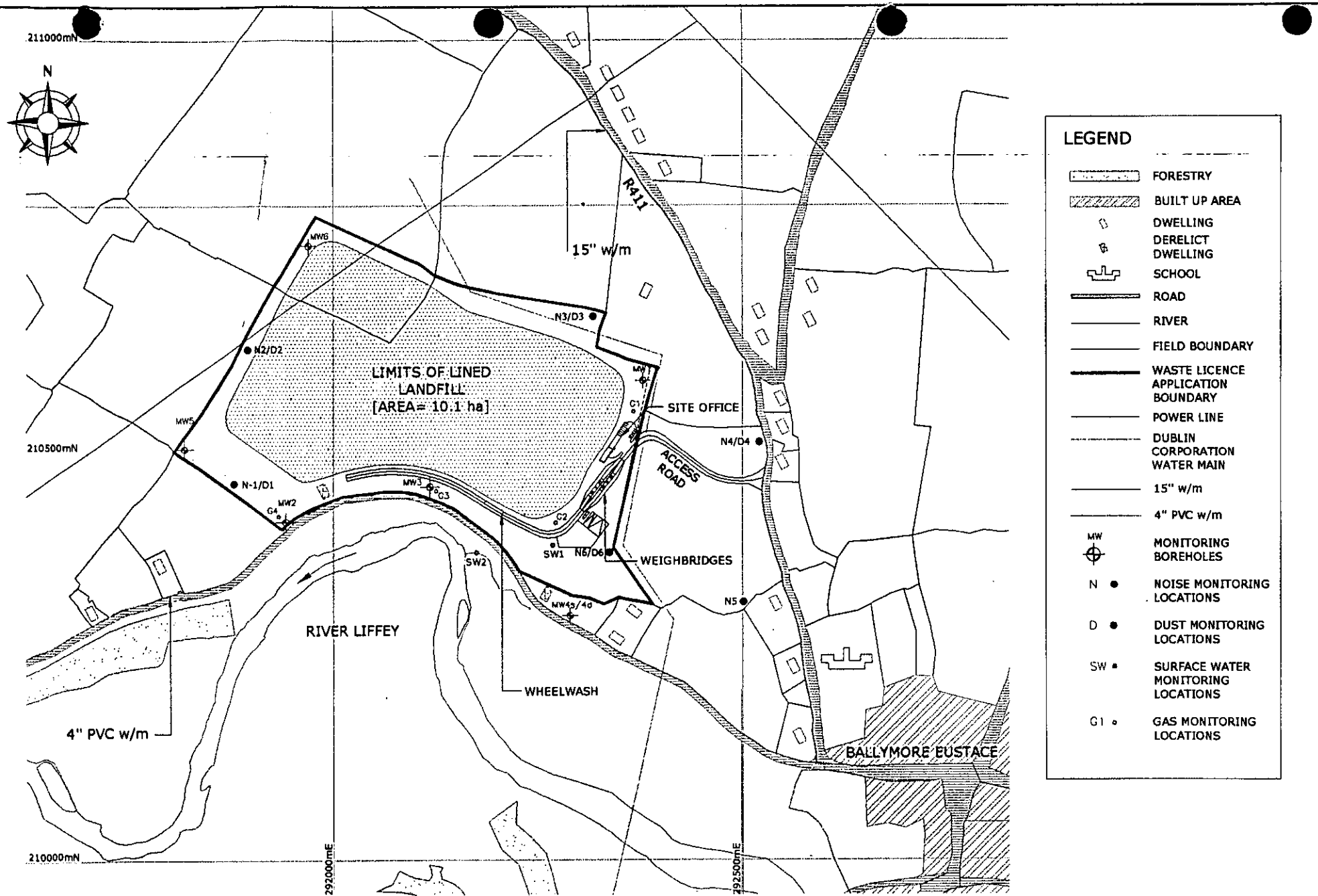
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**KTK SAND & GRAVEL**  
 Kimmeens, Ballymore Eustace, Co.  
 Kildare.

FIGURE: 4

OVERVIEW OF FACILITY

Scale: 1:5,000 A3 Drawn By: NH Date: 02/05/01



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 Kildare.

FIGURE 5

PROPOSED MONITORING LOCATIONS

Scale: 1:5,000 A3 Drawn By: NH Date: 12/06/01





## **1. INTRODUCTION**

### **1.1 Master Plan for the Company's Landholdings**

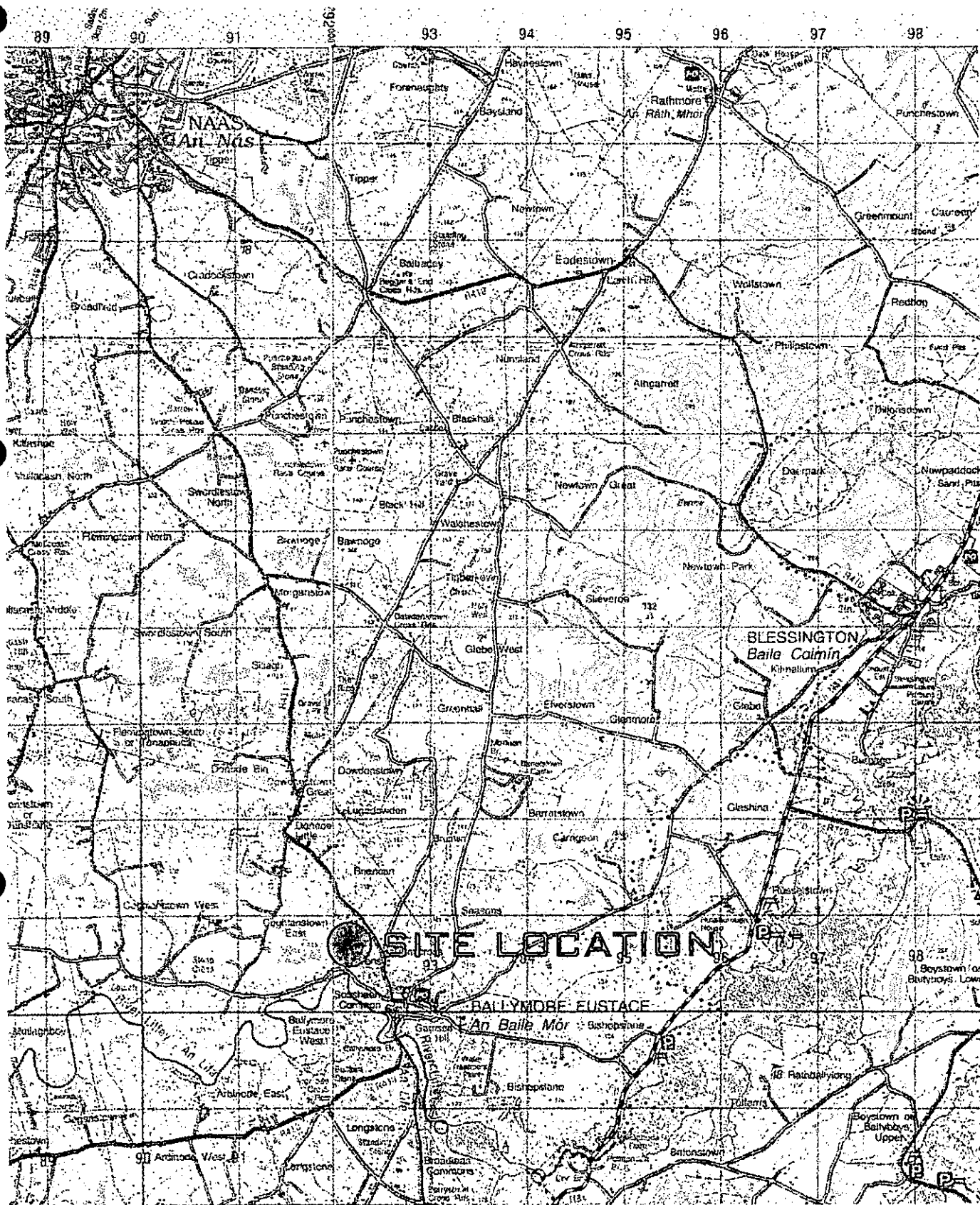
KTK Sand & Gravel Ltd. (KTK S&G or the company or the applicant) operates a sand and gravel extraction and processing business in County Kildare. In March 2000, the company acquired approximately 18.2 hectares of land near Ballymore Eustace, Co. Kildare. The lands had been used for sand and gravel extraction for approximately 30 years. The lands comprised deep excavations, random stockpiles of waste overburden, stockpiles of topsoil, approximately 50,000 tonnes of illegally fly tipped domestic refuse and construction and demolition wastes. A number of pieces of derelict plant and scrap equipment were also left on the site.

When the lands were acquired a number of the conditions of the planning permission 1332/80) had not been fulfilled by previous owners. Specifically conditions 15, 22, 23, 25 and 26 required that the lands be reinstated, rehabilitated and landscaped (See Appendix 1 for a copy of the planning permission).

The site location is depicted on Figure 1.1 and the lands purchased by KTK S& G in March 2000 are outlined on Figure 1.2.

As shown on Figure 1.2, the Dublin Corporation watermain that feeds Dublin from the Ballymore Eustace water treatment works crosses the landholding. It was apparent to the company, and its the consulting engineers and architects that the western part of the landholding, which contained the illegally tipped wastes and the deep excavations, would require significant resources and engineering to reshape the ground and reinstate the levels to tie into the surrounding field levels. The eastern part of the landholding, however, was left in a less challenging state from the point of site works, as it was a rough field gently sloping away towards the watermain right off way.

Given these conditions the company decided to undertake a wide spread consultation process with the local community groups to help determine what uses of the land would be acceptable to the community. Several public meetings have taken place since March 2000. The company and its consultants have made several formal presentations. In particular, in July 2000 and later via public displays in the post office at Christmas 2000. From these interactions and other meetings between the local interest groups and the owner a Master plan for the site emerged. The consulting architect prepared revised Master Plan drawings that were put on display in the post



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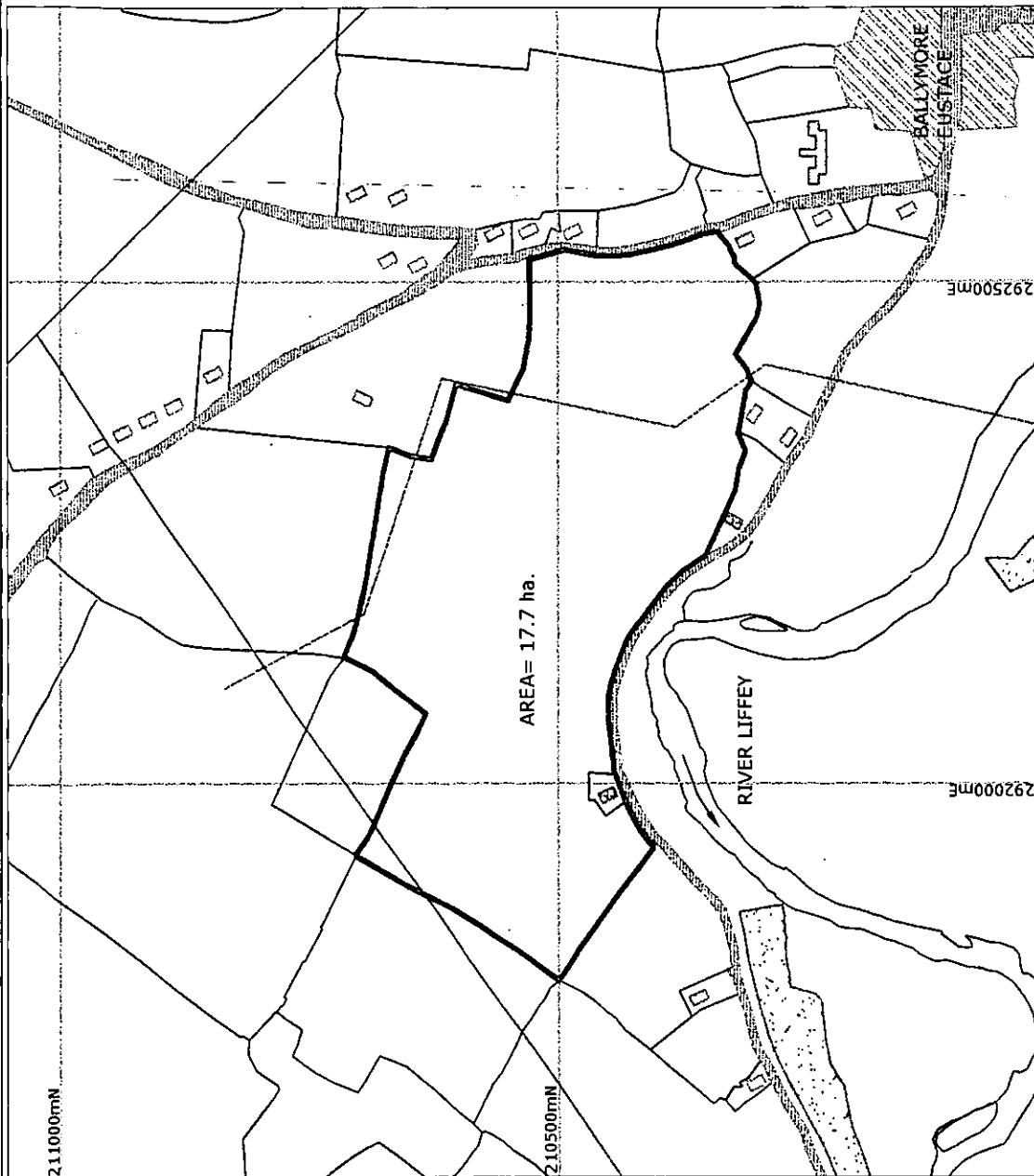
**KTk SAND & GRAVEL**  
 Kimmee, Ballymore Eustace, Co. Kildare.

Figure: 1.1

Scale: 1:50,000

Drawn By: NH

Date: 02.05.01



# LEGEND

	FORESTRY
	BUILT UP AREA
	DWELLING
	DERELICT DWELLING
	SCHOOL
	ROAD
	RIVER
	FIELD
	BOUNDARY
	LAND HOLDING [MARCH 2000]
	POWER LINE
	DUBLIN CORPORATION WATER MAIN

FIGURE: 1.2

LANDHOLDING AS OF MARCH 2000

Scale: 1:3,500 Approx. Drawn By: NH Date: 02/05/01

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

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**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

wastes that would be categorised as non-hazardous commercial and industrial wastes and construction and demolition wastes.

As the material proposed for backfilling will be wastes, a facility must be developed that meets the requirements of the Environmental Protection Agency (EPA or Agency) in relation to waste disposal and recovery facilities. The facility that will be developed would be considered a 'landfill'. Means will be provided to contain and collect leachate, and control any gas emissions. Specific temporary infrastructure facilities such as porta-cabin office, weighbridges a wheel wash, hardstand and waste inspection quarantine areas will be required to fulfill the requirements of the EPA.

To develop such an engineered facility, significant earthworks are required to form the slopes and the floor of the landfill and also to obtain natural materials such as clay, silt, sand and gravel for construction of specific elements of the facility as discussed in more detail later. The irregular surfaced pit that the company acquired in March 2000 obviously required reshaping to render it suitable for emplacement of lining and drainage systems on the sides and base of the pit before any wastes could be deposited.

In addition, in order to have sufficient materials for the lining and drainage systems the company decided to obtain an option to purchase lands adjacent to the existing pit in Coghlanstown East. These lands will be excavated to the extent shown on Figure 1.4 to generate

- silty clay soil that would be used on site for lining and capping the landfill
- stone to be used in the leachate collection layer below the landfill
- sand and gravel for drainage layers in the final capping system on the landfilled wastes
- daily and intermediate cover layers on the wastes and
- subsoil for the restoration layer above the landfilled wastes

The extraction of materials from these adjoining lands and the subsequent backfilling of the created void are subject to a planning permission that will be sought. Notwithstanding this planning permission, the balance of the existing pit could be engineered to accept the proposed wastes if lining and drainage materials are imported.

Materials to fill the void will come mainly from two sources; waste contractors and building contractors. The facility will not be open for use by the general public carrying waste in cars, trucks, small vans etc. A weighbridge and a computerised load tracking system will be installed. Waste types and quantities will be monitored and reported to the EPA.

Access to the site will be via the R411. The number of loads into the site will be on average 50 per day. The loads will be predominantly from the north with less than approximately 10% truck movements passing through the village of Ballymore Eustace. These movements will include the existing and future movements of Dublin Corporation lorries carrying dry sludge from the water treatment works.

The site will be operated and monitored in accordance with the Waste Licence to be issued by the Agency. An annual status and monitoring report will be prepared and submitted to the EPA and will be available to the public.

The life of the facility is not precisely defined, however, based on an average projected filling rate it is estimated that the engineered void would be filled within a 6 to 7 year time frame based on filling this void with mixed non-hazardous commercial/industrial wastes. The life span of the facility would be shortened proportionally by increasing the intake rate. For example an average of 60 loads per day would reduce the filling time by some 20%. The restoration work will take additional time and will stretch the project to perhaps 8 years from start of filling.

It is envisaged that the restored site will feature a soccer pitch, GAA pitch, general amenity areas (i.e. walking paths and a town park) and tennis courts.

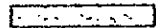
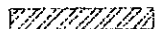



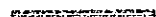





Environmental monitoring will be carried out as long as may be required by the EPA.

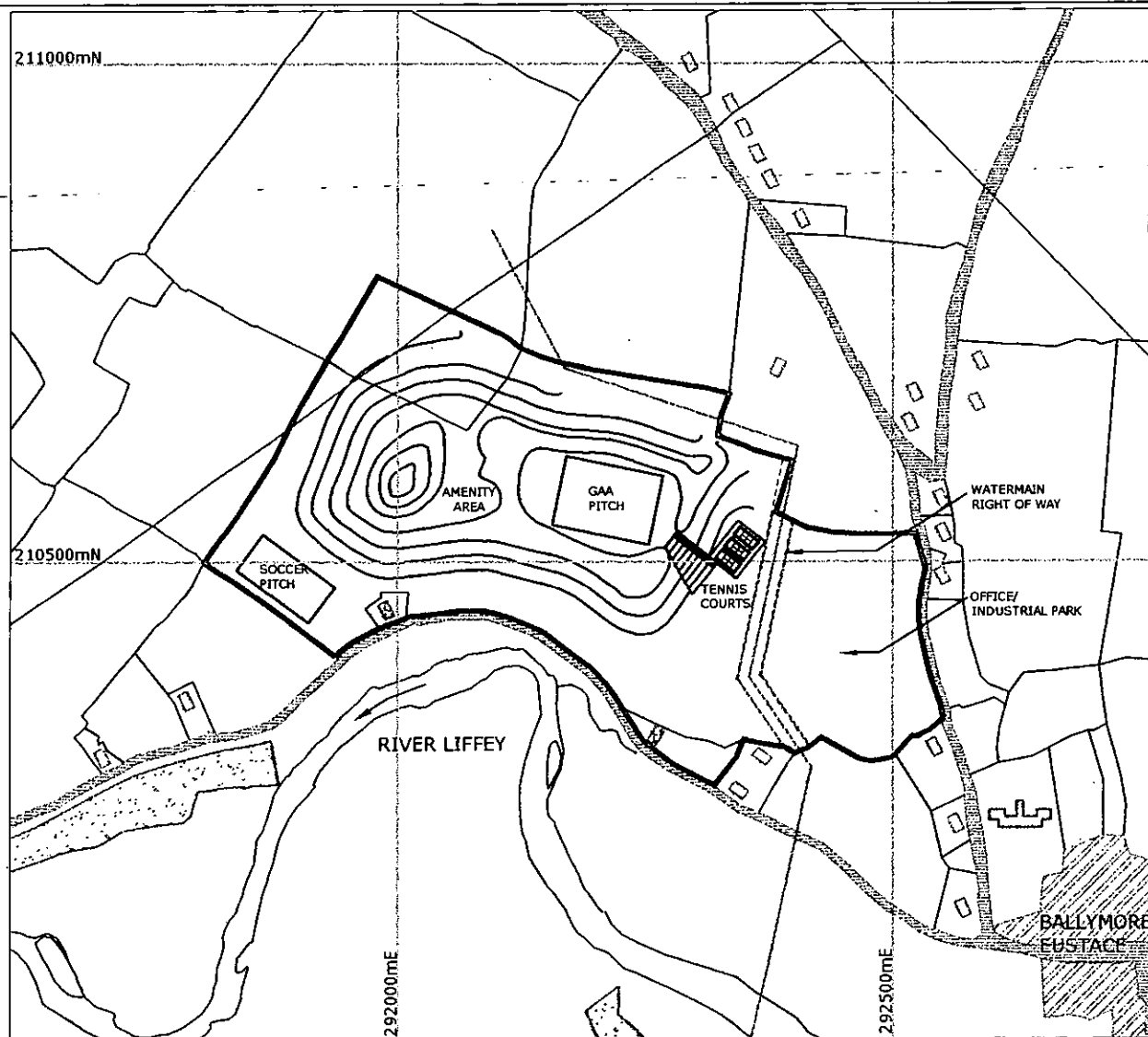
### **1.3 Requirement for an Environmental Impact Statement**

This EIS accompanies a Waste Licence Application.

An EIS must be submitted with a waste license application in order to satisfy Article 13(1) of the Waste Management (Licensing) Regulations 2000, SI 185 of 2000. In accordance with Article 13(4) the EIS submitted to the Agency must comply with Article 25 of the Environmental Impact Assessment Regulations 1989 to 1999. In this case SI No. 93 of 1999 is particularly relevant.

# LEGEND

-  FORESTRY
-  BUILT UP AREA
-  DWELLING
-  DERELICT DWELLING
-  SCHOOL
-  ROAD
-  RIVER
-  FIELD BOUNDARY
-  LAND HOLDING [MAY 2001]
-  POWER LINE
-  DUBLIN CORPORATION WATER MAIN



Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 1.3

MASTER PLAN SCHEMATIC

Scale: 1:3,500 Approx. Drawn By: NH Date: 02/05/01



211000mN

FIELD TO BE EXCAVATED  
SUBJECT TO PLANNING  
PERMISSION

AREA= 15.6 ha.

210500mN

RIVER LIFFEY

292000mE

292500mE

BALLYMORE  
EUSTACE

## LEGEND

- FORESTRY
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- WASTE LICENCE APPLICATION SITE BOUNDARY
- POWER LINE
- DUBLIN CORPORATION WATER MAIN

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 1.4

APPLICATION SITE BOUNDARY

Scale: 1:3,500 Approx. Drawn By: NH Date: 02/05/01

This EIS has been prepared in accordance with the requirements of the following statutory documents:

- (i) The European Community Directive on Environmental Impact Assessment, 1997 (**No. 85/337/EEC**).
- (ii) The European Communities (Environmental Impact Assessment) Regulations, 1989 (**S. I. No. 349/1989**).
- (iii) The European Communities (Environmental Impact Assessment) Regulations, 1998 (**S.I. No. 351 of 1998**).
- (iv) The European Communities (Environmental Impact Assessment) Regulations, 1999 (**S.I. No. 93 of 1999**).

#### **1.4 The Applicants**

KTK S&G (company number 306320) is a family owned and operated company. For the last thirty years the family has been engaged in the supply and delivery of sand and gravel products to the building and construction industry.

The company's activities are mainly geared towards supplying local demand and the Dublin market. In order to improve competitiveness and to enhance and guarantee quality standards the company applied for ISO 9000 accreditation and following assessment was accepted in July 1994 for this standard of management, production and safety in the workplace.

Current employment in the company is nine persons, but this figure has varied upwards to twenty persons. The Company's activities are currently concentrated in the existing pit at Brownstown and Carnalway. The majority of external inputs to this operation are sourced locally.

It is the policy of the company to ensure the health and safety of all employees by maintaining a safe place and system of work. This policy is based on the requirements of employment legislation's including the Safety, Health and Welfare at Work Act 1989 and the Safety, Health and Welfare at Work (Construction) Regulations 1995 (S.I. No. 138 of 1995).

Recently the managing director of the company, Mr Kevin Keenan jr., obtained planning permission and a waste licence for a landfill in an active sand and gravel pit located in Brownstown and Carnalway near Kilcullen, Co. Kildare. That landfill is known as the KTK Landfill



(Licence Register No. 81-1). It is owned and operated by KTK Landfill Ltd, a wholly owned subsidiary of Celtic Waste Ltd. of Dublin.

### **1.5 Need**

Two conditions of the planning permission obtained by others (See Appendix 1 Planning Permission conditions 15 and 23) required restoration of the site. This work was never completed. The proposed facility seeks to rectify this situation.

There is a need for this type of disposal outlet. This has arisen and exists because of a number of factors including;

- The economic boom in the country has resulted in increases in population in urban areas which has resulted in an increase in waste generation in all sectors. The increase in waste arisings has resulted in a rapid decline in the available capacity in landfills.
- Tougher environmental legislation requiring licensing of all waste disposal facilities in the country by the Environmental Protection Agency
- The clamp down by the EPA and local authorities on illegal tipping in the country
- The lack of significant alternatives to landfill disposal in the country in the short to medium term.

There is an obvious and well-documented need for well-engineered landfill facilities in Ireland. The September 1998 Policy Statement on waste by the Department of Environment confirms the need.

The plans for the Ballymore Eustace site will help fulfill government policy.

## 1.6 Alternatives

Alternatives considered by the company were;

1. Leave site in present state
2. Develop the site as an industrial park
3. Develop a landfill but allow only **non-hazardous** construction and demolition waste and industrial and commercial wastes

### Alternative 1:

It is not feasible to leave the site in its present state as the site is to be restored as required by the planning permission. The planning authority as reconfirmed the need to restore the site through various correspondences to former owners and also the company and its planning consultant.

### Alternative 2:

This alternative would have involved reshaping the slopes and floor of the pit and providing services for offices, warehouses and serviced units for small dry industry. This alternative was sketched by the consulting architect and presented to the public in July 2000. Local interest groups debated the pros and cons of this alternative. A landfill alternative combined with an office/industrial park east of the watermain was suggested in a meeting in November 2000 as a compromise solution for the restoration of the site.

### Alternative 3:

The acceptance of non-hazardous construction and demolition wastes and industrial and commercial wastes is the best option in terms of meeting the requirements of the previous planning permission whilst ensuring that the development is easily manageable from an environmental perspective.

The proposed alternative requires engineered facilities to allow disposal and recovery of dry construction and demolition wastes and disposal of commercial and industrial wastes so that the site may be restored.

## **1.7 Structure of the EIS**

The EIS is presented in the "Direct Format Structure" as set down in the Draft Guidelines produced by the Environmental Protection Agency (EPA). In general, it follows the framework presented in the EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements. The structure employed is as follows:

Section 1 Introduction

Section 2 The Proposed Facility

Section 3 The Receiving Environment, Mitigation Measures and Likely Significant Effects

Section 4 Environmental Monitoring

Section 5 Statutory Requirements

## 1.8 Contributors To The EIS

This EIS was prepared by a number of consulting firms. The members of the study team and their respective inputs are as follows:

<b>Consultant</b>	<b>Address</b>	<b>Responsibility</b>
<b>Environment &amp; Resource Management Ltd</b>	No. 21 Link Business Park Kilcullen, Co. Kildare	<ul style="list-style-type: none"> <li>• Project Management</li> <li>• Project Description and Engineering</li> <li>• EIS Assembly</li> <li>• Human beings</li> <li>• Material Assets</li> <li>• Interactions</li> </ul>
<b>Maguire &amp; Associates Ltd.</b>	6 Railway Terrace Naas Co. Kildare	<ul style="list-style-type: none"> <li>• Planning matters</li> </ul>
<b>S. M. Bennet &amp; Co. Ltd</b>	Grovehill, Bishopsland, Ballymore Eustace Co. Kildare	<ul style="list-style-type: none"> <li>• Soils and Geology</li> <li>• Groundwater</li> <li>• Surface Water</li> </ul>
<b>TMS Environment Ltd</b>	53 Broomhill Drive, Tallaght Drive Tallaght Dublin 24	<ul style="list-style-type: none"> <li>• Air; Climate, Noise</li> </ul>
<b>Cultural Resource Development Services Ltd.</b>	Campus Innovation Centre Roebuck UCD Dublin 24	<ul style="list-style-type: none"> <li>• Cultural Heritage</li> </ul>
<b>Natural Environment Consultants Ltd (T/A Natura)</b>	Enterprise Centre The Murrough Wicklow	<ul style="list-style-type: none"> <li>• Flora and Fauna</li> </ul>
<b>Denis Wilson Partnership Ltd</b>	Bracetown Business Park Clonee Co. Dublin	<ul style="list-style-type: none"> <li>• Traffic (for Human Beings section)</li> <li>• Road layouts and design</li> </ul>
<b>Martin Murray Architects</b>	10/11 Marine Terrace Dun Laoghire Co. Dublin	<ul style="list-style-type: none"> <li>• Master Plan and Landscape Plans</li> </ul>
<b>Richard Webb &amp; Associates</b>	Springfields Ballywaltrim Lane Bray Co. Wicklow	<ul style="list-style-type: none"> <li>• Landscape Plans and Visual Impact Assessment</li> </ul>



## **2. THE PROPOSED FACILITY**

**Note: Drawings are included in EIS, Vol. II.**

### **2.1 The Application Site**

The application site comprises a disused sand and gravel pit and an adjoining unexcavated agricultural field at the northwest corner of the existing pit.

Sand and gravel extraction and processing occurred on the application the site from the 1960s through to 1998. There has been no commercial activity at the site since that time.

The application site is 15.6 ha in size and is depicted on Figure 2.1 overleaf and in detail on Drawing 101.

### **2.2 The Proposed Facility**

The Applicant proposes the following activities:

- Developing a fully engineered and lined landfill
- Importing Builders'/Construction and Demolition (C&D) wastes and other commercial and industrial wastes
- Recovery of some of the Builders/C&D wastes for engineering purposes
- Disposal of Builders'/C&D wastes and commercial/industrial wastes

It is proposed that the site and ancillary infrastructure will be engineered to include:

- Paved access roads and hardstands with adequate lighting
- Security fences and gates
- Weigh bridge
- Wheel wash
- Site offices
- Foul sewage treatment facility
- Waste inspection and quarantine areas
- Equipment compounds
- Temporary fuel storage areas
- A fully engineered landfill including:
  - Engineered liner on base and side slopes of the pit
  - Leachate collection system

- Leachate recovery and holding systems
- Landfill gas management systems
- Final capping layers comprising soil and possibly geosynthetic materials

Further details on the design, operation and management of the facility are presented in the subsections that follow.

## **2.3 Waste Types and Quantities**

### **2.3.1 Quantities**

Table 2.3.1 presents estimates of the quantities of the wastes to be imported to the site. These estimates are based on the assumption that the northwest field is excavated, a void space calculation assuming formation levels and final surfaces as shown on Drawings 102 and 104 and the material balance calculations presented in Appendix 2.

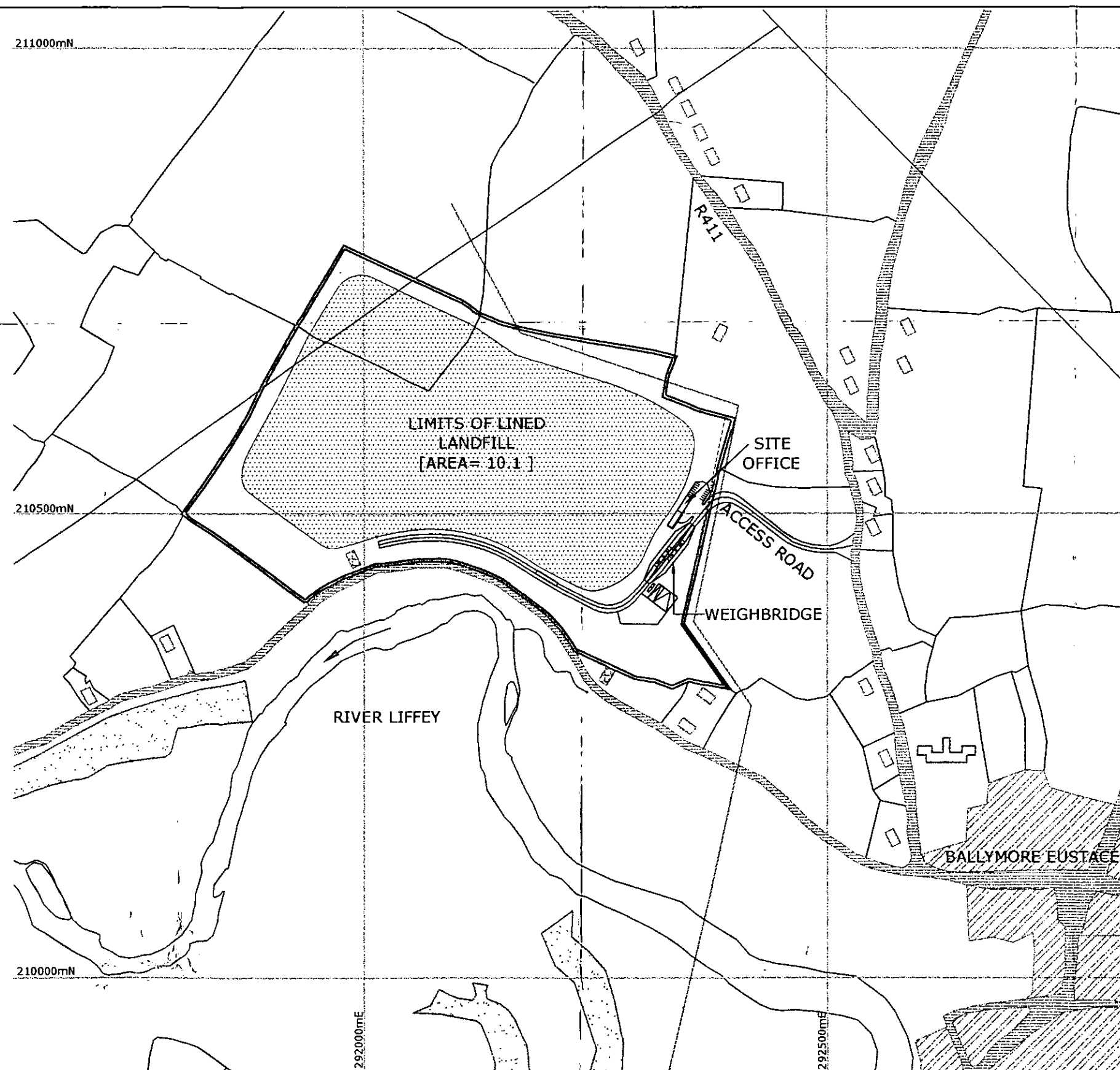
**Table 2.3.1 Estimates of Quantities of Wastes to be Imported**

<b>Waste type</b>	<b>Total Tonnes</b>
Commercial and Industrial (C/I)	1,200,000
Builders'/Construction and Demolition (C&D)	Included in industrial
Waste imported for engineering and restoration purposes <ul style="list-style-type: none"> <li>• Clay</li> <li>• Unclassified fill for landscape mounds and materials to cover waste</li> </ul>	85,000 600,000
<b>Total</b>	<b>1,885,000</b>

### **2.3.2 Nature of Materials**

The wastes that would be accepted at the facility are indicated in Table E.1.3 of the Waste License Application documents submitted in conjunction with this EIS.

The wastes that would be accepted, in terms of European Waste Catalogue classes are indicated in Table 2.3.2.



# LEGEND

- FORESTRY
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- LAND HOLDING BOUNDARY
- POWER LINE
- DUBLIN CORPORATION WATER MAIN

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 2.1

OVERVIEW OF FACILITY

Scale: 1:5,000 A3

Drawn By: NH

Date: 02/05/01



**Table 2.3.2 European Waste Classes of Materials Proposed (P)  
to be Accepted at the Facility**

Major Headings	Waste Class	Description	Proposed
02 00 00		<b>Waste from agricultural, horticultural, hunting, fishing and aquaculture primary production, food preparation and processing</b>	
	02 01 00	<b>Primary production waste</b>	
	02 01 04	Waste plastics (Excluding packaging)	P
03 00 00		<b>Wastes from wood processing and the production of paper, cardboard, pulp, panels and furniture</b>	
	03 01 00	<b>Wastes from wood processing and the production of panes and furniture</b>	
	03 01 02	Sawdust	P
	03 01 03	Shavings, cuttings, spoiled timber/particle board/veneer	P
12 00 00		<b>Wastes from shaping and surface treatment of metals and plastics</b>	
	12 01 00	<b>Wastes from shaping (including forging, welding, pressing, drawing, turning, cutting and filling)</b>	
	12 01 01	Ferrous metal filings and turnings	P
	12 01 02	Other ferrous metal particles	P
	12 01 03	Non-ferrous metal filings and turnings	P
	12 01 04	Other non-ferrous metal particles	P
	12 01 05	Plastic particles	P
16 00 00		<b>Waste not otherwise specified in the catalogue</b>	P
	16 01 00	<b>End of Life Vehicles</b>	
	16 01 03	Used tyres	P
	16 06 00	Batteries and accumulators	P Quarantine
	16 06 04	Alkaline batteries	Incidental
17 00 00		<b>Construction and demolition waste (including road construction)</b>	
	17 01 00	<b>Concrete, bricks, tiles, ceramics and gypsum based materials</b>	
	17 01 01	Concrete	P
	17 01 02	Bricks	P
	17 01 03	Tiles and Ceramics	P
	17 01 04	Gypsum based construction materials	P
	17 01 05	Asbestos based construction materials	P
	17 02 00	<b>Wood, glass and plastic</b>	
	17 02 01	Wood	P
	17 02 02	Glass	P
	17 02 03	Plastic (Pipe)	P
	17 03 00	<b>Asphalt, tar and tarred products</b>	
	17 03 01	Asphalt	P
	17 04 00	<b>Metals (including their alloys)</b>	
	17 04 01	Copper, bronze, brass	P
	17 04 02	Aluminium	P
	17 04 03	Lead	P
	17 04 04	Zinc	P
	17 04 05	Iron and steel	P
	17 04 06	Tin	P

	17 04 07	Mixed metals	P
	17 04 07	Cables	P
	<b>17 05 00</b>	<b>Soil and dredging spoil</b>	
	17 05 01	Soil and stones	P
	17 05 02	Dredging spoil	P
	<b>17 06 00</b>	<b>Insulation materials</b>	
	17 06 02	Other insulation materials	P
	17 07 00	<b>Mixed construction and demolition Waste</b>	
	17 07 01	Mixed construction and demolition	P
<b>19 00 00</b>			
	<b>19 09 00</b>	<b>Wastes from the preparation of drinking water or water for industrial use</b>	
	19 09 01	Solid wastes from primary filtration and screening	P
<b>20 00 00</b>		<b>Municipal wastes and similar commercial, industrial and institutional wastes including separately collected fractions</b>	
	<b>20 01 00</b>	<b>Municipal waste</b>	
	20 01 01	Paper and cardboard	P
	20 01 01 01	Packaging	P
	20 01 01 02	Newspapers & brochures	P
	20 01 01 03	Magazines & glossy papers	P
	20 01 01 04	Other papers	P
	20 01 01 05	Flat packaging cardboard	P
	20 01 01 06	Corrugated packaging board	P
	20 01 01 07	Other cardboards	P
	20 01 01 08	Cardboard composite packaging	P
	20 01 01 09	Liquid packaging Al	P
	20 01 01 10	Liquid packaging non-Al	P
	20 01 01 11	Other composite packaging	P
	<b>20 01 02</b>	<b>Glass</b>	
	20 01 02 01	Green glass packaging	P
	20 01 02 02	Clear glass packaging	P
	20 01 02 03	Brown glass packaging	P
	20 01 02 04	Other glass waste	P
	<b>20 01 03</b>	<b>Small plastics</b>	
	20 01 03 01	Mixed flexible plastic	P
	20 01 03 02	Clear PVC bottles	P
	20 01 03 03	Clear PET bottles	P
	20 01 03 04	Mixed rigid plastic	P
	20 01 03 05	Opaque PVC jars & bottles	P
	20 01 04 06	Green PET jars & bottles	P
	20 01 04 07	Brown PET jars & bottles	P
	20 01 03 08	PE bottles	P
	20 01 03 09	Supermarket bags	P
	20 01 03 10	Other plastic packaging	P
	<b>20 01 04</b>	<b>Other plastics</b>	P
	<b>20 01 05</b>	<b>Small metals (cans etc.)</b>	P
	20 01 05 01	Ferrous metal packaging	P
	20 01 05 02	Other ferrous metal waste	P
	20 01 05 03	Aluminum packaging	P
	20 01 05 04	Other aluminum waste	P
	20 01 05 05	Other metal packaging	P
	<b>20 01 06</b>	<b>Other metals</b>	P
	<b>20 01 07</b>	<b>Wood</b>	P

	<b>20 01 09</b>	<b>Oils and fat</b>	<b>Incidental</b>
	<b>20 01 10</b>	<b>Clothes</b>	<b>P</b>
	<b>20 01 11</b>	<b>Textiles</b>	<b>P</b>
	20 01 11 01	Packaging	<b>P</b>
	20 01 11 02	Other textiles	<b>P</b>
	20 01 11 03	Health care textiles	<b>P</b>
	<b>20 01 24</b>	<b>Electronic equipment (e.g. printed circuit boards)</b>	<b>P</b>
	<b>20 01 25</b>	<b>Unclassified combustibles</b>	
	20 01 25 01	Wood packaging	<b>P</b>
	20 01 25 02	Other combustible packaging	<b>P</b>
	20 01 25 03	Other unclassified combustibles	<b>P</b>
	<b>20 01 26</b>	<b>Unclassified incombustibles</b>	
	20 01 26 01	Unclassified incombustible packaging	<b>P</b>
	20 01 26 01	Other unclassified incombustibles	<b>P</b>
	<b>20 02 00</b>	<b>Garden and park waste (including cemetery waste)</b>	<b>P</b>
	20 02 02	Soil and stones	<b>P</b>
	20 02 03	Other non-compostable wastes	<b>P</b>
	<b>20 03 00</b>	<b>Other municipal waste</b>	
	20 03 03	Street cleaning residues	<b>P</b>

**Note:**

1. "Incidental" means that these materials are not on the accepted list of wastes but that they may appear in small or incidental amounts in loads of mixed waste.

## **2.4 Proposed Site Infrastructure**

The site of the proposed facility is a disused sand and gravel pit. As such there is no existing site infrastructure that can be used for the proposed facility.

The proposed site and landfill infrastructure is shown on Drawings 102 and 103.

### **2.4.1 Site Security**

A kiosk will be included for security purposes to facilitate the weighing of incoming and outbound vehicles. There will be a main gate at the entrance to the site. It will be locked nightly.

The boundary will be made secure by a combination of thick hedges and stock proof fences and gates where required.

There will be security personnel on site when the facility is closed.

### **2.4.2 Site Roads**

The site will be accessed via an improved existing entrance off of the R411. Lorries carrying wastes will proceed from the R411 westerly along a private access road in a southerly direction towards the weighbridge area. The private access road (not on the application site) will be surfaced with macadam. This road will cross the Dublin Corporation watermain. A suitable pavement structure (combination of reinforced concrete and macadam) will be constructed over the watermain.

An internal macadam surfaced road will be developed to access the site offices, weighbridges, waste inspection area and wheel wash.

Temporary haul roads will be developed around the perimeter of the landfill and within the landfill area to facilitate waste recovery and disposal operations.

### **2.4.3 Hard-Standing Areas**

Hardstanding areas are depicted in Drawing 103. Hardstanding areas will encompass site offices, weighbridge, wheelwash, and leachate holding and loadout area. A permanent haul road will lead from the weighbridge towards the landfill tipping area.

#### **2.4.4 Weighbridge**

There will be at least one weighbridge on-site. As shown on Drawings 102 and 103, inbound and outbound weighbridges are planned at this point in the facility design.

#### **2.4.5 Wheel wash**

A wheel wash will be installed as shown on Drawing 103.

#### **2.4.6 Laboratory Facilities**

There will be no laboratory on-site.

#### **2.4.7 Fuel Storage Areas**

Fuel tanks will be stored on-site within the lined landfill area and on a mobile bunded tank.

#### **2.4.8 Waste Quarantine Areas**

There will be a waste quarantine area provided on the site as indicated in Drawings 102 and 103. It is proposed to include a temporary/portable low shed (less than 3.5 m in height) to hold drums, gas bottles and batteries. There will also be a skip for tyres outside on the hardstand. Clearly marked/painted skips will also be positioned within the landfill area to hold any unacceptable wastes and other materials that might be recovered e.g. pallets or metal.

#### **2.4.9 Waste Inspection Areas**

A mobile load inspection area will be constructed out of netting and bunds near the tipping face. A select number of loads will be inspected in this area. Wastes will also be inspected at the tipping face.

#### **2.4.10 Traffic and Traffic Control**

It is expected that there will be approximately 55 in bound waste lorry movements per day. During construction there may be an additional 16 inbound movements per day. A full assessment of traffic on the road is presented in section 3.5.

Stop signs, yield signs and directional signs will be installed on the internal roads. Traffic calming measures, including speed bumps,

will also be included. Pavements will be white lined and will include directional errors as required.

#### **2.4.11 Services**

The site will be serviced with electricity, telephone/fax lines and a potable water supply.

Underground ducts will be utilised to carry cabling. Existing overhead ESB lines crossing the site will be diverted or put into buried ducts.

#### **2.4.12 Sewerage and surface water drainage infrastructure**

##### **Foul Sewage**

There will be toilet facilities on-site for employees. The small quantity of foul sewage will discharge into a proprietary treatment unit such as a Puraflow or Klargester Biodisc system. The treated effluent will be directed to a percolation area.

##### **Surface Water Drainage**

All paved surfaces will drain to roadside gullies. The surface water runoff will flow from the road gullies through a piping system to a buried silt settling tank. The silt settling tank will drain into surface water bypass interceptor before it is discharged off site into a groundwater infiltration basin or the River Liffey (See Drawings 102 and 103).

#### **2.4.13 Plant sheds, garages and equipment compound**

An equipment compound will be developed within the lined landfill area. This compound will be defined by temporary security fences, as required. The waste compactors, excavators and other heavy plant will be parked in this compound. Its location will vary as the tipping area shifts across the site.

A temporary shed will be erected (in the hardstand area) to store small tools and plant such as lawnmowers, bobcat sweeper tractor and bowser.

#### **2.4.14 Site Accommodation**

A kiosk will be installed next to the weighbridges.

Site offices, changing facilities, toilets, showers and a canteen will be provided in a temporary porta-cabins located near the weighbridges (See Drawing 103).

#### **2.4.15 Fire Control System**

Fire control would be provided by using on-site soils to smother a fire or by calling in the fire brigade, from Naas.

## **2.5 Engineered Landfill**

### **2.5.1 Overview of Design**

The proposed extent of the engineered landfill is depicted on Drawing 102. Drawing 104 presents the proposed restoration levels for the landfill. Cross sections of the side slopes and the completed landform are shown on Drawings 106 and 107.

Large cuts and fills will be involved in order to shape the existing pit into a useable void space for waste disposal. Earthworks construction will be ongoing over the life of landfilling activities on the site.

The infill below the surrounding land surface will range between 16 and 28 metres deep. The maximum level of deposited C/I waste will be 150 mOD to tie into the land surface in the northeast corner of the site.

The edge of the lined area (footprint) of the landfill will be ca. 10.1 ha. Buffer lands will be available outside the limits of the landfill for fencing, landscaping, environmental monitoring installations, site roads, and surface water drainage systems. There is a nominal 6 m wide Services Corridor outside the edge of the lined landfill slope that will contain jeep tracks, roadside ditches/French drains and litter fences. Along the southern perimeter of the landfill the separation distance from the edge of the lined slope and the site boundary extends to approximately 30 metres (Drawing 102). This allows for provision of landscaping berms and shelterbelts of trees and other vegetation.

The ultimate area of the floor upon completion of excavations in the northwest field will be ca. 6 ha.

### **2.5.2 Landfill Infrastructure**

The landfill slopes and base will be lined with an HDPE geomembrane. There will be a leachate collection system comprising a drainage layer 0.5 m thick and perforated HDPE collection pipe. The lined landfill base will be sloped to promote drainage to sumps in which submersible leachate pumps will be installed to remove leachate from the base of the landfill. The landfill lining and leachate collection systems are described in detail in section 2.6.2 and 2.6.3, respectively. The completed landfill will be capped with a number of soil layers as described in detail in section 2.6.5.



### 2.5.3. Void Space of Landfill

The landfill foot print, design slopes of the lined excavation, landfill base area and contours and the final restoration contours govern the volume of the void that will be filled. The landfill formation contours shown on Drawing 102 were selected to leave a minimum of 1m of soil above the groundwater table. The restoration contours shown on Drawing 104 are the contours to which materials will be deposited. The materials deposited above 150 m OD in landscaping mounds will comprise inert C&D wastes. Over time the wastes below 150 mOD will decompose and the surface will settle. The engineered capping layers will be placed on the final surface of the waste that plateaus at 150 mOD.

The computed volume of the void formed by the base and side slope surfaces shown on Drawing 102 (i.e. the area inside the edge of liner) and the restoration surface contours shown on Drawing 104 is approximately 2.3 million m<sup>3</sup>.

This total volume includes the following materials and approximate volumes:

**Table 2.5.1 Landfill Volumes**

<b>Materials</b>	<b>Volume (m<sup>3</sup>)</b>
Clay Liner on base	60,000
Drainage layer on base	30,000
Engineered final Capping layers	220,000
Inert C&D materials above 150 mOD	270,000
Daily and intermediate soil	200,000
<b>Subtotal Engineering and Restoration Materials placed in landfill area</b>	<b>780,000</b>
Computed Net volume to be filled by C/I Wastes	1,520,000
Estimated Recovered volume due to settlement of wastes over time	200,000
<b>Estimated Net Volume to be filled by C/I Wastes allowing for Settlement</b>	<b>1,720,000</b>

The anticipated tonnage of C/I wastes that will fill the 1.72 million m<sup>3</sup> is 1.20 million tonnes based on a density of 0.70 tonnes/ m<sup>3</sup>. Materials balance calculations have been carried out (See tables in Appendix 2) which indicate a shortfall in inert soil fill requirements even with the extraction of the materials within the northwest field.

An additional 315,000 m<sup>3</sup> of unclassified fill (approximately 600,000 tonnes) and 44,000 m<sup>3</sup> of clay (approximately 85,000 tonnes) will be imported and placed in the restoration/landscape works.

#### **2.5.4 Landfill Phasing and Construction**

The concept plan is to develop two distinct landfill Phases, identified as **Phase 1** and **Phase 2** on Drawing 102. However, a smaller second phase and a third phase comprising the northwest corner of **Phase 2** may be necessary to fit the construction work into the summer season. Also there may be delays in removing all of the materials from the northwest field thus necessitating a smaller **Phase 2** development to accommodate the incoming wastes.

#### **2.5.5 Time Scales for Landfill Development and Completion**

If the waste licence is received in early 2002 construction of Phase 1 will begin in April 2002. Landfilling of Phase 1 would commence approximately 6 months after the initiation of construction.

Phase 2 construction would begin in April 2004. Landfilling would commence in Phase 2 later in 2004.

Delays in obtaining a waste license and the required planning permission for excavation of the field may delay construction of the landfill thereby delaying the commencement date for landfilling to possibly 2003.

#### **2.5.6 Liner System Details**

##### **2.5.6.1 Design Concept**

The proposed landfill facility will include a base and slope lining system that will contain leachate. The lining system on the base will be overlain by a drainage layer that will direct leachate to sumps.

The lining system on the base will be a composite liner that will comprise a layer of compacted clayey silt ( i.e. a compacted clay liner – CCL) a minimum of 1 m thickness and a 2 mm thick high density polyethylene (HDPE) geomembrane. The soil liner will have a coefficient of permeability of less than  $1 \times 10^{-9}$  m/sec. The design levels for the top surface of the base liner will be 1 metre above the formation levels shown on Drawing 102. The proposed base levels are dictated by the water table level beneath the former sand and gravel pit, and the need to create a positive grade for

gravity flow of leachate towards sumps where pumps will be installed in the leachate collection system. The base liner design concept is illustrated on Drawing 108.

The side slopes of the excavated pit will be lined with a geosynthetic clay liner (GCL) and a layer of HDPE geomembrane. The GCL will be reinforced and will have a permeability of less than  $1 \times 10^{-10}$  m/sec. As the leachate level will be maintained at a low level there will be a very low risk of leachate leakage through the side slopes. The CCL will be extended to a metre above the anticipated high level of the leachate. The sidewall liner design concept is illustrated on Drawing 108.

#### **2.5.6.2 Liner Specifications**

Specifications will be performance based. The mineral soil layer shall be minimum of 1 metre thick and shall have a co-efficient of permeability (K) of less than  $1 \times 10^{-9}$  m/sec. The silty clay materials on site will be used to construct the CCL. Preliminary laboratory and field testing of the material proposed for use as a liner has been carried out. The testing to date indicates that the on site soils will be suitable for the CCL. The results are presented in Appendix 3.

Detailed specifications for all liner systems will be prepared and supplied to the EPA prior to construction.

#### **2.5.6.3 Method Statement for Construction**

A qualified engineer and/or contractors will prepare method statements prior to construction of the liner.

#### **2.5.6.4 Safety Statement for Construction**

The contractor constructing the liner system shall prepare a "Safety Statement".

#### **2.5.6.5 Quality Control and Assurance Plans**

These shall be prepared following licensing and prior to the commencement of liner construction.

There will be third party supervision, testing and control of liner construction.

#### **2.5.6.6 Leak Detection Survey**

A pre-commissioning test of the liner in the form of leak detection survey (LDS) will be carried out as part of the HDPE liner CQA/CQC. It shall be specified and the details shall follow, following licensing and prior to completion of the lining system. All defects discovered by the LDS will be repaired and signed off before wastes are accepted.

#### **2.5.6.7 Access Ramps to Lined Cells**

Access ramps to the tipping area will be carefully built with inert material that does not contain sharp fragments or objects that could potentially puncture the lining system. The ramps will be built so their horizontal upper surface extends out beyond the toe of the lined slope. This will be done to minimise shear loading on the lined slope.

### **2.5.7 Leachate Management Arrangements**

#### **2.5.7.1 Leachate Management Plan**

##### **Containment Features**

Leachate will be contained by a base and slope lining systems. Upon completion of the entire lining system there will be containment of leachate within a HDPE liner.

##### **Collection System**

A leachate collection, drainage layer and piping system will be installed on the lining system that will be constructed on the base of the landfill.

Drawing 102 depicts a layout of the leachate collection system. The leachate collection system will consist of a 150 mm ID minimum diameter perforated HDPE collector pipes laid in a 0.5 m thick layer of drainage stone. The wall thickness of the pipe will be selected to avoid crushing due to a overburden loads.

The material comprising the drainage layer will have a permeability of greater than  $1 \times 10^{-3}$  m/sec.

The proposed completed levels of the lining system will vary between 122.5 mOD to 125 mOD. The plan is to drain leachate by

gravity flow in a number of runs of perforated pipe lying within the 0.5m thick layer of drainage stone. The base of the landfill will be shaped so that there is a minimum overall slope of greater than 0.5 %. The perforated leachate collection pipe will drain to sumps as shown on Drawing 102. Within 50 metres of the sumps the slope on the base liner will be 2%.

### **Leachate Removal/Evacuation Features**

The plan is to remove leachate from the base of the landfill by submersible pumps. The leachate will be pumped from the landfill base and discharged ultimately into a leachate holding tank.

There will be 2 No. pumping systems in the landfill. The pumping systems will include a HDPE perforated pipe (well screen) laid horizontally on the base of a stone filled sump that will be constructed at the top of the lined landfill slope. (See Drawing 108). The horizontal well screen (300 mm ID diameter HDPE pipe) will feed a submersible pump that will be equipped with level switches or a pressure transducer that will activate the pump when the leachate head reaches a prescribed level. The horizontal well screen will be connected to an inclined HDPE riser pipe that will be laid on the lined slopes.

The discharge from the submersible pumps will likely be through 40 to 60 mm diameter pipes. It will be possible to insert and withdraw the submersible pumps and discharge lines for routine maintenance, repair or replacement. The leachate evacuation pumps will discharge into a leachate gravity/rising main that will connect to a holding tank.

A submersible pump will be installed in the leachate holding tank, which will be controlled by level switches. There will be high and low level switches. The leachate evacuation pumps in the landfill will shut off, if the level in the tank exceeds a prescribed level.

### **Storage Facilities**

The plan is to use the lined landfill area as the primary facility for leachate storage. During the operational period of the facility, the maximum planned leachate level within the lined area will be 1.5 metre above the lowest level on the HDPE lined base. The volume of leachate contained in the landfill will vary with depth of leachate at the base. The second storage facility will a GRP tank. The minimum proposed capacity is 50 m<sup>3</sup>.

The leachate holding tank will be equipped with a submersible pump which will feed a piping system that will allow top loading of 25 to 30 m<sup>3</sup> bulk haul articulated tanker. One tanker will be located near the leachate holding tank. It will be filled on a batch basis, and subsequently removed by a truck, which will leave an empty tanker. The pavement area in which the buried holding tank and leachate tanker will be located will be sloped to a gully that will drain back into the holding tank or the lined landfill area.

The bulk tanker will haul the leachate to the closest suitable sewage treatment plant in County Kildare.

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### **Leachate-Re-circulation**

A leachate re-circulation system will be planned, designed and proposed to the Agency prior to its installation. The system will include pumping leachate back from the two sumps into buried piping systems installed below the surface of the waste.

### **System for Monitoring Leachate Levels**

Leachate levels will be measured in the leachate evacuation pump sumps. Pressure transducers will also be installed in the drainage layer constructed on the lining system. Installation of vertical risers within the waste as landfilling proceeds is not proposed. If the pressure transducers fail monitoring boreholes will be installed upon completion of each phase through the deposited materials to within 3 to 4 m of the upper surface of the HDPE liner.

### **Leachate Disposal**

Leachate may be removed by pumping into a tanker. The proposed method of disposal of leachate from the proposed landfill is the treatment plant located at Athy, County Kildare.

The option of pre-treatment of leachate and discharge into the foul sewers in Ballymore Eustace will be investigated and assessed.

#### **2.5.7.2 Annual Quantities of Leachate**

Leachate generation depends on a number of factors including climate, site topography, nature of the wastes, landfill cover materials and vegetation, and the phasing and operational procedures. It is acknowledged in the industry that an accurate

/prediction of leachate generation is difficult. Estimates and the assumptions upon which they are made are indicated in table 2.5.1.

### **Restoration Plan**

The waste will be progressively capped with various soil layers. It is assumed for the purposes of calculation that capping will be complete in a specific area within two years after the area has been filled. Table 2.5.2 illustrates the assumed sequence of filling and restoration for the site based on the assumptions given above.

### **Comments on Assumptions**

The amount of absorptive capacity and evaporation from the waste will depend on the waste types. There is published data for absorptive capacity of municipal solid waste (MSW). It is assumed that the commercial and industrial wastes are approximately similar to MSW for the purposes of the calculations.

Evaporation from the landfilled materials is also difficult to predict. Therefore, a reasonable allowance of approximately half of the estimated actual evapotranspiration at the site has been made in the water balance calculations.

The amount of infiltration that will eventually infiltrate through the proposed engineered capping system is not easily predicted. Experience would suggest that 20% of the total rainfall may penetrate final covers (Bagchi, 1994). This equates to about 190 mm/year, which is roughly 40% of the effective rainfall.

Investigators in Wales (see Cherrill and Phillips, 1997) have calculated that, in the case of engineered capping system, the infiltration may be in the range of 50 to 120 mm/year if the capping system includes a barrier layer with a permeability of  $1 \times 10^{-8}$  m/sec. The experience with native glacial tills placed and compacted with tracked equipment can produce a barrier layer in the final cap with a permeability of less than  $1 \times 10^{-8}$  m/sec. Therefore, a lower infiltration rate than 50 mm/year above maybe expected.

As a percentage of net rainfall this range equates to 10 to 25 % of the average computed effective rainfall at the site. A conservative infiltration rate, through the proposed completed capping system, of 25% of the average effective rainfall has been made in the calculations.

## Results of Calculations:

Table 2.5.3 enclosed gives the results of the calculations. The calculations indicate that the average annual generation rate during the operational phase will range between 12,600 and 37,400 m<sup>3</sup>/year. It should be noted that these calculations are indicative only and the generation rates will vary from month to month and year to year. It is likely the maximum generation rates will be during approximately the months of November through to April. It is likely that significant quantities of leachate may not be observed in the first few months to years of the operations, as it will take time for the wastes to reach their field capacity. It should also be noted that isolation of areas within each of the lined development phases to separate potentially clean surface water runoff from water that has been in contact with waste within a completely lined phase is currently not proposed but may be considered during development of the landfill.

The leachate generation rate in the post closure period will depend largely on the construction of the capping system. Based on the assumptions previously indicated the average annual quantity of leachate following closure and restoration of the site will be approximately 12,000 m<sup>3</sup>/year. A very low permeability clayey barrier installed in the capping system at this site may reduce leachate generation to less than 50 mm/year, which would equate to annual total quantity of approximately 5,000 m<sup>3</sup>/year.

These indicative rates will be reviewed during the operational period and compared with pumping rates.

### 2.5.7.3 Leachate Emissions

The EPA's guidance notes indicate that the nature, composition, quantity, level and rate of any leachate emissions should be furnished. Information is provided below in regard to the emissions. The impact of the emissions is also addressed.

Should there be leachate emissions from the facility there would be a point discharge at the leachate holding tank or a disperse discharge through the landfill base. The discharge through the base may be leakage via holes in the geomembrane and via diffusion through the 2 mm thick geomembrane. The leachate would then migrate via advection and diffusion through the minimum 1 metre thick compacted clay liner (CCL) until it reaches the native unsaturated glacial sediments. The unsaturated zone beneath the landfill base will generally be between 2 and 3 m thick. Leachate



Table 2.5.2 Indicative Filling and Restoration Programme

$A_1$ = Area (Ha) - Phase 1	4.0	Ha
$A_2$ = Area (Ha) - Phase 2	6.1	Ha
$W$ = Tonnes of Waste (Annual)	200,000	Tonnes
$V$ = Volume of Waste (Annual)	285,714	m <sup>3</sup>
$Ab$ = Absorptive capacity of waste	0.08	m <sup>3</sup> /tonne
$P$ = Average Annual Precipitation	950	mm
$ET$ = Evapotranspiration	467	mm
$E$ = Evaporation from waste (0.5*ET)	233.5	mm
Years	6.00	

Formulae

$f$  = filling (not capped)

$o$  = open

$p$  = partly restored

$r$  = restored

$$L = [(P-E) * A * 10] - (W * Ab)$$

$$L = [(P-E) * A] * 10$$

$$L = 0.5 * [(P-ET) * A * 10]$$

$$L = 0.25 * [(P-ET) * A * 10]$$

Year	Phase 1 A = 4.0 ha	Phase 2 A = 6.1 ha
0	-	-
1	f	-
2	f	-
3	p	f
4	p	f
5	r	f
6	r	f
7	r	p
8	r	r

Table 2.5.3 Leachate Volumes (m<sup>3</sup>)

Year	Phase 1	Phase 2	Total Annual
0	-	-	0
1	12,660	-	12,660
2	12,660	-	12,660
3	9,660	27,707	37,367
4	9,660	27,707	37,367
5	4,830	27,707	32,537
6	4,830	27,707	32,537
7	4,830	14,732	19,562
8	4,830	7,366	12,196

would migrate vertically downward through the unsaturated sediments to the saturated sediments where it will mix with the groundwater beneath the site.

Contaminants in the leachate will be attenuated in four media, the HDPE liner, the compacted clay liner, the unsaturated sediments and the saturated sediments. The impact of leachate on the underlying groundwater will depend on the quantity and composition of the leachate that finally reaches the groundwater flow system and the volumetric flow rate of the groundwater. Within the CCL and the unsaturated sediments several processes such as adsorption, biological uptake, cation and anion exchange, filtration and precipitation will attenuate many of the contaminants present in leachate. ~~Some of these processes and dilution will also occur in~~ the groundwater flow system beneath the site.

### **Quantity, Level and Rate**

Leakage through defects in a composite liner may be calculated using semi-empirical formulae developed by Giroud et al in the 1980s and early 1990s. However, assumptions must be made with respect to a number of variables that include: the head of leachate on the liner; the contact conditions of the geomembrane on the 1 m thick low permeability soil layer beneath the liner; and the number and area of the defects or holes in the geomembrane. The applicable formula for leakage through holes is as follows:

$$Q = 0.21 i_{avg} a^{0.1} h^{0.9} k^{0.74}$$

Where;

$Q = m^3/s$

$i_{avg}$  = a dimensionless factor that depends on the head of leachate and the thickness of the clay layer, in this case the maximum assumed head is 1.5 m on average and the minimum thickness of the clay layer will be 1 m, therefore based on a paper by Giroud et al, 1994 this factor will be approximately 1

$a$  = the area of the defect in  $m^2$

$h$  = hydraulic head which is assumed to be a maximum of 1.5 m

$k$  = permeability of the clay layer which will be  $1 \times 10^{-9} m/sec$

This formula is applicable in situations where there is good contact between the geomembrane and the clay layer. It is assumed that this will be the case.

The size and number of defects must be assumed based on past experience. The technical literature suggests defect areas of less

than  $10^{-5} \text{ m}^2$  can be assumed. If there is third party QA/QC then it may be assumed there are 5 or less holes per hectare.

On the basis of the foregoing assumptions the leakage through a 6 ha landfill base is  $6 \text{ ha} \times 9 \text{ litres/ha/day} = 54 \text{ litres per day}$ . This is equivalent to approximately  $20 \text{ m}^3/\text{year}$ . This estimate is based on theoretical and empirical formulae and a leachate head of 1.5 m. In practice the leachate head will be less than 1.5 m as the proposed maximum head at the low end of the sloped landfill base is 1.5 m.

Leakage rates through intact geomembranes were estimated by Giroud et al, 1989a, for a number of different leachate heads and assuming there is a pervious layer beneath the geomembrane. On the basis of the reported rates in Table 7 in Giroud et al, 1989a, a 2mm thick HDPE geomembrane and an assumed maximum leachate head of 1.5m, the leakage rate through the liner material will be  $44 \text{ m}^3/\text{year}$ . This is considered to be an overestimate of the leakage rate at the proposed landfill since as noted by Giroud et al, 1989a, the nature of the material overlying and underlying the geomembrane will have a significant effect on the leakage rate (i.e. the rate will be reduced if low permeability material underlies the geomembrane).

It is apparent from the technical literature and the illustrative calculations presented above, that it is not possible to provide a unique leachate emission rate for this or any proposed facility. If all of the assumptions represent the real situation, then the leachate emission quantity, level and rate through the base of the landfill will be less than  $100 \text{ m}^3/\text{year}$ . The leakage rate will be reviewed and re evaluated once reports by the CQA/CQC inspector for the liner are in hand and the actual leachate heads are known.

The other leachate emission point from the landfill is the discharge of the pump located in the leachate holding tank. This emission is a controlled point discharge into either a tanker or a rising main that will convey leachate from the landfill to the foul sewers. The estimated quantity of this discharge will vary as outlined in Table 2.5.3.

### **Nature and Composition**

The nature and composition of the leachate emissions will depend largely upon the nature and composition of the wastes deposited in the landfill and a number of other factors including temperature, moisture content, depth of fill and stage of the decomposition of the waste in the landfill. Table E.1.1 in the completed application form

indicates the approximate quantities of waste, classified by source (i.e. construction and demolition, commercial or industrial). Table E.1.3, indicates the type of wastes that will be accepted. The quantity of each type of waste is not known and therefore it is difficult to predict the nature and composition of the leachate. The leachate will be similar to the leachate that is generated in the KTK Landfill near Kilcullen. Data on the composition of leachate from that landfill site is enclosed (See table 2.5.4).

Further testing of the KTK Landfill leachate was recently carried out to ascertain BOD & COD levels (See Table 2.5.5).

## **Impact of Emissions**

Significant effects on the future quality of groundwater migrating beneath the site are not expected. Monitoring of the composition of leachate and groundwater quality upgradient and downgradient of the site will be carried out to confirm that this is the case. Corrective actions will be taken if monitoring results show that leakage from the landfill is affecting groundwater quality.

One potential effect of discharging leachate into the County Council sewage treatment works will be consumption of a small portion of the available capacity of the plant. There may be other potential effects that will be clarified with the sanitary authority prior to commissioning of the leachate removal system in the proposed landfill and later once the composition of the leachate is known from actual test results.

## **2.5.8 Landfill Gas Management**

### **2.5.8.1 Introduction**

Gases are generated in landfills as a consequence of the aerobic but mostly anaerobic biodegradation of organic matter in the deposited waste. The proposed backfill materials will contain textiles, paper, cardboard and timber. These materials will biodegrade slowly and produce landfill gas. The quantity and nature of the gas will depend on the mixture of the materials deposited in the landfill and a number of factors, which are described below.

Passive venting and active collection of landfill gas will be incorporated into the design and operating procedures of the facility.

Table 2.5.4 Potential Leachate Composition

PARAMETER	UNIT	17/05/00	21/11/00
pH*	pH Units	6.89	6.9
Temperature*	°C	-	-
Electrical Conductivity*	µS/cm @ 20 °C	2000	3630
Chemical Oxygen Demand	mg/l as O <sub>2</sub>	1860.00	5560.00
Biochemical Oxygen Demand	mg/l as O <sub>2</sub>	22	9
Ammoniacal Nitrogen	mg/l as N	20.3	140
Boron	mg/l as B	0.571	1.63
Chloride	mg/l as Cl	108.15	630
Cadmium	mg/l as Cd	<0.0035	<0.0035
Calcium	mg/l as Ca	366	942
Chromium	mg/l as Cr	0.013	0.05
Copper	mg/l as Cu	<0.015	0.031
Cyanide	mg/l as Cn	0.5	0.21
Iron	mg/l as Fe	37.4	16.2
Lead	mg/l as Pb	<0.049	<0.049
Magnesium	mg/l as Mg	28.6	67.4
Manganese	mg/l as Mn	-2.59	12.5
Mercury	mg/l as Hg	<0.0005	<0.0005
Nickel	mg/l as Ni	0.092	0.096
Nitrite	mg/l as NO <sub>2</sub>	<0.1	-
Nitrate	mg/l as NO <sub>3</sub>	84.35	-
Phosphate	mg/l as P	-	2.3
Phosphorus	mg/l as P	0.27	-
Potassium	mg/l as K	40.9	118
Sodium	mg/l as Na	88.3	299
Sulphate	mg/l as SO <sub>4</sub>	18.83	<0.2
Zinc	mg/l as Zn	0.11	0.486
Total Oxidised Nitrogen	mg/l as N	<0.1	0.2
Total Organic Carbon	mg/l as C	558	1450
Total Alkalinity	mg/l as CaCO <sub>3</sub>	434	2219

Note:

Ranges from KTK Landfill samples taken in 2000

\* Field and Laboratory Measurements

Table 2.5.5 KTK Landfill (Kilcullen) Leachate Sample

KTK LANDFILL LEACHATE SAMPLE 23 APRIL 2001							
Sample No.	Sample Id.	FILTERED			UNFILTERED		
		COD	BOD [mg/l] 5 days	BOD [mg/l] 20	COD	BOD [mg/l] 5	BOD [mg/l] 20
1	KTK LA	1118	300	455	1196	336	455
2	KTK LB	1176	288	443	1186	264	455
3	KTK LC	1080	348	443	1190	300	383

## 2.5.8.2 Landfill Gas Volumes

### Background

The quantity and rate of gas production in a landfill site is dependent upon a number of factors including the:

- nature/composition of the waste
- biodegradable fraction of the organic constituents of the waste
- moisture content and density of the waste
- temperature

The exact composition or mixture of the waste to be deposited in the landfill is not known. Therefore an accurate estimate of the quantity of biodegradable matter present in the landfill and total quantity of gas produced cannot be made. Since this is the case, the discussion below addresses possible gas generation rates based on a number of arbitrary assumptions.

The total maximum yield of gas is in the range of 400 m<sup>3</sup>/dry tonne of waste or approximately 500 m<sup>3</sup>/wet tonne of waste according to Archer, 1987. It is assumed that these values apply to total municipal solid waste stream, which includes residential, commercial and industrial wastes. Tchobanoglous et al, 1993 indicates that maximum amount of gas that can be produced under optimum conditions will be in the range of 10 to 17 ft<sup>3</sup>/lb of biodegradable volatile solids in the organic fraction of the municipal solid waste. A generation value of 12 ft<sup>3</sup>/lb (approximately 750 m<sup>3</sup>/tonne) is reported in the same reference, for mixed organic waste.

In summary, it is accepted from research that not all of the organic fraction of the wastes deposited in a landfill will biodegrade and form biogas because:

- lignin contents inhibits biodegradation
- some materials are contained in plastic bags
- some materials may not be exposed to sufficient moisture

In Tchobanoglous, 1993 the relative rates of biodegradation and by inference the rate of gas production are suggested as follows, where rapidly biodegradable is defined as 3 months to 5 years and slowly biodegradable is up to 50 years or more.

## **Gas Production Estimates -Computation Methodology**

The reference text, Tchobanoglous, 1993 outlines an approach that may be followed to predict the quantity of gas generated from the proposed landfill site. The following information must be taken into consideration when estimating the total volume of gas that may be generated and the rate of generation at the site.

- **An annual filling rate and breakdown in waste streams**

It is assumed that approximately 200,000 tonnes (wet) per year of mixed C/I wastes will be deposited in the landfill annually.

- **Possible composition and moisture content of landfilled waste stream**

A possible composition and moisture content of the wastes that might be brought to the landfill is presented in Table 2.5.6.

It was assumed for the purpose of an estimate of gas volumes, that the organic fraction (except plastic which is considered to be inert) of the waste in the landfill would be 130,000 tonnes (wet) per year.

- **An estimate of dry weight of organic wastes**

Based on average values of moisture content for different types of waste it was estimated that there will be approximately 123,000 tonnes (dry) per year of organic waste.

- **An estimate of the biodegradable fraction of the organic wastes**

The biodegradable fraction of this waste depends on the quantity of volatile solids in the organic fraction and the lignin content of the volatile solids. A reliable estimate of the amount of biodegradable material in the landfill cannot be made without detailed composition analysis of the waste. A conservative estimate of the biodegradable portion of the dry organic waste is 123,000 tonnes.

- **An estimate of the total gas generation value for each dry tonne of biodegradable organic material**

The value indicated in Tchobanoglous et. al., 1993 may be used. It is noted that a number of other lower values are quoted in the technical literature but the lower rates appear to relate to the total tonnage of waste. The value of 750 m<sup>3</sup>/tonne relates to the tonnage

**Table 2.5.6 Possible waste composition of wastes to be landfilled**

**Scenario: 200,000 tonnes/yr of Commercial and Industrial Waste**

<b>Composition</b>	<b>Estimated Per cent (weight)</b>	<b>Tonnes</b>	<b>Tonnes Organic Waste (wet weight)</b>	<b>Tonnes Organic Waste (dry weight)</b>	<b>Typical Moisture Content (%)</b>	<b>Average Moisture (%)</b>
Paper & Card	55	110,000	110,000	103,400	6	
Glass	6	12,000			2	
Plastic	10	20,000			2	
Metals	6	12,000			3	
Textiles, Rubber and Leather	3	6,000			10	
Wood	10	20,000	20,000	19,600	2	
Other (fines, inerts)	10	20,000			30	
	100	<b>200,000</b>	<b>130,000</b>	<b>123,000</b>		<b>7.3</b>



of dry organic volatile solids that are biodegradable by methanogens in anaerobic conditions.

- **An estimate of the time period over which the wastes will biodegrade.**

Tchobanoglous, 1993 suggests that some of the wastes will biodegrade quickly (i.e. within 5 years) and other wastes will biodegrade slowly (i.e. up to 50 years).

### **Gas Production Rates**

A literature review suggests that the rate of production is highly variable and may fall in the range of 3.9 to 130 m<sup>3</sup>/tonne/year. (Archer, 1987). Other references suggest lower rates of production in the range of 1 to 10 m<sup>3</sup>/tonne/year, (EPA, 1997 and Bagchi 1994). It is obvious that if the total quantity of gas that is produced is fixed at say 750 m<sup>3</sup>/tonne then the rate of production will be a function of the overall duration over which the degradation process will occur. If the waste slowly degrades then the duration of degradation will be long and the rate of production will be low.

A theoretical gas production model will be developed during the course of the design the active gas collection system. The gas production model will be based on a first order decay function for the biodegradation process. Estimates of gas production rates based on a model developed for another similar landfill site is given in Table 2.5.7 and Figure 2.5.1.

### **Total Volume of Gas**

The total maximum quantity of gas generated may be computed based on some of the assumptions described above.

$$\begin{aligned} &= 750 \text{ m}^3/\text{tonne} \times 123,000 \text{ dry tonnes/year} \times 6 \text{ years} \\ &= 5.5 * 10^8 \text{ m}^3 \end{aligned}$$

This is a conservative estimate because no account is made for unavailable biodegradable wastes.

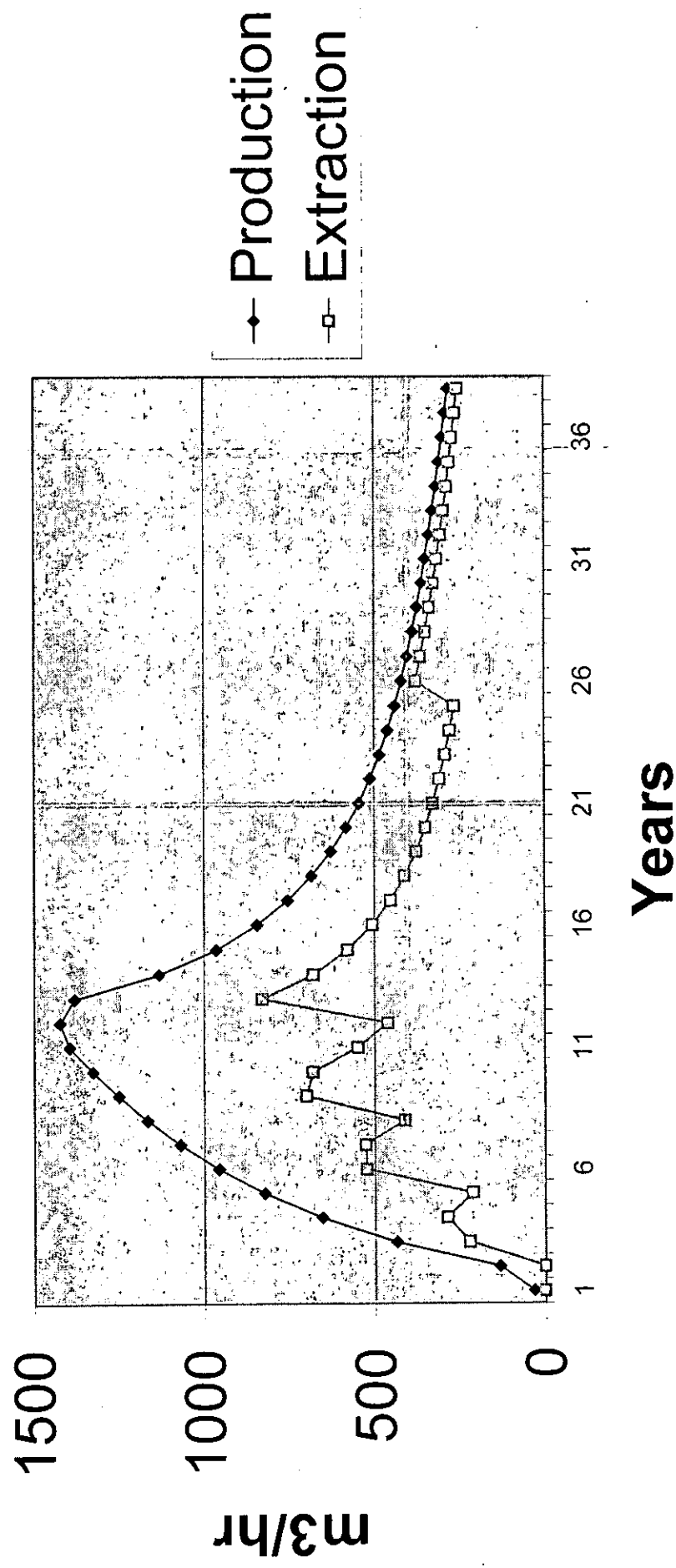
### **Comment on Estimates**

It is apparent and acknowledged in the technical literature that theoretical estimates based on a multiplicity of assumptions as indicated above will not be accurate and will only give approximate upper limits of gas quantities and production rates. Further

Table 2.5.7 Potential Landfill Gas Production and Extraction over time

	Gas Production			Extractable Volume	
	m <sup>3</sup> per tonne per annum	million m <sup>3</sup> per annum	m <sup>3</sup> per hour	million m <sup>3</sup> per annum	m <sup>3</sup> per hour
1	1.73	0.29	33.65	0.00	0.00
2	3.46	1.18	134.35	0.00	0.00
3	7.51	3.82	436.71	1.94	221.65
4	8.44	5.74	655.06	2.51	286.35
5	8.48	7.20	822.59	1.86	212.24
6	8.22	8.39	957.41	4.59	523.18
7	7.87	9.38	1070.00	4.61	526.94
8	7.52	10.22	1166.71	3.61	412.00
9	7.16	10.96	1251.53	6.13	699.65
10	6.84	11.62	1327.18	5.96	681.29
11	6.54	12.22	1395.53	4.81	549.29
12	6.67	12.48	1424.47	4.04	461.06
13	6.47	12.11	1381.29	7.26	828.82
14	5.31	9.92	1132.71	5.95	679.65
15	4.52	8.45	964.47	5.07	578.71
16	3.95	7.40	844.35	4.44	506.59
17	3.53	6.61	754.35	3.96	452.59
18	3.21	6.00	684.47	3.60	410.71
19	2.94	5.51	628.47	3.31	377.06
20	2.73	5.11	582.71	3.06	349.65
21	2.55	4.76	544.47	2.86	326.71
22	2.40	4.48	512.24	2.69	307.29
23	2.27	4.25	484.47	2.54	290.71
24	2.15	4.04	460.35	2.42	276.24
25	2.06	3.85	439.29	2.31	263.53
26	1.96	3.68	420.47	3.32	378.47
27	1.89	3.54	403.65	3.18	363.29
28	1.82	3.40	388.35	3.06	349.53
29	1.75	3.28	374.35	2.95	336.82
30	1.69	3.16	361.41	2.85	325.29
31	1.64	3.06	349.41	2.75	314.47
32	1.59	2.96	338.12	2.67	304.35
33	1.53	2.87	327.53	2.59	294.82
34	1.48	2.78	317.53	2.51	285.76
35	1.45	2.69	308.00	2.42	277.18
36	1.40	2.62	298.94	2.35	269.06
37	1.36	2.54	290.24	2.28	261.18
38	1.32	2.47	281.88	2.22	253.65

# Figure 2.5.1 Potential Landfill Gas Production and Extraction



estimates will be made once more accurate estimates of the waste composition are available and following waste deposition and gas pumping tests.

### **2.5.8.3 Landfill Gas Composition**

The composition of landfill gas is well documented in the technical literature. Table 2.5.8 presents a typical composition of landfill gas during the biodegradation phases of municipal solid waste.

The composition of landfill gas at the proposed facility will not be precisely the same as the composition of the landfilled materials.

**Table 2.5.8 Typical Landfill Gas Composition**

<b>Component</b>	<b>Typical Value (% Volume)</b>
Methane	63.8
Carbon Dioxide	33.6
Oxygen	0.16
Nitrogen	2.4
Hydrogen	0.05
Carbon Monoxide	0.001
Saturated Hydrocarbons	0.005
Unsaturated Hydrocarbons	0.009
Halogenated Hydrocarbons	0.00002
Hydrogen sulphide	0.00002
Organosulphur Compounds	0.00001
Alcohols	0.00001
Others	0.00005
Water	0.001-0.004

### **2.5.8.4 Landfill Gas Management Plan**

The proposed gas management plan comprises four elements

- i. Minimisation of volumes by eliminating putrescibles
- ii. Containment and isolation
- iii. Monitoring
- iv. Passive venting and
- v. Active collection and flaring

## **Minimisation**

Gas volumes will be minimised by accepting only non-putrescible wastes at the facility.

## **Containment and Isolation**

The side slopes and base of the landfill excavation will be lined such that there is a barrier to horizontal migration of landfill gas.

Buildings close to the landfill designed and constructed in accordance with Department of Environment guidelines relating to Protection of New Buildings and Occupants from Landfill Gas. Buildings constructed with isolation measures will not be alarmed. Buildings without isolation measures will be alarmed.

Active collection of gas on the perimeter of the waste body will also prevent the migration of gas through the subsurface.

The back up passive venting system will also help reduce the potential for migration into the surrounding geologic deposits that surround the site.

## **Monitoring**

Monitoring of the subsurface around the perimeter of the site will be carried out to ensure that gas is not escaping. Periodic surface and subsurface surveys within the waste body as landfilling proceeds will be carried out to assess the generation of gas.

Prior to installation of the active system, monitoring of gas in the waste body will be carried out via surface and subsurface surveys. When monitoring results indicate a significant increase in the quantities of landfill gas, steps will be taken to install the active system.

## **Passive Venting**

Passive venting will naturally take place from the deposited waste and through any interim cover materials.

Upon closure and restoration of sections of the landfill, passive venting of gas would be possible through the capping system which will include a 300 mm thick drainage layer comprising sand/gravel placed over the final upper layer of waste or interim inert fill cover.

The passive venting system will be the backup system to the active system. A sub horizontal piping system may be laid in the gas drainage layer to direct gas to vertical vent pipes that would be installed where possible across the restored surface.

### **Active Collection System**

The active collection system would comprise a network of wells, connected to an appropriately sized flaring unit. The wells would be installed in the waste body as soon as practicable after monitoring results indicate significant quantities of landfill gas.

As part of the flaring system equipment selection emissions from the flare-stack would be assessed for source, quantity, level and rate, and composition. The location of the flare will be in the landfill compound area shown on Drawing 104.

A condensate removal system would be designed. Condensate would be collected and discharged into the landfill via a borehole or into the leachate collection system.

A maintenance programme for the active gas collection system will be specified at a later date and agreed during with the EPA.

The applicant will consider the possibility of utilising landfill gas to generate energy at the site.

### **2.5.8.5 Risk Assessment**

The Agency's guidance notes request a risk assessment in relation to the gas emissions. This subsection has been included to address potential risks.

### **Nature and Composition of the Gas Emissions**

The nature and composition of the gas emissions would be typical of landfill gas as described above.

### **Emission Rates**

The emission rates from a landfill site depend on the rate of gas production, the gas pressure in the landfill, the barometric pressure and the nature of the materials, which contain or enclose the deposited wastes.

During the operating life emissions would preferentially be through the surface of the waste. As the landfill is capped with low permeability material, the disperse emissions to air would decrease. Instead the emissions would be via a system of passive vents through the cap.

The gas production rate and the design of the gas management systems will govern the emission level, rate and quantity.

Active collection and a backup system of passive venting through the capping system are proposed. The intent of these systems will be to relieve the gas pressures in the landfill and thus mitigate the potential for advection and diffusion of gas through the base and side slope liner systems. The active and passive systems may not release all of the gas and there may be emissions through the proposed capping system that includes a low permeability clay barrier.

It has been shown through modelling of the advection and diffusion processes that emission rates through landfill caps with a clay barrier are relatively low (Kjeldson, 1996). A sample calculation by Kjeldson indicated that the combined diffusive and advective flux of methane through a 1 m clay soil layer would be 133 g/m<sup>2</sup>/year based on the assumptions made. Based on a methane density of 0.72kg/m<sup>3</sup> at 20°C the volume of the emission will be approximately 18,650 m<sup>3</sup>/year. This rate is relatively low in comparison to the production rates. Some of the measured rates also reported by Kjeldson are between 10 and 100 times greater. However, a variety of conditions exist at the sites where measurements were taken. The sample calculation does not account for any attenuation due to chemical or biological processes in the soil. It is known that methane in the landfill gas will oxidise as it migrates through unsaturated soil layers. Laboratory studies by Kightly and Nedwell, 1994 suggest that large quantities of methane can be oxidised in landfill covers soils.

Emission of biogas through the side slope liner will be minimised by the proposed lining systems.

An active gas collection system will be designed to effectively reduce the pressure in the landfill and remove gases for flaring. The biogas emissions to ambient air will be significantly minimised. The emissions from a landfill with an active collection system will be via the flare stack.

## **Pathways**

A potential pathway for subsurface gas emissions may be from the waste body through the landfill base and side slope liner systems. The nature and low permeability of the lining systems will effectively minimise advection and diffusion of gas.

The pathway for emissions to ambient air will be through a passive venting system if the active system fails and minimally through the top cover as discussed. Otherwise the ambient air is the pathway for emissions from the flare stack.

## **Receptors of Emissions and Assessment of Risks**

Potential receptors of subsurface gas emissions are the buildings on the site and the surrounding lands. The risk to on site structures and the surrounding lands is considered to be low with the proposed passive control measures. To ensure that hazards do not exist in the site buildings gas monitoring boreholes are proposed as described in Section 4. Biogas will also be monitored in the subsurface outside the waste disposal area, within the buffer zones.

The following trigger levels will apply with respect to gas levels recorded in the subsurface monitoring boreholes:

1. Observation - Monthly Reading in Buffer Land Monitoring Boreholes:-

CH<sub>4</sub> greater than 10% LEL  
CO<sub>2</sub> greater than 1.0% vol.

Action - Take readings daily for a week to confirm data

2. Observation - Average of Five No. Consecutive Daily Readings:-

CH<sub>4</sub> greater than 10% LEL  
CO<sub>2</sub> greater than 1.0%

Action - Advise Regulatory Authority

3. Observation - Buffer Land Monitoring Boreholes around the Site Buildings and in the Bufferland

CH<sub>4</sub> greater than 20% LEL  
CO<sub>2</sub> greater than 1.5%



- Actions**
- Take readings daily for five days and check levels inside buildings
  - If levels persist advise regulatory authority and develop mitigation plan for approval by the Agency

Potential receptors of diluted landfill gas in the atmosphere are local residents surrounding the site. The health risk is assessed to be low. The potential for exposure to an odour nuisance will be monitored during the initial two years of operations. If odours develop into a nuisance it will be mitigated with active collection systems or odour control measures, other than already proposed, such as misting systems.

## **2.5.9 Landfill Capping System**

### **2.5.9.1 Capping System**

The landfill will be capped with several different soil materials that will serve to allow for gas collection (if required) and also to minimise infiltration of rainfall and thus leachate generation. Restoration will take place progressively as the development phases are completed. Low permeability clay/silt will be used to provide an infiltration barrier. A flexible membrane liner will be considered in lieu of the clay/silt barrier layer although there will be a general strategy during operations and post closure to ensure the wastes are wet in order to promote rapid bio-degradation. The overall thickness of the capping system will be on average at least 2.1 metres if the clay barrier is used. The capping system will be completed over an area of approximately 10.1 hectares.

Starting at the ground surface the capping system will comprise on average:

<b>Component</b>	<b>Average Thickness (mm) (approx.)</b>
Topsoil	150
Subsoil	850
Drainage layer	300
Clay/Silt Barrier Layer	500
Gas Collection Layer	<u>300</u>
	2100

### 2.5.9.2 Specifications of Capping Materials

- The topsoil will have an organic content which will be capable of sustaining grass.
- The subsoil will be a mixture of silt and sand (a loam) and will be free draining.
- The mineral drainage layer will have a permeability of less than  $1 \times 10^{-4}$  m/sec.
- ~~The clay/silt barrier layer will be compacted and will have a~~ permeability of less than  $1 \times 10^{-8}$  m/sec.
- The gas collection layer will comprise permeable, clean, coarse sand and gravel with a permeability less than  $1 \times 10^{-4}$  m/sec.

A **Method Statement** for construction shall be prepared and submitted prior to installation of the capping layers.

The landfill operator or contractor responsible for capping shall prepare a **Safety Statement** for construction of the capping layers.

A **Quality Assurance Plan** shall be produced at the same time as the QA Plan for the lining system.

### 2.5.9.3 Landfill Stability and Settlement

**The stability of the landfill** will be monitored weekly by technical personnel. Any unusual conditions will be logged in the site diary and reported to the site manager. An annual topographic survey will be carried out.

**Landfill settlement** will be monitored by an annual topographic survey.

### 2.5.9.4 Daily and Intermediate Cover

Internal bunds, daily and intermediate cover will be drawn from processed material on site and/or imported waste materials. Sandy subsoil, or crushed bricks and concrete will be used for daily cover. Clay/silt subsoil will be used for intermediate cover.

### **2.5.9.5 Temporary Capping**

Temporary capping of 0.5 metre of clay/silt material will be placed on the interim slopes and surfaces of waste. Temporary capping will be removed or punctured, prior to deposition of more waste.

### **2.5.10 Surface Water Management Arrangements**

Surface water accumulating in lined areas containing waste will be treated as leachate.

Runoff from completed landfill areas will be collected in perimeter French drains and directed to soakaways.

Runoff from paved hardstands and roads will be directed to gullies and a surface water drainage system, which will include a silt settling chamber and a class 1 surface water bypass separator. The outfall for the hardstand drainage systems will be a percolation area or the River Liffey.

Liquid from the wheel wash will be drained back into the landfill.

## **2.6 Facility Operations**

### **2.6.1 Operating Times**

The facility will accept materials from Monday to Friday, 7.30 am to 5.00 pm and Saturday 7.30 am to 1.00 pm.

- Operations onsite will be between 6.30 am and 6.00 pm Monday to Friday and on Saturday between 6.30 am and 2.00 pm.

The facility will be closed on Sundays and Bank Holidays.

### **2.6.2 Personnel**

There will be approximately 10 operatives and a site manager employed directly to operate and manage the facility. Consultants will be retained to undertake environmental monitoring.

### **2.6.3 Waste Acceptance Procedures**

- Only drivers arriving at the facility with a contract will be admitted.
- Drivers are weighed in.
- Drivers will be directed to the tipping area to unload. Loads will be inspected on the tip face. Tipping will be strictly supervised by the bank man and if any unacceptable material is observed a tracked excavator operated by site staff will be used to recover and load the unacceptable material back into a vehicle. Should unacceptable waste be discovered in the tipped load a report will be completed by the site personnel.
- Drivers will weigh out and leave the facility.

Waste acceptance procedures that are outlined in EPA manuals will be reviewed and incorporated into the standard operating procedures for the site.

### **2.6.4 Landfill Operations**

The landfill design is described in Section 2.5.

#### **2.6.4.1 Plant and Equipment**

Plant related to waste disposal and covering will include:

- Waste Compactors
- Excavator
- Bull dozer
- 25-30 tonne dump truck
- JCB / Road Sweeper
- Farm tractor and bowser

#### **2.6.4.2 Waste Handling**

Operations will be similar to the following:

- Receipt of waste (after weigh-in)
- Inspection of wastes (select number of loads) in separate area on the landfill.
- Waste tipped at tip head
- Further inspection of waste at tip head
- If waste is found to be in contravention of acceptable wastes as dictated in the Waste License it will be re-loaded on the originating lorry and removed from the site
- Wastes will be placed in lifts of 3m and then compacted with a compactor
- Compacted waste will be covered with daily cover, which may be inert fill or artificial materials
- The width of the daily working area will be 30m

#### **2.6.5 Landfill Construction**

Considerable quantities of materials will be required to construct and operate the engineered landfill. Materials will be derived from materials on site sources and imported wastes. Tables in Appendix 2 provide an indication of the nature and quantities of the required materials.

### **2.7 Environmental Nuisance Controls**

#### **2.7.1 Aerosol Control**

No leachate or any other liquids will be sprayed hence there are no aerosol nuisances at the site. Leachate will be recirculated via trenches.

### **2.7.2 Bird Control**

It is possible that some birds may be attracted to the proposed engineered landfill. Frequent covering of wastes will mitigate against the attractiveness of the site for birds. If birds appear there are various techniques to prevent intrusion that will be considered and implemented as required.

Various bird-scaring techniques include:

- Shooting
- Falconry – the utilisation of birds of prey such as falcons
- Triple Banger – A gas banger, which lets off three shots in rapid succession. It is fully programmable and can be set to work at specific times during the day.
- High Pitch Scarer – This is an electronic device operated by day/night photocell, which uses simulated alarm or distress calls associated with various species of birds of prey.

### **2.7.3 Dust Control**

Use of macadam surfaces will prevent formation of dust. Road cleansing and provision of a wheel wash will ensure that mud and dust are controlled. Water will be sprayed onto the road and on other bare waste surfaces using a bowser as required. A power sweeper attachment for a tractor or JCB will be available on site as well. All operations on site will be carried out in a way that will ensure that no dust nuisance occurs beyond site boundaries.

### **2.7.4 Fire Control**

Measures for fire prevention and control will include;

- Emergency response contact numbers will be posted in prominent positions on site (fire service, police, ambulance and other agencies).
- A telephone system on site will ensure instant contact with the emergency services.
- A water supply is available on site.
- Fire hoses and extinguishers will be available on site.
- No burning of waste will be permitted on site.

- There will be no unauthorised people allowed access to the tip face and there will be a security company ensuring surveillance outside normal working hours.
- The waste will frequently be covered with inert material.

#### **2.7.5 Litter Control**

Frequent covering will reduce litter. Litter control using 5-7m high tight mesh fences will be utilised. Routine litter patrols will be carried out on a daily basis in the site and along the access road from the filling area to the site entrance off the public road. The Naas road will be inspected for a distance of 500 m. for litter. Any fly tipping, which occurs, at the site entrance or on the access road will be immediately cleaned up and deposited in the site.

#### **2.7.6 Odour Control**

The quantity of putrescible waste will be negligible, if any. Unfortunately even non-putrescible wastes when stored in skips produce musty odours. As the wastes saturate on the site odours will develop in the tipping area. To minimise problems of odour the following practices will be employed:

- i. adequate compaction
- ii. effective use of appropriate types of cover
- iii. progressive capping and restoration
- iv. effective leachate management in a closed tank
- v. active gas collection

#### **2.7.7 Road Cleansing**

All lorries will go through a wheel-wash prior to exiting the site. Road cleansing and sweeping will be carried out as required.

#### **2.7.8 Traffic Control**

The entrance to the site will be 12 m wide. The entrance will allow movement of traffic into and out of the site. Traffic signs and white lines will be used at the site entrance and throughout the site to control traffic.

#### **2.7.9 Vermin Control**

It is anticipated that vermin will not be a significant issue at this site as the quantity of putrescible waste will be negligible, if any. As a

precaution a specialist contractor will be retained to carry out regular monitoring.

## **2.8 Restoration and Aftercare**

### **2.8.1 Restoration Plan**

Following the completion of excavation and landfilling operations the proposal is to restore the site for amenity uses including a Soccer pitch, GAA pitch, a public park/amenity area and tennis courts.

### **2.8.2 Proposed Contours**

~~The plan is to backfill the reformed pit to the indicative final~~ contours as presented on Drawing 104. It can be readily seen that the eventual contours tie in with the existing levels of the lands in the vicinity. The highest level of the C/I wastes will be 150 mOD after consolidation and settlement. Inert materials will be used for landscaping mounds and hills above 150 mOD.

### **2.8.3 Restoration Layers**

The uppermost layer on the landfill surface will be topsoil approximately 150 mm. The topsoil will be placed and grass will be sown on a phased basis across the site. The land surface will be restored from east to west following behind the filling operations. Soil berms and restoration layers will be brought up on the external surfaces of the landfill once filling is above the edge of the adjoining ground.

Below the topsoil there will be a layer of subsoil 850 mm thick. This layer will overlie environmental control layers as previously described in Section 2.5.9.1.

Surface runoff from the completed surface will be controlled as required by a system of open and French drains installed along the edge of the completed landform.

### **2.8.4 Landscaping Plan**

An assessment of the existing landscape; landscape during construction and landfilling at the site as well as post closure landscape including a Landscaping Plan is included in Section 3.7. Drawing 105 shows the site after completion of the Landscape Works.



## **2.9 / Contingency Arrangements**

The operator has included contingency arrangements in the event of an emergency. They are identical to the ones in place at the existing facility.

1. Fire fighting procedures
2. Contingency arrangements in case of breakdown or emergency situations
3. Emergency contact numbers

### **2.9.1 Fire Fighting Procedures**

In the unlikely event of a fire at the proposed facility, there will be a telephone system on site, which should ensure instant contact with the emergency services. Fire control would be also provided by using on-site soils to smother a fire.

### **2.9.2 Contingency arrangements in case of breakdown or emergency situations**

Breakdown of equipment will be handled by prompt repair and/or the replacement of equipment. Equipment on site will be serviced on a regular basis.

Emergencies of an accidental nature during normal working hours will be handled by calling the Garda, the Fire Brigade or Ambulance Services.

### **2.9.3 Contingency arrangements in case of contamination of air, surface water, groundwater or other environmental media.**

In the event of the need to contain contaminated groundwater extraction wells will be installed along the southern boarding of the site.

Leachate spills are unlikely to occur as leachate pumping and containment facilities will be connected to pressure sensors, which will activate and/or shut off pumps.

Water bowsers and spray systems will be used to control dust on roads and on stockpiled materials.

Active gas collection will mitigate odours and gas migration. Additional extraction wells and flares will be provided if off site

migration of gas is detected through regular monitoring of the landfill perimeter.

#### **2.9.4 Emergency contact numbers for staff with responsibility for the site**

In case of an emergency the site manager will be contactable via a pager system.

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**3**

### 3. THE EXISTING ENVIRONMENT

**Note: Figures referred to contained in EIS Volume II Appendices.**

This section is broken into a number of subsections (e.g. Air). Each subsection consists of subsections. They are Existing Environment; Potential Emissions; Likely Impacts; Mitigation Measures; and Likely Significant Impacts.

"Existing Environment" examines the environment as it pertains to a particular parameter (e.g. surface water) It should be noted the "Potential Emissions" takes a broader than traditional view of emissions (e.g. dust, noise etc) to include any change to the environment as a result of the proposed development (e.g. loss of habitat, generation of traffic etc). The "Likely Impacts" section reviews the likelihood of the "Potential Emissions" leading to a negative environmental impact if no "Mitigation Measures" were taken. "Mitigation Measures" have been developed to ensure that there are no "Likely Significant Impacts".

### 3.1 Air

The following Section was prepared by tms environment ltd.

#### 3.1.1 Existing Environment

The site of the proposed development is situated in Ballymore Eustace, Co Kildare. The site is situated immediately to the north-west of Ballymore Eustace village which is situated approximately 12km south of Naas. The main area of existing residential development is to the south-east of the site. The main roads in the vicinity of the site are to the south (Kilcullen Road) and to the east (R411).

~~The significance of potential impacts of the proposed development~~ on the air quality is influenced by several factors including the existence of other sources of air pollution and the existing ambient air quality. A comprehensive evaluation of the existing ambient air quality was therefore vital to an assessment such as required in this study. The parameters that were considered included sulphur dioxide and smoke which are indicative of fossil fuel combustion. Nitrogen dioxide, carbon monoxide and particulate matter are emitted from vehicle exhaust and dust deposition which may result from construction and operations were also addressed.

There are no major industrial facilities or any other significant developments located close to the site, so the dominant contributors to existing sulphur dioxide levels are expected to be domestic heating sources; while traffic is likely to represent the main source of nitrogen oxides. The main vulnerable groups which could potentially bear any impacts upon local air quality include the residents of some detached residential housing around the site boundaries and pupils and staff at the National School to the south-east of the site. There are no other sensitive receptors nearby.

The ambient air quality was determined by reference to existing data collected by Kildare County Council and by undertaking a survey of dust deposition. The air quality data that has been collected was considered to be sufficient, complete and relevant to the purposes of this assessment.

Ambient air quality monitoring in Ireland is generally undertaken to assess compliance with national air quality standards and to implement European Union Directives. Air quality monitoring stations located throughout the country are maintained by the local authorities and are generally confined to measurements of smoke and sulphur dioxide. The



EPA also operates a number of automated monitoring sites that, in addition to the aforementioned parameters, also measure ozone and nitrogen oxides.

The air quality monitoring station nearest to the site of the proposed development is in Newbridge, 14km north-west of Ballymore Eustace. Smoke measurements for the period April 1999-March 2000 are reported in the *Air Quality Monitoring Annual Report 1999*<sup>1</sup>, published by the EPA. During this period, the median winter-time smoke concentration was  $6\mu\text{g}/\text{m}^3$ . Winter values often represent the worst-case scenario for air quality since the cooler, denser air prevents adequate dispersion of smoke in the atmosphere. The 98<sup>th</sup> percentile smoke concentration was  $23\mu\text{g}/\text{m}^3$ . The data is not representative of ambient air quality in the vicinity of the site which is a much less heavily populated area than Newbridge where the data was recorded. Nevertheless, the smoke measurements at Newbridge are well within the limit for the annual median of daily mean values of  $80\mu\text{g}/\text{m}^3$  set by the EU Council Directives on air quality standards and therefore pose no adverse effects on human health or amenity.

Annual mean concentrations of sulphur dioxide in rural areas are expected to be in the range  $3 - 6\mu\text{g}/\text{m}^3$  and  $25 - 100\mu\text{g}/\text{m}^3$  in urban locations (World Health Organisation: Guidelines for Air Quality May 2000.) The Air Quality Monitoring Annual Report 1999 indicates that the annual mean concentration of sulphur dioxide in Newbridge was  $9\mu\text{g}/\text{m}^3$  and the 98-percentile was  $20\mu\text{g}/\text{m}^3$ . These results in Newbridge are probably heavily influenced by nearby domestic heating sources. The values recorded at Newbridge are also significantly less than the limit value of  $120\mu\text{g}/\text{m}^3$  set by EU Directive 80/779/EEC<sup>2</sup> and less than the more stringent limits set by EU Directive 1999/30/EEC<sup>3</sup> which is yet to come into force in Ireland. The ambient air quality in Ballymore Eustace would be expected to be even better than that measured at Newbridge since the population (and therefore the quantity of domestic heating emissions) is sixteen times smaller in Ballymore Eustace.

Air pollution from traffic is characterised mainly by increased concentrations of nitrogen dioxide. However it can be predicted that given the relatively low population of Ballymore Eustace and the

<sup>1</sup> Environmental Protection Agency (2001) *Air Quality Monitoring: Annual Report 1999*. EPA, Wexford.

<sup>2</sup> Council of the European Communities (1980) Council Directive 80/779/EEC of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulates, *O.J. L 229, 20 August 1980*.

<sup>3</sup> Council of the European Communities (1999) Council Directive 1999/30/EEC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air. *O.J. L 163, 29 June 1999*.

surrounding area, the levels of nitrogen dioxide, carbon monoxide and particulate matter from vehicle exhausts would be well within air quality standards.

An increase in both the residential and commuter population of the area is expected to occur. It is reasonable therefore to predict an increase in traffic flow to and from the area. In the absence of the proposed development, it is anticipated that the air quality in the immediate vicinity of the site would be increasingly dominated by vehicle exhaust emissions caused by traffic on the R411. It would also be expected that the emissions of dust from existing site activities would diminish with time to insignificant levels as the site became increasingly restored.

The main sources of emissions to air from the present activities are likely to be dust from the movement of material related to the restoration of the sand and gravel pit. A measurement frequently used in connection with air quality assessments where dust emissions may be significant is Dust Deposition Rate which is normally measured by gravimetrically determining the mass of particulate matter and dust deposited over a specified surface area over a period of one month (28 days). The results are expressed as dust deposition rate in mass per unit area per day.

Typical dust deposition rates in a rural agricultural environment are low; typically in the range 0 – 60 mg/m<sup>2</sup>-day, with values of up to 80 – 120 mg/m<sup>2</sup>-day in urban locations. The spatial pattern of dust deposition may be influenced by local wind direction and strength. The pattern of wind direction and strength is described in Section 3.2. The prevailing wind direction is from the south-west which would tend to blow any dust to the north-east of the site. Rainfall will also tend to reduce the rate of emission of dust.

In order to determine the impact of the existing activities upon the air quality, a survey of dust deposition rates at selected locations around the site was undertaken. The full methodology and detailed results are presented in Appendix 4.

The dust deposition gauges were positioned at locations near to the site boundary as indicated in Figure 3.1.1. Location D2 was located at the field boundary on the western side of the site, D3 was located on the northern boundary while D4 and D6 were located on the eastern side close residences and to the R411 and the Kilcullen Road respectively. The results of the survey are presented in Table 3.1.1.

**Table 3.1.1 Baseline Dust Deposition Survey, Ballymore Eustace (completed April-May 2001)**

MONITORING LOCATION	DUST DEPOSITION RATE (mg/m <sup>2</sup> -day)
D-2 Western boundary of site	28.8
D-3 Northern boundary of site	11.2
D-4 Adjacent to R411 on eastern side of site	15.1
D-6 Southern boundary of site	6.8

The results of the dust deposition survey suggest that the existing site activities do not cause any significant impacts upon residences surrounding the site. The highest level was recorded at location D2 which was situated at the western end of the site. This higher level was probably attributable to windblown dust being carried across the site by a south-east wind which was prevalent at the time. All of the levels of dust deposition recorded by the gauges were less than 30mg/m<sup>2</sup>-day and therefore representative of a rural environment. Levels of dust deposition close to sensitive receptors at D4 and D6 were also very low. A standard of 240 mg/m<sup>2</sup>-day is normal for ensuring that no significant adverse nuisance effects such as soiling of buildings etc are encountered as a result of dust deposition from industrial activities.

### **3.1.2 Potential Emissions**

#### **3.1.2.1 Construction**

The construction phase will involve activities that have potential to release pollutants, in the form of particulate matter, to the environment. Construction activities are likely to elevate dust deposition levels in the area above that which would normally be expected in the absence of the development. The construction phase is expected to last

approximately 6 months. It should be pointed out that the proposed construction activities are not likely to be noticeably different, in terms of their environmental impact, from those that are ongoing at present.

The main dust emission sources during the construction phase will be:

- (a) earthmoving operations;
- (b) movement of vehicles over internal haul roads on site; and
- (c) delivery and transfer of construction materials.

Movement of materials to construct screening mounds at the site perimeter will expose soil and potentially result in emissions of dust to the atmosphere from wind erosion.

Internal movements of construction vehicles and construction personnel vehicle movements will contribute to emissions of gaseous pollutants such as sulphur dioxide, nitrogen oxides, carbon monoxide and traces of volatile organic compounds. In addition, the construction vehicles will contribute to emissions of fine particulate matter from diesel engines. Again this impact on air quality in the vicinity of the site will be of limited duration and of minor significance, particularly in relation to movement of vehicles on the R411 and other nearby roads.

The majority of vehicle movements will take place within the site with minimal movement of construction and delivery vehicles on/off the site. Toward the end of the construction phase, a relatively small number of deliveries of construction materials (for example: liner, crushed stone) required for construction of the lining.

### **3.1.2.2 Operation**

The proposed development will comprise of a landfill site with a void space of ca. 2.3 million m<sup>3</sup> soil and waste materials. The void will be located in the central and western areas of the site. It will be developed in two phases and filled over a period of approximately six years. Restoration will follow this proposal.

Additional traffic exhaust emissions due to operational traffic and vehicles entering/leaving the site are likely to exert an impact on the ambient air quality in the vicinity of the site. However, these emissions will be a minor influence in a regional air quality context and ambient levels of pollutants will be expected to remain within relevant air quality guidelines.

Background levels of sulphur dioxide in the atmosphere are primarily a result of emissions from existing domestic heating sources. There will be no emissions of smoke or sulphur dioxide as a result of the proposed development.

Operation of the landfill site will involve the deposition of non hazardous industrial, commercial and C&D waste. Impacts in the form of dust deposition may arise from the movement of delivery vehicles across internal haul roads and the tipping of certain types of waste.

Impacts in the form of landfill gases may also arise. However since only non-putrescible waste will be accepted into the site, it is highly unlikely that any off-site odour nuisances will arise at the site. Odours can generally derive from the deposited waste, exposed leachate or landfill gas emissions.<sup>4</sup> Certain types of waste are more likely to produce dust and odour emissions prior to being sealed into the landfill. Once sealed into the landfill site, the decomposition of any organic substances will produce carbon dioxide, methane and possibly other "landfill gases".

The rate of emission is controlled by several factors including moisture content and temperature. The cool temperatures experienced at the site (see Section 3.2) will help to slow the rate of decomposition and hence slow the rate of emissions of any landfill gases.

### **3.1.3 Description of Likely Impacts**

As stated in 3.1.2.1, the impacts of the construction phase are likely to be the same as those associated with existing site activities. The dust deposition survey that was undertaken to characterise the existing environment provides an accurate picture of the likely impact of the construction phase. It is also likely that the levels of dust deposition at the eastern boundary (near the R411) will decrease since there will be a reduction in the movement of sand, gravel and clay in this area of the site when activities are focused into the centre and western areas. Therefore, since the results of the dust deposition survey have indicated that there is no impact arising from existing site activities, it is highly likely that there will be no significant impacts resulting from construction with respect to dust deposition.

The operational phase is also likely to produce emissions of dust and gases. However, the nearest residential dwelling is approximately 10m from the application site although 90m from the nearest site activity

<sup>4</sup> Environmental Protection Agency (1995) *Landfill Monitoring*. Landfill Manuals. EPA, Wexford

(i.e. weighbridge etc.) and 140m from the nearest edge of the landfill void. It will be screened by vegetation and a downward slope. This will be sufficient to reduce any impacts of dust deposition upon sensitive receptors.

The impact of vehicle exhaust emissions caused by construction and operational activities will be a minor influence in a regional air quality context and ambient levels of pollutants will remain within relevant air quality guidelines.

The emission of landfill gas is often perceived to be a significant impact upon public health and amenity. However, there is only the potential for landfill gas to become a source of odour nuisance in older, poorly managed landfill sites which contain putrescible waste. Modern landfill sites are able to control the rate of production of gases and direction in which it is vented to the atmosphere. In the case of the proposed development, the emission of any landfill gas will be lower than if putrescible matter was accepted at the site. The waste disposed at the site will be construction and demolition waste and solid non-hazardous commercial and industrial waste so there are not expected to be any impacts of this amount of landfill gas upon the area surrounding the site.

### **3.1.4 Mitigation Measures**

The construction phase will temporarily result in dust emissions from excavation and the movement of materials within the site. Mitigation measures will however, be put in place as required to avoid nuisance to surrounding residences. These will include as necessary:

- a) Construction of screening mounds at an early stage in the construction phase and retention and enhancement of existing vegetation at the site perimeter.
- b) Use of dust suppression measures including wheelwash facilities and water sprays at the site entrance/exit to prevent material being transferred to external roads (during both construction and operational phases).

In addition, the two construction periods are expected to last up to 6 months each, weather permitting. The short duration of the construction phase will assist in mitigating any impacts upon the environment.

In the long term the development will result in reduced potential for emissions of dust because the developed site will be sealed and grassed limiting the potential for dust emissions. The relatively high rainfall experienced at the site (as described in Section 3.2) would help to mitigate any fugitive emissions of dust.

Mitigation of any odour impact arising from the production of landfill gas will take the form of standard site management practices including the control of moisture content and the removal of leachate. The non-putrescible nature of the waste received at the site will reduce the tendency for significant quantities of landfill gas to be produced. A gas management plan will be implemented in order to control the emissions of any gas from the site.

### **3.1.5 Likely Significant Impacts**

It is predicted that there will be no significant impacts upon air quality caused by the construction and operation of the proposed development. All of the likely impacts which have been identified have been addressed and mitigation measures proposed where necessary to ensure that the impacts remain at acceptable levels.

## **3.2 Climate**

### **3.2.1 Existing Environment**

The site of the proposed development is situated in Ballymore Eustace, Co Kildare. The site is situated immediately to the northwest of Ballymore Eustace village which is situated approximately 12km south of Naas.

The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. Since no area of the country lies more than 120 km from the sea, the range of mean temperatures across the country is narrow. Data from Met Éireann, the Irish meteorological service, who operate monitoring stations at a number of locations around the country, indicates that December, January and February are generally the coldest months of the year. Most areas of the eastern half of the country (which includes the location of the proposed site) experience rainfall in the region of 750-1100 mm per annum. However, the location of the proposed development on the windward side of the Wicklow Mountains means that the amount of rainfall it would receive would usually be at the upper end of this range.

There is no continuous meteorological monitoring station located uniquely close to the site of the proposed development. However, comprehensive meteorological data is available for Casement Aerodrome, which is approximately 22 km north-east of Ballymore Eustace.

Analysis of the long-term monitoring data from the meteorological station at Casement Aerodrome from 1992-1996 shows that the dominant wind direction is from the S-SW-W quadrant with an annual incidence of about 55% as shown in the windrose plot, Figure 3.2.1. The annual average wind speed is approximately 5.5m/s with wind speeds of < 3 m/s occurring for 30 % of the year; wind speeds in excess of 5 m/s occur for 45 % of the year. Wind speed and direction can affect the pattern and extent of dispersal of pollutants emitted by the proposed development. A summary of wind speed occurrences for the period 1992 - 1996 is presented in Table 3.2.1.

An analysis of mean monthly temperatures and precipitation rates for Casement Aerodrome is presented in Table 3.2.2. Mean monthly temperatures for the area are in the range 5.0 to 15.3°C, with mean monthly precipitation rates in the range 49.6mm in June to 80.6 mm in



January. The average annual precipitation rate at Casement is 756.9mm.

Table 3.2.3 presents rainfall data recorded at Blessington, Co. Wicklow between 1949 and 1990. Blessington is located only 6.5km north-east of the location of the proposed development and therefore experiences a similar local climate to Ballymore Eustace. Comparing the rainfall data between Casement Aerodrome and Blessington in Tables 3.2.2 and 3.2.3 clearly shows the influence of the Wicklow Mountains which increase the amount of precipitation on the windward side. In addition, both Blessington and Ballymore Eustace are situated adjacent to Poulaphuca Reservoir which acts as a major source of moisture and may also contribute to elevated levels of rainfall. As a result, Blessington receives 30% more annual rainfall than Casement Aerodrome.

Evapo-transpiration rate data were not available for the Blessington monitoring station but it would be expected to be similar to that at Casement since there would be little variation in temperature range and wind speed. The effective rainfall at Ballymore Eustace would be expected to exceed calculated effective rainfall at Casement by a similar margin of 30%. The measurement of effective rainfall presented in Table 3.2.2 is predicted to be a conservative value given that no account has been made for the nature of the soil surface at the site.

It is not expected that Ballymore Eustace experiences a microclimate since there are no topographic peculiarities or other factors which would allow a microclimate to exist.

**Table 3.2.1 Percentage frequency of wind speed for Casement Aerodrome, (1992-1996)**

Speed (m/s)	<1.5	2.1-3.1	3.6-4.1	5.7-8.2	8.7-10.8	>10.8	Total
% Frequency	12.4	17.7	23.9	25.3	12.7	7.9	100

**Table 3.2.2 Climate Data for Casement Aerodrome  
(1992-1996)**

Month	Mean Temp. °C	Mean Rainfall (mm)	Potential Evapo-transpiration (mm)	Effective Rainfall (mm) <sup>5</sup>
January	5.5	80.6	9.9	70.7
February	5.4	62.1	19.2	42.9
March	6.3	59.1	36.0	23.1
April	8.2	57.9	56.3	1.6
May	10.0	68.2	77.0	-8.8
June	13.6	49.6	93.0	-43.4
July	15.3	56.2	86.1	-29.9
August	14.7	54.0	77.1	-23.1
September	12.1	54.5	46.2	8.3
October	9.6	61.0	23.7	37.3
November	7.3	76.1	7.2	68.9
December	5.0	77.6	4.4	73.2
Monthly average	9.4	63.1	44.7	18.4
Annual total	-	756.9	536.7	220.2

<sup>5</sup> Effective rainfall = Mean rainfall - Potential evapo-transpiration

**Table 3.2.3 Mean monthly rainfall for Blessington (1949-1990)**

Month	Mean Rainfall (mm)
January	92
February	64
March	73
April	59
May	68
June	69
July	62
August	86
September	85
October	94
November	92
December	103
Monthly average	78.9
Annual average	947

## 3.2.2 Potential emissions

### 3.2.2.1 Construction

Construction of the proposed development will involve activities that have potential to release pollutants to the environment. The majority of these emissions (e.g. dust) do not have a role to play in the local, national or global climate.

Exhaust emissions from site traffic and machinery will emit greenhouse gases such as carbon dioxide. There will be no incineration of combustible material on site which would have generated more carbon dioxide.

### 3.2.2.2 Operation

The movement of vehicles, to, from and within the site and the operation of machinery on site will generate emissions of carbon dioxide which is a greenhouse gas, and nitrogen oxides.

There will be production of waste gases from the degradation of landfilled waste at the site. There will be no putrescible or hazardous

waste disposed at the site, the proposed waste being solid non-hazardous commercial, industrial and C&D waste. Some decomposition of organic materials is inevitable but the emission of methane (another greenhouse gas) and carbon dioxide resulting from the decomposition of these trace substances will be minimal. It is not possible to predict the quantity of carbon dioxide that will be released without knowing the precise chemical characteristics of the waste that will be received into the site.

### **3.2.3 Description of Likely Impacts**

It has been suggested in Section 3.2.1 that the local climatic conditions experienced at the proposed site are influenced by the nearby Wicklow Mountains and the Poulaphuca Reservoir. The proposed development will not have an impact upon any of these climatic influences and will not affect local temperatures or rainfall experienced in the vicinity of the proposed site. The only impact upon climate that may occur as a result of the proposed development is the emission of relatively small amounts of greenhouse gases such as carbon dioxide and to a lesser extent, methane. However, the impact of these emissions on a local, national and global scale is imperceptibly small. Predicted trends in climate change will not be affected by the proposed development.

### **3.2.4 Mitigation Measures**

Although carbon dioxide and methane are greenhouse gases, the contribution made by the proposed development will have a negligible effect upon the local, regional or national climate. Site management practices will be employed to control the rate of decomposition and a gas management plan will be implemented to monitor and manage any emission of gas from the site.

### **3.2.5 Likely Significant Impacts**

There will not be any likely significant impacts upon climate as a result of the proposed development.

### **3.3 Cultural Heritage**

The following Section was prepared by Cultural Resource Development Services Ltd.

#### **3.3.1 Existing Environment**

##### **3.3.1.1 Baseline Survey**

The Record of Monuments and Places for Co. Kildare was consulted for the relevant parts of Co. Kildare Ordnance Survey 6" Sheets 24 and 29. All sites within a radius of c. 2.5km of the proposed development were identified. The relevant files for these sites, which contain details from aerial photographs, early maps, OS memoirs, OPW Archaeological Survey notes and other relevant publications, were then studied in the Sites and Monuments Records Office. These monuments are listed in Table 3.3.1.

The topographical files in the National Museum of Ireland were consulted to determine if any archaeological artefacts had been recorded from the area. Other published catalogues of prehistoric material were also studied: Raftery (1983 - Iron Age antiquities), Eogan (1965; 1983; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers) and the Irish Stone Axe Project Database (Archaeology Dept., U.C.D.). The following townlands were assessed: Ballymore Eustace East, Ballymore Eustace West, Bishopsland, Bishopslane, Briencan, Brumlin, Coghlanstown East, Coghlanstown West, Kimmeens, Sousheen Common and Tinnycross. Of these, material has been recorded from the townlands of Bishopsland and Bishopslane. The finds from the area are listed in Table 3.3.2.

The excavations bulletins (see Bennett 2000a and b) were assessed to determine if any archaeological excavations had been undertaken in the area between 1969 and 1997. The townland of Kimmeens together with adjacent townlands were assessed. No recorded archaeological excavations were undertaken in this area between these dates.

**Table 3.3.1. List of Archaeological Sites and Monuments in  
c. 2.5km Catchment**

The recorded archaeological sites within c. 2.5km of the proposed development are listed below; all noted in the Sites and Monuments Records for Co. Kildare. The monuments are listed in a standard format as follows:

<b>SMR No.</b>	<b>Classification</b>
Townland	Description
NGR	
OD (feet)	

**List of Sites and Monuments**

**KD024:026 Motte and bailey**

Doonode Big  
29177/21309  
-

**KD024:029 Tower house**

Barretstown  
29377/21248  
-

**KD024:037 Ringfort, possible**

Dowdenstown Grt  
29254/21267  
400-500'  
Identified from aerial photograph (GSAP N335-4).

**KD029:005.1 Ecclesiastical remains**

Coghlanstown W  
28967/21033  
-

**KD029:005.2 Enclosure, possible**

Coghlanstown W  
28970/21037  
-

**KD029:006 Cross**

Coghlanstown W  
29052/21029  
400-500'  
Sited in undulating pasture, beside road and now immediately adjacent to gate. A plain granite cross, 1.33m high, 0.36m wide at stem, 0.73m wide at arms, 0.17m thick. Noted in (Killinan and Duignan 1967, 102; see also Fitzgerald 1912/14). Noted on 1939/40 edition of the OS Map.

**KD029:007 Lintel led grave cemetery, site of**

Coghlanstown E  
29153/21100  
400-500'  
Sited in undulating area of pastureland, well drained, on northeast side of a hill. No visible surface trace of this monument survives. The sandpits may have been grassed over. Noted on 1939/40 edition of the OS Map as "Slot-Lined Cemetery, site of".

**Table 3.3.1 (continued). List of Archaeological Sites and Monuments in c. 2.5km Catchment**

<b>KD029:008</b> Ardinode E 29140/20931 400-500'	<b>Enclosure, possible, site of</b> Identified from aerial photograph (AHK 34 - St Josephs collection).
<b>KD029:009</b> Ardinode E 29148/20927 400-500'	<b>Enclosure, site of</b> Identified from aerial photograph (AHK 34 - St Josephs collection).
<b>KD029:010</b> Ballymore Eustace W 29216/20944 500-600'	<b>Bulluan stone</b> A rough granite boulder lying on its side on the field bank. It has two circular depressions in the flat surface, which is now the east side of the stone. One is very shallow; the second is deep and has two outflow channels from it to the edge of the stone. One of these channels runs along a natural fissure in the rock. Noted on 1939/40 edition of the OS Map as "Bullon".
<b>KD029:011</b> Ballymore Eustace E & W; Bishopland; Broadleas Commons 29334/20984 400-500'	<b>Town: church, site of; crosses; font; effigy</b> The church site is very overgrown, impossible to survey. The present church has a date stone of 1802. The OS Map indicates two crosses. One is a large granite solid wheeled cross sitting in a rectangular granite base, standing to the north of the present church (height c. 3.5m). The inscription dates it to 1689. The second cross was not located. O'Donovan (1938/40) notes that "at Ballymore we found at present the east gable of an edifice locally called 'chapel' which stands in the churchyard". He also refers to a holy font located in the southeast corner of the parish church. Killinan and Duignan (1967, 102) refer to "in the Protestant Church is an early 16 <sup>th</sup> century armoured FitzEustace tomb effigy from New Abbey, Old Kilcullen".
<b>KD029:012</b> Bishopslane 29326/20927 500-600'	<b>Enclosure</b> Marked on 1939/40 edition of the OS Map as circular hachures.

**Table 3.3.1 (continued). List of Archaeological Sites and Monuments in c. 2.5km Catchment**

<b>KD029:014.1</b> Broadleas Commons 29243/20848 500-600'	<b>Standing stone</b> O'Donovan (1938/40, 117) notes that "1 mile from Ballymore and adjoining Broad Lays Commons is seen the stone after which the townland is called. It stood in a small earthen moat (KD029:014.2) but now lies on the ground, having been thrown down two to three years ago". The stone, which is marked "Long Stone" on the 1837 and 1939/40 editions of the OS Maps, is 12' 4" long, and is dressed by art and was, says local tradition, used as a gallows in rebellious times (see also Killinan and Duignan 1967, 102). Preservation Order No. 93 has been placed on this monument.
<b>KD029:014.2</b> Broadleas Commons 29244/20848 500-600'	<b>Barrow, possible, site of</b> A small moat that surrounded a standing stone (KD029:014.1) was levelled in c. 1836. It was probably a small barrow, similar to the Simonstown West Standing Stone and Barrow.
<b>KD029:033</b> Broadleas Commons 29280/20864 500-600'	<b>Ringfort, possible</b> Shown on the current edition of the OS Map as a bank preserved in the field boundary from the S-W-NW. The curving bank is still extant, although it continues along the field boundary and there is no trace of an outer fosse. Marked by a circular double hachure on the 1837 edition of the OS Map, but is not marked on the 1939/40 edition (where it is as above).
<b>KD029:035</b> Coghlanstown W 28977/21033 500-600'	<b>Castle, site of</b>
<b>KD029:039</b> Bishopsland; Coghlanstown E & W 29363/20944 500-600'	<b>Linear earthwork</b> Noted by Healy (1976) as a 650m linear bank, 2.5m wide and 1m above field level, with drains on both sides, and 0.5m deep. Old thorn hedges grown from both faces of the bank.



Aerial photographs of the area of the proposed development were examined in the Geological Survey of Ireland and the National Museum (Cambridge-St. Joseph Collection). No previously unrecorded features of archaeological interest were noted.

Historical background research commenced with an inspection of the *Hayes's Index of Manuscripts and Periodicals* (Hayes 1965; 1970), and the *Journal of the Kildare Archaeological Society*.

### **3.3.1.2 Archaeological and Historical Background**

Please refer to Figure 3.3.1 for the sites and monuments referred to in this text.

#### **3.3.1.2.1 Prehistory (c. 4000 BC – AD 500)**

The earliest recorded archaeological sites in the area probably date to the Bronze Age (c. 2500 - 600 BC), in the form of a possible barrow site and standing stone at Broadleas Commons (KD029:014) (see O'Donovan 1938/40). Further evidence of Late Bronze Age settlement in the area is in the form of a hoard of a bronze workers tools, comprising 25 bronze objects, including a socketed axehead (NMI 1944:148) and an anvil (NMI 1942:54) (see Table 3.3.2).

#### **3.3.1.2.2 Medieval Period (c. AD 500 – 1550)**

There is considerable evidence to suggest that this area was inhabited from the Iron Age through the Early Christian Period. In particular there are two possible ringforts at Broadleas Commons (KD029:033) and Dowdenstown Great (KD024:037). In addition there are three recorded circular enclosure sites, identified from aerial photographs and/or noted on the early editions of the Ordnance Survey 6" Maps: the pair of enclosure sites at Ardinode East (KD029:008 and 9), and that at Bishopsland (KD029:012). These are probably the remains of ringforts, dating substantial activity in the area from c. 400 -1200 A.D.

Museum Ref	Townland	Classification	Notes
NMI 1942:1750	Bishopsland	Palstave	↑  Bronze hoard consisting of 25 objects. Late Bronze Age workers tools. Found in the bank of the river Liffey in 1942. see Eogan (1983, Catalogue No. 16)  ↓
NMI 1942:1751	Bishopsland	Hammer	
NMI 1942:1752	Bishopsland	Hammer	
NMI 1942:1753	Bishopsland	Hammer	
NMI 1942:1754	Bishopsland	Anvil	
NMI 1942:1755	Bishopsland	Trunnion Celt	
NMI 1942:1756	Bishopsland	Flesh Hook	
NMI 1942:1757	Bishopsland	Vice like object	
NMI 1942:1758	Bishopsland	Chisel, tanged	
NMI 1942:1759	Bishopsland	Tube	
NMI 1942:1760	Bishopsland	Sickle	
NMI 1942:1761	Bishopsland	Tweezers	
NMI 1942:1762	Bishopsland	Rod, solid	
NMI 1942:1763	Bishopsland	Chisel?	
NMI 1942:1764	Bishopsland	Fragment	
NMI 1942:1765	Bishopsland	Ferrule portion	
NMI 1942:1766	Bishopsland	Saw, single sided	
NMI 1942:1767	Bishopsland	Saw, double sided	
NMI 1942:1768	Bishopsland	Saw, handle	
NMI 1942:1769	Bishopsland	Spiral (in two pieces)	
NMI 1942:1770	Bishopsland	Ferrule portion	
NMI 1942:1771	Bishopsland	Saw, fragment	
NMI 1942:1772	Bishopsland	Bronze wire strips	
NMI 1944:148	Bishopsland	Axehead, socketed	
NMI 1944:149	Bishopsland	Chisel	
NMI 1981:331	Bishopslane	Lead/pewter disc	Recessed circ. area on one surface with inscribed circle within it.

Ballymore came to prominence in the 13<sup>th</sup> century when it became part of the manor of the archbishop of Dublin, and a castle was built there. In 1234 King Henry III granted the archbishop the right to hold a fair there. Being on the border of the Pale, Ballymore was constantly raided by the O'Tooles and the O'Byrnes, for example, in 1306 the castle was burnt and the constable, Henry Calfe, killed (Costello 1988). Ballymore castle also served as a prison at this time; in 1306 a number of Irish rebels were kept prisoner there before they were removed to Dublin to stand trial (Taaffe 1996/99). In the mid 14<sup>th</sup> century, Ballymore was described as containing: a ruinous hill, a chamber for the archbishop, a little chamber for clerks, a kitchen roofed with shingles and a stable and grange, both thatched. At this time the King granted Ade Dodyng of Ballymore

and his companions £10 for having murdered three men of the O'Byrnes (Costello 1988).

The townland of Coghlanstown, in which part of the proposed development is sited, appears in ancient documents under a number of names: *Ballycotelan*, *Ballicutland*, *Ballycutlane* and *Cotlanston*. It took its name from an Anglo-Norman resident (probably *Cotlan*), during which period a castle (KD029:035) was erected and a church built, dedicated to St. James. A holy well, also dedicated to St. James, is located close to the old churchyard (KD029:005.1).

In the later half of the 14<sup>th</sup> century, the FitzEustace family took up residence in Coghlanstown. The family are said to have descended from the Anglo-Norman family of le Poer (Power). A younger son of Sir Eustace le Poer (of Oughterard and Castlewarden) took his father's Christian name as a surname. The first FitzEustace associated with Coghlanstown was Sir Maurice FitzEustace, who in 1384 was appointed Sheriff of Dublin, and took his seat in *Ballycotelan*. When he died in 1402, he was succeeded by his son, Sir Richard FitzEustace, who was appointed Justice of the Peace for Co. Kildare in 1408. In 1444, while serving as a member of the Dublin Parliament, Sir Richard was elected Messenger to England. Until his death in c. 1455, he served as Constable of the Castle of Ballymore Eustace under the Archbishop of Dublin.

Sir Richard was succeeded by his son Sir Robert, Sheriff of Kildare in 1452, 1456, 1470 and 1472. In 1475 Sir Robert was one of the representatives for Co. Kildare of the Brotherhood of St. George, a military association incorporated to defend the English territories of Leinster (the four counties of the Pale). The force consisted of 120 mounted archers, 40 men-at-arms, and 40 pages. The fraternity was dissolved in 1494 by an Act of Parliament. At the time Sir Robert held 'the Manor of *Ballycutland*', containing three castles, five messuages, and orchard, a water-mill and 678 acres of land. His properties also included lands at Donode, Jigginstown, Gaganstown, Rochestown, Friarstown and Ardinode, all in Co. Kildare.

Upon his death in 1496, he was succeeded by his son, Maurice, Sheriff of Kildare in 1499. In c. 1515 he was the chief conspirator in a dishonourable transaction concerning the inheritance of lands, which had belonged to his mother in law (Recorded by a Bill in Chancery). He died in c. 1520, and was succeeded by his son Christopher of *Cotlandston*. Christopher took part in the 1534

rebellion of the Silken Thomas, 10<sup>th</sup> Earl of Kildare. As a result he was made prisoner in Dublin and was subsequently hanged.

The castles and lands of Ballycutland and Donode were granted by the Crown to Robert Hussey in 1537, but in 1544 the Manors of Cotlanston, Downards and Sygenstown was granted to Sir Francis Harber (originally a merchant of Dublin). Sir Harbert was believed to have been an informer to the Crown of the plans of Silken Thomas, and the lands were granted as a reward.

### **3.3.1.2.3 The Late Medieval to Modern Period (AD c. 1550 – 1900)**

Sir Francis died in 1565, but the land and properties remained in the family until 1624. Sir Thomas Hibotts took over the land at this time, until 1654, when the deeds were transferred to Sir John Hoy (Fitzgerald 1912/14, 296-310).

Meanwhile, in 1572 the Irish raided Ballymore Eustace, burning it all except for 'Mr Le Strange's house and castle'. In 1608 the archbishop's right to hold a market and fairs were revived.

In the 1798 rebellion, the town was reduced by the burning of the Protestant church and several houses (Costello 1988).

The stone cross (KD029:006) at Coghlanstown West, is sited at the side of the road. It is said to have been set there as the cart transporting it there collapsed. Its dimensions fit with a cross-base in the churchyard (KD029:005.1) to the west, and it is probable that the two portions belong together (Fitzgerald 1912/14, 296-310).

### **3.3.1.3 Field Walking Survey**

Fieldwork was carried out on the 7<sup>th</sup> of July 2000 and the 22<sup>nd</sup> May 2001, on both occasions in sunny conditions. The area of the proposed development was walked. Adjacent fields were walked during the first assessment, but not during the second, due to foot and mouth access restrictions.

The area in which the proposed development is to be sited consists of land which has been extensively quarried in the past (see Figure 3.3.2 and Plate 3.3.1). An inspection of perimeter of the site indicated that the entire area has been quarried away, with the exception of the northwest portion of the site, which is in open

pasture (see Figure 3.3.2). No archaeological features or finds were noted either in this undisturbed portion of the site, or in the sections visible around the perimeter of the site.

The proposed development area is surrounded predominantly by fields in open pasture, which generally slope towards the site. Field boundaries generally consist of hedgerows and lines of trees, with small banks in places. The townland boundary between Kimmeens and Ballymore Eustace, where visible to the south of the proposed development, consists of a c. 1m high by 2m wide bank, which is tree lined and made up of stone and earth. It has been removed in places where it runs along the southern boundary of the site. Similarly, the townland boundaries between Kimmeens and Sousheen Common and Sousheen Common and Coghlanstown East have been removed by quarrying within the proposed development site.

To the northwest of the townland boundary between Ballymore Eustace and Kimmeens, approximately 40m from it, and running roughly parallel to it, occur the remains of a substantial ditch (see Figure 3.3.2 and Plate 3.3.2). The ditch, sited in a field in open pasture, was assessed from the roadway (due to foot and mouth restrictions); it consists of a c. 4m wide, 1m deep, and shallow sided ditch. This is shown on the 1<sup>st</sup> and 2<sup>nd</sup> editions of the Ordnance Survey 6" maps, and it possibly continued into Kimmeens townland, where the development is sited (see Figure 3.3.2). However, any trace of this has been removed by the earlier quarry works. A small spring running from the lower portion of the same field and joining with the River Liffey appears to be natural (see Plate 3.3.2).

There are two individual derelict houses within the site perimeter. They are similar in style, consisting of rectangular shaped brick-built houses, of approximate dimensions 10m by 4m (see Plate 3.3.3). The entrance doorway is in the front middle of the houses, and there are small windows on either side of the door. Both are set within small plots of land as shown on Figure 3.3.2, which have already been significantly disturbed by the quarry operations.

### **3.3.2 Potential Emissions**

The development will involve substantial ground disturbance. However, this will mostly occur in areas that have already undergone considerable disturbance due to previous quarry operations. Although the baseline study and field walking did not

highlight any potential archaeology in the area of open pasture within the development site (see Figure 3.3.2), there is the possibility that previously unrecorded archaeological remains survive below the surface. Should such remains be present, then ground disturbance in this area would result in their destruction.

### **3.3.3 Description of Likely Impacts**

The majority development site has been quarried in the past to below the level of potential archaeological remains. Furthermore, no archaeological sites, monuments or remains have either been recorded on or adjacent to the site, or were noted during field survey. As such, the impact of the proposed development on the cultural heritage of the area will be negligible. However, as noted above, there is the potential for previously unrecorded sub-surface archaeological remains to be present in the area in open pasture within the development site. If any archaeological features or finds are present in this area, they will be destroyed by ground disturbance during the course of the proposed development.

### **3.3.4 Mitigation Measures**

Monitoring (under licence from Dúchas and by a suitably qualified archaeologist(s)) should be undertaken during the ground disturbance phase of the development in the area of open pasture as described above and shown on Figure 3.3.2. If any archaeological features or material be uncovered during the course of monitoring, works should cease immediately, and Dúchas informed. Time must be allowed for a suitably qualified archaeologist(s) to inspect and assess any such material. If it is established that archaeologically significant material is present full archaeological excavation and recording will be required. Adequate financial and logistical provision should be made for any such archaeological excavation, related post excavation, testing and/or conservation work and for publication of the results.

A plan and photographic survey of the derelict houses is also recommended, prior to any construction work being undertaken in these areas.

As the remainder of the site has been extensively quarried in the past to below the level of potential archaeological deposits, the impact of the proposed development will be negligible. For this reason, apart from those outlined above, no mitigation measures are required. However, should in the future the proposed

development or related activity (including service roadways) extend into any of the adjacent previously undeveloped land outside of the current proposed development area, then further advice should be sought from Dúchas, the Heritage Service, prior to any such works commencing.

### **3.3.5 Likely Significant Impacts**

Given that the area has been significantly disturbed by previous quarrying operations, then should the above mitigation measures be implemented, the impact of the proposed development on the cultural heritage of the area will be minimal.

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### **3.4 Flora And Fauna**

#### **3.4.1 Existing Environment**

Natura Environmental Consultants (t/a Natura) were commissioned by Environment & Resource Management Ltd. to undertake an ecological survey of a site adjacent to the town of Ballymore Eustace in Co. Kildare.

##### **3.4.1.1 Methods**

A site visit was made in April 2001. Descriptions of the habitats within the site and the immediate surrounding areas were made using the habitat classification system outlined in Fossitt (2000) and the codes in parentheses are derived from this reference. Nomenclature follows Webb *et al.* (1996).

Due to the limitations of the survey conducted it was not possible to compile a full species list of birds and mammals utilising the site at all times of the year. Direct observation and bird calls were used to identify birds present during the survey work in April 2001. Because most mammals are small, mobile and fugitive they are much more difficult to observe and record in the field than are birds. Comprehensive mammal surveys were not a practical proposition as part of this study and the assessment of mammals is based largely on the suitability of the habitat in conjunction with observation of tracks, burrows and signs of mammalian activity on the site.

The aquatic invertebrate fauna of the River Liffey at two stations was assessed using the Environmental Protection Agency's standard technique (Lucey *et al.*, 1999). This provides a biological assessment of water quality. The invertebrates, collected by kick-sampling, were preserved in alcohol and identified by Ecological Consultancy Services Ltd (Ecoserve).

An evaluation was made of the present ecological value of the site with respect to the potential impacts of the proposed development.

##### **3.4.1.2 Habitats And Flora**

###### **Site Overview**

The site is located immediately north-west of the town of Ballymore Eustace and is flanked to the east and south by minor roads. There

are fields of semi-improved pasture to the north and west. The River Liffey runs to the south of the site and is approximately 30m distant from the site boundary at its closest point.

The site is a recently abandoned sand and gravel quarry and there are only fringes of semi-natural habitat remaining around the site periphery. Drainage of the site is to the south towards the River Liffey. The main habitats within the site are described below and shown in Figure 3.4.1.

### Designated Areas

There are no designated areas occurring within the site, although the Liffey Valley Meander Belt, proposed National Heritage Area, is located 30 metres south of the site. There are also nine proposed National Heritage Areas (pNHA) and one Special Protection Area (SPA) located within 10km of the site (see Table 3.4.1)

**Table 3.4.1 Designated Areas within 10km of the site**

pNHA No.	SPA No.	Name	Distance from the site
000393		Liffey Valley Meander Belt	30 m south
000731	063	Poulaphouca Reservoir	4 km east
001759		Newtown Marshes	4 km south
002053		Hollywood Glen	8 km south
002104		Grand Canal	8 km northwest
001772		Dunlavin Marshes	9 km southwest
000397		Red Bog Kildare	9 km northeast
001396		Liffey Bank above Athgarvan	9 km west
000392		Curragh	10 km west

### ***Dry calcareous and neutral grassland (GS1)***

Two small areas of dry grassland can be found on the site, one in the northwest corner and one along the northern boundary of the site. Both areas have a reasonable species diversity with sweet vernal (*Anthoxanthum odoratum*), meadow grasses (*Poa spp.*), clovers (*Trifolium spp.*), yarrow (*Achillea millefolium*), ladys bedstraw (*Galium verum*) and mosses dominating the sward. Cowslip (*Primula veris*) are occasional.

A small copse of woodland occurs on a steep slope on the southern boundary of the site. This is dominated almost entirely of beech (*Fagus sylvatica*) and extends for a distance of approximately 100m varying in width between 2 and 20m. This adjoins an area of transitional scrub-woodland to the east which has a more diverse composition including young sycamore (*Acer pseudoplatanus*), ash

(*Fraxinus excelsior*), elder (*Sambucus nira*) and gorse (*Ulex europaeus*). There is abundant briar (*Rubus fruticosus* agg.) and occasional weld (*Reseda luteola*).

### **Scrub (WS1)**

A small willow thicket with abundant gorse occurs along a drainage line in the south-east of the site. Part of this area has recently been disturbed during the quarrying process. There were frog tadpoles in a number of shallow pools in this area formed from the track marks of heavy machines. The area is fringed by wet grassland.

### **Hedgerows (WL1)**

A hedgerow runs along the majority of the site's northern boundary though in places it has considerable gaps. It is dominated by hawthorn (*Crataegus monogyna*) with occasional blackthorn (*Prunus spinosa*) and single isolated mature specimens of oak (*Quercus petraea*), ash and beech. There is a very poorly developed understorey as it is very thin at the base.

A small stretch of hawthorn hedge also occurs on the south-east corner of the site which is developing into a small thicket. A fenceline along the western and south-western perimeter of the site has occasional isolated hawthorn, blackthorn and gorse along its length.

### **Exposed sand, gravel or till (ED1)**

A small area of the quarry close to the north-western boundary of the site has not been subject to recent disturbance and has an establishing vegetation comprised of species typical of the dry grassland as listed above. In addition there are occasional coltsfoot (*Tussilago farfara*), burdock (*Arctium minus*), nipplewort (*Lapsana communis*), nettle (*Urtica dioica*) and dandelion (*Taraxacum* spp.).

### **Recolonising bare ground (ED3)**

Along the eastern fringe of the site there is an area of recolonising bare ground which has a suite of plants typical of this environment including the species listed above as well as some areas of gorse and hard rush (*Juncus inflexus*).

### **Wet Grassland (GS4)**

A small seepage area occurs at the base of a slope adjacent to the south-eastern boundary of the site. It is comprised mainly of creeping bent grass (*Agrostis stolonifera*), meadowsweet (*Filipendula ulmaria*) and hard rush.

### **Active quarry (ED4)**

The vast majority of the site has recently been managed as an active sand and gravel quarry and was subject to high levels of disturbance. Resultantly, there is no vegetation cover.

## **3.4.1.3 Fauna**

### **Birds**

Due to the high level of disturbance to the site there is limited habitat available for birds. A sand martin colony is present (April 2001) on the northern perimeter of the site where there is an old quarry face in fine sediments. There are approximately 70 holes present but due to the time of the year it was not possible to determine the number of birds that will utilise the site for nesting. A small number of sand martins were seen hawking in the vicinity, though no activity was noted at the colony.

The fringing habitats around the site including the beech copse and adjacent thicket, and the area of willow and gorse scrub, contained an assemblage of species typical of woodland and scrub including dunnoek, wren, robin, chaffinch, blackbird, song thrush and willow warbler. All these species could be expected to breed within the site in suitable habitat. Other species noted were pheasant, rook, jackdaw, magpie, grey crow and meadow pipit. A solitary sparrowhawk was observed hunting over part of the site though no evidence of a suitable breeding location was apparent.

### **Mammals**

The site contains a high density of rabbits around the periphery and a large warren is located adjacent to the site on the north-western corner. As a result there was abundant signs of fox activity and a solitary fox was observed lying up in the old quarry workings in the north of the site. No evidence of a fox earth was found though there are areas of scrub on the southern part of the site which were

inaccessible. An outlier badger sett was seen at the edge of a hawthorn hedge/thicket on the south eastern boundary of the site.

#### **3.4.1.4 Aquatic Environment**

The site contains a single small seepage located on the southern boundary in the area of willow scrub. There is no associated aquatic flora and fauna in this seepage which suggests that it is a seasonal feature. Drainage on the site is to the south towards the River Liffey which is approximately 30m away at its nearest point. The Liffey is a major river of regional importance not only for its fisheries value as a salmonid river but also for its ecological significance in terms of associated riparian habitats and general amenity value. At this stretch of the river it is approximately 20 to 25m wide and has a gentle flow in water generally greater than 1m deep. At a number of points however, it forms riffle stretches which are suitable for the assessment of water quality using the biotic index. Samples were taken at two stations (shown in Figure 3.1.1), one upstream of the site at Ballymore Bridge (L1,) and the other immediately downstream of the site (L2). Both sampling stations were on riffle habitats with abundant growth of willow moss (*Fontinalis antipyretica*) on submerged rocks and water crowfoot (*Ranunculus cf. pencillatus*) in gravel substrates.

The results of the water quality sampling at both stations give a 'Q' value of 3-4 (see Table 3.4.2), indicating that the water in this stretch of the river is slightly polluted. Both samples had low numbers of A and B groups (groupings relate to pollution sensitivity with A group organisms being most sensitive) apart from Baetidae, and were dominated by caseless caddis fly larvae from the genus *Hydropsyche* (group C). A Q-value of 3-4 has been assigned to both sites due to the dominance of group C taxa and Baetidae (Group B), and the presence of a few individuals from A group taxa. Some of the Tricopteran larvae had fungus growing on them. There was very low diversity of species at Ballymore Bridge.

**Table 3.4.2. Aquatic invertebrates from the R. Liffey at Ballymore Eustace**

STATION NUMBER	L1	L2	EPA*
<b>ANNELIDA</b>			
Hirudinea (leeches)		+	D
Oligochaeta (worms)		+	--
<b>CRUSTACEA</b>			
<i>Asellus sp</i>	+	+	D
<b>ARTHROPODA – INSECTA</b>			
<b>Ephemeroptera (mayflies)</b>			
Baetidae	++	+++++	B
Heptagenia sp.	+	+	A
<b>Trichoptera (caddis flies)</b>			
<i>Hydropsyche sp</i>	+++++	+++++	C
<i>Rhyacophila sp.</i>	+	+	C
Polycentropodidae		+	C
Cased tricoptera indet		+	B/C
<b>Diptera (two-winged flies)</b>			
Chironomidae	++	+	D
Simuliidae larvae		+	C
Dipteran pupa		+	C
<b>Coleoptera (beetles)</b>			
Beetle larvae indet.			C
<i>Elminthidae</i> adults		+	C
<i>Elminthidae</i> larvae	+	++	C
Dytiscidae		+	C
<b>NO. OF TAXA</b>	<b>7</b>	<b>15</b>	
<b>Q-INDEX</b>	<b>3-4</b>	<b>3-4</b>	

The EPA faunal indicator groups of sensitivity to pollution are:

- A (sensitive)
- B (less sensitive)
- C (tolerant)
- D (very tolerant)
- E (most tolerant).

- ++++++ = Numerous (51+ individuals)
- +++++ = Common (21-50)
- ++++ = Fair numbers (11-20)
- ++ = small numbers (6-10)
- + = scarce (1-5)

### **3.4.2 Description Of Likely Impacts**

#### **3.4.2.1 Direct Impacts**

##### ***Habitats***

The landfill development will result in the infilling of the sand and gravel quarry which covers most of the site. This constitutes a minor negative impact of local significance. As this is a recently abandoned quarry site, it is of low ecological value as there has been little natural re-colonisation of plants and animals except for a sand martin colony in the sandy cliffs. (See Section 3.4.1.3 Fauna).

An area of species rich grassland will be removed (160m x 70m approx.). This is a minor negative impact as this habitat is of low local ecological value. Small areas of scrub and wet grassland will be removed to facilitate access roads and ancillary buildings. This will be a minor negative impact as these habitats are of low local ecological value.

##### ***Fauna***

The removal of nesting burrows of a colony of sand martins along the north-western corner of the quarry cliffs is a moderate negative impact of local significance. Provided the landfill construction is undertaken outside the sand martin breeding season, the sand martins will find alternative suitable nesting areas in the locality.

#### **3.4.2.2 Indirect Impacts**

The River Liffey runs very close to the southern boundary of the site, 30m at its closest point. It is a major river of regional importance. There should be no impact on the river by the landfill provided it is constructed and managed in accordance with EPA Guidelines. However given the ecological importance of the river and the proximity of the landfill to it, precautionary/safety measures should be put in place to ensure there will be no possible impact in terms of leachate contamination or polluting surface water run-off.

#### **3.4.2.3 Residual Impacts**

Despite the mitigation measures outlined above, the proposed development will involve the permanent loss of a sand and gravel quarry habitat and a sand martin nesting site.

### **3.4.3 Mitigation Measures**

#### **3.4.3.1 Mitigation by avoidance**

- Negative impacts on the River Liffey will be avoided by ensuring no possibility of contamination of river by landfill leachate or polluting surface water runoff. During construction temporary mitigation measures will be put in place to ensure no surface runoff will flow into the River Liffey resulting in siltation.
- The sand martin colony will not be disturbed during the breeding season (April to July inclusive).
- Trees around the perimeter of the site will be retained. This includes Beech trees on the southern boundary and other mature trees on the hedgerows around the perimeter of the site.
- All trees to be retained within the site will be afforded protection during the landfill construction and operation as follows:
  - Appropriate fencing will be erected around the trees to the perimeter of the crown spread before site works commence.
  - The ground flora beneath the trees will be left intact.
  - There will be no dumping of spoil or storage of materials around the base of the trees.
- The scrub/thicket containing the badger sett on the south-east side of the site will be retained.

#### **3.4.3.2 Mitigation by remedy**

- Additional planting of native trees (such as ash, oak) and shrubs (such as hawthorn, blackthorn) around the perimeter of the site and eastern side of the site will provide some mitigation for the loss of habitat in general.
- Ongoing water quality monitoring of the River Liffey will be required to ensure that there are no impacts of the landfill on the river. A contingency mitigation plan will be drawn up in advance in the event of a pollution incident.



### **3.4.4 Likely Significant Impacts**

Assuming the mitigation measures outlined above are implemented satisfactorily and that the management of the landfill facility is in accordance with required EPA Guidelines there should be no significant impacts of the proposed development on flora and fauna.

### **3.4.5 References**

Lucey, J., Bowman, J. J., Clabby, K. J., Cunningham P., Lehane M., MacCarthaigh, M., McGarrigle, M.L., Toner, P. F. (1999). *Water quality in Ireland 1995-1997*. Environmental Protection Agency.

Fossitt, J. A. (2000). *A guide to habitats in Ireland*. Heritage Council, Kilkenny.

Webb, D.A, Parnell, J., Doogue, D. (1996). *An Irish Flora*. Dungalgan Press

### **3.5 Human Beings**

The following Section was prepared by Environment & Resource Management Ltd and Denis Wilson Partnership Ltd. (Traffic).

#### **3.5.1 Introduction**

In general human beings can be impacted by dust, odour and noise from the operation of the proposed facility. The effects of dust, odours and noise on humans are dealt with elsewhere in this EIS.

The human beings section has been broken down into the following subsections:

- **Population Statistics**
- **Land-use and housing**
- **Infrastructure**
- **County Development and Waste Management Planning**
- **Local Industry**
- **Tourism**
- **Traffic**

An environmental impact assessment is provided below. A separate environmental assessment of traffic has been prepared and is included in this section.

#### **3.5.2 Existing Environment**

##### **3.5.2.1 Population Statistics**

The 1996 census report produced by the Central Statistics Office details population figures in terms of District Electoral Divisions.

The site of the proposed facility is located in the D.E.D. of Ballymore Eustace (Naas No. 1 Rural District). In 1996 it had a population of 1,385 people, an increase of 3.4% over the 1991 census.

##### **3.5.2.2 Land Use and Housing**

The site of the proposed facility is located in the Townland of Kimmeens, Ballymore Eustace, Co. Kildare, the edge of Ballymore Eustace village is located approximately 250m southeast of the closest site boundary.

The site is an exhausted sand and gravel pit. The perimeter of the pit is 130 to 150 m.O.D. The surrounding landscape is rolling Kildare country side. (It is described in greater detail in Section 3.7).

The site is located in a rural area, largely agricultural in nature, although close to a village. The land to the north of the site is pasture; to the east of the site has some residential dwellings and a restored sand and gravel pit; to the southeast includes Ballymore Eustace village; to the south is pastureland and the river Liffey and to the west includes pastureland.

Excluding Ballymore Eustace village there are approximately 30 once of residences within a 500m radius from the site boundary. Ballymore Eustace Village is within 500 metres of the closest site boundary.

The local infrastructure and development are depicted in Figure 3.5.1.

### **3.5.2.3 Infrastructure**

The R411 passes the site at the easterly entrance and proceeds in a northwesterly direction towards Naas. Most of the waste lorries will utilise the Naas Road, coming from Naas for access to the facility (i.e. it will not pass the school). A small number (4-6) of waste lorries each way will pass by the school on the R411 on the way to the facility. The Coghlanstown/Kilcullen Road skirts the southern boundary of the site and proceeds towards Kilcullen.

There is a water main that traverses the eastern boundary of the site. The proposed facility will receive potable water from a watermain running along the R411. The water demand will predominantly be for the office, canteen, toilets and as a dust suppressant.

Sewage, generated on-site by employees, will be managed through the use of a proprietary treatment system and percolation area.

The site will have three phase power. A connection will enter from the east.

The site will have a telephone and fax connection.

### **3.5.2.4 County Development Plan**

The County Kildare Development Plan and The Ballymore Eustace Development Plan were reviewed.

#### **3.5.2.4.1 County Kildare Development Plan**

The current plan was approved in 1999.

##### ***Section 1.6.1 of the Plan***

The site lies within the lands identified in the Plan as "The East Kildare Uplands". As the Plan points out "These hills cut off the Wicklow Mountains and Blessington town from the Central Lowlands of Ireland. Most of the hills are composed of Silurian slates and greywackes which outcrop in the summit area and are covered on the middle and lower slopes with deposits of boulder clay and gravels left by the retreating ice sheets of the late Midlandia Glaciation."

Sand and gravel extraction is listed as one of the predominant land uses of this area. The Plan indicates that in recent times this extraction "has intensified" and has left a residue of worked out pits that are "visually objectionable".

Schedule 2 "List of Specific Objectives for Sand and Gravel Pits" of this Plan deals with this particular pit (i.e. Pit No.14). The specific objective for this pit is to allow a limited extension (subject to planning permission) of up to 3 acres (1.21 ha). The extraction should be coupled with a rehabilitation programme to both the new work and the existing extensive pit at no cost to the council. After use could be partially amenity woodland and the remainder investigated as an urban recreational use associated with the town.

##### ***Section 1.11.7 of the Plan***

Ballymore Eustace is designated as a "Special Village" It is Council policy to maintain the character and quality of the village. It is also is also policy to encourage amenity and environmental improvements schemes.

The site of the proposed facility is a disused sand and gravel pit. In general terms the plan of this proposed development is to restore the site in accordance with Planning Permissions. The project will

provide an environmental improvement as well provide some amenity improvements.

### **Section 2.23 Areas of High Amenity**

It is Council policy to preserve and enhance the natural amenities of the River Liffey.

The Landscape Section (Section 3.7), of this EIS, describes screenings and plantings to minimise views into the site from the River Liffey (i.e. along southern portion of site).

#### **3.5.2.4.2 Waste Management Plan for County Kildare**

The Waste Management Plan for County Kildare was consulted. In general it articulates plans with regard to the management of wastes generated within its own boundaries.

With regard to private development it makes mention of existing private facilities in County Kildare. No particular policy is articulated with regard to private development of waste management infrastructure.

Considerable reference is made to Irish waste management policy.

#### **3.5.2.4.3 Ballymore Development Plan**

The current plan was prepared in 1996. A new plan is being prepared.

The site of the proposed development is not within the site boundaries of Ballymore Eustace village. However it is directly adjacent to the northwest corner of the village boundary and therefore this proposed development could have some impact on the village.

**Section 1.3 "Status Context and Character"** alludes to sand and gravel pits to the north of the village which may affect the village's expansion as well as pose a serious threat to the surroundings.

The proposed development seeks to restore a disused sand & gravel pit to close to the original contours. The plan is to restore the site's visual amenity as well as provide recreational opportunities (e.g. GAA pitch, tennis courts etc).

Item T1 on the drawing accompanying the Development Plan seeks to "Improve and widen Ballymore/Harristown road between the development boundary and Naas Road." This work does not appear to have been completed.

**Section 2.7 "Items for Preservation"** articulates that it is the Council's objective to preserve, among other things, item of amenity and townscape interest.

Although the discussion in this section revolves around the destruction or alteration of existing items it is not inconceivable that this strategy could encompass the restoration of areas with degraded visual amenity, which would contribute to visual amenity and townscape interest.

**Section 2.29 " Extractive Industries"** deals with sand and gravel extraction and the requirements to rehabilitate all existing and future workings. Rehabilitating pits by backfilling with topsoil, subsoil and builder's rubble is allowed.

#### **3.5.2.5 Local Industry**

The site of the proposed facility falls within Extraction Zoning (See Map I.3). Planning Permissions have been granted for extension of sand and gravel extraction on the site (see Appendix 1). Also Kildare County Council development plan contemplates expansion of extraction (See Schedule 2).

Local businesses surrounding the site include those in Ballymore Eustace village and include those industries typically located in a village (e.g. grocery stores, pubs).

The proposed facility will result in employment with regard to construction of the facility. It is estimated that there will be 10 person years of employment (i.e. 2 six month periods where approximately 10 people will be employed to construct the facility). The operation of the facility will result in estimated employment of approximately 10 people, including a site manager, machine operators and site operatives. It is estimated that the facility will be in operation for 6 years with restoration works adding perhaps another two years.

To the extent possible local people will be employed during the construction and operation phases of the development.

### **3.5.2.6 Tourism**

Ballymore Eustace is designated as a Special Village. As such it attracts tourism, it is assumed primarily from people touring in the vicinity of the village.

The presence of the disused sand and gravel pit does not likely dissuade people from visiting Ballymore Eustace. The restoration of same will not attract people to Ballymore Eustace *per se* although it will result in an improvement of the visual amenity in that area.

The County Development Plan clearly articulates (Section 2.22 of Plan) that the landscape of the county has been identified as an important amenity feature as it relates to tourism.

The proposed development seeks to re-instate, to the extent possible, the landscape to its former state. Section 3.7 Landscape describes this in more detail.

### **3.5.3 Potential Emissions**

Potential emissions relate to dust, odours (Section 3.1), noise (Section 3.8), surface water (Section 3.9) and groundwater emissions (Section 3.6) and are dealt with in this chapter.

Traffic is dealt with in a separate sub-section.

It is not thought that the proposed development will negatively affect /contravene population, land-use and housing, County/Local Plans, local industry and tourism.

### **3.5.4 Description of Likely Impacts**

The most likely impacts are due to dust, noise and traffic. They are more fully described in Sections 3.1, 3.8 and 3.5.7.

### **3.5.5 Mitigation Measures**

Mitigation measures for dust, odour, noise and traffic are described in their respective sections.

In short measures will be taken to minimise the aforementioned and take actions to reduce any potential impacts on human beings.

### **3.5.6 Likely Significant Impacts**

If the appropriate measures no significant effects of the development on human beings is envisaged.

A waste licence will require various environmental monitoring to ensure that this is the case over time.



### **3.5.7 Traffic**

Traffic is recognised as an important factor in terms of environmental impact on human beings. A separate environmental assessment of traffic has been prepared by specialist traffic engineers Denis Wilson Partnership Ltd.

#### **3.5.7.1 Existing Conditions**

The application site is located on the outskirts of Ballymore Eustace, which is an attractive quiet village located in East Kildare. Close to the Wicklow border it is located on the banks of the River Liffey and Blessington Lakes. The population of this town is in the region of 700 people.

The site is located to the northwest of Ballymore Eustace. The existing access to the site is formed by a simple priority arrangement connecting directly to the R411 Ballymore to Naas Road. The R411 runs north from the village, with Naas town centre some 12km from the site. Travelling north on the R411 the existing site access is located just outside the 30mph speed limit, which applies through the village. Access from the National Primary Road Network is provided from the N81 Blessington Road via the R411.

To the north the site is bounded by large meadows and some residential dwellings, to the west and south the site is bounded by a number of residential dwellings and the River Liffey, to the east the site is bounded by the R411 Regional Route.

The general road infrastructure in the immediate vicinity of the development site is of a relatively good standard in terms of a regional distributor road and the road surfaces in the vicinity of the development are in good repair.

#### **Historic Traffic Data & Use of the Development Site**

The lands covered by the application have historically been used for the extraction of sands and gravel, which discontinued as recently as 1998. The existing site is therefore a disused sand and gravel pit.

The operators of the site for the period 1984 to 1998 were SLM Sales Ltd. Given below in Table 3.5.1 is a summary of information provided by SLM Sales Ltd. regarding their operations and the levels of traffic attraction associated with sand and gravel haulage from the Ballymore Eustace site.

**Table 3.5.1 Historic Traffic Data at Development Site**

Year	Loads Per Day	Year	Loads Per Day	Year	Loads Per Day
1984	110	1989	120	1994	80
1985	120	1990	110	1995	94
1986	115	1991	100	1996	74
1987	125	1992	100	1997	95
1988	118	1993	90	1998	94

It can be seen from the above Table 3.5.1 that trade from the site started to drop off slightly in the latter half of the 90's, however on average SLM Sales Ltd. and other haulage contractors were extracting approximately 100 loads per day for the fifteen year period between 1984-1998. From the above it can be seen that when the site was in operation, as recently as 1998 the traffic generation to and from the site was in the order of approximately 200 trips per day (100 vehicles in and 100 out of the site).

### **Current Traffic Flows on Links and Junctions**

In establishing the scope of a traffic impact assessment as a general rule of thumb the assessor should include junctions on the local roads network considered to have a potential increase in traffic flow of 10% or more in the peak hour on any one approach arm as a direct result of traffic generated by the proposed development. In congested areas this value normally reduces to 5%.

The capacity and operation of a road network is dependent on the junctions within that network and it is the operation of the junctions which determine capacity and vehicular delay. In order to assess the current traffic conditions on the road network in the vicinity of the proposed development site, classified manual turning count surveys were carried out at the existing junction adjacent to the National Primary School to the west of the village. This is the junction of the R411 Ballymore Eustace to Naas Road and the Kilcullen Road.

The above traffic surveys were carried out on the morning of Thursday 26<sup>th</sup> April 2001 between the hours of 0730-1000hrs, the afternoon of Thursday 17<sup>th</sup> May 2001 between the hours of 1630-1830hrs and the morning of Friday 18<sup>th</sup> May 2001 between the hours of 0730-1000hrs. For comparative purposes the earlier

survey in April 2001 was carried out when the school was closed for the Punchestown Race Meeting (which in fact was cancelled in 2001). The hours over which the surveys were carried out are accepted to extend over the morning and evening peak hours (rush hours) during a normal weekday.

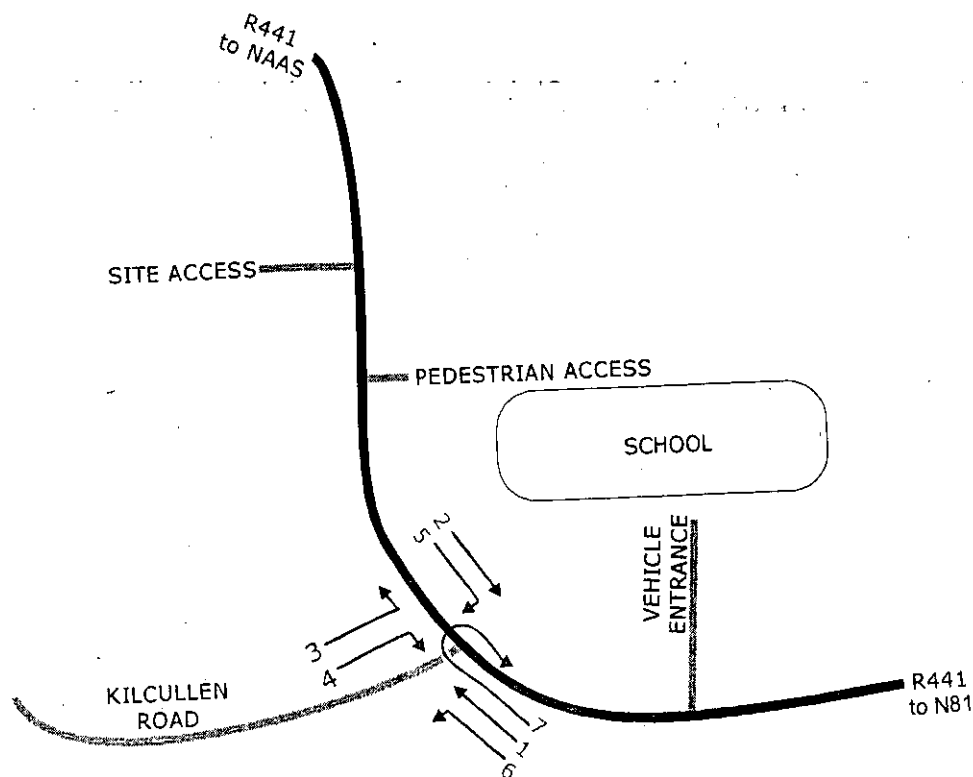
The peak traffic periods were recorded in the survey as being 0815-0915hrs in the morning with the school both open and closed. The evening peak was recorded as being between 1700-1800hrs. A summary of the peak hour survey data is provided in Table 3.5.2 (and accompanying descriptive figure) below.

The peak AM two-way traffic flow on the R411 past the primary school is approximately 192 vehicles (depends on which entrance to school i.e. vehicular entrance or pedestrian entrance) when the school is closed. This value increases to approximately 230 vehicles when the school is open thereby indicating a 20% increase in AM peak hour traffic when the school is open. The equivalent throughput of vehicles in the PM peak hour was recorded at approximately 236 vehicles. It can be seen that the levels of traffic during the peak periods are relatively consistent with an average two-way traffic flow on the R411 past the development access of approximately 230 vehicles per hour. In the context of the capacity of a road of this category the general link capacity should be in the region of 1,000 vehicles in both directions, thereby indicating that the existing link is operating at approximately 12.5% of ultimate capacity. It will be seen later that the combined peak of network traffic and the traffic generated by the development is likely to occur in the AM peak period when the school is open. This is the traffic scenario upon which analysis of the peak traffic periods will be based.

**Table 3.5.2 Summary of Peak Hour Traffic Survey Results  
R411 Naas Road/R413 Kilcullen Road Junction**

R411				Kilcullen Road				
1 North		2 South		3 Left Out	4 Right Out	5 Right In	6 Left In	7 U-turn
←		→		↙	↘	↓	↙	↻
HGV	Pcu	HGV	pcu					
Thursday 26 <sup>th</sup> April 2001 (Peak Hour 0815-0915hrs)								
3	50	4	115	0	19	0	19	1
Thursday 17 <sup>th</sup> May 2001 (Peak Hour 0815-0915hrs)								
1	123	2	76	0	10	2	23	19
Friday 18 <sup>th</sup> May 2001 (Peak Hour 1700-1800hrs)								
5	89	4	113	1	19	4	24	3

**Surveyed Traffic Movements  
(to be read in conjunction with Table 3.5.2)**



### **3.5.7.2 Potential Emissions**

#### **Proposed Development Land Uses**

The proposed scheme is for the construction of a modern commercial residual landfill site and will generally comprise a waste disposal area, buffer zone and reception area. The reception area at the entrance to the site will include a weighbridge, administration buildings, wheel washing facility, machinery/service area and waste inspection area and various ancillary facilities associated with the day-to-day operation of the landfill site.

It is proposed that primary access to the site will be by means of the existing site access located on the R411 on the eastern boundary of the development site, albeit that it is proposed to upgrade this existing access. The access or service road from the R411 will run due west from the R411 for approximately 154 metres thereafter turning through a right angle to run south (parallel to R411) for 190 metres thereafter turning through a further right angle (parallel to Kilcullen Road) to access the landfill area. The distance from the R411 to the weighbridge is approximately 210 metres, which can comfortably facilitate the queuing of some 10-12 HGVs, nonetheless as will be seen later, queuing of this magnitude is not likely to occur.

It is assumed that the landfill will be constructed in two distinct phases. It is estimated that the construction of Phase I will take place in the period April-August 2002 with the site forecast to be operational in September 2002. Phase 1 will constitute approximately 40% of the overall development. It is estimated that Phase 2 would be constructed in the period April-August 2004 and will be fully operational in September 2004. Clearly this will not have an influence on the overall traffic attraction to the landfill site during normal operation, however there will be a resultant short term increase in traffic to the development during the period of construction of Phase 2. In determining the likely impacts of the development later in this section; we will investigate both the impact of the development under normal operating conditions and the likely short-term additional impact of the development over the construction period of Phase 2. It is expected that the landfill will be operational for approximately six years with possibly 2 years of restoration work and therefore it is expected that landfill operations should be complete by approximately September 2008.

In the assessments of the likely traffic impact and the relative levels of road link and junction capacity that will follow in this report the above phasing of the project in selecting appropriate assessment years and determining the relative levels of traffic generation at the development site over the lifespan of the scheme is considered.

#### Forecast Traffic Attraction of Landfill Operations

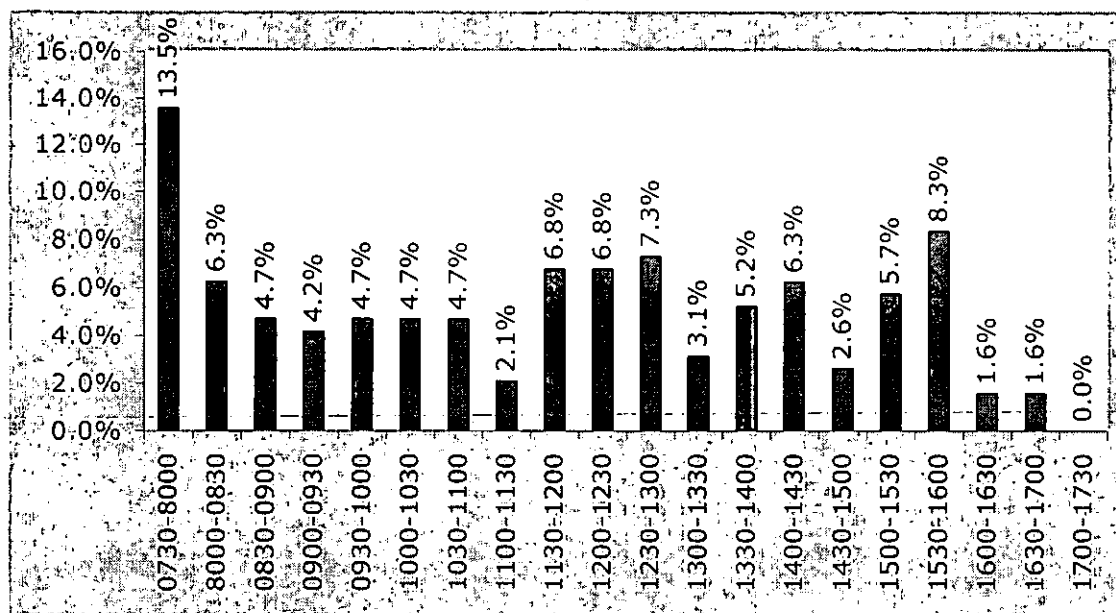
The proposals at the development site include for a landfill facility and ancillary reception and service buildings. It is estimated for the purposes of this section of the report that in total over the life of the scheme the landfill will accept between 45-55 loads per day.

~~As a point of reference, we have used empirical data gathered at an~~ existing similar development in County Kildare, delivery records at the existing KTK Landfill Site near Kilcullen indicate that the average tonnage to that site is 16.05 tonnes per vehicle. Waste will arrive at the site in larger containers, some of which can carry as much as 20 tonnes of waste, however for the purposes of this assessment, in order to carry out a 'robust' analysis of traffic impact we have assumed that a similar average load to the KTK site will be manifest at the proposed development. The opening hours of the site will be 0630-1800 hrs Monday to Friday, 0630-1400hrs on Saturdays. The site will not operate on Sundays or Bank Holidays. This constitutes approximately 275 working days per annum. Although the site will not be operational before 0730hrs it is expected, and will be permitted that vehicles arrive at the site from 0630hrs. These vehicles will enter the site, however they will not cross onto the weighbridge before 0730hrs. As previously stated there is sufficient space on the site access road to accommodate 10-12 vehicles queuing in this period.

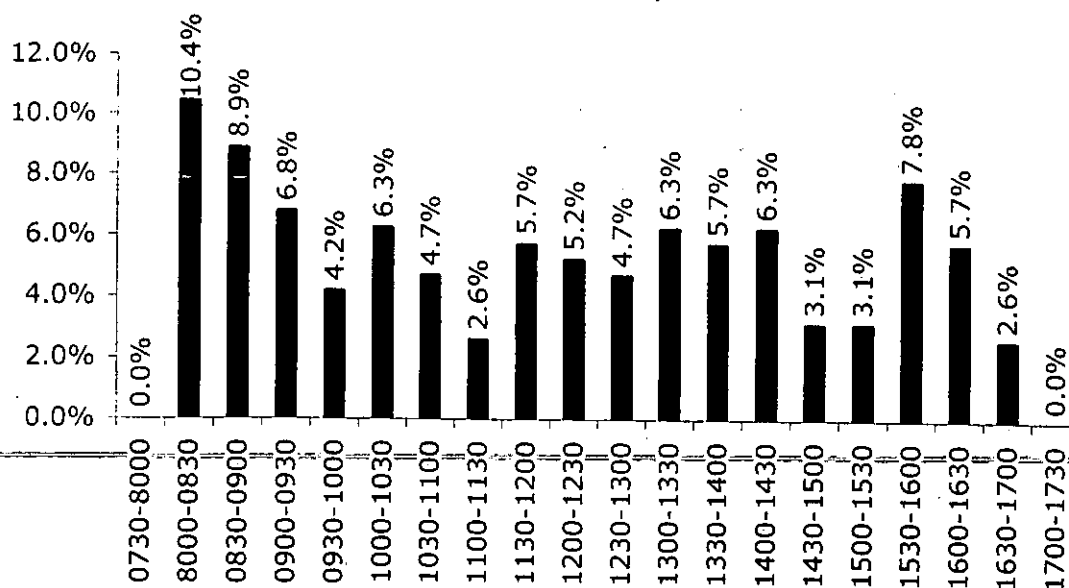
For the purposes of this report we have taken daily generation of approximately 55 heavy goods vehicles per day in connection with the deposition of materials at the site.

In order to estimate the peak hour arrival and departure figures we have again referenced survey data gathered from the KTK Landfill Site. Figures 3.5.2 and 3.5.3 below give a graphical representation of the percentage distribution of traffic to and from the KTK site for a typical day of operation. Data has been obtained from weighbridge records at the site.

**Figure 3.5.2 Daily Distribution of Traffic Arriving  
at KTK Landfill Site, Kilcullen**

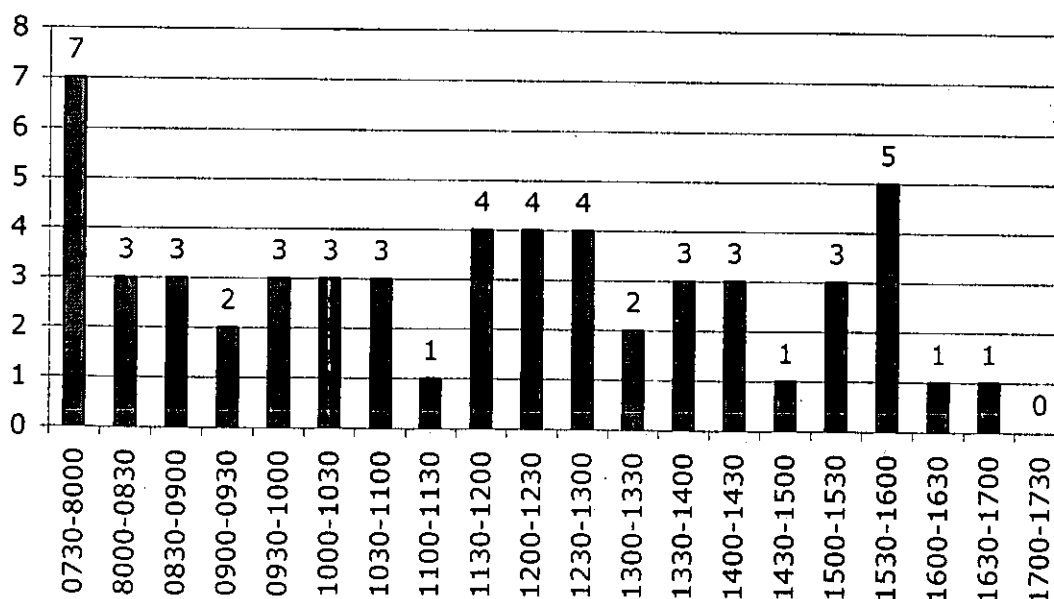


**Figure 3.5.3 Daily Distribution of Traffic Departing at KTK Landfill Site, Kilcullen**



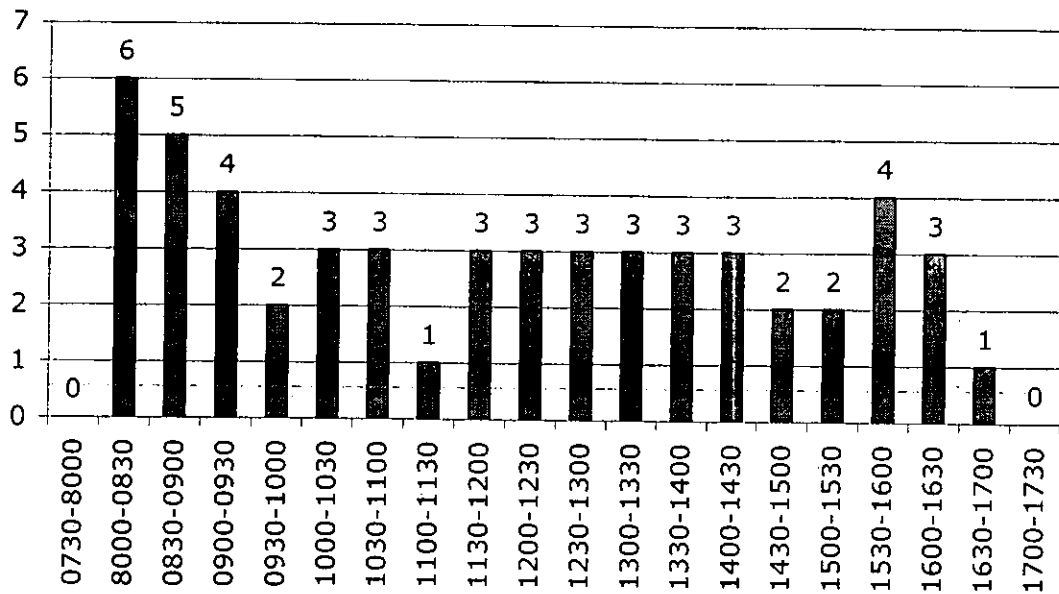
The data depicted is based on the average of representative samples taken during the month of August 2000, no major variations in daily traffic flows were recorded in the data provided. From the above figures we have made assessments of the likely daily profile of traffic attraction at the proposed landfill development site. The following Figures 3.5.4 and 3.5.5 show the forecast daily profile of landfill related traffic.

**Figure 3.5.4 Forecast Traffic Arriving at Proposed Landfill**





**Figure 3.5.5 Forecast Traffic Departing Proposed Landfill**



The variation between vehicles entering and leaving the site in any one given hour is accounted for by the time it takes to turn each vehicle around, which can take from 30-45 minutes. From our experience on similar projects we consider that the above data are representative of the likely traffic operation of the proposed landfill site at Ballymore Eustace.

It can be seen from the above figures that the period of greatest activity at the development site is likely to be during the morning period between 0730-0930hrs. As can be seen, the level of trade at the site generally levels out over the remainder of the day with approximately 3-4 vehicles arriving and departing the site every hour.

The above analysis allows for traffic attraction relating to the commercial operation of the landfill site for deposition of materials only. However, traffic will also be generated by site staff, miscellaneous deliveries and export of leachate. The number of vehicles per day associated with these activities are as outlined in the following.

**Site Operatives/Staff:** It is assumed that 10 Vehicles per day would be generated to and from the proposed development, constituting 10 arrivals of private vehicles prior to 0630hrs and 10 departures between 1800-1830hrs after the site is closed.

Leachate Export: It is forecast that there would be approximately 3 tankers per day. We have assumed that 1 HGV will enter and leave the site in the period between 0800-0900hrs with the remaining trips occurring throughout the day but not after 1700hrs.

Miscellaneous Deliveries: It has been assumed that on average there would be only one delivery to the site per week relating to the general operation of the site. It is expected that this element of traffic generation will be insignificant.

### **Construction Related Traffic Attraction**

The construction Phases of the project will generate traffic on the local road network. We consider that the primary generators of traffic will be deliveries of construction materials, construction staff and import of granular material for the landfill site. In the assessment of traffic attraction to the development we have made the following assumptions, based on our experience on similar developments.

Construction Staff: 10 Vehicles per day to and from the proposed development, constituting 10 arrivals of private vehicles prior to 0800hrs and 10 departures between 1700-1800hrs.

Misc. Deliveries: It has been assumed that on average there would be approximately 5 construction related deliveries per week. It is not expected that this element of traffic generation will be significant.

It is proposed that the landfill will be constructed in two distinct phases, which will be implemented over the life of the scheme. In terms of the quantities of granular material required for the construction of the landfill elements we have estimated a total of 30,000cu.m will be required for the whole landfill. At an approximate weight of 1.8 tonnes per cubic metre, the import of granular fill, delivered in 20 tonne loads, would constitute approximately 2,700 loads in total.

From the experience of the Environmental Impact Assessment team in the preparation and implementation of similar schemes and from discussions with the applicant we have assumed that delivery would take place over a period of 20 weeks, however this period can be extended if required to reduce potential impact as there will be no shortage of area within the site to stockpile the material for a longer period of time. Based on the above, for the construction of each

phase, this would constitute approximately 10 vehicles to and from the development site per day over the twenty week period for the construction of Phase 1 and 16 vehicles per day for the construction of Phase 2.

Provided below in Table 3.5.3 is a summary of the above forecast traffic generation figures for the proposed landfill site. The accumulative figures are shown on a pseudo programme of the implementation of the development.

**Table 3.5.3 Summary of Daily Traffic Attraction at Proposed Landfill**

	Construction April to August		Landfill Open Starts in September	
	Phase 1 2002	Phase 2 2004	Phase 1 2002	Phase 2 2004
Deposition of Wastes	Nil	55/day	55/day	55/day
Site Operatives/Staff	Nil	10/day	10/day	10/day
Leachate Export Tankers	Nil	3/day	3/day	3/day
Misc. Operational Deliveries	Nil	1/week	1/week	1/week
Construction Related Staff	10/day	10/day	Nil	Nil
Misc. Construction Deliveries	1/day	1/day	Nil	Nil
Import of Granular Fill	10/day	16/day	Nil	Nil
<b>Total Daily Traffic Attraction</b>	<b>21/day</b>	<b>95/day</b>	<b>72/day</b>	<b>72/day</b>

It can be seen through comparison of Table 3.5.3 above and Table 3.5.1 that the levels of Heavy Goods Vehicle (HGV) traffic associated with the proposed landfill site during normal operations are some 50% less than the levels of traffic generation associated with the site when it operated as a commercial sand and gravel pit, which ceased approximately 2½ years ago.

### **Distribution of Trips and Routing to and from the Landfill Site**

In terms of traffic distribution of the development generated traffic from the operation of the landfill site on the surrounding roads network it is proposed that save for some 5 vehicles per day, landfill related HGV traffic would arrive at the site from the North. It is proposed that traffic to the site would predominantly come from Naas accessing the site via the R411. The return journey of this landfill HGV traffic would be back to Naas via the R411. It is also assumed that any deliveries, including importation of granular material by HGV would use this same route to and from the site. Therefore, it is envisaged that only 5 landfill vehicles would travel through Ballymore Eustace. These vehicles include 2-3 lorries per day from the Public Water Treatment Works located on the east of Ballymore Eustace.

It has been assumed for the preparation of this assessment that non-HGV traffic to the site, including site staff, construction staff etc. would distribute on the local roads network in the proportions

recorded in the manual traffic count surveys. In short, if it is shown that say 40% of all traffic on the R411 past the site is heading north and 60% is heading south we would assume that 60% of all non-HGV traffic would arrive at the site from the north and therefore 40% would arrive from the south. Non-HGV traffic departing the site will be distributed in a similar manner.

We consider that the traffic distribution assumed for the proposed development is reasonable given the current conditions on the existing road network.

### **Assessment Year(s) and Estimation of Network Traffic Growth**

#### **Development Traffic**

The levels of traffic generation and distribution assumed at the proposed development site are outlined above. Considering that the development site will receive a finite amount of material every year during the lifetime of the landfill. It is assumed that the landfill site will have a relatively finite or consistent level of traffic attraction over its life.

We do not consider that the levels of traffic to and from the development site assumed above, will fluctuate appreciably and therefore we do not consider that the forecast levels of traffic at the site could reasonably be expected to experience significant growth in relation to time.

#### **Estimation of Network Traffic Growth and Traffic Flows**

Commuter traffic on the surrounding road network will increase over the construction and operational periods of the proposed development. It is assumed that for the most part this increase will result from development and car ownership figures in the area.

In the National Roads Authority publication 'National Roads Needs Study' it is assumed that traffic growth rates on the national roads system between the years 1995 and 2020 can be reasonably represented by a uniform annual traffic growth rate of 3.5%. Traffic growth on the National Primary Road Network, in general terms, results from development associated with economic growth. Traffic from new developments filters into the National Primary Road Network system via the regional and distributor road network, resulting in traffic growth on the primary roads.

The road network in the vicinity of the proposed site is made up principally of regional routes, which under normal circumstances would usually experience a lower growth rate than the National Primary Road Network. However, for the purposes of this report we have assumed that traffic levels in the vicinity of the proposed development will experience a level of growth close to that quoted above for National Primary Roads.

Since traffic growth on the local roads network can for a large part be attributed to development in the area, it could be assumed that a portion of this network growth would account for the traffic generated by the proposed development. However, in the interests of preparing a 'robust' analysis of the traffic situation we have discounted this consideration. In the assessments of the local road network to follow in this report we have not accounted for this element of 'double counting' and have simply compounded the traffic growth on the local road network by the advised 3.5% plus the traffic generated by the proposed development.

It must be appreciated that in the analysis of the roads network we have applied the above traffic growth rates to the peak hour period. However these growth rates are not always applicable to the peak hour period and it is generally accepted by traffic engineers that the peak hour, instead of increasing or intensifying as a peak, tends to spread over a longer period. This scenario has been the observation over the past number of years on the approach roads to Dublin in the AM peak period. As such the peak period on the roads in and around Dublin tends to be identifiable as about a two-hour period. Therefore in light of the above considerations we believe that it can be assumed that the figures used in the peak hour analysis are robust in terms of the likely levels of traffic on the local roads network in the vicinity of the proposed development.

From the above, we consider that the assessment of future traffic growth on the local roads network in the vicinity of the proposed development is a realistically 'robust' assessment of the traffic situation likely to prevail in future years after implementation of the proposed development. The above growth factors will be applied to the existing road network from the manual traffic count data. The resulting network traffic flows will be used in the assessment analysis provided in the following sections of this report.

### 3.5.7.3 Likely Impacts

#### Assessment Traffic Flows

From a review of the survey data on the R411 past the development site the network traffic peak periods have been identified as 0815-0915hrs in the AM and 1645-1745hrs in the PM.

For the purposes of assessing the traffic situation on the roads network in the vicinity of the proposed development we have prepared the following Tables 3.5.4 and 3.5.5 which show the respective AM and PM peak traffic flows to and from the site for the network peak traffic periods identified above. We have forecast development traffic flows for each relevant scenario over the life of the scheme in order that the 'worst case' or maximum combined development and road network traffic flows can be assessed.

**Table 3.5.4 Summary of AM Peak Hour Traffic Attraction**

	Construction April to August				Landfill Open Starts in September			
	Phase 1 2002		Phase 2 2004		Phase 1 2002		Phase 2 2004	
	In	Out	In	Out	In	Out	In	Out
Deposition of Wastes	0	0	6	11	6	11	6	11
Site Operatives/Staff	0	0	0	0	0	0	0	0
Leachate Export Tankers	0	0	1	1	1	1	1	1
Misc. Operational Deliveries	0	0	0	0	0	0	0	0
Construction Related Staff	5	0	5	0	0	0	0	0
Misc. Construction Deliveries	1	1	1	1	0	0	0	0
Import of Granular Fill	2	2	3	3	0	0	0	0
<b>Total HGV Traffic Attraction</b>	<b>3</b>	<b>3</b>	<b>11</b>	<b>16</b>	<b>7</b>	<b>12</b>	<b>7</b>	<b>12</b>
<b>Total AM Peak Traffic Generation</b>	<b>8</b>	<b>3</b>	<b>16</b>	<b>16</b>	<b>9</b>	<b>12</b>	<b>7</b>	<b>12</b>

**Table 3.5.5 Summary of PM Peak Hour Traffic Attraction**

	Construction April to August				Landfill Open Starts in September			
	Phase 1 2002		Phase 2 2004		Phase 1 2002		Phase 2 2004	
	In	Out	In	Out	In	Out	In	Out
Deposition of Wastes	0	0	1	1	1	1	1	1
Site Operatives/Staff	0	0	0	0	0	0	0	0
Leachate Export Tankers	0	0	0	0	0	0	0	0
Misc. Operational Deliveries	0	0	0	0	0	0	0	0
Construction Related Staff	0	5	0	5	0	0	0	0
Misc. Construction Deliveries	1	1	1	1	0	0	0	0
Import of Granular Fill	1	1	1	1	0	0	0	0
<b>Total HGV Traffic Attraction</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Total PM Peak Traffic Generation</b>	<b>2</b>	<b>7</b>	<b>3</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

It can be seen from the above, that the peak traffic attraction at the site occurs in the AM peak period. Traffic in the AM peak is predominantly entering the site and therefore has a greater impact on mainline R411 traffic than vehicles in the PM peak period, which are predominantly exiting the site.

In the preparation of the above tables assumptions have been made as to the arrivals and departures of each identified source of traffic generation. The following gives a brief summary of the assumptions made.

Deposition of Materials: In order to estimate the peak hour arrival and departure figures we have referenced survey data gathered from a similar private commercial landfill site in Kildare. The results of the analysis are given in Tables 3.5.4 and 3.5.5 above.

Site Operatives/Staff: It is assumed that 10 vehicles per day would be generated to and from the proposed development. Considering that the site will open at 0630hrs (0730 for disposal) it has been assumed that there would be no arrivals in the AM peak. All 10 are assumed to depart the site after the PM peak period.



Leachate Export: It is forecast that there would be approximately 3 tankers per day. We have assumed that 1 HGV will enter and leave the site in the period between 0800-0900hrs with the remaining trips throughout the day but not after 1700hrs. (If it is assumed that there is an early morning trip this would indicate that a late evening trip would be unnecessary)

Misc. Operational Deliveries: It has been assumed that on average there would be only one delivery to the site per week relating to the general operation of the site. It is not expected that this element of traffic generation will be significant nor that it would be manifest in the peak hour periods.

Import of Granular Material: 10 Vehicles per day to and from the proposed development in the construction of Phase 1 and 16 vehicles per day in Phase 2. In Phase 1, 2 vehicles are expected to enter and exit in the AM peak with 1 vehicle in the PM peak. For Phase 2, which is slightly larger than Phase 1, these figures have been increased to 3 in the AM but still 1 in the PM peak periods.

Construction Staff: 10 Vehicles per day to and from the proposed development, constituting 10 arrivals of private vehicles. It is assumed that half of these vehicles would arrive/depart during the identified peak hour.

Misc. Construction Deliveries: It has been assumed that on average there would be approximately 5-10 construction related deliveries per week. It is not expected that this element of traffic generation will be significant. However, in the interests of a robust assessment, we have assumed one delivery in both the AM and PM peak periods.

As can be seen from the above analysis, the maximum combined peak hour road network and development generated traffic flows at the development site are likely to occur during the construction of Phase 2 of the development when Phase 1 of the development would be operational. The peak period occurs in the morning. Given below in Tables 3.5.6 and 3.5.7 are the traffic scenarios for the peak period during the construction of Phase 2 and for the end of the life of the scheme.

**Table 3.5.6 Summary of Peak Short-term Traffic Attraction (Phase 2 Construction Period – 2004)**

R411 North		R411 South		Left Out		Right Out		Right In		Left In	
←		→		↙		↘		↓		↓	
HGV	Pcu	HGV	pcu	HGV	pcu	HGV	pcu	HGV	pcu	HGV	pcu
1	136	2	84	15	0	1	0	10	2	1	3
Total vehicle movements at proposed access: 30HGV, 227pcu (257 movements)											

**Table 3.5.7 Summary of Peak Traffic Attraction (End Phase 2 Operational Period – 2008)**

R411 North		R411 South		Left Out		Right Out		Right In		Left In	
←		→		↙		↘		↓		↓	
HGV	Pcu	HGV	pcu	HGV	Pcu	HGV	pcu	HGV	pcu	HGV	pcu
1	156	3	97	11	0	1	0	7	0	0	0
Total vehicle movements at proposed access: 6HGV, 263pcu (269 movements)											

### **Proposed Site Access Arrangements**

In brief, it is proposed that the development would be served from the existing junction located on the R411. This is the same access to the site, which was in service for the period 1984-1998 when the site was operated for the purposes of sand and gravel extraction.

It is proposed to enhance the existing junction through widening the entrance and increasing the radii of the bellmouth of the junction in order to more readily accommodate the movement of larger vehicles and to increase visibility at the access for those undertaking exiting manoeuvres.

### **Capacity Assessment of Access Arrangements**

The Transport Research Laboratory (TRL) computer modelling program PICADY (Priority Intersection Capacity and Delay) has been used for the assessment of major/minor priority junctions on the local road network and for the assessment of the proposed access arrangements. In general terms the program operates on the gap acceptance theory. The output parameters of PICADY

provides information for roads designers and planners with regards to capacity, queuing and delay. The program is closely related to other TRL programs ARCADY and OSCADY and is intended primarily as a means of assessing junction performance. It can also be used as an aid in junction design. Generally a level of saturation of 85-90% (equivalent practical reserve capacity 15-10%) is acceptable over the design life of priority junctions, however as with the other programs this figure should not be considered in isolation during the peak hour period and should be viewed together with queuing and delay information.

Under the peak hour conditions of Table 3.5.6 and 3.5.7 we have carried out PICADY assessments of the operation of the proposed access arrangements from the R411 Regional Road. Analyses have been carried out for the morning (AM) peak hour as this period yields the worst traffic scenario in terms of combined network and development related traffic. A summary of the results for the proposed access arrangements is given in Tables 3.5.8 and 3.5.9 below.

**Table 3.5.8 Summary of Capacity Assessment (Site Access)**

Junction Analysis	Demand	Ave./Max Delay	Mean Queue	Max Queue	Reserve Capacity
	Vehicles	Min./Veh.	Veh.	Veh.	Percentage
Phase 2 Construction Period (Short Term Traffic Impact)	232.2	0.02/0.23	0.0	0.1	95.1%
Phase 2 End of Operational Period (Worst Case Normal Operation)	252.3	0.02/0.23	0.0	0.0	96.4%

**Table 3.5.9 Summary of Forecast Queues & Delay (Site Access)**

Junction Analysis	R441 Naas Road (→ Southbound)								Site Access			
	→		↓		←		↑		↙		↘	
	Q	Del	Q	Del	Q	Del	Q	Del	Q	Del	Q	Del
2004 Phase 2 Construction	0.0	0.0	0.1	12	0.0	0.0	0.0	0.0	0.1	11	0.0	14
2008 Phase 2 Operational	0.0	0.0	0.0	12	0.0	0.0	0.0	0.0	0.0	11	0.0	14

It can be seen from the above calculations that the junction to the site should operate satisfactorily under the worst likely traffic

conditions resulting in the traffic generated due to the implementation of the proposed landfill site. It can be seen from Table 3.5.9 that no queuing should occur either on the mainline R411 or on the access road from the site. The maximum delay would be approximately 14 seconds and would be experienced by HGV traffic turning right out of the site. Vehicles turning left out of the site would be delayed by approximately 11 seconds, whilst traffic turning right into the site would be delayed by approximately 12 seconds. We consider these delays insignificant in terms of the overall operation of the site access.

Table 3.5.8 shows that the junction is likely to operate with approximately 95% practical reserve capacity during the peak periods. ~~Considering that 15% reserve capacity is generally accepted as satisfactory,~~ clearly the access is likely to operate under near free-flow conditions.

From our experience on projects of a similar nature, the above results were expected. The traffic attracted to the site during the peak periods is very low and the volumes of traffic using the R411 through Ballymore Eustace are also very low. As indicated earlier in this report approximately only 12.5% of the practical capacity of the R411 is currently used at peak traffic periods.

As additional investigation into the capacity of the access arrangements we have run progressive analyses of the junction applying an increasing factor to the assessment flows used above. The results indicate that an increase in site related traffic of 700% together with an increase in mainline traffic in the R411 of 700% could be achieved before the access begins to demonstrate traffic capacity difficulties such as queues and delays. Clearly increases of this magnitude are highly unlikely at this location.

From the above therefore we conclude that the capacity of the mainline R411 is not likely to be compromised by the operations of the proposed landfill development.

#### **3.5.7.4 Mitigation Measures**

From the above analyses it can be seen that the potential impact of traffic to and from the proposed development is not likely to be significant even during the peak traffic periods. It must be noted that the peak extends over the period 0730-0930hrs, thereafter during normal operations the development would generate approximately one vehicle to and from the site in every quarter of an hour. From the above analysis of the peak period therefore is

can be assumed that the potential impact during off-peak times (0930-1630hrs) will be insignificant.

Nevertheless, it is the developer's intention to limit, insofar as is practicable, the possible disruption to the village of Ballymore Eustace. As stated in the report, it is proposed that almost all of the HGV traffic (50 of 55 vehicles per day) to the site will arrive from Naas to the North thus avoiding the need to travel through the village. The estimated 5 vehicles per day through the village centre are from sources close to the east side of the village such as the water treatment works, clearly it would be impractical to expect these vehicles to undertake a circuitous journey in order to access the western side of the village.

It is proposed to use the existing access to the site. This access was in operation for the period 1984-1998 for on average 100 heavy vehicles associated with the extraction of sand and gravel at the proposed development site. Under the proposals for the implementation of the landfill site this junction would be upgraded to a standard appropriate to accommodating the manoeuvres of heavy vehicles. Access improvement works involve the widening of the junction together with an easement to the turning radii for vehicles into and out of the site. Additionally it is proposed to improve the visibility sightlines afforded drivers at the junction.

#### **3.5.7.5 Likely Significant Impact**

Given the very low levels of traffic attraction, the low levels of network traffic on the roads in the vicinity of the development and the proposed mitigation measures to reduce the impact on the local community we do not consider that there is likely to be any significant impacts due to the proposed development.

### **3.6 Soils, Geology, & Groundwater**

The following Section was prepared by S.M. Bennet & Co. Ltd.

This section assesses the impact of the development on soil, geology, and groundwater.

#### **3.6.1 Existing Environment**

Existing environment is understood by the author as relating to those current conditions relating to soil, geology and groundwater beneath the existing disused sand and gravel pit and in its immediate environs. The existing geological and hydrogeological environments were explored by a number of boreholes and trial pits. Boreholes and monitoring well locations are depicted in Figure 3.6.1.

#### **Topography**

Topographically the site is located on a south facing slope on the north bank of the River Liffey with elevations ranging from 152 metres OD along the northern boundary to 118 metres OD at MW 00-4.

#### **Site Geology**

The site investigation programme to date has comprised trial pits through the pit floor, seventeen boreholes and four permanent monitoring wells.

The site is underlain by glaciofluvial deposits comprising strata and lenses of limestone-derived gravel, sand, silt and clay particles. There is clear visual evidence of meltwater sorting of the particles as the silt and clay appear in distinct layers and pockets surrounded by lenses and strata of sorted sand, gravel and cobbles. The silty clay strata appear on all faces of the pit except where made ground or stripped overburden waste was dumped. The current owner of the site has in recent months undertaken site works to reinstate some of the slopes along boundaries. This site work has exposed the silty clay strata along the northern and eastern slopes of the pit and beneath the pit floor at Trial Pit 4. The silty clay strata have been found generally between 122m OD and 130 mOD although in MW 00-1 the silty clay was encountered over a thickness of 12.4 m between 133.7 and 121.3 mOD approx. In MW 00-4 which is in the flood plain of the Liffey the silty clay was encountered below 114.7

mOD. In Trial Pit 4 clean sand was encountered beneath approximately 3m of the silty clay at a depth of 121.7 mOD. The silty clay is overlain by a complex sequence of fine sand to coarse sand and sand and gravel layers. These layers are evident on the side slopes and were removed from within the site during previous extraction operations. It is also obviously clear from the large exposures in the pit and the recent earthworks that the depositional environment of the sediments was chaotic as there is no clear vertical or horizontal definition of the strata across the site.

Lithologically the coarser units of cobbles and sands form discrete lenses, which vary in thickness. Where present, imbrication suggests the direction of flow deposition as being north to south, although this may be localised. Generally the coarser material such as sand, gravel, and occasional cobbles reside in the upper overburden. At depth the matrix of grey silty clay appears to decrease in stiffness and the interbedded sand and gravel lenses appear less common and substantially smaller. As an exception to these general observations the grey silty clay matrix was not encountered in MW 00-2 although this boring did not extend to bedrock.

The glaciofluvial deposits are underlain by greywack bedrock of the Tipperkevin Formation. During the course of other studies in the area the underlying Tipperkevin Formation bedrock interface has been documented as highly irregular. Bedrock was proven in MW 00-1 and MW 00-4 at approximately 120 metres OD and 100 metres OD respectively equating to a depth of approximately 20 metres below land surface at each location.

Trial pits below the floor of the pit encountered a variety of deposits ranging from the silty clay matrix to coarse sand and gravel to fractured granular till overlying bedrock.

### **Site Hydrogeology**

The Tipperkevin Formation is classified by the Geological Survey as a non-aquifer.

Some of the overburden beneath the floor of the pit may be considered a locally important aquifer. Some of the overburden would not yield any water such as the silty clay sediments that underlie the pit floor. Correspondingly some of the overburden beneath the pit floor would offer some protection to groundwater flowing at depth. Based on the GSI classification system the

vulnerability rating of the groundwater beneath the pit floor would in general be high to extreme. Installation of an engineered liner at the floor of the pit and beneath the proposed landfill would theoretically decrease the vulnerability rating to low as the equivalent thickness of the geomembrane liner to a compacted clay soil, based on the permeability of the materials, is at least 100 times.

Deep groundwater flow direction as determined from static water levels in the monitoring wells is northeast to southwest and towards the River Liffey. A steep hydraulic gradient of 0.055 exists locally, the fall between MW 00-1 and MW 00-4(s) being 16.55 metres over a distance of 301 metres. Water levels recorded in Trial Pits 1 and 2 were between 119.4 and 120.0 mOD on 15/05/01. Trial Pit 3 was dry at 121.2 mOD and Trial Pit 4 was dry at 121.7 mOD on 15/05/01.

**Table 3.6.1 Recent water levels recorded in the monitoring boreholes**

Location	Top of Casing elevation mOD	Completion Depth m	Completion elevation mOD	Water Level m (BTOC) 23-Apr-01	Water Level m OD 23-Apr-01
MW 00-1	143.69	24.85	118.84	10.30	133.39
MW 00-2	134.76	22.20	112.56	17.28	117.48
MW 00-4(s)	119.13	4.95	114.18	2.29	116.84

Some of the strata that lie above the existing pit floor are also water bearing as there is seepage along the northern slopes where permeable layers overlay less permeable silt or clay layers. The groundwater catchment extends to the north and east at least as far as the Bishophill topographic divide some five kilometres to the northeast. Land use in the catchment is strictly cattle and sheep pasture and stocking rates are considered average to low. There is a definite upward vertical hydraulic gradient as measured in MW 00-4s and MW 00-4d. A line of springs defining a groundwater discharge boundary is located downgradient of the site along the steep bank that lies between the Coghlanstown road and the edge of the pit. There are springs at the margin of the Liffey flood plain in Sousheen Commons. Groundwater contributes to baseflow in the river along this section.

Hydraulic conductivity in the overburden differs dramatically between the silty clay matrix and the sand and gravel layers. The matrix is expected to exhibit K values less than  $10^{-9}$  m/s and this



prediction is supported by laboratory tests. Preliminary recovery tests on the monitoring wells screened in productive sand lenses indicate K values in excess of  $10^{-4}$  m/s. Two cross-sections showing the relative OD elevations of static water, bedrock, and topography are presented in the attached Figures 3.6.2 and 3.6.3. Drilling logs and monitoring well construction logs relating to this investigation are included in Appendix 6.

### **Groundwater Quality**

Groundwater quality has been sampled in four monitoring wells installed around the perimeter of the proposed landfill. The samples were analysed for the standard EPA landfill monitoring list.

All the groundwater samples are generally of good potable quality (Table 3.6.2). The water has a high pH that is reflected in its high buffering capacity or alkalinity. It is lime rich and completely free of bacterial coliforms or e. coli

Ammoniacal nitrogen (expressed as N) was elevated in all boreholes and if expressed as  $\text{NH}_4$  would exceed the IMAC for ammonia. Manganese and Nitrite were elevated in MW 00-4(s) above the IMAC. Manganese, however, is naturally occurring in this area in excess of the IMAC value and has no health significance. Although below the IMAC guideline of 25 mg/l, the elevated presence of nitrate reflects the agricultural land use in the catchment.

**TABLE 3.6.2**  
**Chemical Analysis of Groundwater**  
**Kimeens Pit, Ballymore Eustace (23/04/2001)**

PARAMETER	UNITS	MW 00-1	MW 00-2	MW 00-4 (d)	MW 00-4 (s)	IMAC
Temperature (field)	°C	11.9	11.5	11.5	9.4	-
pH (field)	-	8.19	8.15	8.09	8.14	6.0-9.0
Conductivity (field)	µS/cm	731	692	652	573	1500
Tot. Diss. Solids (field)	mg/l	372	345	332	288	-
Dissolved Oxygen	-	7.7	3.6	6.7	4.1	-
Alkalinity (Tot. CaCO <sub>3</sub> )	CaCO <sub>3</sub> mg/l	390	380	380	300	-
Boron	B mg/l	<0.05	<0.05	<0.05	<0.05	-
Cadmium	Cd mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Calcium	Ca mg/l	153.0	149.7	144.4	111.3	200
Chloride	Cl mg/l	18	16	15	27	250
Chromium	Cr mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Copper	Cu mg/l	<0.05	0.08	<0.05	0.07	0.50
Cyanide	Cn mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Fluoride	Fl mg/l	<0.01	<0.01	<0.01	<0.01	1
Iron	Fe mg/l	<0.05	<0.05	<0.05	<0.05	0.20
Nickel	Ni mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Lead	Pb mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Magnesium	Mg mg/l	26.16	16.82	18.54	14.86	50
Manganese	Mn mg/l	<0.05	<0.05	<0.05	<b>0.28</b>	0.05
Mercury	Hg mg/l	<0.05	<0.05	<0.05	<0.05	0.001
Nitrate	NO <sub>3</sub> mg/l	18.7	14.9	18.0	2.0	50
Nitrite	NO <sub>2</sub> mg/l	<0.05	<0.05	<0.05	<b>2.0</b>	0.1
Nitrogen (Ammonical)	N mg/l	0.7	0.6	0.80	0.90	-
Nitrogen (Tot. Oxid.)	mg/l	4.3	3.4	4.1	0.5	-
Phosphorus	P mg/l	<0.05	<0.05	<0.05	<0.05	-
Potassium	K mg/l	1.0	1.3	0.9	2.3	12
Sulphate	SO <sub>4</sub> mg/l	15	25	14	27	250
Sodium	Na mg/l	20.4	21.2	20.6	29.5	150
Phosphate	P <sub>2</sub> O <sub>5</sub> mg/l	0.07	0.06	0.09	0.17	5.0
Tot. Oxid. Nitrogen	mg/l	4.3	3.4	4.1	0.5	-
Total Org. Carb.	C mg/l	7	5	4	5	-
Total Solids	mg/l	462	444	405	454	-
Arsenic	As mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Barium	Ba mg/l	<0.05	0.06	<0.05	0.07	0.50
Selenium	Se mg/l	<0.05	<0.05	<0.05	<0.05	0.01
Silver	Ag mg/l	<0.05	<0.05	<0.05	<0.05	0.01
Total Phenols	mg/l	<0.01	<0.01	<0.01	<0.01	0.0005
Zinc	Zn mg/l	<0.05	<0.05	<0.05	<0.05	1
Bacterial Coliforms	no. /100 ml	nil	nil	nil	nil	-
Escherichia Coliforms	no. /100 ml	nil	nil	nil	nil	-

NB Values in bold underline exceed the Irish Potable MAC Standards, S.I. No. 81 of 1988

At/ present there are no occupied or inhabitable dwellings hydraulically downgradient of the proposed landfill development. The nearest occupied dwelling consists of a newly-constructed two storey residence immediately southeast of the proposed development. Foul waste water from this residence is discharged to a conventional septic tank and percolation system. Water supply is via mains. In fact all residences along the roads bounding the site have access to a mains water supply.

### **3.6.2 Potential Emissions**

In this section the author has interpreted 'Potential Emissions' as being those emissions that historically have been associated with similar type operations at other geographic locations. The 'Potential Emissions' covered in this section may or may not be eliminated by proposed features of the landfill design. The potential emissions to soil, geology, and groundwater associated with this landfill development can be grouped into two categories: during construction; and during operation including post completion.

During construction the potential emissions are limited to the following:

- Fluid emissions associated with machinery and vehicles including refuelling and maintenance. These emissions may be released in theory over any area of the development surface. However parking, refuelling areas, and maintenance areas are likely to be those where there is the greatest potential for releases;
- Paved areas and temporary building roof runoff.

During operation and post completion the potential emissions are as follows:

- Leachate leakage or accidental releases through leachate handling for offsite disposal;
- Machinery and operational vehicle fluid losses in parking areas, in the landfill itself, in refuelling areas, and in maintenance areas;
- Vehicle, generator, and machinery fuel storage;
- Foul water discharge from staff canteen and cloakroom facilities;
- Roof and paved area runoff.

### **3.6.3 Description of Likely Impacts**

In this section the author has interpreted 'Likely Impacts' as those impacts likely to take place in the event that the necessary containment and preventative measures are not incorporated in the development design. In such an event the likely impacts of the development on soil, geology, and groundwater would be as follows:

- Changes are likely in the static water table elevation in the immediate vicinity of the pit. Due to the truncation of permeable sand lenses by the landfill, mounding of groundwater on the upgradient side of the pit and a depression of the local water table on the downgradient side is likely to occur. Any such changes in the static water table elevation will not be of significance.
- Mounding of groundwater may also occur in the vicinity of soakaways taking surface water and roof runoff. Such mounding will not be of significance.
- In the event that the clay liner and proposed mitigation measures are not incorporated in the development, it is likely that there will be a localised potential impact on soil quality as a result of potential emissions (Section 3.6.2) in certain areas of the pit. This impact is likely to be short term since the contaminant sources will gradually be attenuated by natural effects over time.
- Similarly there would be a likely but virtually undetectable reduction in groundwater quality downgradient of the site in the event that uncontrolled potential emissions (Section 3.6.2) were released to ground without the incorporation of the necessary clay and geomembrane liner and other associated mitigation measures. Water quality along the Sousheen Commons spring line would be likely to dis-improve marginally during the early years of the landfill. However in time, natural groundwater flushing and associated dilution would restore the spring water quality.

### **3.6.4 Mitigation Measures**

The term 'Mitigation Measures' has been interpreted by the author as those measures to be incorporated in the design and

construction of the proposed development so as to prevent or minimise its impact on the natural environment. The following mitigation measures have therefore been proposed:

- The emplacement of a composite liner comprising compacted clay and a HDPE geomembrane beneath the landfill and the installation of a conventional leachate collection system and a stringent CQA/CQC programme will ensure that no leachate leakage occurs from the landfill area. Handling of leachate from the collection system for offsite disposal will take place in a concrete paved area centrally drained to the leachate tank.
- To minimise the impact on the static water level such as the mounding and lowering as mentioned in Section 3.6.3, a high permeability drainage layer will be installed outside and beneath the landfill liner. This will allow groundwater from truncated sand and gravel layers along the northern slope to flow beneath the landfill without obstruction and will prevent significant changes in the current static water level around the perimeter of the landfill area.
- Liquid from the wheel wash will drain into the lined landfill area
- Fuel and lubricant storage and handling for site vehicles and machinery will be stored in a purpose-built containment facility. Bulk diesel will be stored in a bunded area within the lined landfill area. Landfill plant will be refuelled within the landfill area.
- Site vehicles and plant and plant may be parked on the concrete paved hardstand area. Drainage from this area will be via an oil interceptor to a soakaway. Landfill plant will also be parked within the landfill area when not in use overnight and on weekends.
- Vehicle maintenance may be undertaken on the purpose-built concrete hardstand or within the lined area.
- Operational waste will be segregated for offsite disposal into canteen, oily rags, waste oils, non-recyclable plant waste, and other miscellaneous waste. Separate containers will be provided in the hardstand area for waste oils and oily rags etc.
- During the operational life of the landfill foul water discharge from the site office, weighbridge kiosk and staff canteen will be

piped directly to a proprietary treatment unit from which the treated effluent will be discharged into the ground via a percolation area.

- A groundwater monitoring programme will monitor any changes in static water levels and water chemistry potentially associated with the proposed development.
- Groundwater monitoring is described in Section 4 (i.e. Monitoring Section).

### **3.6.5 Likely Significant Impacts**

The author has interpreted the term 'Likely Significant Impacts' to mean those impacts of significance likely to occur in the event that the design of the proposed development is implemented in its entirety including all containment measures.

In the event that the mitigation measures identified in Section 3.6.4 are incorporated in the landfill design, it is predicted that there will be no measurable or significant impacts to soil, geology, or groundwater quality as a result of this site development. Nonetheless, even if the precautionary principle is adopted and all the potential impacts are considered without the implementation of mitigation measures, the impact of the proposed development on soil, geology, and groundwater will not be significant (see Section 3.6.3).

**TABLE 3.6.2**  
**Chemical Analysis of Groundwater**  
**\*Kimeens Pit, Ballymore Eustace (23/04/2001)**

PARAMETER	UNITS	MW 00-1	MW 00-2	MW 00-4 (d)	MW 00-4 (s)	IMAC
Temperature (field)	°C	11.9	11.5	11.5	9.4	-
pH (field)	-	8.19	8.15	8.09	8.14	6.0-9.0
Conductivity (field)	µS/cm	731	692	652	573	1500
Tot. Diss. Solids (field)	mg/l	372	345	332	288	-
Dissolved Oxygen	-	7.7	3.6	6.7	4.1	-
Alkalinity (Tot. CaCO <sub>3</sub> )	CaCO <sub>3</sub> mg/l	390	380	380	300	-
Boron	B mg/l	<0.05	<0.05	<0.05	<0.05	-
Cadmium	Cd mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Calcium	Ca mg/l	153.0	149.7	144.4	111.3	200
Chloride	Cl mg/l	18	16	15	27	250
Chromium	Cr mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Copper	Cu mg/l	<0.05	0.08	<0.05	0.07	0.50
Cyanide	Cn mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Fluoride	Fl mg/l	<0.01	<0.01	<0.01	<0.01	1
Iron	Fe mg/l	<0.05	<0.05	<0.05	<0.05	0.20
Nickel	Ni mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Lead	Pb mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Magnesium	Mg mg/l	26.16	16.82	18.54	14.86	50
Manganese	Mn mg/l	<0.05	<0.05	<0.05	<u>0.28</u>	0.05
Mercury	Hg mg/l	<0.05	<0.05	<0.05	<0.05	0.001
Nitrate	NO <sub>3</sub> mg/l	18.7	14.9	18.0	2.0	50
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Nitrogen (Tot. Oxid.)	mg/l	4.3	3.4	4.1	0.5	-
Phosphorus	P mg/l	<0.05	<0.05	<0.05	<0.05	-
Potassium	K mg/l	1.0	1.3	0.9	2.3	12
Sulphate	SO <sub>4</sub> mg/l	15	25	14	27	250
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Total Org. Carb.	C mg/l	7	5	4	5	-
Total Solids	mg/l	462	444	405	454	-
Arsenic	As mg/l	<0.05	<0.05	<0.05	<0.05	0.05
Barium	Ba mg/l	<0.05	0.06	<0.05	0.07	0.50
Selenium	Se mg/l	<0.05	<0.05	<0.05	<0.05	0.01
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Total Phenols	mg/l	<0.01	<0.01	<0.01	<0.01	0.0005
Zinc	Zn mg/l	<0.05	<0.05	<0.05	<0.05	1
Bacterial Coliforms	no. /100 ml	nil	nil	nil	nil	-
Escherichia Coliforms	no. /100 ml	nil	nil	nil	nil	-

NB Values in bold underline exceed the Irish Potable MAC Standards, S.I. No. 81 of 1988

At present there are no occupied or inhabitable dwellings hydraulically downgradient of the proposed landfill development. The nearest occupied dwelling consists of a newly-constructed two storey residence immediately southeast of the proposed development. Foul waste water from this residence is discharged to a conventional septic tank and percolation system. Water supply is via mains. In fact all residences along the roads bounding the site have access to a mains water supply.

### **3.6.5 Potential Emissions**

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### **3.6.6 Description of Likely Impacts**

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### **3.6.7 Mitigation Measures**

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construction of the proposed development so as to prevent or minimise its impact on the natural environment. The following mitigation measures have therefore been proposed:

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- Site vehicles and plant and plant may be parked on the concrete paved hardstand area. Drainage from this area will be via an oil interceptor to a soakaway. Landfill plant will also be parked within the landfill area when not in use overnight and on weekends.
- Vehicle maintenance may be undertaken on the purpose-built concrete hardstand or within the lined area.
- Operational waste will be segregated for offsite disposal into canteen, oily rags, waste oils, non-recyclable plant waste, and other miscellaneous waste. Separate containers will be provided in the hardstand area for waste oils and oily rags etc.
- During the operational life of the landfill foul water discharge from the site office, weighbridge kiosk and staff canteen will be

pipled directly to a proprietary treatment unit from which the treated effluent will be discharged into the ground via a percolation area.

- A groundwater monitoring programme will monitor any changes in static water levels and water chemistry potentially associated with the proposed development.
- Groundwater monitoring is described in Section 4 (i.e. Monitoring Section).

### **3.6.8 Likely Significant Impacts**

The author has interpreted the term 'Likely Significant Impacts' to mean those impacts of significance likely to occur in the event that the design of the proposed development is implemented in its entirety including all containment measures.

In the event that the mitigation measures identified in Section 3.6.4 are incorporated in the landfill design, it is predicted that there will be no measurable or significant impacts to soil, geology, or groundwater quality as a result of this site development. Nonetheless, even if the precautionary principle is adopted and all the potential impacts are considered without the implementation of mitigation measures, the impact of the proposed development on soil, geology, and groundwater will not be significant (see Section 3.6.3).

### **3.7 Landscape**

#### **3.7.1 Existing Landscape**

##### **a. Designations**

Under the Kildare County Development Plan 1999, the site lies within what has been designated as the East Kildare Uplands for which a Rural Detail Map has been prepared. This map forms part of the County Development Plan. The site itself is in part zoned for Extractive Industry Area 14 for the extraction of sand and gravel and the securing of subsequent restoration to suitable uses, including agriculture, forestry, recreation, woodlands and urban development.

The site overlooks the Liffey Valley and Reservoir Edge zone of the East Kildare Uplands Rural Detail Map. The broad planning concept/policy for this zone is *"To protect the unique scientific and other amenity features of the Liffey Valley and reservoir edge. Protect power station complex and Water Supply Treatment Works."* The site itself is around five kilometers from the reservoir and the power station. This zone itself forms a part of the Liffey Meander High Amenity Area. There is a specific objective in the County Development Plan to create a small lookout point on road 217 - the Ballymore to Kilcullen Road to overlook the Liffey Valley and Sousheen Commons within the High Amenity Area.

The Ballymore to Naas road, the R411, forming the eastern boundary of the site, is designated in the County Development Plan for the restriction of further access along the Naas road.

There are no protected structures or monuments within 500m of the site.

The protected view along the R411 noted on Map 1.3 does not overlook the site.

##### **b. Landscape Character**

The character of the existing landscape is one of undulating pastures grazed by sheep and cattle, with large fields enclosed by low hawthorn hedges. Views into the site are restricted by these hedges, the roadside banks and low ridges. The meanders of the river Liffey may be seen to the south of the site with extensive riverside meadows and deciduous woodlands on the steeper slopes

above the river. One such beech woodland on a steep slope above the river and also above the Ballymore to Kilcullen Road forms the southern boundary of the site and effectively screens the site from adjacent views. These woods are amenity rather than commercial and are protected under the County Development Plan. There are a number of large Period country houses and associated parklands in the area but not within 500 metres of the site. From the site there is an extensive panorama across the Liffey valley and Ballymore Eustace village to the Wicklow Mountains in the distance.

A map showing the existing contours is included as Figure 3.7.1. Sections through the site are shown on Figure 3.7.1a.

Within the site there are a number of small areas of different landscape character and these are shown on Figure 3.7.1b. The dominant area is the quarry itself, which is quite devoid of vegetation. On the eastern side of the site adjoining the Naas road is an area of disturbed ground with an adventitious flora of grass and herbs. A watermain runs along the northern boundary of the site which has preserved a fifty metre wide strip of pasture land from quarrying. The hedges here are predominantly of hawthorn. The southern end of the watermain runs through a small valley in which a willow thicket and a small herb rich marsh have developed. The willow thicket screens the site from an adjacent house. The southern boundary of the site is a thin strip of beech woodland with the trees approximately 15 metres high. Most of the trees are in good condition with no signs of die back in the crown.

A series of photos illustrate these areas of landscape character within the site as well as views across the site and the surrounding landscape. The two panoramas show the view to the north of the site and across the Liffey Valley to the south. The location of these views are shown on Figure 3.7.1c.

### **c. *Visual Envelope***

The visual envelope of the site is shown on Figure 3.7.1d, which indicates the main and intermediate visual boundaries (mostly hedgerows) and the main views out from the site. The main view out from the site is to the south and east across the village of Ballymore Eustace, which is largely hidden among trees, and part of the Liffey valley.

In spite of the size of the site, the surrounding landform, hedges and woods restrict views into the site. This is especially the case from the surrounding roads. The site can only be seen from the R411 Naas road from the site entrance and views are blocked by the hedge and bank along the road. In similar fashion, there are only two places along the Ballymore - Kilcullen Road which afford brief views in to the site. These are shown on Figure 3.7.1c.

#### d. **Principle Private and Public Views**

The views into the site from the adjacent public roads are restricted as mentioned above. There are few private properties, which have a view of the site in the foreground or middle distance. Those which do are shown on Figure 3.7.1e. These properties are numbered on that map as follows:

**Table 3.7.1      Grid references of Views into Site**

<b>Point Number</b>	<b>Easting</b>	<b>Northing</b>
1	291320.889	210169.041
2	291786.135	210359.809
3	291994.684	210431.418
4	292549.489	210484.856
5	292368.425	210303.226
6	292563.222	210235.405
7	292631.083	209957.189

Point 1 is a distant view from the Kilcullen Road from which a portion of the western end of the site may be glimpsed.

Point 2 is from a farm close to the site from which the western half of the site may be seen. A berm has been formed along the western boundary to screen off the remainder of the site.

Point 3 is a derelict cottage on the site, but there is a view of part of the site from the road at this point.

Point 4 is from a house overlooking the site on the Naas road. This is the only point, which affords a view of the whole site. This view can be partially screened by planting a hedge as a part of the enabling landscape works.

Point 5 is a house screened from the site by a dense thicket of willow.

Point 6 is a house which has a view of the steep bank forming the south-eastern boundary of the site. This slope can also be planted during the enabling landscape works. The remainder of the site cannot be seen.

Point 7 is at the road apex of a small cul-de-sac on the western edge of the village and the slope on the edge of the site is visible in the distance. This is the same slope as may be seen from point 6 and will be planted as a part of the enabling landscape works. The remainder of the site cannot be seen.

The southern boundary of the site is the Kilcullen Road which runs in a cutting between mature trees. The site is not visible except from point 3.

Apart from a glimpse at the entrance, the site is not visible from the Naas road due to the bank along the road and the hedges along the road further north. Just above the point at which a minor road joins the Naas road at Tinnycross, there is a view of the site from the minor road. This view may be screened with on-site landscaping. There are no views of the site from surrounding roads beyond the 500 metres radius from the site boundaries.

### **3.7.2 Potential Emissions**

Due to the close visual envelope of the site and the lack of significant views into the site, the landscape impact of the proposed development will be minimal. Any minor existing views into the site will be screened by internal site earthworks and boundary tree and hedge planting.

The main visual screen is the deciduous beech woodland running along the southern boundary of the site on the steep slope above the Liffey.

It is not commercial forestry and is unlikely to be felled. Only a narrow strip of trees are within the site boundary above the Kilcullen Road. These trees will be retained and augmented with additional planting.

The existing landscape of the site, being a disused gravel pit, is already severely degraded in visual terms and the proposals offer a means of achieving restoration in the medium term.

### **3.7.3 Likely Impacts**

The likely impacts of the development are that a 230 metre stretch of open hedgerow will be lost in Phase 2 of the fill process. This length will be compensated for by the planting of a similar length of new hedge during the initial enabling landscape works, so that by the time the existing hedge has to be removed, the new hedge will have achieved some visual impact.

At the western end of the site the berm cutting off views into the site will be regraded but views into the site will still be restricted.

If no mitigation measures are taken then the degraded views into the site will remain. Mitigation measures are described below.

### **3.7.4 Mitigation Measures**

The proposals for the mitigation landscape treatment of the site, including the restoration measures, are shown on a series of plans (Figs. 3.7.4a to 3.7.4f). The proposals include for enabling landscape works prior to the commencement of filling which will help to reduce the visual impact of the site even further. These works include for bunding, the planting of perimeter hedges and trees and the planting of slopes. This will be followed by three phases of landscape treatment tied in with the phasing of site operations which will provide for a progressive restoration as the site develops.

#### **a. Enabling Landscape Works**

Enabling landscape works will be carried out prior to the commencement of operations in order to provide both advanced screening to later development and immediate screening of views and restoration of slopes. The location of the enabling landscape works is shown on Fig. 3.7.4a. Three main measures are proposed, including:

##### Perimeter Hedges

All of the hedges on the perimeter of the site will be reinforced with a double row of hawthorn, *Crataegus monogyna*, planted in a double staggered row at 600 mm centres. The ground will be



rotavated prior to the planting of the 500 mm high transplants and the plants will be mulched after planting with bark chips to control weeds. Beech trees, *Fagus sylvatica*, will be planted as 600 mm whips at 20 metres centres along the hedge line. The outside of the hedges will be fenced with sheep netting to a height of 1.2 mtrs on treated timber posts. A new fence and hedge will be planted outside of the north western corner of the quarry to screen the quarry in the latter phase of development.

#### Woodland Reinforcement

New woodland planting is proposed for the northern boundary of the site along the route of the water main, along the northern boundary of the existing beech wood along the Kilcullen Road and in other areas of the site that are not effected by site works. Planting will be of a mixture of 40% each of beech and oak, *Quercus petraea*, and 20% of ash, *Fraxinus excelsior*, planted as 600 mm high forestry transplants at one metre centres. The ground will be ploughed prior to planting and all trees will be protected with rabbit guards. Trees will be spot treated with glyphosate herbicide, which becomes inactive in contact with the soil, for the first two years of establishment, to control any grass and weed growth. Planted areas will be fenced against grazing stock and against damage by site machinery.

#### Screen Mounding

Mounds will be formed in the centre of the site to screen the initial filling operations as well as the wheel wash and site offices. The mounds will be topsoiled and planted with a 33% mixture of Birch, *Betula pendula*, alder, *Alnus glutinosa*, and willow, *Salix caprea*. These trees establish quickly on poorer soils. Trees will be planted as 600 mm high transplants at one metre centres. The surface will be sown to a light mix (15 gm/ sq. m.) of fescue grass, red clover and wild flowers. The slope which is visible from the south east from adjacent properties will also be planted with this tree mixture.

#### **b. Phase 1**

Phase 1 landscape works are shown on Fig. 3.7.4b. This work will consist of the grading and formation of the slopes and gradients as filling proceeds. The final levels of the football pitch will be graded and consolidated. The main east facing slope will be graded and soil conditioner will be incorporated into the top 300 mm of final fill. The slope will then be seeded with a native wildflower seed mix EC01

from 'Design by Nature' of Carlow. This slope will screen filling operations as they proceed to the west of the site.

Sections through the Phase 1 mounding are shown in Fig. 3.7.4c.

#### **c. Phase 2**

Phase 2 will consist of grading and formation works at the western end of the site, including the capping of the fill with approved material. The final landscape treatment of the site will be included in this phase, which is shown in Fig. 3.7.4d.

The covering of such a large area with topsoil is not recommended as topsoil is a resource in short supply and so is expensive. The weed seed bank in the topsoil will encourage heavy weed growth which will add to the problems of maintenance. It is recommended that a soil conditioner should be incorporated into the top 300 mm of the final fill or capping material. Wildflower seed mix MM04 from Design by Nature, of Carlow should be directly sown into this surface also incorporating a light sowing of fescue grass.

Areas to be sown to woodland should be planted with a birch/alder/willow mixture of 33% of each species. Trees may be pit planted as 600 mm transplants at one metre centres. Each tree pit will incorporate 15 gm. of slow release fertiliser and 15 gm. of water absorbing polyacrylamide gel to prevent water stress during the first growing season. The trees will be planted during the autumn so that they may make some root growth over winter and so avoid drying out the following summer. Planted areas should be fenced against grazing with 1.2 m. high sheep netting.

#### **d. Completed Landscape Works**

The completed landscape treatment as shown in Fig. 3.7.4e, includes the construction of the football pitches with final consolidation, the construction of drains to the pitches and the topsoiling and seeding of the playing surfaces. A sandy loam should be spread over the surface of the pitches to a depth of 300 mm. The pitches may be sown to a suitable grass mix incorporating rye grass at 30 gm./ sq. mtr.

The two park circles will be constructed and edged with drystone walling and planted with suitable shrubs, incorporating some ornamental species but predominately native planting. The circles

will be grassed and will include a picnic area and a children's play area.

Paths of self-binding gravel edged with tanalised timber boards will lead from the car park to the look-out point at the top of the mound, which will afford a prospect over the Liffey Valley and will thus fulfill one of the objectives of the County Development Plan for a look out in this area.

Sections showing the contour profile across the site at the completion of the landscape works are shown in Fig. 3.7.4f, including a detailed section showing the relationships between the Liffey, the Ballymore road, the existing and proposed woodland on the slopes and the filled slopes.

#### **e. Maintenance and Aftercare.**

The site will need minimum maintenance after the establishment phase. The fences around the site and around the planted areas will be maintained against livestock. Trees will be weeded for the first two years until they have become established. Those areas sown to a wildflower mix will need no maintenance until after the third year when grasses have become established, after which they should be lightly grazed by sheep. Areas of public access will require normal maintenance for such situations and the play area would have weekly safety inspections arranged through the community and the local authority.

#### **3.7.5 Likely Significant Impacts**

If the mitigation measures are followed there should be no significant effect on the landscape as a result of the proposed facility. When restoration is complete the effect on the landscape will be positive.

### 3.8 Noise

The following Section was prepared by tms environment ltd.

#### 3.8.1 Existing Environment

The site of the proposed development is situated in Ballymore Eustace, Co Kildare. The site is situated immediately to the north-west of Ballymore Eustace village which is situated approximately 12km south of Naas.

From a noise perspective, sensitive receptors in the vicinity of the site include a number of private properties and the National School (N-7, N-9) in Ballymore Eustace village. There are three private properties (N-4) situated along the R411 Road approximately 160m from the eastern boundary of the landfill site. To the northeast of the site there is a house (N-10) situated approximately 60m from the nearest site boundary. There is a house (N-5) situated beyond the south eastern site boundary adjacent to the R411 Road. There is a private residence (N-6) situated adjacent to the southern site boundary. There is a private residence (N-8) situated along the Kilcullen Road approximately 140m southwest of the proposed site. Finally, there is a derelict house situated within the southern site boundary. Considering that this house is uninhabited, noise impacts were not predicted at this location.

Noise sources existing at the site in April 2001 include the movement of personnel vehicles (up to 10 vehicles), the movement of excavation and earthmoving vehicles (one of each) across the whole of the site area and two water pumps situated in the bottom of the excavated area in the centre of the site (soon to be removed).

The existing noise environment was characterised by a series of noise measurements completed in the vicinity of the site on 11<sup>th</sup> and 18<sup>th</sup> April 2001. The measurements were completed in accordance with the requirements of *ISO1996: Acoustics - description and measurement of environmental noise*.

The noise monitoring locations chosen for this survey were selected in order to assess the existing noise climates at the boundaries of the proposed site and to assess the existing noise climates at six noise sensitive receptors that are situated in close proximity to the site. It should be noted that the proposed landfill site is situated within the larger land holding boundary and that landfill operations will be confined to the west of the water main that travels along the

east of the site. Figure 3.1.1 depicts a map of the site showing noise sensitive receptors in the vicinity of the site. A description of the location of each monitoring point is presented in Table 3.8.1, with further details in Appendix 8. The detailed measurement methodologies and survey results are presented in Appendix 8, while the principal findings from the survey are summarised in Table 3.8.2.

The results of this survey indicate that the current noise climate at distances removed from the proposed development site at Ballymore Eustace is typical of a rural environment. There are however several significant sources of noise in the vicinity.

According to EPA BATNEEC guidance notes on noise, if the total noise level from all sources is taken into account, the daytime noise level at noise sensitive receptors should be kept below a level of approximately 55dB(A). The noise levels ( $L_{Aeq}$ ) recorded at locations along the site boundary were all (with one exception) within the range of 50-53dB(A). Noise levels at location N-4, near the eastern edge of the landholding boundary, exceeded the 55dB(A) limit by a considerable margin. This was caused by site activities close to the land holding boundary. Dumper trucks were continuously unloading clay in the north-east corner and an earthmover was simultaneously levelling the ground. After site activity had ceased, noise level measurements taken at N-4 indicated that the level of noise had fallen by 25dB(A) to 47dB(A). This reduction in noise would be clearly detectable to the human ear.

**Table 3.8.1 Monitoring point locations for noise survey**

MONITORING POINT	DESCRIPTION	APPROXIMATE DISTANCE FROM MEASUREMENT POSITION TO NOISE SENSITIVE RECEPTOR (m)	APPROXIMATE DISTANCE FROM NOISE SENSITIVE RECEPTOR TO NEAREST SITE BOUNDARY (m)
N-1	South-western boundary of site	150	140
N-2	Western boundary of site	-	-
N-3	Northern boundary of site	25	20 <sup>9</sup>
N-4	Eastern corner of site	15	160
N-5	South-eastern corner of site	10	130
N-6	Southern boundary of site	35	25
N-7	Adjacent rear gate of National School	30	150
N-8	Adjacent residence on the Kilcullen Road nearest the south-western boundary	25	140
N-9	Basketball court in schoolyard	5	200

**Table 3.8.2 Baseline environmental noise survey results,  
Ballymore Eustace, Co. Kildare**

<b>MONITORING LOCATION</b>	<b>SURVEY DATE AND TIME INTERVAL</b>	<b>L<sub>Aeq, T</sub> dB(A)</b>	<b>L<sub>A90, T</sub> dB(A)</b>	<b>L<sub>A10, T</sub> dB(A)</b>
N-1	11/04/2001 15:25 to 16:25	50	35	51
N-2	11/04/2001 16:30 to 17:30 17:55 to 18:25	50 39	44 30	53 41
N-3	11/04/2001 14:10 to 15:10 18:30 to 19:00	51 40	47 32	52 40
N-4	11/04/2001 10:20 to 11:20 19:02 to 19:32	72 47	64 32	74 51
N-5	11/04/2001 11:25 to 12:25	50	38	54
N-6	11/04/2001 12:30 to 13:30 19:35 to 20:05	53 44	35 37	57 47
N-7	18/04/2001 10:30 to 11:30	63	35	65
N-8	18/04/2001 11:40 to 12:40	56	39	53
N-9	09/05/2001 17:00 to 17:30	50	31	54

**Key to noise measurement indices:**

L<sub>Aeq, T</sub> : the equivalent continuous sound level measured over a specified period of time

L<sub>A90, T</sub> : the sound level exceeded for 90% of the measurement time. This is generally used to estimate background levels.

L<sub>A10, T</sub> : the sound level exceeded for 10% of the measurement period. Used to estimate periodic high levels of noise emissions.

Noise measurements taken near noise sensitive locations at N-7 (near the National School) and N-8 (near a residence adjacent to the south-west boundary of the site) exceeded the recommended 55dB(A) limit during the measurement period. The source of this noise in both locations was road traffic passing along the R411 and the Kilcullen Road respectively. At locations N-7 and N-8, the  $L_{A90}$  value (representing background noise levels) was significantly below the 55dB(A) limit.

Site activities were not audible at the noise sensitive locations N-7 and N-8 due to the screening effect of earth banks at the western boundary and naturally-formed mounds to the south of the site.

In summary, the existing noise environment in the vicinity of the proposed site is considered to be predominantly rural in character and within acceptable limits. Site activities occurring over a short duration and passing traffic may cause the noise levels to exceed the recommended limits in localised areas around the site boundary.

### **3.8.2 Potential emissions**

#### **3.8.2.1 Construction**

Construction of each phase of the proposed development is expected to take place over a total period of up to 6 months. Construction activities will generally take place between the hours of approximately 08:00 to 20:00, Monday-Friday and 08:00 to 13:00 on Saturdays. There will be no night time construction activities. Noise impacts associated with the construction phase will arise mainly from the following activities:

- a) Movement of excavators, bulldozers, dumper trucks, compactors and tractor within the site (principally at the centre and western areas).
- b) Movement of site personnel vehicles entering and leaving the site from the R411 (approximately 5-10 vehicles per day).
- c) Movement of a small number of delivery vehicles associated with site buildings and materials to construct the landfill liner.

Up to 12 items of plant machinery or vehicles may be in use during the construction phase but it would be unlikely that all would operate simultaneously.



### **3.8.2.2 Operation**

The proposed development will comprise a landfill site. The void will be located in the central and western areas of the site. It will be developed in two phases and filled over a period of approximately six years. Noise impacts associated with the operation phases will arise mainly from the following activities

- a) Movement of Heavy Goods Vehicles (HGVs) entering and leaving the site from the R411 (up to approximately 55 deliveries per day);
- b) Movement of site personnel vehicles entering and leaving the site from the R411 (up to approximately 10 vehicles per day);
- c) Operation of waste compactors, excavator, bulldozer, dumper trucks and tractor within the landfill site. Up to eight items of plant machinery and vehicles may be operating on the site at any period of time.

Note that it is very unlikely that all of these sources of noise impacts would operate simultaneously. In addition, their operation will be limited to the opening hours of the site.

### **3.8.3 Description of Likely Impacts**

The noise impacts resulting from construction activities will not adversely affect any residences in the vicinity of the site. Current activities associated with earthmoving in the north-east corner will end and activities will be focused 90m further west (away from the residences on the R411). Machinery and vehicles associated with earthmoving and excavation will be located below the level of the surrounding surface and residences will therefore be shielded from any noise emissions. The screening banks and natural mounds on the site will also shield nearby residences from noise associated with site activities.

The predicted noise levels at the nearest noise sensitive locations as a result of construction phase activities have been calculated, using the individual sound power levels for each plant item, according to "D3.4 Method for mobile plant in a defined area" outlined in BS 5228: Part 1: *Noise and Vibration Control on Construction and Open Sites*. Details of the calculations are presented in Appendix 8. The sound pressure levels associated with individual vehicles and items of plant and machinery associated with both construction and

operational activities have been measured in relation to similar landfill activities operated by the developer. These values are listed in Appendix 8 and have been used in the impact predictions.

The Construction Phase is of very limited duration and noise levels will be well below acceptable limits. As shown in Tables 1A - 3E in Appendix 8, three separate sets of modelling predictions have been made to consider the potential noise impacts associated with the construction phase of this development. The construction of screening banks will be the most significant noise-generating activity at this stage of the development. Noise levels will not exceed 68dB(A) at any residence in the vicinity of the site during this activity (Table 1A- 2E, Appendix 8). The construction of screening banks at any one location relative to a noise sensitive receptor will not be continuous. In general, the screening bank construction activity will move around the site until the banks are fully completed. In order to predict the potential noise impacts at a given noise sensitive location during the construction of screening banks at further distances from each noise sensitive receptor, a second set of predictions based on an *average* distance from the construction activity to the noise sensitive receptor was also made. The results of these predictions are presented in Tables 2A - 2E, and the results of the assessment show that the average noise levels experienced during the very short period of time while screening banks will be constructed will not exceed 66dB(A) at any residence in the vicinity of the site during this activity (Table 2A- 2E, Appendix 8).

Construction noise impacts are assessed in terms of the requirements of *BS 5228:1997 - Noise and Vibration Control on Construction and Open Sites*. This Standard does not specify noise limits associated with construction activities but does recognise that since the activities are temporary, noise limits higher than those with permanent installations are generally acceptable in the community. International practice dictates that noise limits in the range  $L_{Aeq,1hr} = 65 - 75$  dB(A) are generally acceptable in the community during daytime construction activities. The predicted noise impacts associated with the very short construction phase of the proposed development will not exceed this international guideline. It should also be noted that construction activities are not continuous and hence the magnitude of potential impacts is further reduced in significance relative to the maximum possible impacts quoted in this evaluation.

After completion of the screening banks, shielding due to the presence of the screening banks will attenuate noise levels experienced at noise sensitive receptors. During the main construction phase of this development, when the landfill void will be lined and prepared for accepting waste, the machinery and vehicles associated with earthmoving and excavation will be located below the level of the surrounding surface and residences will therefore be further shielded from any noise emissions associated with site activities. Under these circumstances, two sets of noise impact predictions have again been made for the development. In the first instance, the closest possible distance from the noise sensitive receptors to the edge of the landfill void was used as input data for the impact predictions. The calculations presented in Tables 4A – 4E of Appendix 8 show that even when the landfill activity is at the closest distance to each of the noise sensitive receptors, the predicted noise levels will not exceed 39dB(A) at any residence in the vicinity of the site. At further distances such as an average distance represented by the centre of the landfill void to the receptor, the predicted noise levels will not exceed 25dB(A) at any residence in the vicinity of the site.

The site will eventually be restored to approximate ground level so the shielding effects from machinery located below the surface will not always be observed. Noise levels experienced at noise sensitive receptors may be up to 5dB(A) higher than the maximum values quoted. During the final restoration stages when machinery is operating at the surface of the void, the maximum noise level which could be experienced as a result of site activities at any noise sensitive receptor is 44dB(A).

As noted elsewhere in this report, the BATNEEC Guidance Note for Noise in relation to Scheduled Activities for the purpose of Integrated Pollution Control Licensing identifies a target daytime noise level at noise sensitive receptors of approximately 55dB(A) to ensure that adverse impacts are not experienced. The impact assessment predictions presented in this report show that the noise levels associated with site activities will not exceed these permissible levels.

Noise impacts may also arise as a result of vehicles entering and leaving the site via the access point on the R411. This impact will be minimal during the construction phase since the majority of vehicles will not leave the site. During the operational phases, up to approximately 55 HGV vehicles carrying waste will enter and leave the site each day. For the very low additional traffic flows which will result from the proposed development during either the

Construction Phase or Operation Phase, the calculation of the predicted change in noise levels expressed as  $L_{A10,18hr}$  as a result of the traffic movement is determined to be substantially less than 1dB(A) which is very substantially lower than the 3dB(A) increase which would be required to be a clearly perceptible change in the noise climate at a community location.

The relatively low number of vehicle movements will ensure that no adverse impacts on the noise environment in the vicinity of the site are expected as a result of the proposed development.

In addition, there is the potential for noise nuisance to arise from incidental activities such as tonal reversing warning indicators, excessive engine revving and use of air brakes. The area where the reverse warning tones may be used most frequently includes the site of tipping in the landfill void itself and the turning area in the south-east corner of the site. The turning area is located 40m away from the nearest dwelling but is elevated 20 metres above it. The National School is located 350 metres from the turning area. Such impacts could affect nearby residences during opening hours.

### **3.8.4 Mitigation Measures**

The construction phases of the development will each span less than 6 months; thus any adverse noise impacts will be short-term. In addition, construction activities will generally be restricted to daylight hours, so no nuisance impacts from night-time noise will arise.

Vehicle and machinery noise associated with the proposed development is the only predicted impact on the noise environment in the area. No heavy construction activities such as piling or continuous concrete pouring will be necessary; the noise and vibration impacts associated with the construction phase are not expected to be significant. The majority of plant activity during construction of the liner and waste tipping will be located up to 15 metres below the level of the surrounding land in the centre-western area of the site. Screening mounds approximately 2-3m high will also be constructed along the eastern and southern boundaries at an early stage in the construction phase. These measures will assist in attenuating noise to acceptable levels at the site boundary.

Mitigation measures to control the impacts of noise during site operations include the screening mounds, which will attenuate the noise from internal site activities. Noise from operational vehicles

and machinery may be attenuated by up to 10dB(A) as a result of the landfill void walls and screening mounds.

Site management practices will include advising drivers of HGVs and other vehicles to use reverse warning indicators with care with respect to the location of sensitive receptors. Such measures will not compromise safety requirements on or off the site.

### **3.8.5 Likely Significant Impacts**

It is predicted that there will be no significant impacts upon the noise environment caused by the construction and operation of the proposed development. All of the likely impacts which have been identified have been addressed and mitigation measures proposed where necessary to ensure that the impacts remain at acceptable levels. Vibration impacts from construction and operation activities are also expected to be insignificant.

In the absence of the proposed development, it is predicted that noise from existing site activities would be expected to cease after the site restoration work was completed. However, road traffic noise would become increasingly dominant in the noise environment.

### **3.9 Surface Water**

The following Section was prepared by S.M. Bennet & Co. Ltd.

In this section surface water discharges, ephemeral ponding, and all local surface water bodies are discussed.

#### **3.9.1 Existing Environment**

At the present time no true surface water features exist on this site. The land is free draining and there are no lakes or streams on the site. However in places excavations have been made to below the water table resulting in the formation of shallow ponds. These ponds do not support wildlife and the construction of the proposed development is designed so that the clay base liner will be a comfortably above this level thus re-incorporating them into groundwater. Consequently it is the authors opinion that these ponds do not warrant further discussion.

A number of springs rise at the northern limit of the Liffey floodplain downgradient of the site. The main spring is lined with stone and historically was used as the local water supply, spring water being hand-drawn. This is referred to as the Sousheen Commons Spring and is unlikely to have been in active use for at least ten years, the three former dwellings being abandoned, and the new house having been provided with a mains supply.

The Sousheen Spring is the source of a stream that flows directly to the Liffey along a flood plain channel 90 metres long. This stream is groundwater fed along its entire length and water quality is excellent, water cress being present in abundance. Observations on site and discussions with locals also suggest that a combination of surface and groundwater from the sites north of the spring have been and are piped to this stream. Low flow in the channel is estimated at 0.01 cubic metres per second and it is being sampled as part of the baseline monitoring programme.

At its closest point the River Liffey is located 60 metres from the proposed edge of the landfill and on the south side of the Coughlanstown Road. Mean water in the Liffey is at 114 metres OD and its flow is augmented by groundwater moving from the direction of the site. Summer low flow in the Liffey is estimated at 5 cubic metres per second. The groundwater contribution in the area including the Sousheen Spring stream is estimated at not more

than 0.02 cubic metres per second under similar conditions. This results in a dilution factor of at least 250 to-one.

### **3.9.2 Potential Emissions**

There are no direct surface water emissions from this site. However surface water runoff from roads and hardstands will be directed to a piped drainage system that will lead to a silt settling tank and oil separator and then onto a soakaway or a piped discharge point along the Sousheen Common stream. Roofwater will be allowed to drain into the ground via conventional soakaways.

Roof and paved area runoff are considered the only surface water emissions associated with the proposed development during its operation.

When the landfill and the proposed landscaping works are completed surface runoff from grassed areas and pitches will be collected in surface ditches and drains and discharged into soakaways where possible or via a piped outfall.

### **3.9.3 Description of Likely Impacts**

Likely impacts on surface water bodies or as a result of surface water emissions are interpreted as those impacts likely to take place in the event that the necessary containment and preventative measures are not incorporated in the development design. These are as follows:

- Uncontrolled releases of surface water runoff from areas of contaminating activity such as the leachate handling and vehicle maintenance areas would result in a strictly localised deterioration of groundwater quality. This effect would however not be detectable at any significant distance from the release point due to the dilution factor and attenuating capacity of subsurface.
- Releases of roof runoff to soakaways are likely to cause temporary localised increases in static groundwater levels.
- The worst case scenario of potential groundwater quality deterioration as a result of the non-implementation of the proposed containment measures would cause a deterioration in the quality of water originating both from the Sousheen Spring and nearby spring discharges.

### **3.9.4 Mitigation Measures**

The author has interpreted the term 'Mitigation Measures' as those measures to be incorporated in the proposed landfill design so as to prevent or minimise its impact on surface water. The following measures have been included:

- Surface water that could potentially contain contaminants is to be directed to an oil interceptor;
- Clean surface water from completed and capped landfill areas and roof runoff will be directed to conventional soakaways;
- Maintenance programmes will be in place to ensure surface water runoff does not erode the capping soils and flow into the waste.
- A surface water sampling programme at or below the Sousheen Spring will monitor any potentially associated changes in water chemistry.
- Surface water monitoring is described in Section 4 (i.e. Monitoring Section)

### **3.9.5 Likely Significant Impacts**

In the event that the mitigation measures identified in Section 3.9.4 are incorporated in the landfill design, it is predicted that there will be no impacts to surface water, significant or otherwise, as a result of this site development. Nonetheless, even if the precautionary principle is adopted and all the potential impacts are considered without the implementation of the proposed mitigation measures, the impact of the proposed development on surface water will not be significant and is unlikely to be measurable as a change in surface water chemistry.



### **3.10 Material Assets**

In the vicinity of the proposed development are private residences, farms, and the Village of Ballymore Eustace.

The ultimate goal of this project is to fill this former sand and gravel pit and restore, to the extent possible, the ground to match former levels prior to extraction activities. As a result portions of the site will be developed to provide amenity areas, which will be material assets for the local community.

During operations the existing public road system will be utilised as did the former sand and gravel extraction business on the site until 1998. The traffic associated with the proposed filling will be less than the former business on site.

Roads will cross the existing Dublin corporation watermain.

The proposed restoration work will require public/privates services; water, electricity, telephone and other telecommunications lines. Leachate will be disposed in a public sewage treatment plant.

#### **3.10.1 Potential Emissions**

Construction and operation of the facility will result in dust and noise.

Lorries will bring wastes to the site and travel away from the site via public roads.

Litter could arise from lorries or from the landfill operations.

Sewage will be discharged on site and not into the public system.

Leachate will be tankered away and not disposed into the local public system.

#### **3.10.2 Likely Impacts**

Because the site is already largely disturbed there is not likely to be any significant impacts on the landscape as viewed by neighbours looking towards the site.

As the proposed facility is filled there may be some infrequent and minor inconveniences due to traffic and perhaps dust and noise.

Any of these inconveniences will take place during day-time hours. These potential inconveniences are discussed in previous sections. It is not thought that they will detract from property values.

Damage to the Dublin Corporation wartermain could occur if due care and caution are not exercised in regard to site work and road crossings.

### **3.10.3 Mitigation Measures**

Mitigation for maintaining the landscape is described in Section 3.7.

Mitigation measures for dust and noise are described in Sections 3.1 and 3.8 respectively.

Mitigation measures for traffic are discussed in Section 3.5.

The applicant will seek to meet with local residents and interest groups regularly to ensure issues relating to nuisances that may affect their material assets do not arise.

The Dublin Corporation wartermain will be protected through the means outlined in the existing planning permission (Appendix 1) and an appropriately designed pavement structure where the access road crosses it.

### **3.10.4 Likely Significant Impacts**

The quantity of public water used by the site will be measurable but not significant. The duration of the use will be approximately 6 years.

The amount of electricity used will be measurable but not significant. The duration of the use will be approximately 6 years.

Leachate will be tinkered to the public treatment works for a number of years perhaps 20 or more. The quantity and strength will diminish over time as the site will be capped and restored. At some point the composition may be suitable for discharge into the foul sewer system with some pretreatment or possibly without any pretreatment. This option will be reviewed in the future and over-time with the sanitary authority and the EPA.

It is unlikely that the site in its present configuration is having any affect on local residents. The site is generally well screened and not visible from most vantage points.

In the long term the impact of this development will be positive because a disused sand and gravel pit will be restored to former contours and sports and amenity facilities will be provided. It is not expected that there will be any negative impact on material assets during the development of this site.

### 3.11 Interactions

Table 3.11.1 depicts potential interactions of the various aspects described in this chapter. The Table should be read such the item in the most left hand column interacts or affects one of the items to the right (e.g. air (dust) can interact/affect human beings)

**Table 3.11.1 Interactions of the Foregoing**

	AIR	CLIMATE	CULTURAL HERITAGE	FLORA AND FAUNA	HUMAN BEINGS	SOILS, GEOLOGY AND GROUNDWATER	LANDSCAPE	SURFACE WATER	NOISE
AIR					X				
CLIMATE						X		X	
CULTURAL HERITAGE									
FLORA AND FAUNA									
HUMAN BEINGS					X (TRAFFIC)				
SOILS, GEOLOGY AND GROUNDWATER									
LANDSCAPE				X	X				
SURFACE WATER						X			
NOISE					X				

Air (Dust), Traffic, Landscape, and Noise can affect human beings. The impact of the proposed development as it pertains to the aforementioned is dealt with in Sections 3.1, 3.5, 3.7 and 3.8 respectively

The climate (i.e. precipitation) can potentially affect groundwater and surface water. This has been discussed in Sections 3.6 and 3.9 respectively.

The change in landscape as a result of proposed activities could affect the flora and fauna at the site. This is addressed in Section 3.4.

It is unlikely that there will be any significant adverse environmental impacts due to interactions.



## 4 ENVIRONMENTAL MONITORING

A number of waste licenses for landfills have been issued in the country. A similar landfill to the proposed is the KTK Landfill, in Kilcullen, County Kildare. It is proposed that a similar sampling regime will be utilised for this proposed facility. The proposed monitoring regime is presented in Table 4.1.

**Table 4.1 Proposed Monitoring at the Proposed Landfill**

<b>Monitoring Parameter</b>	<b>Frequency</b>	<b>Emission Limits</b>	<b>Comments</b>
<b>Dust</b>	<b>Annual</b>	240 mg/m <sup>3</sup> /day	It is proposed to monitor dust at the locations shown in Figure 4.1. In addition the site manager will observe and record dust generation daily. Complaints will be recorded and appropriate actions taken.
<b>Ecological Monitoring</b>	<b>None proposed</b>		
<b>Noise</b>	<b>Annual</b>	55 dB(A) $L_{Aeq}$ <b>daytime</b> 45 dB(A) $L_{Aeq}$ <b>nighttime</b>	It is proposed to monitor noise at the locations shown in Figure 4.1.
<b>Groundwater monitoring</b>	<b>Quarterly</b>	Not applicable	A minimum of one upgradient and three downgradient boreholes will be sampled and analysed quarterly
<b>Landfill gas</b>	<b>Monthly</b> in Gas Boreholes and Wells <b>Weekly</b> in Site Office	Methane 20% LEL (1%v/v) Carbon Dioxide 1.5% v/v	The concentration of methane, carbon dioxide, and oxygen will be measured in landfill perimeter gas monitoring boreholes and in shallow gas monitoring boreholes near the offices and canteen.
<b>Leachate monitoring</b>	<b>Quarterly</b>	For leachate tankered to a Wastewater Treatment Plant:  pH 6-8 COD 25,000 ppm	<b>Standard and extensive list of parameters (see Table 4.2)</b>  Leachate composition will be monitored at the leachate holding tank.
<b>Meteorological Data</b>	<b>Daily</b>	Not applicable	A meteorological station will be installed. Evaporation and evapotranspiration data will be obtained from a nearby Met station
<b>Odour</b>	<b>Annual</b> (proposed)	Not applicable	Parameters tested will include VOCs, mercaptans, hydrogen sulphide.
<b>Surface Water</b>	<b>Weekly/Quarterly</b>	To be determined	<b>Standard and extensive list of parameters (see Table 4.2)</b>  The discharge from site drains will be inspected weekly and sampled quarterly.

**Table 4.2 Surface Water, Groundwater, and Leachate – Monitoring**

<b>Parameter</b>	<b>Surface Water* Monitoring Frequency</b>	<b>Groundwater Monitoring Frequency</b>	<b>Leachate Monitoring Frequency</b>
Visual Inspection	Weekly	Not Applicable	Not Applicable
Groundwater Level	Not Applicable	Monthly	Not Applicable
Leachate Level	Not Applicable	Not Applicable	Biannually
Ammoniacal Nitrogen	Quarterly	Quarterly	Biannually
BOD	Quarterly	Not Applicable	Biannually
COD	Quarterly	Not Applicable	Biannually
Chloride	Quarterly	Quarterly	Biannually
Dissolved Oxygen	Quarterly	Quarterly	Not Applicable
Electrical Conductivity	Quarterly	Quarterly	Biannually
Odour/visual Inspection	Not Applicable	Quarterly	Biannually
pH	Quarterly	Quarterly	Biannually
Total Suspended Solids	Quarterly	Not Applicable	Biannually
Temperature	Quarterly	Quarterly	Biannually
Boron	Not Applicable	Quarterly	Biannually
Cadmium	Quarterly	Quarterly	Biannually
Calcium	Quarterly	Quarterly	Biannually
Chromium (Total)	Quarterly	Quarterly	Biannually
Copper	Quarterly	Quarterly	Biannually
Cyanide (Total)	Not Applicable	Quarterly	Biannually
Fluoride	Not Applicable	Quarterly	Biannually
Iron	Quarterly	Quarterly	Biannually
Nickel	Quarterly	Quarterly	Biannually
Lead	Quarterly	Quarterly	Biannually
List I/II organic substances	Quarterly	Quarterly	Biannually
Magnesium	Quarterly	Quarterly	Biannually
Manganese	Quarterly	Quarterly	Biannually
Mercury	Quarterly	Quarterly	Biannually
Phosphorus	Quarterly	Quarterly	Biannually
Potassium	Quarterly	Quarterly	Biannually
Sulphate	Quarterly	Quarterly	Biannually
Sodium	Quarterly	Quarterly	Biannually
Total Alkalinity	Quarterly	Quarterly	Biannually
Total Phosphorus or orthophosphate	Quarterly	Quarterly	Biannually
Total Oxidised Nitrogen	Quarterly	Quarterly	Biannually
Total Organic Carbon	Quarterly	Quarterly	Biannually
Residue on evaporation	Not Applicable	Quarterly	Biannually
Arsenic	Not Applicable	Quarterly	Not Applicable
Barium	Not Applicable	Quarterly	Not Applicable
Selenium	Not Applicable	Quarterly	Not Applicable
Silver	Not Applicable	Quarterly	Not Applicable
Phenol	Not Applicable	Quarterly	Not Applicable
Zinc	Quarterly	Quarterly	Biannually

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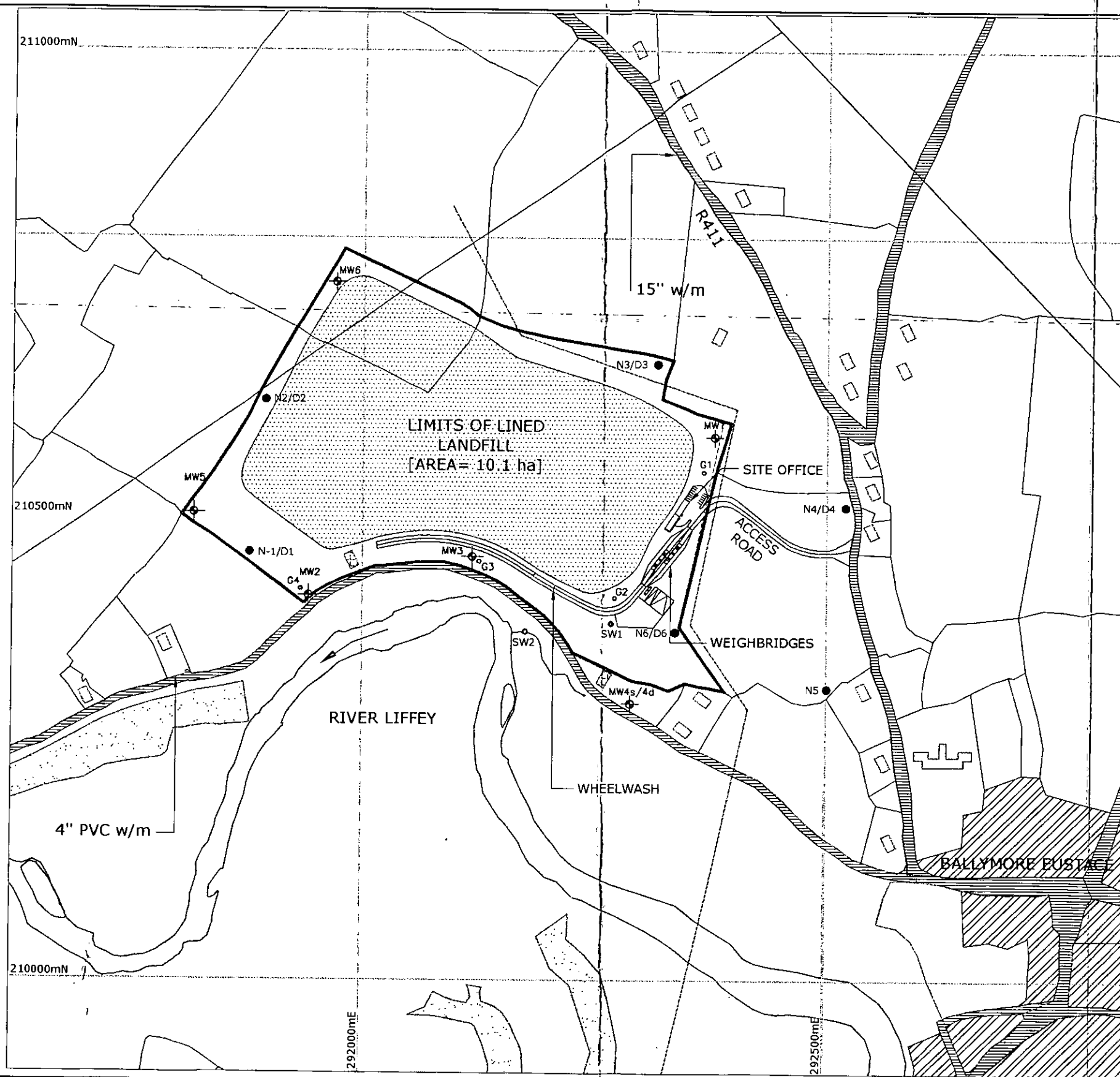


## 4 ENVIRONMENTAL MONITORING

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Noise	Annual	55 dB(A) L <sub>Aeq</sub> daytime 45 dB(A) L <sub>Aeq</sub> nighttime	It is proposed to monitor noise at the locations shown in Figure 4.1.
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Landfill gas	Monthly in Gas Boreholes and Wells Weekly in Site Office	Methane 20% LEL (1%v/v) Carbon Dioxide 1.5% v/v	The concentration of methane, carbon dioxide, and oxygen will be measured in landfill perimeter gas monitoring boreholes and in shallow gas monitoring boreholes near the offices and canteen.
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Surface Water	Weekly/Quarterly	To be determined	<b>Standard and extensive list of parameters (see Table 4.2)</b>  The discharge from site drains will be inspected weekly and sampled quarterly.



# LEGEND

- FORESTRY
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- WASTE LICENCE APPLICATION BOUNDARY
- POWER LINE
- DUBLIN CORPORATION WATER MAIN
- 15" w/m
- 4" PVC w/m
- MW MONITORING BOREHOLES
- N NOISE MONITORING LOCATIONS
- D DUST MONITORING LOCATIONS
- SW SURFACE WATER MONITORING LOCATIONS
- G1 GAS MONITORING LOCATIONS

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIG: 4.1

PROPOSED MONITORING LOCATIONS

Scale: 1:5,000 A3

Drawn By: NH

Date: 12/06/01

## **5. STATUTORY REQUIREMENTS**

### **5.1 Data Necessary to Identify and Assess Environmental Effects of the Development**

The data necessary to identify and assess the environmental effects of the development are:

- The characteristics of the development including its physical dimensions, volumes, rates of intake, nature of materials being accepted, and the appearance and condition of the facility and operating as-described in Section 2;
- The existing/receiving environment, emissions and mitigation measures as described in Section 3,
- The proposed monitoring plan as described in Section 4.

### **5.2 Forecasting Methods Used to Assess any Effects on the Environment**

Professional judgment based on site reconnaissance and investigations, desk top studies and calculations were used to assess effects on the environment.

### **5.3 Difficulties In Compiling Specified Information**

Much of the specified information was obtained through commissioned surveys. No great difficulties were encountered in compiling information.

### **5.4 Compliance with Requirements of Environmental Impact Assessment Regulations – Second Schedule SI 93 of 1999**

The information to be contained in an EIS is specified in the Second Schedule of S.I. 93 of 1999. Table 5.1 describes where the required information may be found.

**Table 5.1 EIS Checklist**

<b>S.I.93 of 1999</b>	<b>Second Schedule. Items (abbreviated)</b>	<b>Location in EIS</b>
1. (a)	Description of Proposed Development	Section 2
(b)	Description of Mitigation Measures	Section 3
(c)	Data Required to Identify and Assess Effects	Sections 2 and 3
(d)	Outline of the Main Alternatives Studied	Section 1.6
2. (a) (i)	Description of Physical Characteristics of the Development and Land Use Requirements	Section 2
(ii)	Description of the Main Characteristics of the Production Process	Section 2
(iii)	Estimates, by Type and Quantity of Expected Residues and Emissions	Section 2
(b)	<p>Description of the Aspects of the Environment likely to be Significantly Affected by the Proposed Development Including in Particular: -</p> <ul style="list-style-type: none"> <li>- Human Beings</li> <li>- Fauna and Flora</li> <li>- Soil</li> <li>- Water</li> <li>- Air</li> <li>- Climatic Factors</li> <li>- Material Assets</li> <li>- Architectural and Archaeological Heritage</li> <li>- Cultural Heritage</li> <li>- Inter-relationship of the above factors</li> </ul>	<p>Section 3.5 Section 3.4 Section 3.6 Sections 3.6 and 3.9 Section 3.1 Section 3.2 Section 3.10 Section 3.3 Section 3.3 Section 3.11</p>
(c)	Description of the Likely Significant Effects	Section 3
(d)	Description of Forecasting Methods Used to Assess the Effects on the Environment	Section 5.2
(e)	Indication of any Difficulties Encountered by the Developer in Compiling the Required Information	Section 5.3

# KTK SAND & GRAVEL LTD.

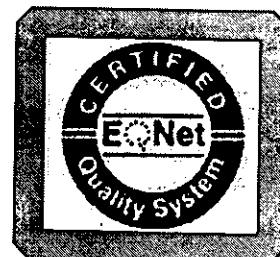
## ENVIRONMENTAL IMPACT STATEMENT VOLUME II APPENDICES

FOR A  
PROPOSED LANDFILL  
AT

BALLYMORE EUSTACE, CO. KILDARE.



JUNE 2001



# **VOLUME 2**

**KTK Sand and Gravel Ltd.  
Environmental Impact Statement (EIS)  
For a Proposed Landfill at  
Ballymore Eustace, Co. Kildare**

**Table of Contents**

**NON TECHNICAL SUMMARY**

**7 pages**

- 1. General**
- 2. Master Plan for the Company's Landholdings**
- 3. Description of the Proposed Development**
- 4. The Existing Environment**
- 5. Environmental Monitoring**

- Table 1 Proposed Facility Statistics**  
**Table 2 Potential impacts of the proposed facility**  
**Table 3 Mitigation measures and likely significant impacts**  
**Table 4 Environmental Monitoring**

- Figure 1 Regional Setting**  
**Figure 2 Landholding as of March 2000**  
**Figure 3 Application Site Boundary**  
**Figure 4 Overview of facility**  
**Figure 5 Proposed Monitoring Locations**

## **MAIN TEXT**

### **1 INTRODUCTION 9 pages**

#### **1.1 Master Plan for the Company's Landholding**

#### **1.2 Overview of Restoration Plan for Western Part of the landholding**

#### **1.3 Requirement for an Environmental Impact Statement**

#### **1.4 The Applicants**

#### **1.5 Need**

#### **1.6 Alternatives**

#### **1.7 Structure of the EIS**

#### **1.8 Contributors To The EIS**

### **2 THE PROPOSED FACILITY 41 pages**

#### **2.1 The Application Site**

#### **2.2 The Proposed Facility**

#### **2.3 Waste Types and Quantities**

##### **2.3.1 Quantities**

##### **2.3.2 Nature of Materials**

#### **2.4 Proposed Site Infrastructure**

##### **2.4.1 Site Security**

##### **2.4.2 Site Roads**

##### **2.4.3 Hard-Standing Areas**

##### **2.4.4 Weighbridge**

##### **2.4.5 Wheelwash**

##### **2.4.6 Laboratory Facilities**

##### **2.4.7 Fuel Storage Areas**

##### **2.4.8 Waste Quarantine Areas**

##### **2.4.9 Waste Inspection Areas**

##### **2.4.10 Traffic and Traffic Control**

##### **2.4.11 Services**

##### **2.4.12 Sewerage and surface water drainage infrastructure**

##### **2.4.13 Plant sheds, garages and equipment compound**



- 2.4.14** Site Accomodation
- 2.4.15** Fire Control System

## **2.5 Engineered Design**

- 2.5.1** Overview of Design
- 2.5.2** Landfill Infrastructure
- 2.5.3** Void Space of Landfill
- 2.5.4** Landfill Phasing and Construction
- 2.5.5** Time Scales for Landfill Development and Completion
- 2.5.6** Liner System Details
  - 2.5.6.1** Design Concept
  - 2.5.6.2** Liner Specifications
  - 2.5.6.3** Method Statement for Construction
  - 2.5.6.4** Safety Statement for Construction
  - 2.5.6.5** Quality Control and Assurance Plans
  - 2.5.6.6** Leak Detection Survey
  - 2.5.6.7** Access Ramps to Lined Cells
- 2.5.7** Leachate Management Arrangements
  - 2.5.7.1** Leachate Management Plan
  - 2.5.7.2** Annual Quantities of Leachate
  - 2.5.7.3** Leachate Emissions
- 2.5.8** Landfill Gas Management
  - 2.5.8.1** Introduction
  - 2.5.8.2** Landfill Gas Volumes
  - 2.5.8.3** Landfill Gas Composition
  - 2.5.8.4** Landfill Gas Management Plan
  - 2.5.8.5** Risk Assessment
- 2.5.9** Landfill Capping System
  - 2.5.9.1** Capping System
  - 2.5.9.2** Specifications of Capping Materials
  - 2.5.9.3** Landfill Stability and Settlement
  - 2.5.9.4** Daily and Intermediate Cover
  - 2.5.9.5** Temporary Capping
- 2.5.10** Surface Water Management Arrangements

## **2.6 Facility Operations**

- 2.6.1** Operating Times
- 2.6.2** Personnel
- 2.6.3** Waste Acceptance Procedures
- 2.6.4** Landfill Operations
  - 2.6.4.1** Plant and Equipment
  - 2.6.4.2** Waste Handling
- 2.6.5** Landfill Construction

- 2.7 Environmental Nuisance Controls**
  - 2.7.1** Aerosol Control
  - 2.7.2** Bird Control
  - 2.7.3** Dust Control
  - 2.7.4** Fire Control
  - 2.7.5** Litter Control
  - 2.7.6** Odour Control
  - 2.7.7** Road Cleansing
  - 2.7.8** Traffic Control
  - 2.7.9** Vermin Control
- 2.8 Restoration and Aftercare**
  - 2.8.1** Restoration Plan
  - 2.8.2** Proposed Contours
  - 2.8.3** Restoration Layers
  - 2.8.4** Landscaping Plan
- 2.9 Contingency Arrangements**
  - 2.9.1** Fire Fighting Procedures
  - 2.9.2** Contingency arrangements in case of breakdown or emergency situations
  - 2.9.3** Contingency arrangements in case of contamination of air, surface water, groundwater or other environmental media.
  - 2.9.4** Emergency contact numbers for staff with responsibility for the site
- 2.10 References**

## **3 THE EXISTING ENVIRONMENT** **102 pages**

- 3.1 Air**
  - 3.1.1** Existing Environment
  - 3.1.2** Potential Emissions
    - 3.1.2.1** Construction
    - 3.1.2.2** Operation
  - 3.1.3** Description of Likely Impacts
  - 3.1.4** Mitigation Measures
  - 3.1.5** Likely Significant Impacts
- 3.2 Climate**
  - 3.2.1** Existing Environment
  - 3.2.2** Potential Emissions
    - 3.2.2.1** Construction
    - 3.2.2.2** Operation
  - 3.2.3** Description of Likely Impacts
  - 3.2.4** Mitigation Measures

### **3.2.5 Likely Significant Impacts**

## **3.3 Cultural Heritage**

### **3.3.1 Existing Environment**

#### **3.3.1.1 Baseline Survey**

#### **3.3.1.2 Archaeological and Historical Background**

##### **3.3.1.2.1 Prehistory (c. 4000 BC – AD 500)**

##### **3.3.1.2.2 Medieval Period (c. AD 500- 1550)**

##### **3.3.1.2.3 The Late Medieval – Modern Period (AD c. 1550-1900)**

#### **3.3.1.3 Field Walking Survey**

### **3.3.2 Potential Emissions**

### **3.3.3 Description of Likely Impacts**

### **3.3.4 Mitigation Measures**

### **3.3.5 Likely Significant Impacts**

### **3.3.6 Bibliography**

## **3.4 Flora and Fauna**

### **3.4.1 Existing Environment**

#### **3.4.1.1 Methods**

#### **3.4.1.2 Habitats and Flora**

#### **3.4.1.3 Fauna**

#### **3.4.1.4 Aquatic Environment**

### **3.4.2 Description of Likely Impacts**

#### **3.4.2.1 Direct Impacts**

#### **3.4.2.2 Indirect Impacts**

#### **3.4.2.3 Residual Impacts**

### **3.4.3 Mitigation Measures**

#### **3.4.3.1 Mitigation by Avoidance**

#### **3.4.3.2 Mitigation by Remedy**

### **3.4.4 Likely Significant Impacts**

### **3.4.5 References**

## **3.5 Human Beings**

### **3.5.1 Introduction**

### **3.5.2 Existing Environment**

#### **3.5.2.1 Population Statistics**

#### **3.5.2.2 Land Use and Housing**

#### **3.5.2.3 Infrastructure**

#### **3.5.2.4 County Development and Waste Management Planning**

##### **3.5.2.4.1 County Kildare Development Plan**

##### **3.5.2.4.2 Waste Management Plan for County Kildare**

##### **3.5.2.4.3 Ballymore Development Plan**

#### **3.5.2.5 Local Industry**

#### **3.5.2.6 Tourism**

- 3.5.3** Potential Emissions
- 3.5.4** Description of Likely Impacts
- 3.5.5** Mitigation Measures
- 3.5.6** Likely Significant Effects
- 3.5.7** Traffic
  - 3.5.7.1** Existing Conditions
  - 3.5.7.2** Potential Emissions
  - 3.5.7.3** Likely Impacts
  - 3.5.7.4** Mitigation Measures
  - 3.5.7.5** Likely Significant Impact

### **3.6 Soils, Geology & Groundwater**

- 3.6.1** Existing Environment
- 3.6.2** Potential Emissions
- 3.6.3** Description of Likely Impacts
- 3.6.4** Mitigation Measures
- 3.6.5** Likely Significant Impacts

### **3.7 Landscape**

- 3.7.1** Existing Landscape
- 3.7.2** Potential Emissions
- 3.7.3** Likely Impacts
- 3.7.4** Mitigation Measures
- 3.7.5** Likely Significant Impacts

### **3.8 Noise**

- 3.8.1** Existing Environment
- 3.8.2** Potential Emissions
  - 3.8.2.1** Construction
  - 3.8.2.2** Operation
- 3.8.3** Description of Likely Impacts
- 3.8.4** Mitigation Measures
- 3.8.5** Likely Significant Impacts

### **3.9 Surface Water**

- 3.9.1** Existing Environment
- 3.9.2** Potential Emissions
- 3.9.3** Description of Likely Impacts
- 3.9.4** Mitigation Measures
- 3.9.5** Likely Significant Impacts

### **3.10 Material Assets**

- 3.10.1** Potential Emissions
- 3.10.2** Likely Impacts
- 3.10.3** Mitigation Measures
- 3.10.4** Significant Impacts

**3.11 Interactions**

**4 ENVIRONMENTAL MONITORING 2 pages**

**5 STATUTORY REQUIREMENTS 2 pages**

**5.1 Data Necessary to identify and Assess Environmental Effects of the Development**

**5.2 Forecasting Methods Used to Assess any Effects on the Environment**

**5.3 Difficulties In Compiling Specified Information**

**5.4 Compliance with Requirements of Environmental Impact Assessment Regulations – Second Schedule SI 93 of 1999**

# **Environmental Impact Statement (EIS)**

## **List of Tables**

- 2.3.1** Estimates of Quantities of Wastes to be Imported
- 2.3.2** European Waste Classes of Materials Proposed (P) to be Accepted at the Facility
- 2.5.1** Landfill Volumes
- 2.5.2** Indicative Filling and Restoration Programme
- 2.5.3** Leachate Volumes (m<sup>3</sup>)
- 2.5.4** Potential Leachate Composition
- 2.5.5** KTK Landfill (Kilcullen) Leachate Sample
- 2.5.6** Possible waste composition of wastes to be landfilled
- 2.5.7** Potential Landfill Gas Production and Extraction over time
- 2.5.8** Typical Landfill Gas Composition
- 3.1.1** Baseline Dust deposition survey, Ballymore Eustace
- 3.2.1** Percentage frequency of wind speed for Casement Aerodrome, (1992-1996)
- 3.2.2** Climate data for Casement Aerodrome (1992-1996)
- 3.2.3** Mean Monthly Rainfall for Blessington (1949-1990)
- 3.3.1** List of Archaeological Sites and Monuments in c. 2.5km Catchment
- 3.3.2** List of Archaeological Finds
- 3.4.1** Designated areas within 10km of the site
- 3.4.2** Aquatic invertebrates from the R. Liffey at Ballymore Eustace
- 3.5.1** Historic Traffic Data at Development Site
- 3.5.2** Summary of Peak Hour Traffic Survey Results R411 Naas Road/R413 Kilcullen Road Junction
- 3.5.3** Summary of Daily Traffic Attraction at Proposed Landfill
- 3.5.4** Summary of AM Peak Hour Traffic Attraction
- 3.5.5** Summary of PM Peak Hour Traffic Attraction
- 3.5.6** Summary of Peak Short-term Traffic Attraction (Phase 2 Construction Period – 2004)
- 3.5.7** Summary of Peak Traffic Attraction (End Phase 2 Operational Period – 2008)
- 3.5.8** Summary of Capacity Assessment (Site Access)
- 3.5.9** Summary of Forecast Queues & Delay (Site Access)
- 3.6.1** Recent water levels recorded in the monitoring boreholes
- 3.6.2** Chemical Analysis of Groundwater, Kimeens Pit, Ballymore Eustace (23/04/2001)
- 3.7.1** Grid references of Views into Site
- 3.8.1** Monitoring point locations for noise survey
- 3.8.2** Baseline environmental noise survey results, Ballymore Eustace, Co. Kildare

- 3.11.1** Interactions of the Foregoing
- 4.1** Proposed Monitoring at the Proposed Landfill
- 4.2** Surface Water, Groundwater and Leachate - Monitoring
- 5.1** EIS Checklist

# Environmental Impact Statement (EIS)

## List of Figures

### In Text

- 1.1 Site Location
- 1.2 Landholding as of March 2000
- 1.3 Master Plan Schematic
- 1.4 Application Site Boundary
- 2.1 Overview of Facility
- 2.5.1 Potential Landfill Gas Production and Extraction
- 3.5.2 Daily Distribution of Traffic Arriving at KTK Landfill Site, Kilcullen
- ~~3.5.3 Daily Distribution of Traffic Departing at KTK Landfill Site, Kilcullen~~
- 3.5.4 Forecast Traffic Arriving at Proposed Landfill
- 3.5.5 Forecast Traffic Departing Proposed Landfill
- 4.1 Proposed Monitoring Locations

### In Volume II, Appendix 9

- 3.1.1 Monitoring Locations
- 3.2.1 Windrose for Casement Aerodrome, 1992-1996
- 3.3.1 Extract from the R.M.P Map for County Kildare (Sheets 24 and 29), showing the location of the proposed development and of archaeological sites and monuments in the area.
- 3.3.2 Extract from R.M.P Map for County Kildare (Sheet 29), showing the results of the field survey.
- 3.4.1 Ballymore Eustace Industrial Park: Habitat Map
- 3.5.1 Local Infrastructure and Development
- 3.6.1 Monitoring Well Location Plan
- 3.6.2 Cross Section MW2 – MW1
- 3.6.3 Cross Section River Liffey – MW1
- 3.7.1 Landscape Assessment – Existing Site Survey (contours only)
  - 3.7.1 a Existing Ground Profile Sections
  - 3.7.1 b Existing Landscape
  - 3.7.1 c Views into Site and Photo Locations
  - 3.7.1 d Visual Boundary of Site
  - 3.7.1 e Local Setting / Site Views
- 3.7.4 a Enabling Landscape Works
- 3.7.4 b State of Works at Completion of Phase 1 Landfill
- 3.7.4 c Sections at Completion of Phase 1 Landfill
- 3.7.4 d State of Works at Completion of Phase 2 Landfill
- 3.7.4 e State of Works at Completion of Landscaping
- 3.7.4 f Sections at Completion of Landscaping



# **Environmental Impact Statement (EIS)**

## **List of Plates & Photoviews**

### **In Volume II, Appendix 9**

- 3.3.1** View of proposed development from Ballymore Eustace to Harristown Road, facing northeast.
- 3.3.2** Spring, ditch and townland boundary, from Ballymore Eustace to Harristown Road, facing south (outside of proposed development)
- 3.3.3** View of derelict house, with quarry bunding in background; taken from Ballymore Eustace to Harristown Road, facing south

### **In Volume II, Appendix 7**

- View 1** Towards site from adjacent field looking southwest
- View 2** From site across Liffey Valley looking southwest
- View 3** Along south boundary within site looking northeast
- View 4** 1 of 2 looking southwest from within site (west end)
- View 4** 2 of 2 looking southwest from within site (west end)
- View 5** Across top of watermain indicating willow thicket
- View 6** Across front of site at roadway looking south
- View 7** From front of site at roadway looking west
- View 8** From centre of landfill site looking north.
- View 9** 1 of 2 Panoramic view facing north from centre of site
- View 10** 2 of 2 Panoramic view facing south from centre of site

# **Environmental Impact Statement (EIS)**

## **List of Drawings**

	<b>In Volume II, Appendix 10</b>	<b>Scale (A1)</b>
<b>101</b>	Existing Conditions Survey	1 to 1000
<b>102</b>	Overview of Proposed Landfill Development	1 to 1000
<b>103</b>	Site Infrastructure	1 to 1000
<b>104</b>	Landfill Surface Contours	1 to 1000
<b>105</b>	Restoration Works and After Use Plan	1 to 500
<b>106</b>	Landform Cross - Sections	1 to 1000
<b>107</b>	Landfill Boundary Cross Sections	1 to 250
<b>108</b>	Landfill Details	As Shown

# **Environmental Impact Statement (EIS)**

## **List of Appendices**

<b>Appendix</b>	<b>Reference Section</b>	<b>Description</b>
<b>1</b>	<b>1</b>	Planning Permission
<b>2</b>	<b>2</b>	Material Balance Calculations
<b>3</b>	<b>3</b>	Clay Test Data
<b>4</b>	<b>3.1</b>	Dust Assessment Report
<b>5</b>	<b>3.5</b>	Public Consultation Information
<b>6</b>	<b>3.6</b>	Borehole Logs
<b>7</b>	<b>3.7</b>	Photo views
<b>8</b>	<b>3.8</b>	Noise Assessment
<b>9</b>	<b>-</b>	Figures
<b>10</b>	<b>-</b>	Drawings



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# Appendix 1

CONSIDERED: Application No. 1332/80

received from

Ballymore Sand Co., c/p Enda McDermott,  
105, Ludford Road, Ballinteer, Dublin 16  
in the County of Kildare under Section 26 of the Local Government (Planning & Development) Act, 1963  
and the Regulations made thereunder, for ~~Order/Permission/Approval~~ for the development of land at  
Kinmeens, Ballymore Eustace

in the County of Kildare for  
Extend existing sand pit into adjoining field

and having considered only the proper planning and development of the said area, regard being had to the provisions of the County Development Plan and other relevant matters referred to in Section 26 of said Act, and reports from Council's Technical Officers thereon.

ORDER: The Council hereby decides to grant ~~Order/Permission/Approval~~ for the said development subject to the conditions set out in the schedule hereto and the applicant is to be notified accordingly.

#### SCHEDULE

#### CONDITIONS

#### REASONS FOR CONDITIONS

- |  |   |
|--|---|
| <p>(1) The development shall be carried out in accordance with the plans lodged by the applicant on 10/10/80 and revised plans and particulars lodged 23/3/1981 &amp; 20/7/1982. save as the conditions hereunder otherwise require.</p> <p>2. The use of the land for this purpose shall cease on the expiration of a period of three years from the date of the aforementioned Order, unless before that date, permission for its retention is granted by the Planning Authority or by An Bord Pleanala on appeal.</p> <p>3. No excavations to take place below 140 metres O.D.</p> <p>4. The slope at the northern boundary of the land sterilized by Dublin County Council water main shall be a 1 in 2 slope.</p> <p>5. Applicant to consult with Dublin County Council regarding access points across existing water main.</p> <p>6. No stock piling of materials shall take place over the watermain.</p> <p>7. No machinery in the pit shall be used between the hours of 6.00 p.m. and 8.00 a.m.</p> <p>8. Not more than 2.5 acres shall be stripped of top soil at any time in advance of working.</p> <p>9. No rock blasting shall take place without the written approval of Kildare County Council.</p> | <p>1. To ensure proper development</p> <p>2. To enable the effect of the development on the amenities of the area to be reviewed having regard to the conditions then obtaining.</p> <p>3. To ensure proper development.</p> <p>4. To ensure proper development.</p> <p>5. To ensure proper development.</p> <p>6. To ensure proper development.</p> <p>7. To preserve the amenity of the area.</p> <p>8. To preserve the amenity of the area.</p> <p>9. To preserve the amenity of the area.</p> |
|--|---|

Made this 10th day of September, 1982.

Signed   
County Manager  
The County Council of the County of Kildare

COUNTY MANAGER'S ORDER NO. P... 10425A

Considered Order No. P... 10425A of the Council made on the 10th day of September, 1982 and no appeal having been taken against the terms of the decision therein contained.

ORDER: The Council hereby grants to the applicant ~~Order/Permission/Approval~~ under the above Act for the development referred to in the above application, subject to the said conditions. *condition 10*

Made this 19th day of November 1982

Signed   
County Manager  
The County Council of the County of Kildare

Ballymore Sand Co., c/o Enda McDermott,  
of 105, Ludford Rd., Ballinteer Dublin 16.

Application by

for ~~Outline/Permission/Approval~~ to develop lands at

.. Kimmeens, Ballymore Eustace,

for Extend existing sand pit into adjoining field.

SCHEDULE (continuation)

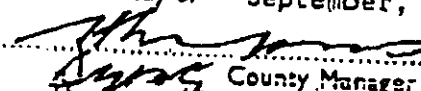
CONDITIONS

10. Stock piles shall be kept to a minimum.
11. Emissions of dust during dry windy periods shall be contained or suppressed by spraying. Dust fallout beyond the site boundary shall not exceed 100mg/m<sup>2</sup>/daily.
12. The working of the site shall be carried out in such a manner that atmospheric pollution from smoke, dust, grit (noxious or offensive gases or mineral particles ~~shall not arise on the site~~) shall be kept at such levels as not to be injurious to public health, livestock, vegetation or amenity.
13. No effluent shall be discharged to any open drain or watercourse that would cause pollution. No washing of material shall take place on the site.
14. Arrangements for the monitoring of dust, noise and vibration levels shall be agreed between the developer and the Planning Authority.
15. The whole of the surface area, including slopes and sections containing deposits accruing from the working of the pit shall be re-instated as closely as possible to the contours of the original ground. The date of commencement of restoration works, the phasing of such works, the sections to be re-instated and the final contours and levels to which the restoration shall be carried out shall be agreed with the Planning Authority.

REASONS FOR CONDITIONS

10. To ensure proper development.
11. To ensure proper development and preserve the amenity of the area.
12. To ensure proper development and meet public health requirements.
13. To ensure proper development and meet public health requirements.
14. To preserve the amenity of the area.
15. To ensure proper development.

Made this 10th day of September, 19 82.

Signed   
County Manager  
The County Council of the County of Kildare

COUNTY MANAGER'S ORDER NO. 10425A

Considered Order No. 10425 of the Council made on the 10th day of September, 1982, and no appeal having been taken against the terms of the decision therein contained.

ORDER: The Council hereby grants to the applicant ~~Outline/Permission/Approval~~ under the above Act for the development referred to in the above application, subject to the said conditions.

Made this 19th day of November 19 82

Signed   
County Manager  
The County Council of the County of Kildare

Ballymore Sand Co., c/o Enda McDermott,  
of 105, Ludford Rd, Ballinteer, Dublin 16.  
for ~~Quarry/Permission/Approval~~ to develop lands at  
Kimmeens, Ballymore Eustace,  
for .. Extend existing sand pit into adjoining field ..

SCHEDULE (continuation)

CONDITIONS

16. All machinery and structures shall be removed at such time or times as they are no longer required in connecting with the winnings and workings of sand and gravel.
17. Any noise, vibration or electrical interference generated on the site shall be maintained at such low levels as would not give reasonable cause for complaint to any person in any residence or public place in the vicinity.
18. No excavations shall take place within the area coloured red on the attached map No. T.P. 586.
19. A post and wire fence shall be erected on the northern boundary of the area coloured red on map No. T.P. 586, prior to the commencement of the development.
20. The existing stone boundary wall, existing trees and shrubs, level of slope and existing grass cover shall be carefully retained within the area coloured red on map TP586.
21. All sides of the excavation adjoining the northern boundary of the area coloured red on Map No. TP586 shall be left with a slope not exceeding one (1) vertical to two (2) horizontal.
22. All existing top soil removed in the course of working shall be separately retained from waste materials so that it can be readily re-used and such top soil shall be retained on site and spread evenly over exhausted dry areas or back filled waste materials to the satisfaction of Kildare County Council and in accordance with an agreed rehabilitation programme.

REASONS FOR CONDITIONS

16. To ensure proper development and preserve the amenity of the area.
17. To preserve the amenity of the area.
18. To ensure proper development.
19. To ensure proper development.
20. To preserve the amenity of the area.
21. To ensure proper development.
22. To ensure proper development.

Made this 10th day of September, 19 82

Signed   
County Manager  
The County Council of the County of Kildare

COUNTY MANAGER'S ORDER NO. 1042512

Considered Order No. 10425 of the Council made on the 10th day of September, 19 82 and no appeal having been taken against the terms of the decision therein contained.

ORDER: The Council hereby grants to the applicant ~~Quarry/Permission/Approval~~ under the above Act for the development referred to in the above application, subject to the said conditions.

Made this 19th day of November 19 82

Signed   
County Manager  
The County Council of the County of Kildare



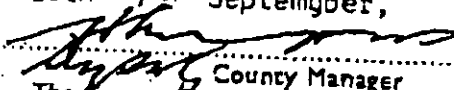
Ballymore Sand Co., c/o Enda McDermott,  
of.....105, Ludford Road, Ballinteer, Dublin. 16.....  
for ~~Obtain/Permission/Approval~~ to develop lands at .....  
.....Kinmeens, Ballymore Eustace.....  
for.....Extend existing sand pit into adjoining field.....

SCHEDULE (continuation)

CONDITIONS

REASONS FOR CONDITIONS

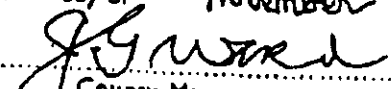
- |   |  |
|---|--|
| 23. Prior to the commencement of the development, the applicant shall submit a comprehensive rehabilitation programme for both the existing sandpit and the proposed extension to same. This to be accompanied by reports from ACOT and An Foras <del>Talún</del> re: viability of future uses. | 23. To ensure proper development and preserve the amenity of the area.       |
| 24. All restored surfaces shall be free from ponds and standing water and such drainage dykes and ditches as may be necessary to remove surface water shall be constructed.   | 24. To meet public health requirements and preserve the amenity of the area. |
| 25. A comprehensive landscaping scheme, including screen planting on site boundaries shall be carried out during the first planting season in accordance with the plans submitted on 20th July, 1982 and as otherwise agreed with Kildare County Council.                                       | 25. To preserve the amenity of the area.                                     |
| 26. Existing hedgerows on site boundaries to be carefully retained.   | 26. To preserve the amenity of the area.                                     |
| 27. Applicant to ensure that excavations around the perimeter of the site are carried out in such a way as not to endanger the stability of adjoining properties.   | 27. To ensure proper development.  |
| 28. Applicant to erect reflective signs, one 100 metres each side of the entrance reading 'Danger - Heavy Vehicles Turning'.  | 28. To prevent traffic hazard being created.                                 |
| 29. Entrance to be constructed as per Drawing NO. 758/02 submitted but constructed of concrete as is to be the access road from this point in to the site as far as the site offices and truck washing facilities.  | 29. To ensure proper development.  |

Made this 10th day of September, 1982  
Signed   
County Manager  
The County Council of the County of Kildare

COUNTY MANAGER'S ORDER NO. 10425A

Considered Order No. 10425 of the Council made on the 10th day of September, 1982  
and no appeal having been taken against the terms of the decision therein contained.

ORDER: The Council hereby grants to the applicant ~~Obtain/Permission/Approval~~ under the above Act  
for the development referred to in the above application, subject to the said conditions.

Made this 11th day of November 1982  
Signed   
County Manager  
The County Council of the County of Kildare

10425

Application by

Ballymore Sand Co. c/o Enda McDermott,  
of 105, Ludford Rd, Ballinteer, Dublin 16.

for ~~COUNCIL~~ Permission/Approval to develop lands at

Kimmeens, Ballymore Eustace, Co. Kildare.

for Extension of existing sand pit into adjoining field.

## SCHEDULE (continuation)

## CONDITIONS

30. Entrance and access road are not to drain onto the public road. A detailed drawing giving levels and gully positions to be submitted for approval.
31. The developer is, at all times, to be responsible for the clearing way of all drop-pings from vehicles using the site and should, in particular, see that the road in the vicinity is kept clean.
32. Before development is commenced, the developer to arrange for the payment to Kildre County Council of contribution of £40,000. towards expenditure which the Council has incurred or may incur in respect of road improvements, which facilitate the proposed development.

## REASONS FOR CONDITIONS

30. To ensure proper development.
31. To preserve the amenity of the area and ensure proper development.
32. The road improvements in the area by the Council facilitates the proposed development and it is considered reasonable that the developer should contribute to same.

Made this 10th day of September, 19 82

Signed   
County Manager  
The County Council of the County of Kildare

COUNTY MANAGER'S ORDER NO. 10425 A

Considered Order No. 10425 of the Council made on the 10th day of September, 19 82 and no appeal having been taken against the terms of the decision therein contained.

ORDER: The Council hereby grants to the applicant ~~COUNCIL~~ Permission/Approval under the above Act for the development referred to in the above application, subject to the said conditions.

Made this 19th day of November 1982

Signed   
County Manager  
The County Council of the County of Kildare



# Appendix 2

## Working Estimates of Excavation and Fill Volumes

	Description	Excavation (m <sup>3</sup> )	Fill (m <sup>3</sup> )
<b>1</b>	<b>Earthworks to form side slopes and base of pit</b>		
1.1	Computed from May 2001 design model to 12 May 2001 survey	512,000	20,000
1.2	Corrections to model (subject to verification)	-57,000	0
	Floor level raised 1 June 2001		
	Foot print decreased 23 May 2001	-15,000	0
	Net Estimated Volumes existing ground May 12, 2001 to design model (subject to verification)	440,000	20,000
<b>2</b>	<b>Assumed composition of Northwest field</b>		
	Computed Volume of excavation including slopes on the inside of the fenceline	190,000	
2.1	Topsoil	3,000	
2.2	Silt/clay	18,000	
2.3	Sand and Gravel for drainage layers		
	Leachate Collection layer	31,900	
	Cap - gas drainage layer	30,300	
	Cap - drainage layer above clay barrier layer	30,300	
	Total Drainage Layer volume in field (assumed)	92,500	
2.4	Balance - unclassified fill: silt, fine sand, gravel, cobbles	76,500	
<b>3</b>	<b>Composition of volumes in design landfill area</b>		
3.1	Total Excavation volumes	440,000	
3.2	Northwest field	190,000	
3.3	Silt/Clay		
	In stockpiles	14,000	
	In eastern excavation (assumed)	34,000	
	Total clay in landfill area	48,000	
3.4	Balance of unclassified fill: silt, sand and gravel (except northwest field)	202,000	

## Material Balance - Unclassified Fill

Unclassified Fill - Estimates		Volume (m <sup>3</sup> )
<b>A</b>	<b>Required</b>	
	Fill inside landfill area	20,000
	Fill in hardstand and road areas	20,000
	Western Berm	10,000
	Landscape berms - east and south sides of landfill	10,000
	Daily and intermediate cover materials	200,000
	Capping layer subsoil	80,000
	Landscape mounds above capped landfill as per architects design	270,000
	<b>Total Required</b>	<b>610,000</b>
<b>B</b>	<b>Available</b>	
	Unclassified fill from northwest field (Item 2.4)	76,500
	Unclassified fill from landfill area ( Item 3.4)	202,000
	Soccer pitch stockpile	15,000
	<b>Total Available</b>	<b>293,500</b>
<b>C</b>	<b>Net Deficit or Excess (A-B)</b>	<b>-316,500</b>

## Material Balance - Clay

	Clay Estimates	Volume (m <sup>3</sup> )
<b>A</b>	<b>Required</b>	
	Phase 1 Floor	23,200
	Phase 2 Floor	34,800
	Layer in Cap	52,000
	<b>Total Required</b>	<b>110,000</b>
<b>B</b>	<b>Available</b>	
	Stockpiles on site	14,000
	Eastern Excavation	34,000
	Northwest Field	18,000
	<b>Total Available</b>	<b>66,000</b>
<b>C</b>	<b>Net Deficit or Excess (A-B)</b>	<b>-44,000</b>

## Material Balance - Drainage Layers

	Drainage Layers - Estimates	Volume (m <sup>3</sup> )
<b>A</b>	<b>Required</b>	
	Landfill Leachate Collection Layer - materials with $k < 1 \times 10^{-3}$ m/sec	31,900
	Gas Drainage Layer in Cap - materials with $k < 1 \times 10^{-4}$ m/sec	30,300
	Drainage Layer above clay barrier layer - materials with $k < 1 \times 10^{-4}$ m/sec	30,300
	<b>Total Required</b>	<b>92,500</b>
<b>B</b>	<b>Available</b>	
	Northwest Field (less topsoil and clay)	169,000
	<b>Total Available</b>	<b>169,000</b>
	<b>Net Deficit or Excess</b>	<b>76,500</b>



## Material Balance - Topsoil

	Topsoil Estimates	Volume (m <sup>3</sup> )
<b>A</b>	<b>Required</b>	
	Landfill Capping layer topsoil	23,200
	Landscaped areas outside of landfill	8,000
	<b>Total Required</b>	<b>31,200</b>
<b>B</b>	<b>Available</b>	
	Topsoil from northern field area ( Item 2.1 )	3,000
	Stockpiles on site	
	northeast	3,500
	near access gate	5,500
	<b>Total Available</b>	<b>12,000</b>
	<b>Net Deficit or Excess</b>	<b>-19,200</b>

# Appendix 3

**BALLYMORE TEST FILL**  
**ENVIRONMENT & RESOURCE MANAGEMENT LTD.**  
**FACTUAL REPORT ON LABORATORY TESTING**  
**OF U100 UNDISTURBED & BULK DISTURBED**  
**SAMPLES OF COMPACTED CLAY**  
**DELIVERED 27 APRIL 2001**

**REPORT No. 4141**

**Consultants:** Environment & Resource Management Ltd.

Glover Site Investigations Ltd.,  
8 Drumahiskey Road,  
Balnamore,  
Ballymoney,  
Co. Antrim BT53 7QL.

**BALLYMORE TEST FILL**

**ENVIRONMENT & RESOURCE MANAGEMENT LTD.**

**FACTUAL REPORT ON LABORATORY TESTING (JUNE 2001)**

**CONTENTS:**

**LABORATORY WORK DESCRIPTION:**

- (i) Moisture Content Determination
- (ii) Consistency Limits Determination
- (iii) Particle Size Distribution Tests
- (iv) Triaxial Cell Permeability Tests

**RESULTS:**

Consistency Limits tests with Moisture Content determinations.

Particle Size Distribution tests.

Triaxial Cell Permeability tests.

**BALLYMORE TEST FILL**  
**ENVIRONMENT & RESOURCE MANAGEMENT LTD.**

**FACTUAL REPORT ON LABORATORY TESTING (JUNE 2001)**

**LABORATORY WORK DESCRIPTION:**

The laboratory testing programme was specified by the Consultants, Environment & Resource Management Ltd., by fax message dated 24 April 2001.

Both U100 undisturbed samples and bulk disturbed samples of the compacted 'Clay' (basal lining material) test layer were taken by the Consultants on 24 April 2001.

These samples (2 No. bulk disturbed and 2 No. U100 undisturbed) were delivered by Glover Site Investigations Ltd. personnel to our Laboratory on 27 April 2001.

**(i) Moisture Content Determination:**

The 'as received' moisture content of each sample was determined by oven-drying (Test 3.2 of BS 1377 : Part 2 : 1990).

**(ii) Consistency Limits Determination:**

Each bulk sample was classified by determination of Consistency Limits; the preferred Cone Penetrometer method was employed for the Liquid Limit test in accordance with Tests 4.3 and 5 of BS 1377 : Part 2 : 1990.

The results have been presented in tabulated format together with the 'as received' moisture contents.

**(iii) Particle Size Distribution Tests:**

The gradings of the bulk sample were determined by wet sieving and hydrometer sedimentation analysis (Tests 9.2 & 9.5 of BS 1377 : Part 2 : 1990).

These results are presented as particle size distribution (PSD) curves together with tabulated proportions of gravel, sand, silt, clay size particles and deduced values of  $D_{10}$ ,  $D_{60}$  and  $C_u$  for each sample.

**(iv) Triaxial Cell Permeability Tests:**

The coefficient of permeability in a vertical direction was measured on 105mm diameter specimens prepared from the specific undisturbed (U100)-samples. Each test was carried out in accordance with Test 6 of BS 1377 : Part 6 : 1990.

In addition, the coefficient of permeability was measured on 101mm diameter x 116mm long specimens compacted from the bulk disturbed samples.

The specimens were compacted dynamically using the 4.5 kg rammer, in 5 layers into the standard mould, to attain the BS Heavy standard (Clause 3.5 of BS 1377 : Part 4 : 1990) at the 'as received' moisture content.

Each specimen was subjected to saturation and consolidation to achieve a mean effective stress of 130 kPa using the procedures of Clauses 5.4.3 and 5.5 of BS 1377 : Part 6 : 1990.

The results of each of these tests are presented in the following format:

- (a) Tabulated Summary of Results.
- (b) Graph of Pore Pressure Dissipation v. log Time for Consolidation Stage.
- (c) Graph of Volume Change v. square root Time for Consolidation Stage.
- (d) Graphs of Cumulative Flow v. Time for Flow Stages.

Examination of both specimens prepared from the U100 samples revealed preferential flow paths along contiguous partings/pockets of silt and silty fine sand within the clay.

These pockets/lenses of silt/fine sand were more widely spaced within the laboratory compacted specimens.

**CONSISTENCY LIMITS TESTS WITH  
MOISTURE CONTENT DETERMINATIONS**

**BALLYMOTE TEST FILL**  
**ENVIRONMENT & RESOURCE MANAGEMENT LTD**

**MOISTURE CONTENTS AND CONSISTENCY LIMITS RESULTS**

Sample ID		Moisture Content *		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index	Casagrande Classification
Type	No.	Natural (%)	'Fines' (%)					
B	1	17.8	18.0	29	17	12	0.08	CL
U	F40	17.9						
B	2	18.0	18.1	29	17	12	0.08	CL
U	2	17.5						

\* Samples as delivered to GSI Laboratory in Ballymoney on 27/04/01.

**PARTICLE SIZE DISTRIBUTION RESULTS**

Sample ID		GRAVEL	SAND	'FINES'		D <sub>10</sub> (mm)	D <sub>60</sub> (mm)	C <sub>u</sub>
Type	No.			SILT	CLAY			
B	1	2 %	5 %	68 %	25 %	< 0.001	0.012	> 12
B	2	5 %	13 %	61 %	21 %	< 0.001	0.015	> 15

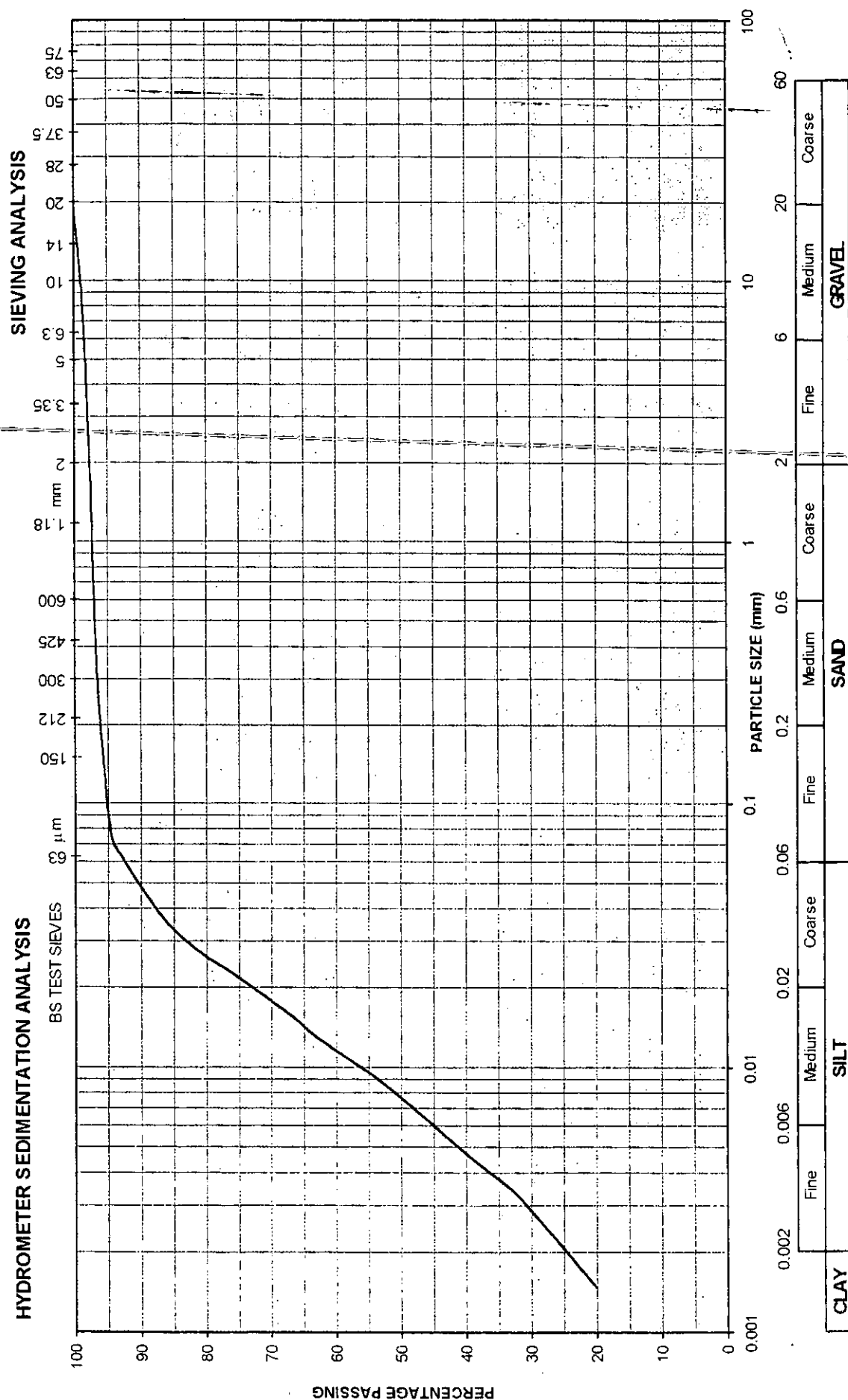
See accompanying Particle Size Distribution curves.



# **PARTICLE SIZE DISTRIBUTION TESTS**

**SAMPLE No.:** 1  
**SAMPLE DEPTH:** BULK

**CONTRACT:** Test Fill (Ballymore)



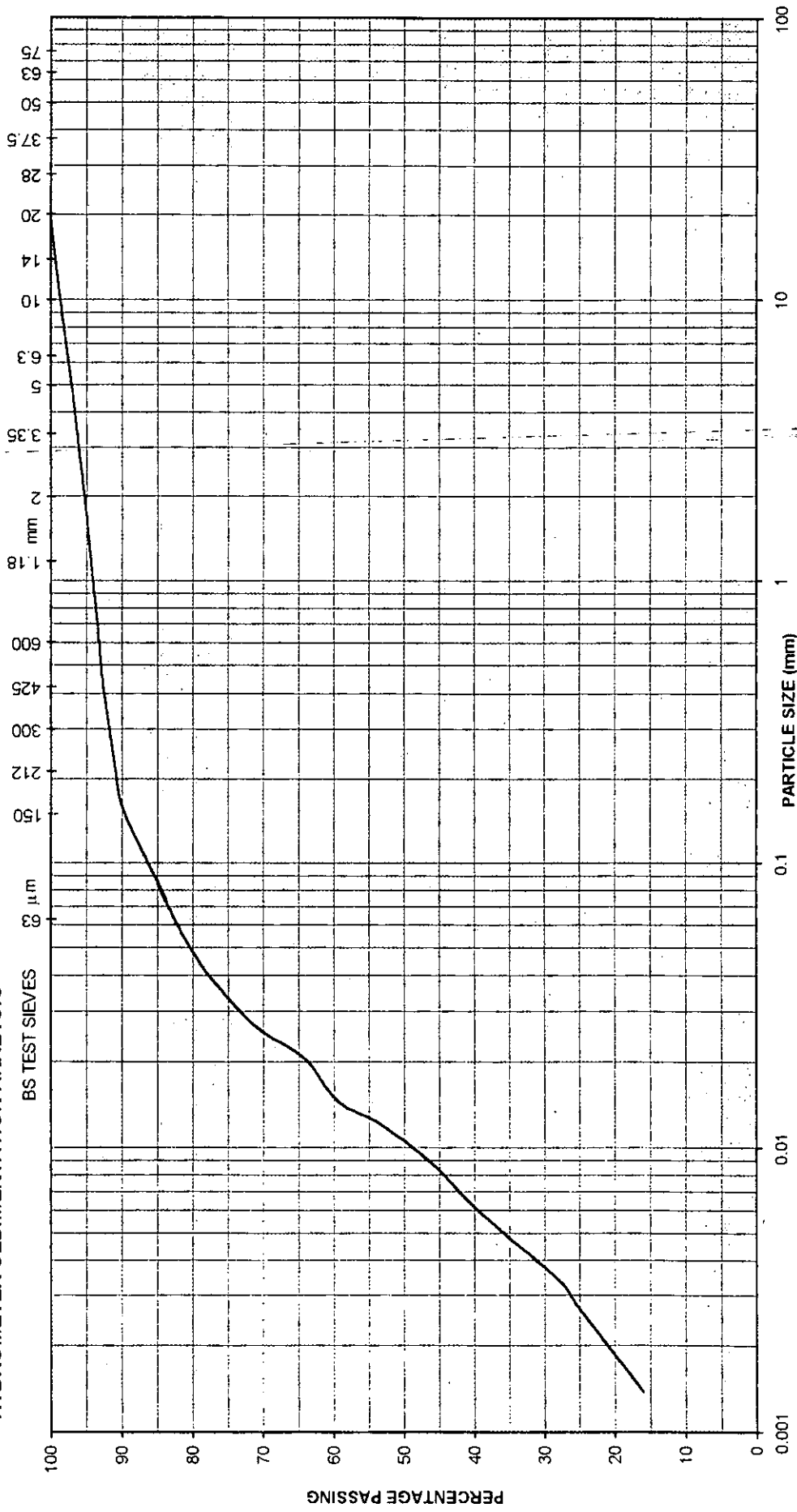
# PARTICLE SIZE DISTRIBUTION

CONTRACT: Test Fill (Ballymore)

SAMPLE No.: 2  
SAMPLE DEPTH: BULK

## HYDROMETER SEDIMENTATION ANALYSIS

## SIEVING ANALYSIS



CLAY			SILT			SAND			GRAVEL		
Fine			Medium			Coarse			Fine		
									</		

# **TRIAXIAL CELL PERMEABILITY TESTS**

## BALLYMORE TEST FILL - E & RM LTD.

### CONSTANT HEAD PERMEABILITY TESTS IN TRIAXIAL CELL

Sample Type	Sample No.	Moisture Content (%)	Bulk Density (kg/m <sup>3</sup> )	Dry Density (kg/m <sup>3</sup> )	Mean Effective Stress (kPa)	Coefficient of Permeability (m/s)	Remarks
U100	F40	17.9	2105	1785	131	$1.2 \times 10^{-9}$	#
BULK	1	17.8	2143	1819	130	$2.7 \times 10^{-10}$	‡
U100	U2	17.5	2151	1831	130	$2.1 \times 10^{-9}$	#
BULK	2	18.1	2133	1806	130	$5.1 \times 10^{-10}$	‡

Notes: # Post-testing examination of specimen revealed contiguous pockets/lenses of silt & silty fine sand  
∴ predominantly preferential flow.

‡ Specimens were compacted by 4.5 kg rammer to Heavy standard in accordance with BS 1377  
: Part 4 : 1990 Clause 3.5 at 'as received' moisture content.

See accompanying detailed tabulated results and graphs.

# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore Test Fill (E & RM Ltd)

LOCATION: 1

DATE SAMPLED: 24/04/01

SAMPLE DEPTH:

SAMPLE No.: F40

**SAMPLE DESCRIPTION:** Soft dark brownish grey silty CLAY; containing large pockets of greyish brown silt and silty fine sand interconnected by partings/fissures.

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Casagrande Classification	

## Constant Head Permeability Test in Triaxial Cell in accordance with Test 6 of BS 1377 : Part 6 : 1990.

Type of Specimen:	Undisturbed U100 sample taken in-situ from compacted fill.				
Method of Preparation:					
Flow Conditions:	Vertical downwards				
Test No.	1	2	3		
Diameter (D) mm	108				
Area (A) mm <sup>2</sup>	8962				
Length (L) mm	108				
Initial Moisture Content %	17.9				
Initial Bulk Density kg/m <sup>3</sup>	2105				
Initial Dry Density kg/m <sup>3</sup>	1785				
<b>SATURATION STAGE:</b>					
Method of Saturation:	#				
Initial Cell Pressure kPa	50				
Initial B Value	0.92				
Total Back-Pressure Applied kPa	0				
Period of Saturation Hour	19				
Final B Value	0.99				
<b>CONSOLIDATION STAGE:</b>					
Cell Pressure ( $\sigma_3$ ) kPa	451				
Back-Pressure ( $u_b$ ) kPa	300				
Effective Consolidation Pressure ( $\sigma'_c$ ) kPa	151				
Period of Consolidation Hour	7				
$t_{50}$ min	85				
<b>PERMEABILITY MEASUREMENT:</b>					
Cell Pressure ( $\sigma_3$ ) kPa	451				
Back Pressure ( $p_2$ ) kPa	300				
Pressure Difference ( $p_1 - p_2$ ) kPa	40				
Inlet Pressure ( $p_1$ ) kPa	340				
Mean Effective Stress ( $\sigma'_3$ ) kPa	131				
Test Temperature °C	22				
Correction Factor ( $R_d$ )	0.95				
From graph of Volume of Flow (ml) v. Time (mins):					
Mean Rate of Steady Flow (q) mL/min	0.0253				
Corresponding Head Loss ( $p_c$ ) kPa	2.13				
Hydraulic Gradient (i)	36.2				
Final Moisture Content %	16.1				
Final Bulk Density kg/m <sup>3</sup>	2142				
<b>COEFFICIENT OF PERMEABILITY:</b>					
Mean Effective Stress ( $\sigma'_3$ ) kPa	131				
$\sigma'_3 = \sigma_3 - \frac{1}{2}(p_1 + p_2)$					
<b>Coefficient of Permeability in the Vertical direction (<math>k_v</math>) at 20°C</b>					
$k_v = \frac{1.63 q L R_d}{A ((p_1 - p_2) - p_c)} \times 10^{-4}$ m/s	$1.2 \times 10^{-9}$ *				

**REMARKS:** # Increments of cell pressure only. \* Predominantly preferential flow through silt lenses.

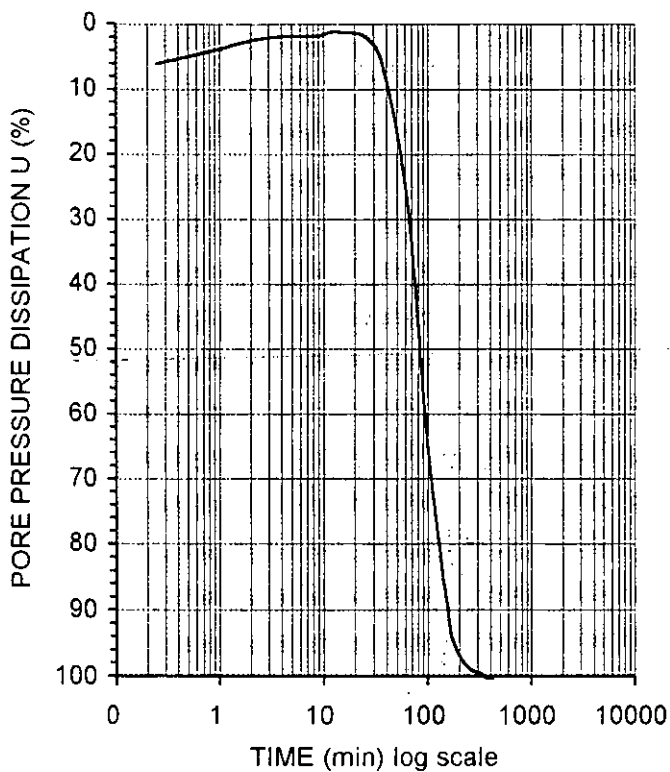
# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore (Test Fill).  
BOREHOLE No.: 27/04/01

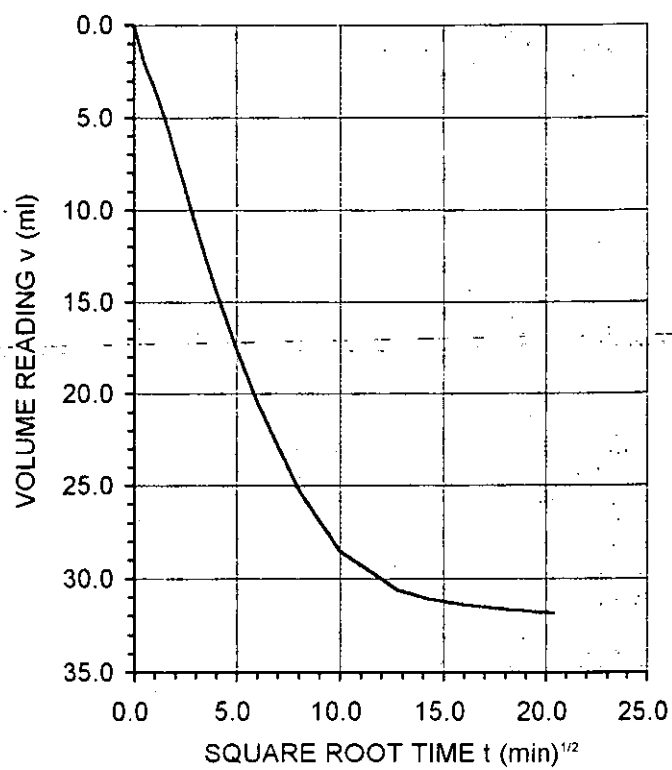
SAMPLE DEPTH:  
SAMPLE No: F40

TEST No.: 1  
 $\sigma_3'$  (kPa): 131

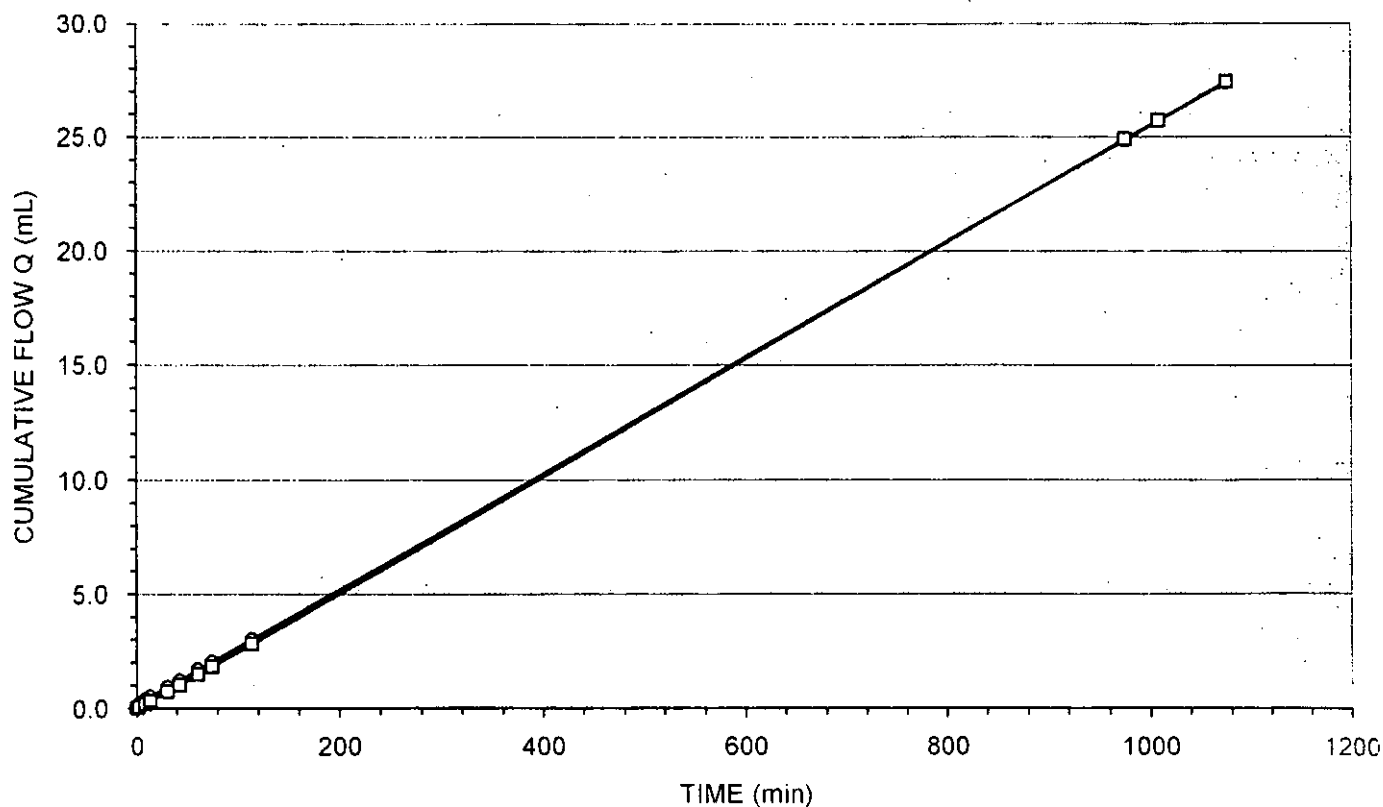
PRESSURE DISSIPATION v. LOG TIME



VOLUME CHANGE v. SQUARE ROOT TIME



CUMULATIVE FLOW v. TIME



# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore Test Fill (E & RM Ltd) LOCATION: 1

SAMPLE No. B1 (27/04/01)

**SAMPLE DESCRIPTION:** Firm (as received) dark grey silty CLAY with a trace of fine gravel; containing occasional partings/pockets of greyish brown very silty fine sand.

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Casagrande Classification	
29	17	12	CL	

## Constant Head Permeability Test in Triaxial Cell in accordance with Test 6 of BS 1377 : Part 6 : 1990.

Type of Specimen:	Compacted to BS Heavy standard (Clause 3.5 of BS 1377 : Part 4)
Method of Preparation:	
Flow Conditions:	Remoulded 4.5 kg rammer dynamic compaction at m=c.18% Vertical downwards

Test No.		1				
Diameter (D)	mm	101.6				
Area (A)	mm <sup>2</sup>	7854				
Length (L)	mm	116				
Initial Moisture Content	%	17.8				
Initial Bulk Density	kg/m <sup>3</sup>	2143				
Initial Dry Density	kg/m <sup>3</sup>	1819				
<b>SATURATION STAGE:</b>						
Method of Saturation:		#				
Initial Cell Pressure	kPa	50				
Initial B Value		0.92				
Total Back-Pressure Applied	kPa	0				
Period of Saturation	Hour	24				
Final B Value		1.00				
<b>CONSOLIDATION STAGE:</b>						
Cell Pressure ( $\sigma_3$ )	kPa	500				
Back-Pressure ( $u_b$ )	kPa	350				
Effective Consolidation Pressure ( $\sigma'_c$ )	kPa	150				
Period of Consolidation	Hour	25				
$t_{50}$	min	850				
<b>PERMEABILITY MEASUREMENT:</b>						
Cell Pressure ( $\sigma_3$ )	kPa	500				
Back Pressure ( $p_2$ )	kPa	350				
Pressure Difference ( $p_1 - p_2$ )	kPa	40				
Inlet Pressure ( $p_1$ )	kPa	390				
Mean Effective Stress ( $\sigma'_3$ )	kPa	130				
Test Temperature	°C	21.5				
Correction Factor ( $R_c$ )		0.96				
From graph of Volume of Flow (ml) v. Time (mins):						
Mean Rate of Steady Flow ( $q$ )	mL/min	0.00459				
Corresponding Head Loss ( $p_c$ )	kPa	2.03				
Hydraulic Gradient ( $i$ )		33.9				
Final Moisture Content	%	15.2				
Final Bulk Density	kg/m <sup>3</sup>	2200				
<b>COEFFICIENT OF PERMEABILITY:</b>						
Mean Effective Stress ( $\sigma'_3$ )	kPa	130				
$\sigma'_3 = \sigma_3 - \frac{1}{2} (p_1 + p_2)$						
Coefficient of Permeability in the Vertical direction ( $k_v$ ) at 20°C	m/s	$2.7 \times 10^{-10}$				
$k_v = \frac{1.63 q L R_c}{A ((p_1 - p_2) - p_c)} \times 10^{-4}$						

**REMARKS:** # Increments of cell pressure only.



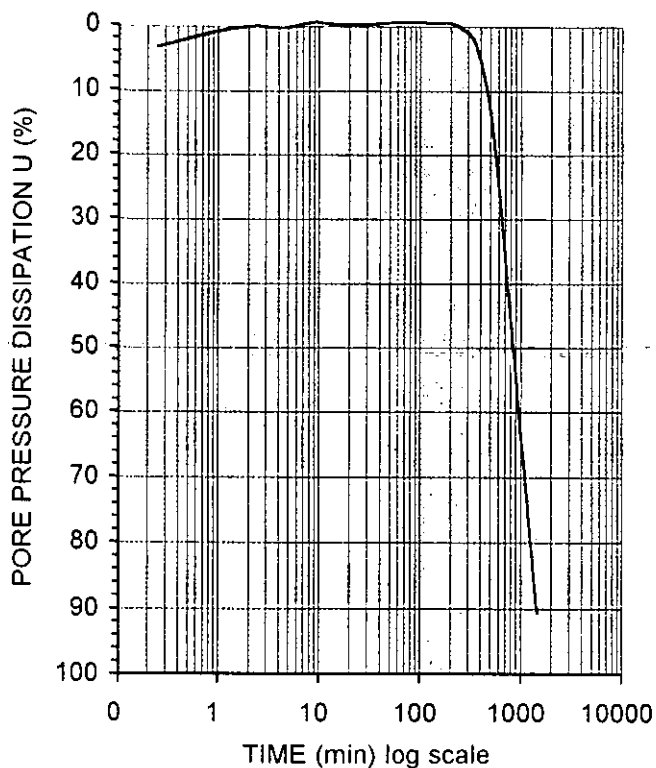
# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore (Test fill)  
LOCATION ID.:

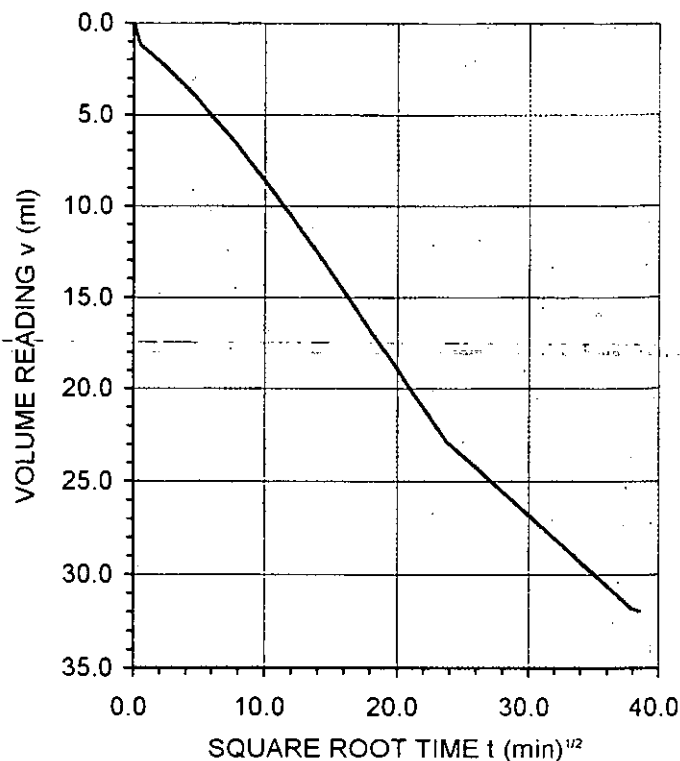
COMPACTION: BS Heavy (m=18%)  
SAMPLE No: BULK 1 (27/04/01)

TEST No.: 1  
 $\sigma_3'$  (kPa): 130

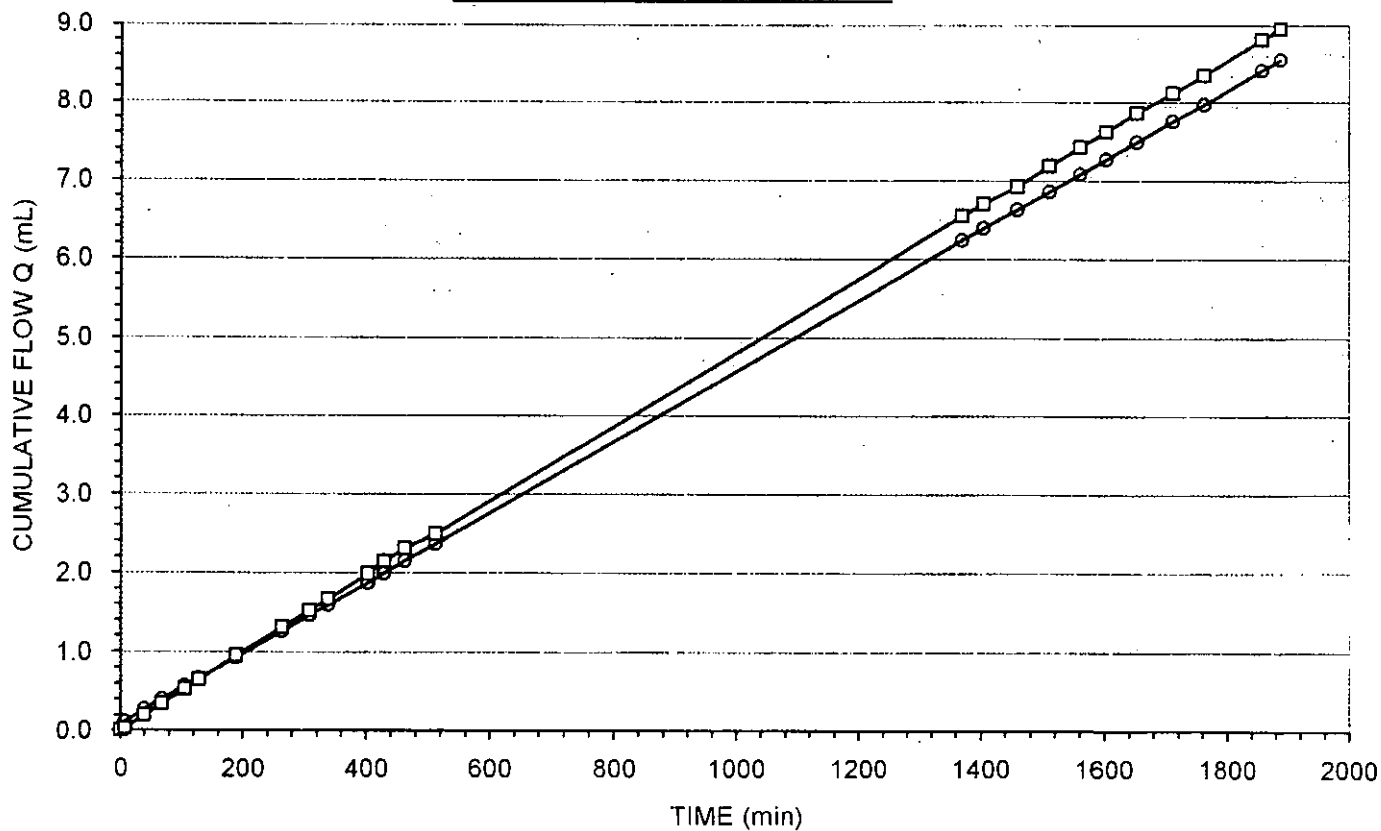
**PRESSURE DISSIPATION v. LOG TIME**



**VOLUME CHANGE v. SQUARE ROOT TIME**



**CUMULATIVE FLOW Q v. TIME**



# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore Test Fill (E & RM Ltd)

LOCATION: 2

DATE SAMPLED: 24/04/01

SAMPLE DEPTH:

SAMPLE No.: U2

SAMPLE DESCRIPTION: Firm intermixed dark grey and greyish brown silty CLAY; containing numerous pockets and lenses/partings of greyish brown silt & very silty fine sand *				
Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Casagrande Classification	

## Constant Head Permeability Test in Triaxial Cell in accordance with Test 6 of BS 1377 : Part 6 : 1990.

Type of Specimen:		Undisturbed U100 sample taken in-situ from compacted fill.				
Method of Preparation:						
Flow Conditions:		Vertical downwards				
Test No.		1	2	3		
Diameter (D)	mm	106				
Area (A)	mm <sup>2</sup>	8683				
Length (L)	mm	133				
Initial Moisture Content	%	17.5				
Initial Bulk Density	kg/m <sup>3</sup>	2151				
Initial Dry Density	kg/m <sup>3</sup>	1831				
<b>SATURATION STAGE:</b>						
Method of Saturation:		#				
Initial Cell Pressure	kPa	50				
Initial B Value		0.92				
Total Back-Pressure Applied	kPa	0				
Period of Saturation	Hour	18				
Final B Value		0.98				
<b>CONSOLIDATION STAGE:</b>						
Cell Pressure ( $\sigma_3$ )	kPa	450				
Back-Pressure ( $u_b$ )	kPa	300				
Effective Consolidation Pressure ( $\sigma'_c$ )	kPa	150				
Period of Consolidation	Hour	8				
$t_{50}$	min	105				
<b>PERMEABILITY MEASUREMENT:</b>						
Cell Pressure ( $\sigma_3$ )	kPa	450				
Back Pressure ( $p_2$ )	kPa	300				
Pressure Difference ( $p_1 - p_2$ )	kPa	40				
Inlet Pressure ( $p_1$ )	kPa	340				
Mean Effective Stress ( $\sigma'_3$ )	kPa	130				
Test Temperature	°C	24.5				
Correction Factor ( $R_f$ )		0.90				
From graph of Volume of Flow (ml) v. Time (mins):						
Mean Rate of Steady Flow (q)	mL/min	0.0350				
Corresponding Head Loss ( $p_c$ )	kPa	2.18				
Hydraulic Gradient (i)		29.2				
Final Moisture Content	%	16.4				
Final Bulk Density	kg/m <sup>3</sup>	2183				
<b>COEFFICIENT OF PERMEABILITY:</b>						
Mean Effective Stress ( $\sigma'_3$ )	kPa	130				
$\sigma'_3 = \sigma_3 - \frac{1}{2}(p_1 + p_2)$						
Coefficient of Permeability in the Vertical direction ( $k_v$ ) at 20°C	m/s	$2.1 \times 10^{-9}$				
$k_v = \frac{1.63 q L R_f}{A ((p_1 - p_2) - p_c)} \times 10^{-4}$		*				
<b>REMARKS:</b> # Increments of cell pressure only. * Predominantly preferential flow through almost contiguous silt lenses.						

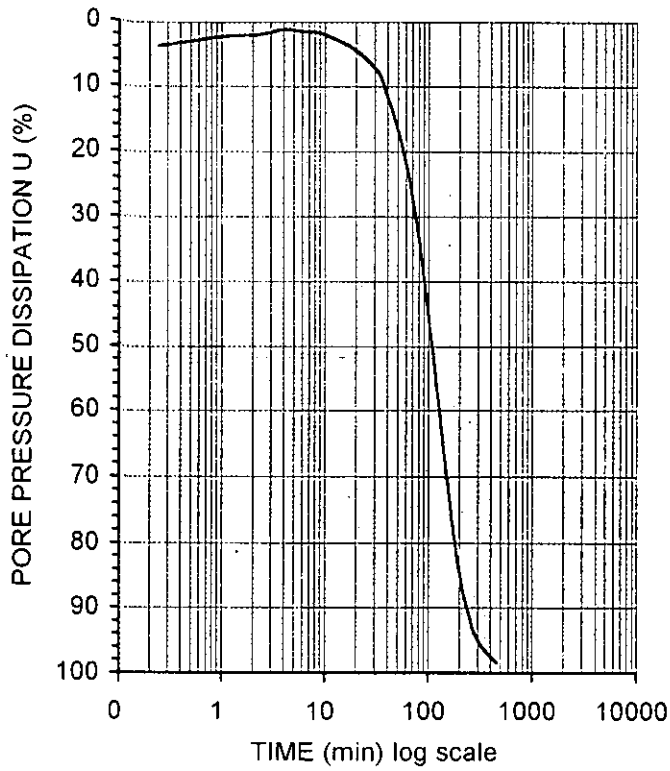
# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore (Test Fill).  
BOREHOLE No.: 27/04/01

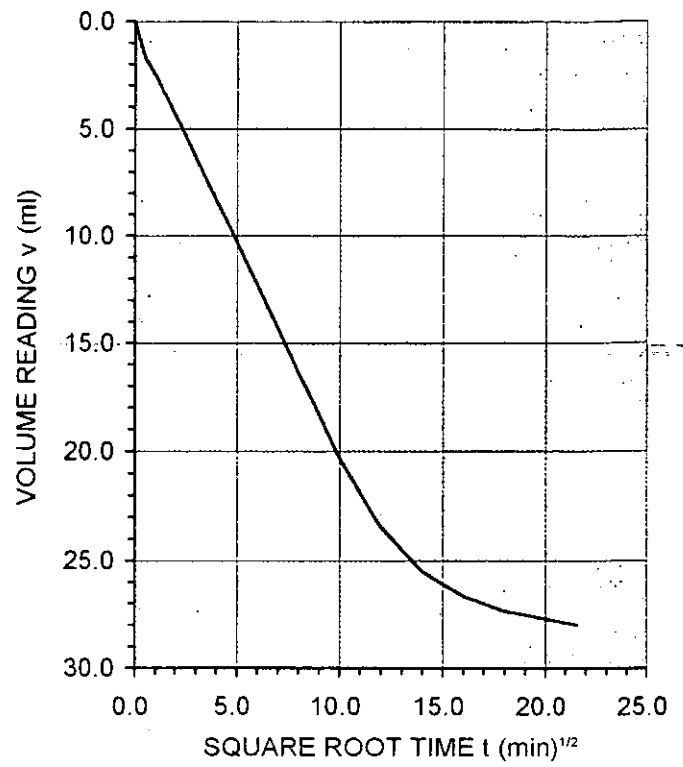
SAMPLE DEPTH:  
SAMPLE No: (U) 2

TEST No.: 1  
 $\sigma_3'$  (kPa): 130

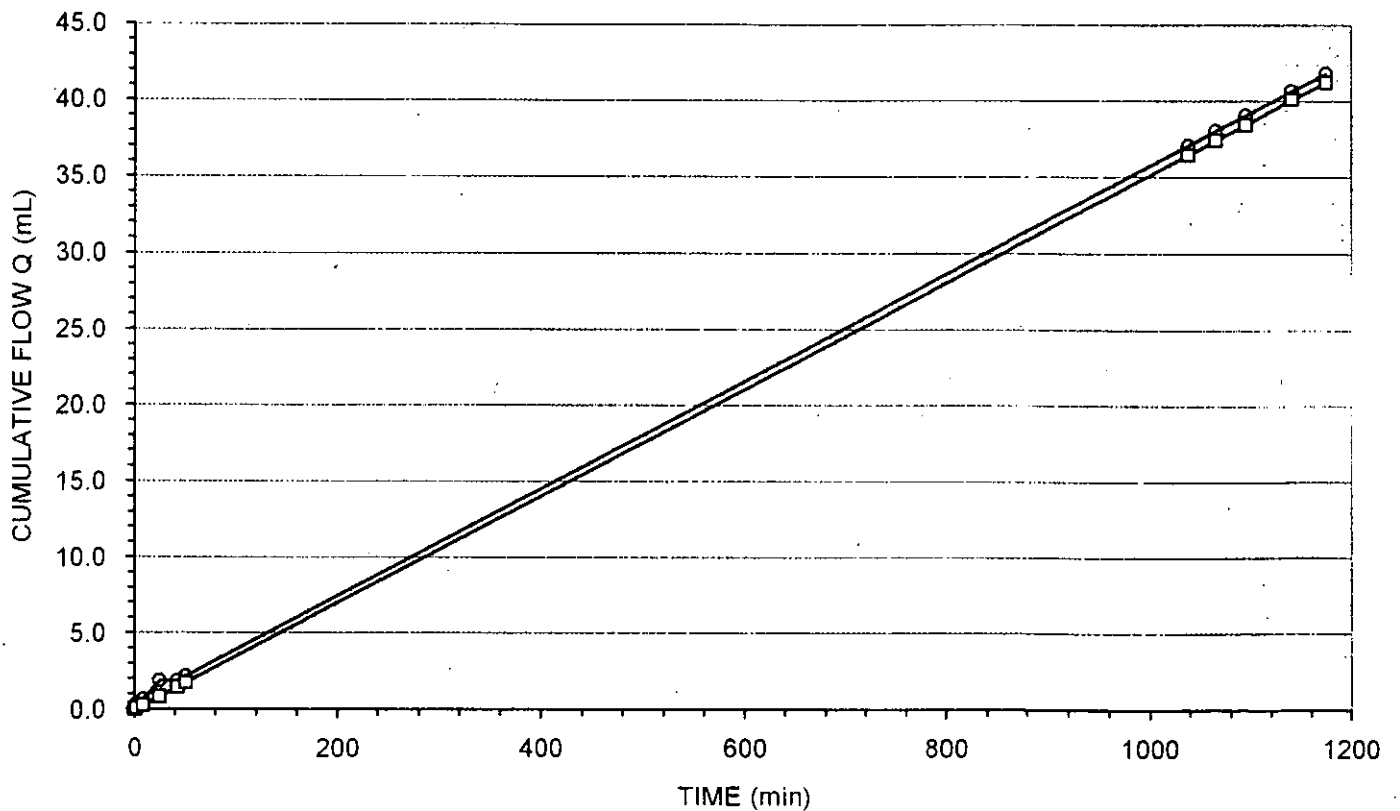
PRESSURE DISSIPATION v. LOG TIME



VOLUME CHANGE v. SQUARE ROOT TIME



CUMULATIVE FLOW v. TIME



# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore Test Fill (E & RM Ltd) LOCATION: 2

SAMPLE No. B2 (27/04/01)

**SAMPLE DESCRIPTION:** Firm (as received) dark grey silty CLAY with a slight trace of fine/medium gravel; containing some lenses and small pockets of greyish brown silty fine sand & silt.

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Casagrande Classification
29	17	12	CL

## Constant Head Permeability Test in Triaxial Cell in accordance with Test 6 of BS 1377 : Part 6 : 1990.

Type of Specimen:	Compacted to BS Heavy standard (Clause 3.5 of BS 1377 : Part 4)
Method of Preparation:	
Flow Conditions:	Remoulded 4.5 kg rammer dynamic compaction at m=c.18% Vertical downwards

Test No.		1				
Diameter (D)	mm	102				
Area (A)	mm <sup>2</sup>	7861				
Length (L)	mm	115				
Initial Moisture Content	%	18.1				
Initial Bulk Density	kg/m <sup>3</sup>	2133				
Initial Dry Density	kg/m <sup>3</sup>	1806				
<b>SATURATION STAGE:</b>						
Method of Saturation:		#				
Initial Cell Pressure	kPa	50				
Initial B Value		0.93				
Total Back-Pressure Applied	kPa	0				
Period of Saturation	Hour	20				
Final B Value		0.99				
<b>CONSOLIDATION STAGE:</b>						
Cell Pressure ( $\sigma_3$ )	kPa	450				
Back-Pressure ( $u_b$ )	kPa	300				
Effective Consolidation Pressure ( $\sigma'_c$ )	kPa	150				
Period of Consolidation	Hour	24				
$t_{50}$	min	700				
<b>PERMEABILITY MEASUREMENT:</b>						
Cell Pressure ( $\sigma_3$ )	kPa	450				
Back Pressure ( $p_2$ )	kPa	300				
Pressure Difference ( $p_1 - p_2$ )	kPa	40				
Inlet Pressure ( $p_1$ )	kPa	340				
Mean Effective Stress ( $\sigma'_3$ )	kPa	130				
Test Temperature	°C	23.5				
Correction Factor ( $R_t$ )		0.92				
From graph of Volume of Flow (ml) v. Time (mins):						
Mean Rate of Steady Flow ( $q$ )	mL/min	0.00885				
Corresponding Head Loss ( $p_c$ )	kPa	2.47				
Hydraulic Gradient ( $i$ )		33.9				
Final Moisture Content	%	15.4				
Final Bulk Density	kg/m <sup>3</sup>	2210				
<b>COEFFICIENT OF PERMEABILITY:</b>						
Mean Effective Stress ( $\sigma'_3$ )	kPa	130				
$\sigma'_3 = \sigma_3 - \frac{1}{2} (p_1 + p_2)$						
Coefficient of Permeability in the Vertical direction ( $k_v$ ) at 20°C	m/s	$5.1 \times 10^{-10}$				
$k_v = \frac{1.63 q L R_t}{A ((p_1 - p_2) - p_c)} \times 10^{-4}$						

**REMARKS:** # Increments of cell pressure only.

# TRIAXIAL CELL PERMEABILITY TEST

CONTRACT: Ballymore (Test fill)

LOCATION ID:

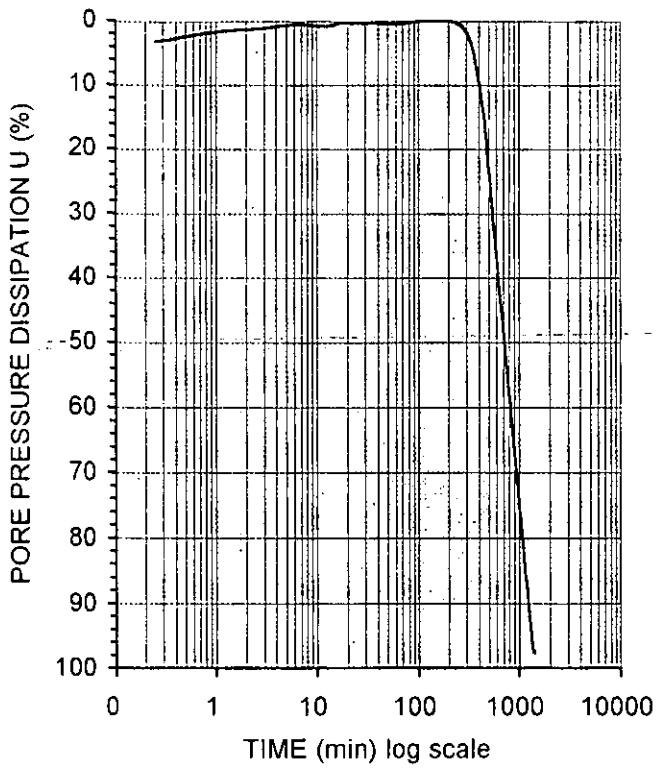
COMPACTION: BS Heavy (m=18%)

SAMPLE No: BULK 2 (27/04/01)

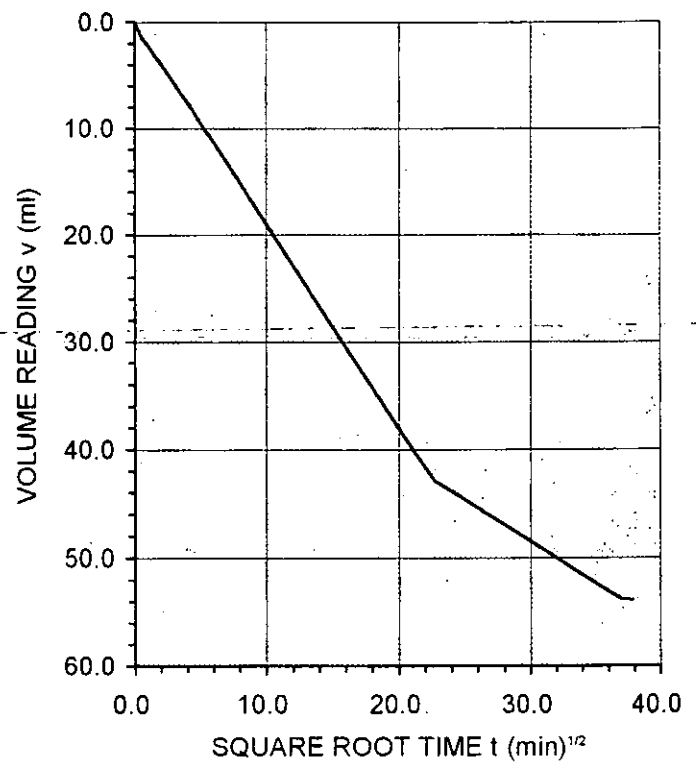
TEST No.: 1

$\sigma_3'$  (kPa): 130

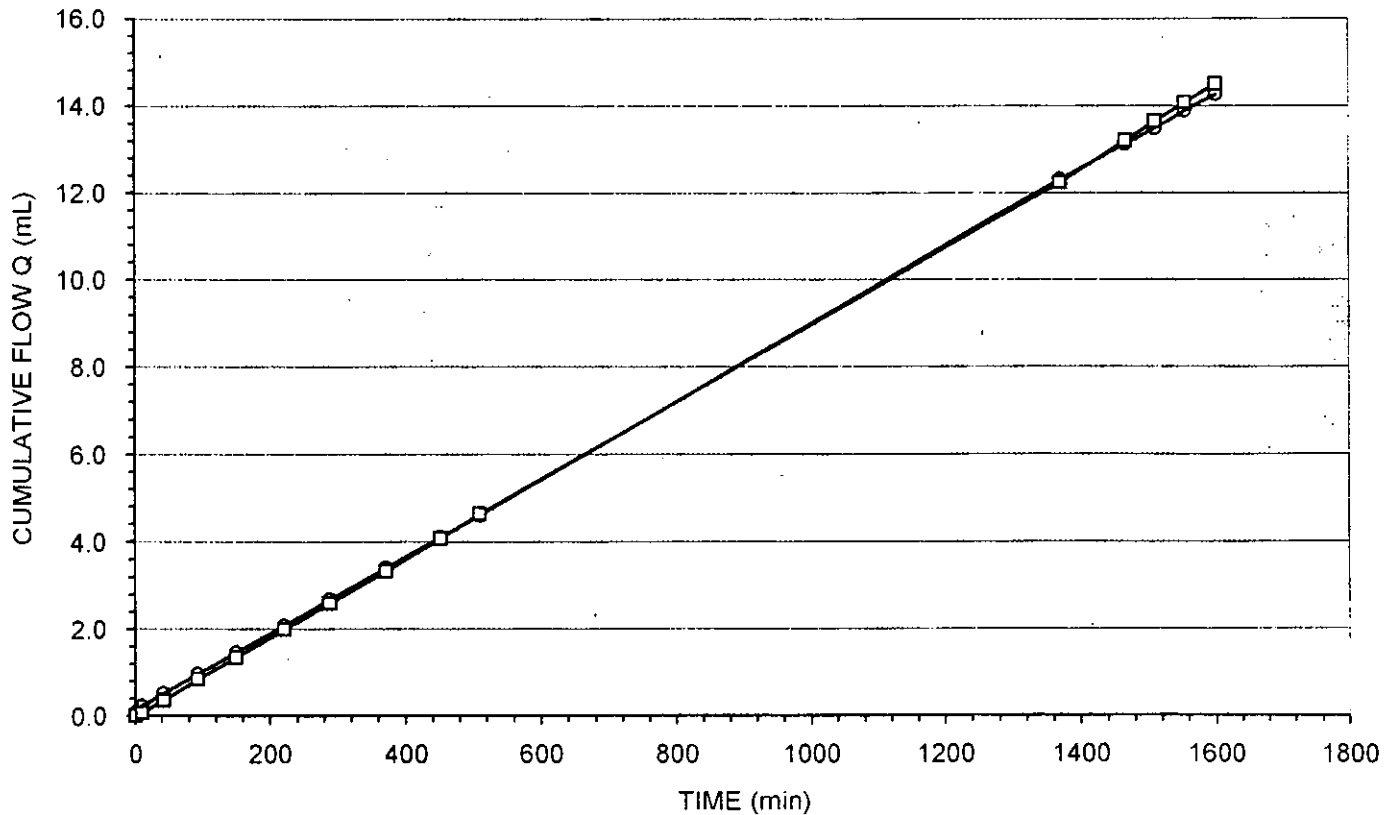
PRESSURE DISSIPATION v. LOG TIME



VOLUME CHANGE v. SQUARE ROOT TIME



CUMULATIVE FLOW v. TIME







# Appendix 4





**tms** environment ltd

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## *Confidential Report*

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**Customer:** Environmental & Resource Management Ltd.  
21 Link Business Park  
Kilcullen  
Co Kildare

**Customer Ref:**

**F.T.A.O.:** Paul van der Werf

**TMS Environment Ref:** 3408

Order No.	Commencement Date: 11/04/2001	Completion Date: 18/05/2001
-----------	-------------------------------	-----------------------------

**Report title:** Dust deposition survey at Ballymore Eustace, Co Kildare

**Report by:**

*David O'Reilly*  
David O' Reilly

*Monica Quinn*  
Monica Quinn

**Approved by:**

*Imelda Shanahan*  
Dr I Shanahan

---

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1. Reports shall not be reproduced except in full, without prior approval of TMS Environment Ltd
2. This report relates only to the items tested
3. Complaints should be addressed in writing to the Laboratory Manager

TMS Environment Ltd., 53 Broomhill Drive, Tallaght, Dublin 24.  
Tel: +353-1-462 6710 Fax: +353-1-462 6714; e-mail: [tmsenvironment@eircom.net](mailto:tmsenvironment@eircom.net)  
Registration No. 217750

## **1.0 Scope**

This report presents the results of a dust deposition survey, which was carried out at 4 locations (D-2, D-3, D-4 and D-6) around the boundary of the site of a proposed Industrial Park and Landfill development, which is located in Ballymore Eustace, Co Kildare. The existing dust climate at the boundaries of the proposed development site was assessed.

## **2.0 Regional environmental setting**

The site of the proposed development is situated in Ballymore Eustace, Co Kildare. The site is situated immediately to the northwest of Ballymore Eustace village which is situated approximately 12km south of Naas and approximately 38km southwest of Dublin city center. The site is a disused sand and gravel pit and is currently being prepared for reinstatement and development. The site is bounded to the southeast by Ballymore Eustace village and is surrounded on all other sides by agricultural land. There is no industry currently located in the area. Access to the site is off the Naas – Ballymore Eustace Road (R411). The Kilcullen – Ballymore Eustace Road, the R413 runs along the southern boundary of the site. The River Liffey also runs along the southern boundary of the site and at the closest point to the site is approximately 25m away. There are two private residences situated along the R413 Road and approximate eight private residences along the R411 in close proximity to the site.

## **3.0 Methodology**

The survey was conducted by TMS Environment Ltd personnel during the period 11<sup>th</sup> April to 9<sup>th</sup> May 2001. There are currently no EU Standards for dust deposition sampling, but British and International Standards do exist. The British Standard, BS1747, has not been updated in recent years, and technological developments have superseded the design of the Dust Deposit Gauge. The International Standard, ISO 4222, for ambient nuisance dust monitoring is extremely simple and is a viable choice for use in surveys of this type. Frisbee Dust Deposit Gauges were developed by the Warren Springs Laboratories in the UK and have been shown to have higher collection efficiencies and to generate more reliable sampling results than the alternative types of gauge. Furthermore, this type of Dust Deposit Gauge has gained widespread acceptance for this type of monitoring survey in Ireland. Consequently, this is the type of gauge selected for the dust deposition measurements at the site.

The dust deposition rate was measured by positioning four Frisbee Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 28 days. The selection of sampling point locations was completed after consideration of the requirements of BS1747 with respect to the location of the samplers relative to trees and other obstructions, height above ground and sample collection and analysis procedures. After the exposure period was complete, the Gauges were removed from the site; the dust deposits in each Gauge were determined gravimetrically and expressed as a dust deposition rate in mg/m<sup>2</sup>-day in accordance with the relevant

standards. The locations of the Dust Deposit Gauges are marked as D-2, D-3, D-4, and D-6 on a map of the site presented separately.

#### 4.0 Results

The measurement results are presented in Table 1 with the measurement locations highlighted in Figure 1.

**Table 1** Dust deposition rate at-Ballymore-Eustace, Co Kildare

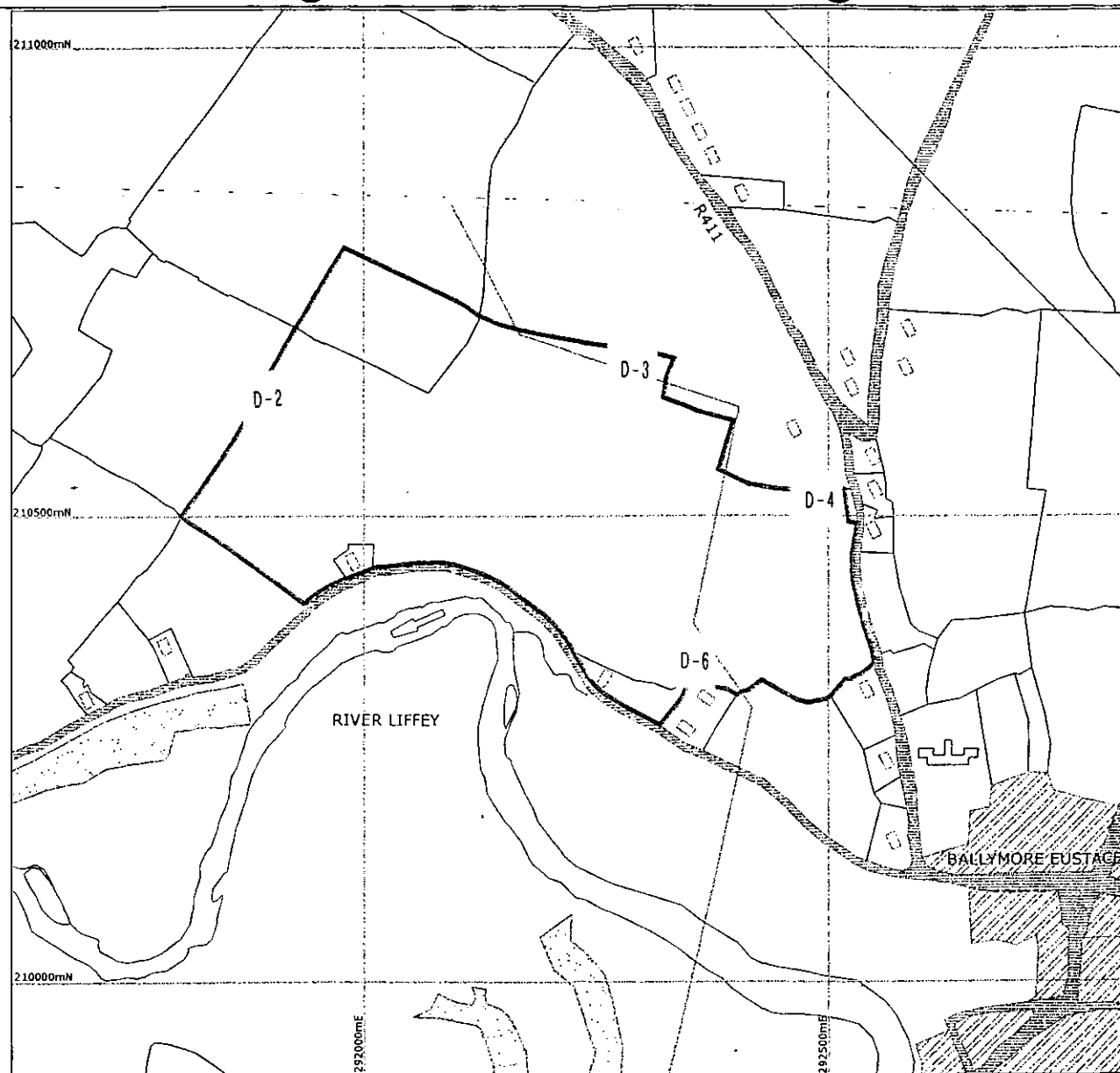
SAMPLING POINT LOCATION	DUST DEPOSITION RATE mg/m <sup>2</sup> -day
D-2 Western boundary of site	28.8
D-3 Northern boundary of site	11.2
D-4 Eastern boundary of site	15.1
D-6 Southern boundary of site	6.8

#### 5.0 Evaluation of results

Dust measurements were completed at four locations (D-2, D-3, D-4 and D-6) within 5m of the boundary of the site. A measurement frequently used in connection with air quality assessments where dust emissions may be significant is Dust Deposition Rate, which is normally measured by gravimetrically determining the mass of particulates and dust deposited over a specified surface area over a period of one month (28 days). The results are expressed as dust deposition rate in mass per unit area per day.

For the purpose of this assessment, a survey of dust deposition rates over a 28 day period was completed. Dust deposition rates in a rural agricultural environment are in the extremely low mg/m<sup>2</sup>-day range, typically 0 – 60, with values ranging from 80 – 120 mg/m<sup>2</sup>-day in urban locations. The monitoring results at positions D-2, D-3, D-4 and D-6 are within the expected concentration range for a rural environment and indicate that the dust emissions from the proposed development at Ballymore Eustace, Co Kildare at these positions are not adversely affecting ambient air quality in the

vicinity of the site. A standard of 130 - 150 mg/m<sup>2</sup>-day is normal for ensuring that no significant adverse nuisance effects such as soiling of buildings etc are encountered as a result of dust deposition from industrial activities.



LEGEND	
	FORESTRY
	BUILT UP AREA
	DWELLING
	SCHOOL
	ROAD
	RIVER
	FIELD BOUNDARY
	LAND HOLDING BOUNDARY
	POWER LINE
	WATER MAIN

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

## CTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE:

SITE SETTING

Scale: 1:5,000 A3

Drawn By: NH

Date: 02/05/01



# Appendix 5

Tuesday 8 May 2001

## DEVELOPMENT OF KIMMEENS PIT

Dear Editor,

This letter has been written to address some of the comments and concerns that were raised during the Information Night held on 31 March 2001 regarding the above development. I would be very grateful if you could find space to print the information below in the next edition of The Bugle.

There are a number of misconceptions that have arisen regarding the development. I hope these are addressed below to the satisfaction of those concerned. I would however like to make a very important point regarding the development.

This development is based upon a modern containment landfill facility as compared to the many existing landfill sites in operation where minimal efforts were made to prevent pollution. These sites rightly deserve the title 'dumps'. This site would be operated to the highest standard with highly trained and competent staff. As an example of this sort of modern facility I would encourage people to view KTK Landfill at Kilcullen and judge for themselves the difference between a modern site and other older sites.

To address the main concerns raised during the meeting.

### 1. Site Engineering and Development

The site would be engineered and constructed using current best practice and techniques. Such works have to be approved by the Environmental Protection Agency (EPA) prior to commencement. The EPA operates a policy of using Best Available Technology (BAT) where possible to ensure that any development undertaken is to the highest possible standards. KTK has every intention of constructing the site to the highest possible standards currently available.

### 2. Waste Materials

The only materials that would be accepted at the site would be construction and demolition wastes and non-hazardous commercial wastes. Absolutely no foodstuff or hazardous wastes would be accepted.

- Typical acceptable non-hazardous waste types include: Topsoil, Sub soil, Broken Concrete, Bricks, Blocks, Light metals, Broken roof tiles, Timber, Paper, Cardboard, Plastic, Plaster board, Bonded asbestos sheeting (not fibrous asbestos), Local sludge from fresh water treatment works (e.g. Ballymore Eustace Waterworks).
- Unacceptable Waste Types include: Foodstuff Wastes, Vegetable Matter Wastes, Hazardous Wastes, Fibrous Asbestos Materials, Sewage Sludges, Liquid Wastes etc.

### 3. Noise

Noise emission limits would be imposed on the site under the terms of the waste licence issued by the EPA. The site

would not be allowed to breach these limits. Regular monitoring by independent consultants would be undertaken to ensure compliance.

The site would be screened using both soil berms and vegetation to provide a buffer to any noise generated from the operations.

With respect to the reversing beepers it is necessary for safety reasons to fit these to machines, however new technologies mean that new style systems are available. These are audible over just a short distance and do not carry as far as conventional systems thus reducing the noise to neighbouring properties. Combinations of special reversing lights and beepers may allow the noise levels of the beepers to be reduced further.

To demonstrate the effectiveness of screening berms alone against reversing beepers and site noise I would invite anyone to visit KTK Landfill where, standing just 100 metres away from the working area the noise of the machinery is not noticeable. KTK Landfill equipment is fitted with conventional reversing beeper systems. The school would be a minimum distance of 350 metres from the waste operations. For the majority of the sites life operations would be over 500 metres away from the school as the western side of the site is infilled.

### 4. Traffic

Please let me reassure people of two very important points:

- NO landfill traffic will pass through Ballymore with the exception of approximately 4 to 6 trips per day
- NO landfill traffic will go past the school with the exception of approximately 4 to 6 trips per day.

The total number of traffic movements per day is regulated under the conditions of the permit issued for the site.

### 5. Issue of a Waste Licence

The waste licence application process is designed to be as accessible and transparent as possible to allow any interested parties maximum opportunity to voice any comments or concerns. At every stage of the process public consultation is undertaken with minimum periods laid down to allow people the opportunity to inspect and comment on the application.

I have in effect already started the consultation process considerably in advance of that required in order to try and ensure everyone has a fair opportunity to make his or her comments.

A fundamental part of the application process is the submission to the EPA of an Environmental Impact Statement which will assess each potential impact from the development. This will include traffic, noise, environmental monitoring, waste types etc.

I will provide a copy of the Environmental Impact Statement and Waste Licence Application for public viewing in Ballymore Eustace.



## 6. Leachate Treatment

On reading the 1st column, 3rd paragraph of the April 2001 Ballymore Bugle I think that there was some confusion over this issue. As mentioned earlier, no sewage sludge would be received on site for disposal. The leachates generated on site would be temporarily stored in a tank on site before being tankered off site for treatment at the closest most suitable treatment works - probably Athy. Leachate is the term used for the effluent created by the passage of water through the body of a landfill site. There would be no discharge of leachate into any local watercourse and certainly not the River Liffey.

Also if anyone has any concerns whatsoever regarding the development they are welcome to contact me directly either verbally or in writing. I will be more than happy to address any concerns.

Kevin Keenan

'Any bonded asbestos received on-site (typically roofing sheeting) has to be delivered in double sealed packages, which are fully inspected for compliance and deposited in dedicated areas. Such deliveries are carried out in full consultation with and the knowledge of both the EPA and the Health and Safety Authority (HSA).

## ENVIRONMENTAL REPORT FOR KTK LANDFILL PUBLISHED

*This is an extract from the April edition of The Bridge concerning the modus operandi of KTK at Kilcullen. We thank them for the courtesy.*

While the County Council Landfill site at Silliot Hill continues to be a source of foul smells, constant litter and God only knows what else, the nearby KTK landfill site certainly offers a complete contrast and may even go some way towards earning landfill sites a better if not even good name. The KTK site is Ireland's first private sector site to operate under an Environmental Protection Agency licence. Recently the Annual Environmental Report was produced for the site and it makes some very interesting reading. Every aspect of the operation of the site is recorded in the report including all dealings with the EPA, complaints from the public and all environmental monitoring. Some of the information in the report is worth passing on.

### Waste Types Accepted at KTK

The acceptable wastes come under three main headings - Commercial Waste, Construction and Demolition Waste and Industrial Non Hazardous Solids. (see footnote for full details.) According to the report no food waste is accepted and during the year 2000 over 20 loads found with some food were rejected. All loads are visually inspected to determine whether foodstuff wastes are present in the load. The main problem with

food waste is that it would lead to higher gas production than the other acceptable biodegradable wastes.

Windblown litter from the site is controlled by high netting. This has been made even more secure following its failure during high winds last December when litter did blow onto adjoining property. During times of high winds the site now closes down to prevent further litter distribution.

The past year saw an enormous amount of activity at the Landfill Site. Almost 234,000 tonnes of waste material was received. Of this 83% was commercial waste, 4% was construction waste/soil, 5% was filter cake from water treatment works and 0.3% was industrial non hazardous solids. Some of the material was reused - 12.4 tonnes of tyres were recovered and removed from the site, 5,000 tonnes of construction and demolition waste was reused for internal roadway construction. Use of the site is being divided into three phases. Already phase one is complete and material is steadily piling up in phase two. Phase three is now being prepared. Preparation involves putting down a liner and a one metre thick layer of compacted clay.

KTK have an insurance policy in place to the value of £1,000,000 against liner failure and possible resulting pollution incidents.

## KTK SAND GRAVEL LTD

### Proposed Restoration of Kimmeens Pits and Office/Light Industrial Park

ACTIVITY		TIME PERIOD	
Phase 1 landfill development		Approx. Start Date	Approx. finish
Groundwork for office park		1-Mar-2002	1-Sep-2002
Phase 2 landfill development		1-Mar-2003	1-Sep-2003
Office Park phase 1 approximately 7,500 m2 of office and service units		1-Mar-2004	1-Sep-2004
Office Park phase 2 approximately 6,000 m2 of office and service units, creche and community centre		1-Mar-2004	1-Dec-2004
Landfill closure subject to approvals being obtained in 2002		1-Mar-2005	mid 2006 end of 2008
<b>Potential Employment</b>			
Landfill 8 to 10			
Office/light industrial park 150 to 200			

## CONSULTATION (Bugle, May 2001)

We must again compliment Kevin Keenan on the manner in which he conducts his affair with the CDA and the People of Ballymore. His is now a model of Business Development through Consultation. It is as much, at least, but probably more wholesome and refined than the process which we first called for at the time of the original application from Abbeydrive to K.C.C. in 1998. The permission afterwards granted by K.C.C. was later rejected by An Bord Pleanála.

Our appeal then was for a Consultation process by Developers with the CDA and the People on any major development around Ballymore. We were the rejected suitor.

Keenan followed the suggested route, but of his own accord, breaking new ground so to speak, for there were few known rules except that of Trust. That alone provided a good start. Accordingly, we now seem to be happily wed, and there is nothing Morganatic about the union, because we get the dowry back, regardless!

## THE TREATY OF NICE. NO CONSULTATION

### IRELAND HAS NO ENEMIES.

On June 7th, we are being asked to ratify the Treaty of Nice, and if we do, Ireland joins up with their new Military Allies within the European Union.

Allies against whom?

We have no enemies.

Well, even though we have no enemies, our current crop of politicians are ensuring we find some, so making suitable war-fodder of the future children of this land.

We have read the Government White Paper on the Nice Treaty, and in the sections dealing with Second Pillar, the future policies of the Common Foreign, Security and Defence Policy, and by whom it will be controlled, we found it to be so full of ambiguity and equivocation that it would be repugnant even to the Terrible Tzar, Ivan IV.

All the Irish Government had to do was to Consult with the Irish People before embarking on their reckless route, or even had they inserted a clause or Protocol asserting the Neutrality of our State in regard to Military matters, so protecting our position, as Denmark did for their own, this treaty would fly through, and deserve to. Now there is grave doubt.

*Once this Treaty is ratified, there is no turning back. Our Constitution can no longer protect you or your children, it will be a dead letter, for the terms of the treaty become that part of Our Constitution in 2004. It is already signed in readiness for adoption.*

Our people should reject this treaty, sending it back for re-negotiation. It might put some vestige of manners on the arrogance of our politicians for their outrageous presumptions. How dare they act behind the People's back, and then present them with a *fait accompli*.

This Treaty is a Social Affair of fundamental importance. What lies so far unexplained, hidden behind the Second Pillar is, quite frankly, a frightening prospect.

It is sad that we feel it necessary to write as we do. We could have been so nice to Nice.

### NEXT EDITION

The next edition of the Ballymore Bugle will be published on Saturday, June 23rd. News, views, adverts and opinions should be with the Editor not later than Wednesday June 13th.

## LETTERS

Dear Editor,

Is it not possible for all of us to attend meetings and keep up with what's going on in the area?

What would we do without the Ballymore Bugle with all the info, facts and knowledge? The April edition was exception - a study unto itself and a great service to the community.

Congratulations to all involved.

Joan Mooney.

**Ed. note:** Upon receipt, the Editor swooned, but has recovered, and passed the query on to John White, P.R.O., CDA.

## THANKS AND CONGRATULATIONS

Did you go to the Good Vibrations show in aid of funds for establishing a Resource Centre in the old Parish Hall? It was absolutely great to see the enthusiasm and professionalism of all involved, young and old.

To one and all involved, the CDA wishes to offer its congratulations and thanks for Good Vibrations' support for our endeavours. Long may it last.

John White, P.R.O., CDA.

## Congratulations to ...

**Mrs. May Dennison** whose birthday is to be celebrated on June 2nd. In the true tradition of our magazine, we decline to mention a Lady's age once they have skipped 21.

**Tom Cregg**, just returned from a holiday, was greeted with a ceremonial Bar-B-Que to celebrate his 70th birthday.

**Cher McDonald** and **Peter Horan** whose engagement was announced recently.

**Sabrina Horan**, who celebrated her 21st at Paddy's on Saturday, May 12th.

## PLANNING

*May 29th is our date with destiny, the due day of the announcement by An Bord Pleanála on its decision regarding the Abbeydrive proposals for planning permission at Broadleas.*

## DRAMA NEWS

The Ballymore Dramatic Society is holding its AGM on Thursday, June 7th in the Ballymore Inn at 8 pm.

New members are very welcome and we hope that all existing members can attend.

## TIDY TOWNS

The Tidy Towns AGM will take place in the Upper Rooms at the Ballymore Inn on Thursday, June 28th, at 8 pm.

## FIANNA Fáil

At a recent meeting of the Wolfe Tone Cumann, Ballymore Eustace, the following members were elected to the officer board:

**Chairperson:** Des Kennedy. **Vice Chairperson:** Mary Browne. **Secretary:** Mary Darker. **Assistant Secretary:** Ber Barrett. **Treasurer:** Pat Barrett. **Joint Treasurer:** James McLoughlin. **Membership and Youth Officer:** Tim Gorman. Also present in attendance were Deputy Sean Power, and Gerry Bridgett, National Executive.

# KTK HOSTS INFORMATION NIGHT

*Update on proposed development of Kimmeens Pit*

*About 50 - 60 people attended the recent meeting held by KTK in the Ballymore Inn.*

*This was purely an information night called by Kevin and company, no votes or alternative plans expected.*

The meeting opened with Kevin calling for a minute's silence in respect of the late Tony McKnight.

Kevin addressed the attendance and stated some people had seemed concerned "he was jumping the posse" with the current activities in the pit. However, he pointed out, the site had to be designed first and there was still a lot of infill needed to reinstate Coughlanstown Road. Also, he wanted to sow trees and clean up the area in general. Immediately, concerns were voiced about the high level of lorries already on the roads and the mess they were causing. "None of those lorries are KTKs" said Kevin "I have a fuel container which comes daily to fill the machines working in the pit. Those other lorries are not KTKs."

The time frame of the proposed landfill was then raised: "45 - 50 movements per day over five and a half to six years." replied Kevin. "The phasing might be slightly out, we may or may not be able to plan the units at the same time." John White of ABCD raised the question of the content of the materials proposed for landfill. "Paper, timber, plastic wrappings, cardboard, blocks, builder's waste and unrecyclable materials. Also sludge from waterworks if site is lined."

Tommy Deegan of the Fishing Club questioned the matter of sludge being diverted to KTKs dump - the Fishing club had objected to the sludge entering the new sewage system but if sludge was transported to KTK, was it not then simply diverted from there to the sewage system?????

Kevin replied he thought it would go to Athy if that was not acceptable and Brendan Headon quickly remarked "What was the difference in protecting the Liffey in Ballymore and sending it to Athy and into the river Barrow?"

Kevin then assured Michael Ward that none of the traffic from the proposed development would go over the bridge, the bulk of the traffic would go the Naas Road, via Beggar's End and on to Blessington and other routes. Michael asked how Kevin could ensure the drivers follow the routes, to which Kevin replied "If I know they break the rules, they're out..." Tommy Deegan stated his concerns about asbestos waste; Kevin assured him they come in sealed bags or pallets and are not mixed with other waste materials.

I enquired how Kevin proposed to win councillors support for Material Contravention but Kevin maintained that would not be necessary - it is within the current Dev. Plan that the lands at Kimmeens be reinstated so he is not diverting from same and the nature of building materials dumped there also

concur with current county plan.

Next I asked Kevin if I might read a letter addressed to ABCD and he agreed. It was an extremely well-written letter, voicing concerns with the proximity of the landfill site to the national school, level of traffic but mostly concerned with the possible environmental pollution which might be caused in years to come. The writer stated that in past, substances and materials which were thought to be safe to bury underground (asbestos being one) have since caused toxic pollution and irreparable damage to the environment. Furthermore, articles written by reputable journalists concurred with this opinion and also highlighted the huge reduction in value of homes located close to landfill sites. Unfortunately, the letter is unsigned so whilst Kevin is willing to reply to the writer, the lack of signature prevents this and somehow undermines the sincerity of the writer's concerns...

Next came a long debate about the traffic generated by proposals and the negative impact caused thereof. Majella O Keefe voiced Ballymore's biggest concerns - the sheer volume and size of landfill containers. These are not lorries, they are worse, bigger, louder - a nightmare on the roads and if Kildare County Council think we might tolerate these, might they not also think we would put up with Readymix's proposed plant at Dowdenstown Lower/Donode? Kevin replied his current permit was for 50 loads per day; if he continued at that level, using ordinary lorries, it would take him 16 years to fill and reinstate the pit.....

The concern of the high level of traffic is one which dominated the meeting, over and over again. 40 ft containers for six years. Not a pretty scenario. I also raised the question of the noise, particularly in relation to the school, which opens its windows possibly from April to the end of September. \*Would it not be a huge distraction to the teachers and children? On a recent walk around Mullaboden/Coughlanstown route, I could hear the non-stop bleep of a machine within the pit - and its a sound which continued all day long. Kevin replied this was a safety noise, to comply with safety guidelines and unfortunately, he has to comply. But what about the residents living close to it? One particular resident told me after the meeting the same "bleep-bleep" wasn't particularly helpful to her business, an alternative self-help practise - I can just imagine.....\*

Other points regarding monitoring of material contents were raised - all landfills are subject to random checks by EPA

officials; the appalling state of roads and the further damage expected by the weight and volume of landfill containers. It was not all negative issues which were voiced - several people stated they were in favour of proposed development, that the pit is an eyesore and since there is a permit to operate it anyway, the final scenario of another community centre plus business units and landscaped park with sports amenities was not a bad thing.

At the end of the meeting, Hugh McCarty(?) - for want of a better expression - "got stuck into Kevin" - donned his legal cap (wig?) and bombarded Kevin with the following questions:

"Have you given any consideration to another means of using lands. Is there not alternative method of landscaping this area, other than a dump?" to which Kevin wryly replied "I'm not Santa Claus..."

Hugh maintained vast amounts of earth had been shifted recently - had Kevin planning permission?

Kevin: "I don't need it, I have a permit."

Hugh: "What surveys have you undertaken re traffic impact, road damage etc These vehicles are massive. I'm not hearing anything here to allay my fears?"

For a while, the rest of us thought we were caught in an episode of IRONSIDE as Hugh "badgered the witness(?). But Kevin struck back with "I have a permit to put 50 lorries a day on the road - I HAVEN'T PUT ONE ON IT YET AND I'M EXPECTED TO CARRY THE CAN FOR EVERYONE ELSE!"

John Headon, God Bless him, came to the rescue with "There's money in Europe for everything! It's up to the people of Ballymore to go and look for it and have the roads upgraded. We should be putting pressure on the politicians and the government - surely we're not going to make do with the wheelbarrow for another six years..."

Whilst a little bit of humour crept into the latter end of the meeting, traffic impact and the proximity of landfill site to school are undoubtedly the biggest concerns of those in attendance and should not be dismissed. Several others have pointed out the expected devaluation to houses and lands within the area. None of those who voiced that particular concern have attended any of the public meetings.

\*It is arguable that the rights of residents, living in an area prior to development and the nuisance (noise) caused thereof, takes precedence over Government Safety Guidelines.

Rose O Donoghue ABCD

# BALLYMORE AT CENTRE OF THREE MAJOR DEVELOPMENTS

*Who said ABCD were exaggerating when we said one major development will open the floodgates with worse to follow? Well, we weren't, it's started already; Gerry Deane of Abbeydrive has submitted his appeal to An Bord Pleanála, hoping to increase the number of houses (149) recently granted him by Kildare County Council; Readymix have applied to build a sizeable sand and gravel plant stretching from Dowdenstown Little (Late Martin Murphy's land) right across to the Donode road and out onto the Naas Road - and I mean sizeable whilst KTK has unveiled the final draft plans for the pit at Kimeens. So as not to depress you or myself, I'll deal with the last plan first, since it's of some benefit to the community and future generations to come.*

## KTK OFFERS COMBINED PLAN

In December last, members of the CDA and ABCD met with Kevin Keenan Jnr to view KTK's final proposals for pit site on Naas Road. These plans are currently on view in the post-office. In simple terms, the new draft offers a compromise between the earlier proposals of (a) business park or (b) landfill facility. Kevin has incorporated a small business park including office units and light industry units to the front of site on Naas Road. A small roundabout will be necessary within entrance gates. To the right on entering, there's a unit containing offices and also a creche facility, with ample green spaces behind; facing centre view, Kevin has suggested a community facility i.e. hall or training centre; to your left then are the bulk of office and light industry units.

On paper, the plan looks a little like a concentration camp but in fact the units are stepped - like Citywest, green banks shield the units from being visible along main road. Behind the community facility I referred to earlier, you'll notice there are a couple of buildings which Kevin will need to manage the landfill facility during it's lifetime and thereafter, these units will revert to community.

"The landfill facility? Didn't the majority vote against that at the controversial meeting in the bandhall?" Yes, but since there clearly was not a strong majority and since landfill is a much more lucrative operation, Kevin has come up with a final - and he insists - final plan.

The business park entails about 8 - 9 acres; the bulk of the land behind the park will be used as a landfill facility for a possible 6 years with 40 loads of 22 tonnes per day or a maximum of 50 loads in smaller bulk. That may depend on Kildare County Council. After the six years is up, KTK will reinstate the lands in grass with landscaped walks and seating provided. This land cannot be built upon. However, there are a number of options from football or sports pitches to landscaped parks which the community might appreciate and Kevin has made a suggestion as to how the community could use said land to raise revenue which in turn, would pay for maintenance and upkeep.

As landlord of the business park, it's in Kevin's own interest to run the landfill efficiently and cleanly. His record in Kilculen is impeccable, no doubt about that. He is willing to allow the community to decide what they want after landfill and also what is most needed as a community facility within business-park. Take a look at the plans in the post-office - at least seven or eight years down the road, this plan would be of direct benefit to Ballymore itself and the lorries to and from this pit would be at an end.

## READYMIX SAND AND GRAVEL PLANT

Whilst we watched Abbeydrive court the planning process and waited to hear KTK's proposals, we took our eye off another, bigger storm brewing. Readymix applied for sand and gravel extraction on Murphy's land at Dowdenstown in 1998. In the last Co Development Plan, the said lands were duly zoned for same and we expected a small fleet of lorries would pass to Dowdenstown via Walshestown, the current "sandpit run".

Boy, was that a mistake. Now Readymix have applied for a full processing and washing plant, concrete batching plant with full staff facilities and associated development and works thereof. This is no small venture; it entails the lands from Murphy's of Dowdenstown right over to Donode Big. Lorries will come out onto the Donode road and then cut across Hunter's paddock to access Naas Road. Have a good think about it. Lorries, lor-

ries, lorries, sand and dust, dirty roads, spilt gravel.

I think Kildare County Co must be getting us back for winning the An Bord Pleanála appeal against Abbeydrive. Landfill we might tolerate for the betterment of the community but what the hell advantage is a sand and gravel plant to us. But there's a shortage of sand and gravel at the moment. Objections have been flying in and needless to say, residents along Naas Road and Donode are going mad. ABCD will examine the wording of the aforementioned zoning of lands at Dowdenstown - I don't recall area of Donode Big being included or access route to Naas Road but we'll need a little expert advise to be sure.

## LAST STAND FOR ABBEYDRIVE

As you know, Kildare Co Council granted Abbeydrive permission to build 149 houses at Broadleas.

Abbeydrive are appealing that decision with an Bord Pleanála; the main issues they contend are:

- The omission of 27 houses from last application; Abbeydrive does not disagree with loss of 13 houses on the hill but wants the other 14 reinstated
- Objects to phasing of only 40 houses per annum and suggests 60 would be more appropriate
- Abbeydrive question the terms of landscaping i.e. that all landscaping and planting must be completed before any dwelling is occupied
- Contests the payment of £8,000 per acre which KCC seek before development begins and suggests £1,000 per acre.

Finally, does anyone own land in outer Mongolia. I'm thinking of moving because if I have to spend another Sunday wading through planning jargon, I might just as well apply to KCC for a job. (If you think it's boring to read, you're getting the condensed version.

Oh, Happy New Year!  
Rose O Donoghue

## Decision-Time re Keenan's Pit

# PLAN A: BUSINESS PARK, SOCCER FIELD & COMMUNITY AMENITIES WINS THE DAY

*Congratulations to the eighty-plus people who turned out for last Saturday's public meeting on the proposed developments at Keenan's Pit. A lively debate ensued, with the pros and cons of both plans examined and discussed - should we opt for Plan A, Business Park incorporating a training centre or creche if required, Soccer Field and parkland amenities or Plan B, Landfill for five years on 30 acres, with all 42 acres reinstated and handed over to the community. Plan B might have been the slim favourite going into the debate but the realisation that said reinstated lands could not be built upon for 100 years after landfill had ceased, swung the pendulum firmly in favour of the business park and community facilities. To those of you who claim strong opinions on the matter but didn't bother your ass to attend the meeting, give yourself a Wally Award. What was it that detained you - Winning Streak? Soccer on the TV? Panic attack lest your seat in the pub be gone? I can well understand our senior citizens finding it hard to get out on a cold winter's evening and I know there are several concerned residents who had commitments on the night but with all the talk about the pit over the past four months, I would have expected a larger turnout. Do the youth of the village even care - I don't recall seeing anyone under twenty-five there.*

The meeting was opened by CDA chairman, Tommy Deegan who invited questions and opinions from the floor. Concerns re flow of traffic so close to the school were voiced: would it be possible with either scenario to have speed ramps or flashing beacons erected? Tommy confirmed that the CDA have actually written to Kildare County Council re same and councillor Billy Hillis acknowledged that flashing beacons were on the way. The nuisance of lorries on the road was argued - "there's bound to be an accident", "two lorries can't pass, traffic will be blocked" but it was argued that two of the largest pits in the area are located on the Walshestown - Beggar's End road, a narrow country road and so far, there's never been an accident or a gridlock situation."

As the meeting progressed, people grew more confident and expressed varying opinions: a resident living near the pit praised KTK for cleaning up the site and added she no longer had to look at filth, dead animals and debris from her back window.

Another person living in the village for the past six years emphasised the local need to provide direct employment: "Whilst a soccer field and other facilities are badly needed, we should be looking to create employment; a business park in the location of the pit would be ideally situated to take the flow of traffic to Naas without having to constantly pass through village."

## 100 YEAR BAN

This view struck a cord with many and concurring opinions were voiced.

Councillor Hillis pointed out the 100 year legal bar on building after landfill has ceased: "We should be giving employment to the youth of the village - the only thing you can do with this site after landfill is sow trees on it!"

## LOCAL EMPLOYMENT Vs VILLAGE STATUS

Another business man stated he would be first in line for a unit at the business park and commented how the dreadful planning of Wicklow Co Council had ruined Blessington; Ballymore should make a stand in providing for it's future and warned that Co Council's can always "be persuaded (bought!) to make dreadful decisions" over which we have no control.

Contrary arguments were made: "If the business park goes ahead, on top of Gerry Deane's housing development, then Ballymore will be quickly absorbed into urban sprawl. Once you start the process, there's no going back - Ballymore will be targeted as a new growth centre, a small town and village status will be lost."

"We should make decisions for the next generation to want to live here," replied a young woman and added the vital need for a full-time creche within Ballymore, an opinion strenuously supported by another with: "Let it thrive, let the village grow."

It was good to hear younger voices expressing their views - another "young" voice warned that a business park did not necessarily mean huge employment for the village or indeed, jobs that would attract a young workforce. "People drive two hours a day for well-paid jobs in the city, jobs which allow them a high standard of living and pay the mortgage. The kind of jobs which the business park would facilitate will probably be within the service sector."

Billy Hillis pointed out that units in the proposed park would more than likely be service units for local business's and not generate employment figures on the scale of a factory or manufacturing plant. Nevertheless, it was clear by then, the thought of office space and service units within a well-screened and shielded business complex was now shading the landfill proposal.

Questions were asked and suggestions made that even if 30 acres of land were designated for landfill, could the remaining 12 acres not support a small business centre and soccer pitch? Apparently not, as the remaining acreage was not suitably sited.

Some in-house irritation and entertainment was provided by "Rodge and Podge" who attended the meeting but chose to sit adrift from the main group. Whilst this duo interrupted and cut across several speakers, they raised very simple but searching points: "How many of you here tonight actually live within the village?" "How many of the local population work within Ballymore?" "Take a drive around a one mile radius of the village - none of the locals objected to your houses being built so why are you objecting to progress that will benefit the people of Ballymore?"

After an hour and a half of criss-cross argument and opinion, chairman Tommy Deegan asked the attendance to make a show of hands to determine which plan they favoured and therein followed another heated debate! Christy Dennison vehemently opposed a vote, on the grounds that coverage of the meeting in The Bugle and Leinster Leader did not specify a decision would have to be made on the night. However, people present furiously argued that when a public meeting was called to discuss the two proposals, what else were they expecting but to vote on the night?

The CDA, with the exception of one member, chose not to vote either way. Several people left at 9.30pm before the vote was called and many others chose to abstain.

## BUSINESS PARK 28 - 21

In the end, twenty eight votes were counted in favour of Plan A with twenty one votes in favour of Plan B. The Business Park incorporating soccer field, parkland amenities and units for the purposes of creche and training centre has passed the first hurdle.

Rose O Donoghue

THE majority of secondary schools in Co. Kildare were closed yesterday (Tuesday) as striking teachers staged a one day stoppage.

More than 400 ASTI members picketed schools in Kildare while union leaders protested outside the Department of Education demanding more pay.

Mr. Bernard Lynch, Kildare co-ordinator said he visited a number of schools around the county "and I have to say that teachers are very determined. I think the Minister

Meanwhile, two out-patient clinics were cancelled at Naas General Hospital where clerical and administrative staff are involved in industrial action this week.

A Hospital spokesman said that all emergency services at the hospital will continue during the one day strike today (Wednesday).

The Hospital said the only disruption will be in terms of records which will not interfere with patient care.



Roy Baker (centre) and Irish team with his gold medal award at the European Kickboxing Championships stadium in Jesolo, Italy, together with Leixlip clubmates Nicola Corbett and Declan Harney and Irish colleagues. Full story - page 10.

## Ballymore backs Business Park

By EAMONN O'MOLLOY  
THE people of Ballymore have backed proposals for a business park on the site of Keenan's Pit.

Local developer Kevin Keenan had said that he would let the community decide on how the 42 acre site should be used.

And local people were asked to vote at a special meeting last week on whether they would like to see the site turned into a business park, incorporating a soccer field and possibly a training centre, or used as a landfill for five years, after which all 42 acres would be "re-instated" and presented to the community.

Over 80 people attended a public meeting last Saturday in the new band hall in Ballymore, and the business park plan was passed by 28 votes to 21, after almost two hours of debate.

Local Cllr. Billy Hillis spoke in

favour of the business park plan and pointed out that there would be a 100-year legal bar on building at the site if it were used as a landfill.

"We should be giving employment to the youth of the village," he said.

However, many were opposed to further building in Ballymore.

"Once you start the process, there's no going back - Ballymore will be targeted as a new growth centre, and village status will be lost," said one resident.

The local Community Development Association chose not to vote either way, as did a number of other people.

"The Business Park incorporating soccer field, parkland amenities and units for the purposes of creche and training centre has passed the first hurdle," said Rose O'Donoghue, spokesperson for the CDA.

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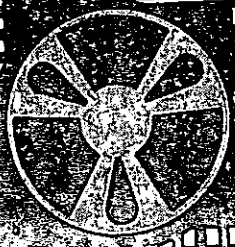
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**C.I.N.E.**

16/11/00. L.L.



## BALLYMORE EUSTACE COMMUNITY DEVELOPMENT ASSOCIATION LIMITED

The Community Development Association (CDA) is holding a public meeting on Saturday 11th November 2000 in the Band Hall to allow you, the people of Ballymore Eustace, the opportunity to express your views on the proposed redevelopment of the used sand and gravel pit at the Kimmeens.

KTK Sand and Gravel Ltd. is the owner of the land in question and the Managing Director, Kevin Keenan, has met with the CDA on a couple of occasions to outline his plans for the site. The total site comprises approximately 42 acres.

To date two proposals have been put forward:

### Plan (a)

KTK Ltd. proposes to reinstate 10 acres at the Coughlanstown end of the site. When reinstated KTK Ltd. will hand over 4 acres to the community for use as a playing field.

(A Waste Permit (09/2000) was granted by Kildare County Council to KTK Ltd. at the end of July 2000 for 3 years. This allows KTK Ltd. to dispose of only inert subsoil, topsoil, sand, gravel, clay, marls, stone, bricks, blocks and concrete. Up to 50 truck loads per day may be deposited on the site.)

The remaining site will be developed as a business/industrial park containing 24,000m<sup>2</sup> (258,000 sq. ft.) of industrial units. Five private houses will be built on the southern boundary. It was originally intended to build a 120 bedroom hotel at the entrance to the site on the Naas Road but it is now planned to build a small development of 5-6 private houses instead.

To get this plan up and running KTK Ltd. needs to get Kildare County Council to rezone the site and grant planning permission for the industrial units, houses, etc.

### Plan (b)

KTK Ltd. proposes to fill and reinstate the site as close as possible to its original contours as in accordance with condition No. 15 of the original planning permission. The fill area will be 30 acres approximately on the Coughlanstown end of the site up to 30 metres from the Dublin Corporation pipeline which runs through the site. That part of the site that will not be filled i.e. the Naas Road side (approximately 8-10 acres) will be used for offices, two weighbridges, canteen and car and truck parking during the reinstatement project. These will all be removed when the site is fully reinstated, approx. 5-6 years from start-up date.

KTK Ltd. then intends to hand over the complete site to the community as an amenity.

KTK Ltd. will be responsible for all environment matters below the grass level on the entire site. The waste materials KTK Ltd. proposes to dispose of will be non-hazardous dry waste, so KTK's bond with the Environmental Protection Agency (EPA) will probably last for 20-30 years. KTK Ltd. are willing to maintain (fencing, grass cutting, etc.) the site for the community for a period of six years after the hand-over date. If the community decide to build on the site anytime in the six years the maintenance agreement will cease.

To get this project up and running KTK Ltd. needs the following approvals from

#### (a) Kildare County Council

1. Offices etc. granted by existing permit 09/2000 for 3 years.
2. Wheel wash granted by existing permit 09/2000 for 3 years.
3. Traffic (50 loads per day) granted by existing permit 09/2000 for 3 years.
4. Weighbridge x 2 (in/out).
5. Improve entrance to site and immediate road.

#### (b) Environmental Protection Agency

1. To dispose of the following materials in the site, topsoil, subsoil, bricks, blocks, concrete, tiles, road grinding, broken tarmac, non-recyclable, timber, paper, cardboard, plastics, light metals.
2. A lining system i.e. plastic membrane, single or double, to protect the environment.
3. Leachate collection system.

The above are the basics of the two proposals put forward to date by KTK Sand and Gravel Ltd.

The CDA wishes to thank KTK Ltd. for outlining their plans to us at an early stage.

The CDA now invites all the people of Ballymore to make known their views on the proposals at the public meeting in the Band Hall on Saturday 11th November 2000.

*T. Deegan  
Chairman*

## CDA NEWS

### Grand £20,000 Draw The Resource Centre. An Apology

Many people have contacted us, particularly from the Longhouse, Coughlanstown and Boolabeg areas to say they have not been contacted to invest in a ticket for the £20,000 Draw. This has been due to a bit of poor organisation on our part and no slight was intended. In fact we have already, in response to concerns expressed, visited houses along the road from Ballymore to Camalway Cross and as usual, the response has been tremendous.

If you feel that you are being let out and denied the opportunity to invest in the Draw, feel free to call any of the committee. In particular, our "Hotline" service is being manned by John White: 045-864386; Hugh O'Neill: 864686; and Tommy Deegan: 864477 who will guarantee an immediate response.

You will have noticed that the work on the Centre is proceeding apace and work has now commenced on the old playschool roof. Already the committee is wading through estimates for the electrical and plumbing work and we would like to thank local tradesmen and Curley-Smith-Design Partnership Ltd. (Pat Curley to you) for their input in the production of specifications and tenders.

Just a final reminder as to the Draw. The Draw will take place on the nights of the 8th and 15th December this year at a venue to be announced. There will be £10,000 to be won on each night and the prize breakdown on both nights will be as follows:

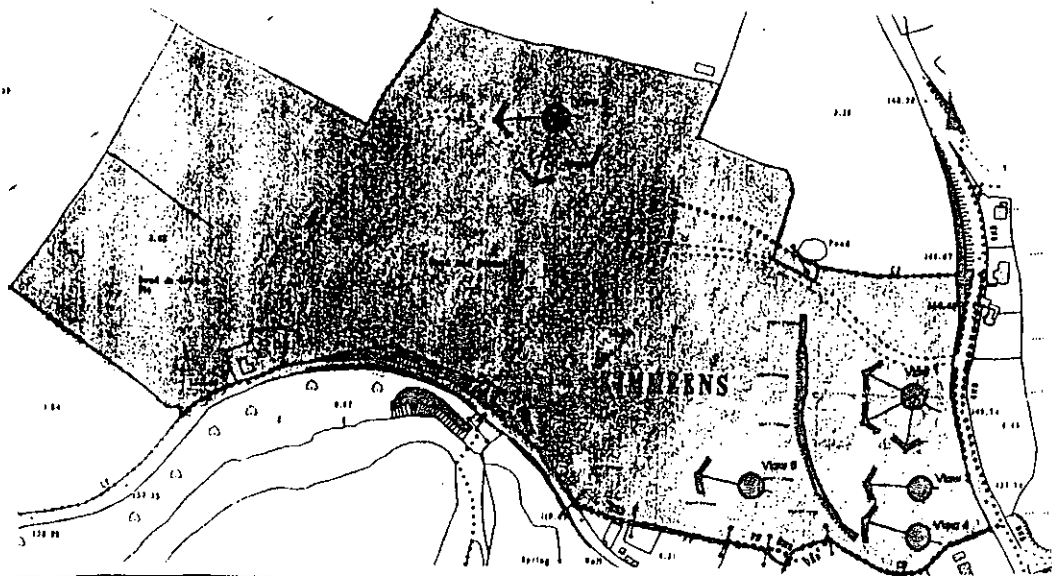
1 Prize of	£5,000
1 Prize of	£1,000
1 Prize of	£ 500
4 Prizes of	£ 250
25 Prizes of	£ 100.

The prizes have been arranged so that one in ten participants should at least get their stake money back.

Closing date for purchase of tickets will be mid-November (probably 20th) so don't forget our "Hotline" service in the want of desperation!

Once again, thank you all for your support so far.

*John White, PRO*



# KTK Sand & Gravel Ltd.



I.S./EN ISO 9002

*Specialists in all types of Washed Sand, Drainage Stone and Hardcore*

Brownstown Kilcullen, Co. Kildare.



Ph: 045 481908 Fax: 045 481042 Mobile: 087~2599340 087~2558902 088~2599340

Ballymore Eustace CDA,  
Ballymore Eustace,  
Co. Kildare.

29<sup>th</sup> September 2000

Dear Chairperson,

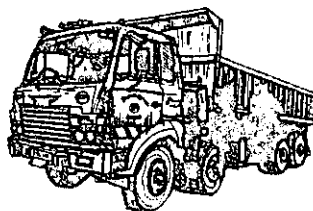
My apologies for the delay with the explanation of my proposal, my secretary Pauline was on holidays and typing is not one of my better trades.

The proposal is as follows:

I propose to fill and reinstate the site to as close as possible to its original contours as in accordance with condition no. 15 of the original planning permission. The fill area will be 30 acres approximately on the Coughlanstown end of the site up to approximately 30 metres from the pipeline, which runs across the site. I have already reinstated behind the old cottage with gravel and waste, which was already dumped at the site by SLM Ltd. approximately 3 acres. The area of the site, which will not be filled, will be all the Naas Rd. side of the site approximately 8 to 10 acres. This area will be used for offices, 2 weighbridges, canteen and car and truck parking during the reinstatement project, these will all be removed when the site is fully reinstated 5 to 6 years approximately from start up date. I then propose to hand over the complete site to the community as an amenity for whatever you see fit to put on the site. KTK will be responsible for all environment matters on the site below the grass on the entire site. Given that the waste materials I propose to dispose of in the site will be non-hazardous dry waste KTKs bond with the EPA will probably be 20 to 30 years also KTK would be willing to maintain the site for the community for a period of 6 years after handover date i.e. grass cutting, fencing, etc, this will give everyone a chance to decide what should be built on the site. If the community decide to build on the site anytime in the 6 years then KTK maintenance agreement will not be in place. The following are the necessary steps KTK need to get approved in order for this project to be fully legal and proper.

Kildare County Council Application: -

- 1 Offices etc, granted by the existing permit 09/2000 for 3 years
- 2 Wheel wash granted by the existing permit 09/2000 for 3 years
- 3 Weighbridge x 2 1 in and 1 out
- 4 Traffic granted by the existing permit 09/2000 for 3 years
- 5 Improve entrance to site and the immediate road







I.S./EN ISO 9002

# KTK Sand & Gravel Ltd.

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EPA Application: -

- 1 To dispose of the following materials in the site i.e. topsoil, subsoil, bricks, blocks, concrete, tiles, road grinding, broken tarmac, non-recyclable, timber, paper, cardboard, plastics, light metals.
- 2 A lining system i.e. single, double whatever is necessary to protect the environment as a whole.
- 3 Leachate collection system

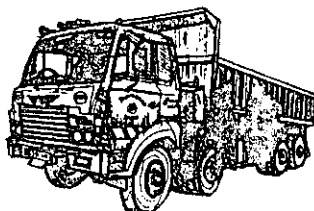
You must appreciate that these are the major points of the application and not the very detailed ones, which will be on paper if the application goes ahead. I have a meeting with the Kildare County Council Planners on the 5<sup>th</sup> October 2000 and a meeting with the EPA Inspector on the 17<sup>th</sup> October 2000. if I could get some feed back before the 17<sup>th</sup> October 2000 it would be very helpful.

I would like to take this opportunity to thank the Committees for the courtesy that they have shown me and also that I am sorry that my first proposal did not meet with your approval at this point in time.

Do not hesitate to call me if anyone needs more details.

Yours sincerely

  
Kevin Keenan.  
Managing Director.



**BRIEFLY****Auction of promise**

KILCULLEN AFC will hold an "auction of promise" in McTernan's, Kilkullen, on Friday September 29 at 8pm.

Items for auction include a computer, meals, electricals, hair-do's, and a mobile phone. All proceeds to Kilkullen AFC.

**Fathers' march**

UNMARRIED fathers will hold a demonstration march this Saturday 30 September commencing at 12 noon at the Four Courts and proceeding down the quays to the GPO where talks and advice will be given to people experiencing difficulties gaining access to their children. The group provides a confidential Helpline at (01) 4514295.

**Walking festival**

THE annual Wicklow Mountains Autumn Walking Festival will be held from 27 - 29 October. The festival base is in the picturesque village of Laragh, less than a mile from Glendalough. Participants can enjoy the festival for one day or three with a group, friend or individually and all ages are welcome. For further information on the festival, contact Wicklow County Tourism (0404) 66058.

**Athy Hospital**

SIGNIFICANT refurbishment works are due to be undertaken at St. Vincent's Hospital.

Some £230,000 has been set aside for roof repairs, upgrading kitchen facilities, resurfacing roads, repairs to carparks, and new equipment. Deputy Jack Wall this week welcomed the decision by the SWHB. "It is imperative that the board continues the work," commented Deputy Wall. "The updating of this important facility is of prime concern."



Five generations posed for this photograph. Included are 3 week old Robyn-Mary, dad Alan Kane, Carbury, his dad Mick Kane, Carbury, his mother Mary Kane, Hodgestown, and her mother Lizzie Ward, Corduff.

# GAA deal

By EAMONN O'MOLLOY

NAAS GAA club's move to Oldtown was given the green light by members on Monday night.

A huge crowd turned up to the Fishery Lane Clubhouse to discuss the proposed move. And after a long debate, the proposal to accept the move was passed almost unanimously.

The deal will see the GAA receive £1.263m and 16.8 acres at Oldtown - in return, their present home will be handed over to developers Lehmex. The club will now finalise details before signing a contract with Lehmex.

Some concerns were raised at Monday's night meeting in regard to the cost of developing the new site and other concerns, but when it came to the vote, dissenters were in the vast minority.

## Developer looks to locals for decision

By EAMONN O'MOLLOY

THE people of Ballymore will have the opportunity to decide whether Keenan's Pit is used as an industrial park or a dump - cum-community resource, according to the developer who owns it.

Kevin Keenan, who owns the 43 acre site on the Naas Road, says he is willing to "let the town vote" on the best usage for the site.

One option is that the site be primarily used as a 24,000 sq metre industrial park, with 10 acres given to the community.

The other option being proposed by Mr. Keenan's KTK company is that the land be used as a dump for demolition waste for five years, after which the entire site would be given to the "community, reinstated in grass".

If the latter option was pursued, the landfill would take

around 40 loads a day of dry demolition waste for the five year period.

KTK already have a permit to draw up to 50 lorries a day to fill the lower area of the pit, and if a licence for landfill use were granted, it would probably mean another two years on top of that.

KTK had proposed that the site be used for a hotel, but that plan has been scrapped after "negative feedback".

Keenan himself believes an industrial park would be beneficial in creating jobs for the town, but says he is anxious for "the community to decide".

"I think this is a matter for everyone in Ballymore, not just the community development people," Kevin told the Leader.

"With the landfill, you are talking about inert waste only, paper, timber, et cetera. I'd really like to hear from the people of

Ballymore on this, I haven't heard a lot of feedback yet," he added.

"A landfill is never an attractive amenity," says a spokesperson for ABCD, the local community group in Ballymore. "On the other hand, to have a 43 acre site for the community would be a terrific advantage. The options are endless.

"Bear in mind, the pit is not within the development boundary of Ballymore; some might argue that we are not obliged therefore to assume that development should happen at all. But the important thing now is for the people of Ballymore to get thinking and talking about this new proposal.

"(We) are most anxious that villagers are informed of any new developments and have times to weigh up the pros and cons of all options to date".

## Clarification

By SYLVIA POWNALL

the team opted for Naas instead. In Naas was not a reflection on the players but was the choice of

# PROSPERITY AND JOBS FOR BALLYMORE.

*A look at the pros and cons of  
including a business/light industry*

*Well, we thought we had headaches with Abbeydrive's proposals to build 507 houses at Broadleas, then 416, 360 and now we await Kildare County Council's decision on the current application for 187. In the meantime, planning permission has been sought for 16 houses next to Hillcrest (behind Moloney's bungalow) but it's the proposals by Kevin Keenan to transform the pit on the Naas Road into a business park and a major hotel which dominate the topic of conversation in the village. Kevin recently met with members of ABCD and the CDA to unveil his plans and invite suggestions from the committees as to what they would like included within the development.*

**This article is intended to inform you of the proposed plans, counter suggestions and address the clear advantages and disadvantages of same. This is a serious matter which merits the consideration of everybody living in and around Ballymore. Do not switch off because it's another article on development.**

## **LICENCE TO OPERATE DUMP**

Phase One of this futuristic development begins with an application by Kevin to KCC for a permit to operate a waste disposal/land fill at Farrells pit. It is unusual that he did not apply for full planning permission with intent to reinstate lands. Kevin maintains that can wait until he finalises the overall plans but in the meantime, he needs some serious landfilling, particularly in the low area at the back of the pit along the Coughlanstown road.

Infill is crucial to his future plans; all waste disposal will be builder's waste i.e. concrete, pebble, tiles and dry waste - no wood, paper, plastics or organic waste will be accepted. A serious amount of subsoil and topsoil will be required, particularly regarding the area at Coughlanstown which Kevin has offered to give to community for a soccer field and dressing rooms, with full banks and hedges to be replanted.

## **RETURN OF THE LORRIES**

Members of the ABCD were aghast at the thought of lorries trudging through the town again.

What business hours would operate at the pit? Probably from 8am - 6pm. How many loads a day? Possibly, an average of 35 - 40. How long would the waste disposal operation last? At maximum capacity of 70 loads a day, only one year but realistically, about two years, maybe more if less than thirty loads a day were accepted.

Waste disposal operations are not particularly appealing to the eye. Kevin pointed out a committee from the community are welcome anytime to inspect the running of the dump and quality of landfill. He was quick to invite the committee to view his operation at Kilkullen and we do know that community workers in Kilkullen regularly inspect the operation and are high in praise of Kevin and the manner in which he maintains the dump.

Nevertheless, the issues which need to be addressed are the proximity to the school, the increased volume of lorries we can expect, mostly along the Naas and Blessington roads. (No more rushing to work in the mornings and daytime walkers will find themselves hopping up and down off the ditch.) Again, the fact that Kevin has not applied for full planning permission with intent to reinstate lands has caused major concerns. What if his application for a short term permit is a "white elephant", and the dreaded lorries continue to trundle through the village for years? (I'm not for one minute suggesting Kevin would, merely pointing out the questions already raised at committee meetings).

## **120 BEDROOM HOTEL**

I'm not exaggerating when I say the committee nearly passed out when we learned of a 120 bed hotel for Ballymore. "120 bedrooms - you can't be serious!" When first the suggestion of a nice country hotel was raised, I thought, thirty rooms was ambitious. 120 seems monstrous, vulgar even and remember, the main entrance to the hotel, business park & community facilities is located quite near the school and along the busiest road into the village.

Architect Martin Murray pointed out the development would necessitate a roundabout at the entrance. Now what the hell benefit would a hotel this size bring to Ballymore? Kevin sees conferences and business lunches as the market for the hotel. One member rightly pointed out professional people attending such meetings/conferences will eat in the hotel during the day's events, possibly have a drink afterwards and then head back to wherever they came from, and in all probability, they're not going to walk up to the local shops "for a bag of sugar or the local paper."

You might argue that hotel guests staying a few nights in a hotel will venture forth and sample the wares of local pubs but again, concerns were expressed that village residents have enough to cope with the noise of the current midnight exodus without adding more!

It has to be said and cannot be argued with, that a hotel even half this size will attract more visitors and traffic to Ballymore. If the hotel prospers, then undoubtedly it will attract other entrepreneurs and you can expect even more development and more traffic. Given that Naas will soon have a major hotel at Killashee and I think another one in the town centre, Kill has been the suggested venue for another, Tulfarris has recently added another 60 bedrooms, Ardenode has applied for additional bedrooms and leisure centre - is there a market or need at all for a hotel in Ballymore. How would this hotel affect our local restaurants, bed and breakfasts?

The area of Farrell's pit is not within the current development boundary area for Ballymore so bear in mind, the likelihood of Abbeydrive finally being given permission to build a certain number of houses in Broadleas plus the additional spate of planning applications which undoubtedly will follow, will make it very hard for Ballymore to maintain it's special village status.

# PROGRESS - OR REGRESSION

## *Possible development in Farrells Pit Industrial park plus a 120 bedroomed hotel*

We've seen Clane, Sallins, Kill and Johnstown quickly swallowed by development. It is the long term prognosis for Ballymore we should look at.

Will jobs in the business park for some locals justify the hassle and inconvenience of lorries and construction? Do we need a hotel? Should the benefits for the community such as soccer pitch, community training centre and pedestrian/bicycle park blind us to the long-term effects of development and the likelihood that much more will follow?

The Irish economy is stable despite rising inflation but no-one should forget the dole queues of the eighties. A business park and hotel will provide jobs for the local population and for those of you who dislike the quiet pace of life in Ballymore, will certainly cause a greater "buzz" about the village. Which is more important? And how do you quantify "progress?" Serious issues which merit serious consideration.

### **MASTER PLAN**

The plan presented to the CDA & ABCD by Kevin accompanied by Architect Martin Murray and Engineer, Geoff — are not yet complete as they wished to draw suggestions and address criticisms/amendments before making the final draft. Roughly 3.5 acres will be allocated for a soccer pitch and dressing rooms (other usages if necessary); one of the business units will be set aside as a training centre, ideal for local FAS schemes or general courses and training; there is still an opportunity for a further unit near the site entrance to be made available to the community for a creche/nursery - again, Kevin & co invited suggestions.

Furthermore, the elevated land which borders Byrne's lands was proposed as a park. Because the water mains runs through this stretch of ground, it

cannot be built upon; the ground is on a higher level and the view from here is spectacular so a park, complete with pedestrian pathways and bicycle lanes plus seating would provide more acreage to the community.

### **TASTEFUL PLANNING**

In the seventies and eighties, industrial parks sprung up like mild-dew on the horizon. Many were unplanned; units simply appeared willy-nilly, complete with wooden pallets and additional galvanised tanks/sheds appearing at random - no such thing as site design or layout, litter and plastic bags entangled in boundary fencing being the view to the passing world.

Architect Martin Murray presented visuals of what the proposed park in Ballymore would look like. As in City West, the plan incorporates using varying levels of platforms, a sort of tiered effect with grass banks and shrubbery providing visual and noise protection. The exterior façade of the units will incorporate high quality cladding such as brick, wood, concrete tiles and slates.

"Clean technology" is one of the markets targeted for - Kevin was adamant that it's a business and light industrial park they're proposing which is completely different from an industrial/commercial park. (24,000 sq metres in total). The site will be serviced by it's own self-sufficient sewerage system.

A management company will be appointed to maintain the park so it's in Kevin own interest to keep it properly and not be downgraded. With regard to the hotel, Kevin will not run the hotel and probably sell or lease it. Five houses are proposed also on the lower Coughlanstown Road and the now derelict cottage will be reinstated as will boundary banks and trees.

### **BACK TO BASICS**

The issues here are simple enough but controversial: the site area is not within the current development plan - should we allow another 40 acres to be developed knowing there's already 60 - 70 acres remaining? Traffic, traffic, traffic is the biggest problem that ABCD finds; whilst plans for the business park was greeted with quiet approval at the meeting, the 120 bedroomed hotel was not.

For the people of Ballymore, it's back to basics. Will development of this kind ruin the quality of life in Ballymore? Will our roads be swamped with lorries and cars? Will we be targeted for even more development? What happens to our special village status?

Is progress of this kind beneficial to the community? Will it bring jobs and economic boom to the local population? Will our youth benefit in the long term? Are the attractive proposals of a soccer pitch and training centre merely thirty pieces of silver which blind us to the negative impact?

Again, seemingly simple questions which are horribly complex and need serious consideration by the people of Ballymore.

**These proposals will give us all a headache and I suspect we'll have a mini civil war. But until Kevin submits the final plans, think about it - a business and light industry park. A 120 bedroomed hotel. Progression or regression for Ballymore?**

**Rose O Donoghue**

## EDITORIAL

### CONSULTATION

Kevin Keenan, we are informed, approached the CDA recently with a plan for the development of the sandpit at the Naas Road. It is to be a commercial development, non-intrusive, clean, and is set to provide ample employment within the area. That is good.

What we appreciate most of all, is the manner of his courtesy towards our community, by informing the Ballymore Estate Community Development Association (CDA) of his intentions, not so much seeking their approval, rather that his plan should be an agreeable type of plan, suited too, to the CDA's own ideas and thus fitting into their wider plan of development around the village. That method we recognise as Democracy in its essence, dependent, yet independent, doing, yet caring. We wish him every success.

### PILLAGED VILLAGE

There are other medium-sized developments being planned around Ballymore, and if the same courtesy is used, not by way of submission, but to correct any flaws which, for want of a tincture of iodine could turn septic, and prove enormously costly to rectify, as happened at Broadleas. No one wishes for a Pillaged Village.

Keenan's way is a salutary lesson to all of us - our community, and others with medium to large sized development plans. It should most particularly be a lesson to the management of Kildare County Council. Not only is it a lesson in good manners, it also shows up the absolutely glaring paucity of finesse which, even if by way of viaticum had they peeped through the keyhole of a good finishing school, its golden sheen would have permeated that confounded brassy gloss of a tinker's kettle called Authority.

There is in Ballymore at present, the festering sore at Broadleas, diagnosed fatal, by the practitioners from An Bord Pleanála, whose relieving surgery kept the veins free. But now, a mutation has crept in, and unless the host (our community) can contain the virus (keep developments controlled), the body itself will mutate into that grotesque art form called "Good Planning", and from its sperm will yield what even degenerate film producers would shun.

### KEENAN'S WAY



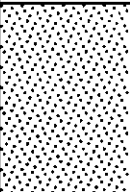
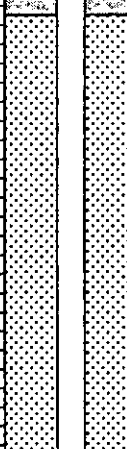
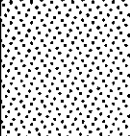

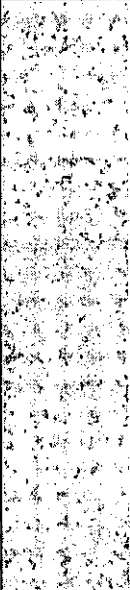

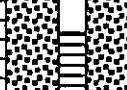

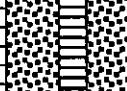
If Kildare County Council care about the route to Good Planning and good Public Relations, let them cast their collective eyes at Kevin Keenan's way of doing business. He consulted with those who really matter, those who are directly involved, in this case, our CDA.

Before any other Major Developments around Ballymore are granted planning permissions, let the Council consult with our CDA, thus avoiding unnecessary wrath. In a recent interview on RTE radio with Vincent Browne, the Minister for the Environment, Mr. Dempsey, was repetitive and at pains to emphasise one singular word - **CONSULTATION**, saying its use was imperative. It is the way; Keenan's Way, and once a problem is properly understood, its solution is so terribly simple.

If the Minister would like to elaborate on the issue raised in relation to Consultation, our magazine, viewed by 4000, will be more than happy to accommodate his response within the hallowed columns of the Ballymore Bugle.



# Appendix 6

Hydrogeological Consultant: <b>S. M. Bennet &amp; Co.</b>		Project No: <b>KTK-BME-1.2001</b>		Borehole No: <b>MW 00-1</b>	
Screen Length: 3 m		Total Depth: 24.85 m (btoc)		Date: 07/03/2001	
Stick-Up (above land surface): 0.45 m		SWL: 9.89 m (btoc)			
Pack Type: Washed Fine Quartz Gravel					
Soil Sample Retained	Lithology	Geologic and/or Lithic Log	Depth (m)	Well Log	Well Construction
1	Damp loose brown sandy SILT with fine to medium gravel		0		Stickup -- Bentonite Seal
2	Damp grey brown silty medium-grained SAND with medium subrounded gravel. Water ingress @6m		2		Backfill
3	Wet brown clayey medium-grained SAND. Increase in water ingress @7m		6		
	Damp silty fine-grained SAND		10		
4-9	Dense homogenous grey brown SILT becoming wetter & softer with depth		12		
			14		
			16		Bentonite Seal
			18		
			20		Gravel Pack
			22		
	Bedrock		24		
		EOB	26		
			28		





Hydrogeological Consultant: <b>S. M. Bennet &amp; Co.</b>		Project No: <b>KTK-BME-1.2001</b>		Borehole No: <b>MW 00-2</b>	
Screen Length: 6 m		Total Depth: 22.20 m (btoc)		Date: 16/03/2001	
Stick-Up (above land surface): 0.7m		SWL: 17.2 m (btoc)			
Pack Type: Washed Fine Quartz Gravel					
Soil Sample Retained	Lithology	Geologic and/or Lithic Log	Depth (m)	Well Log	Well Construction
1	Light brown SAND (Topsoil)		0		Stickup
2	Friable, fine to medium, grey/brown SAND		2		Backfill
3	Dry pale brown SAND containing medium gravels		4		
4			6		
5	Dry medium angular GRAVELS		8		
6/7	Dry pale brown silty SAND with fine gravels increasing in size with depth		10		
8	Friable pale brown fine SAND		12		Bentonite Seal
9	Damp brown fine silty GRAVEL		14		Gravel Pack
10	Fine to medium subangular GRAVEL – slight water ingress		16		
11	Coarse subrounded COBBLES – water ingress		18		
12/13	Fine to medium subangular GRAVEL – water ingress		20		
		EOB	22	EOB	
			24		
			26		
			28		

Hydrogeological Consultant: <b>S. M. Bennet &amp; Co.</b>		Project No: <b>KTK-BME-1.2001</b>		Borehole No: <b>MW 00-4:</b>	
Screen Length: 4.5m (D) and 3 m (S)		Total Depth: 20.50 m (btoc)		Deep & Shallow	
Stick-Up (above land surface): 0.45 m		SWL: 0.54m (btoc): Deep Well		Date: 12/03/2001	
Pack Type: Washed Fine Silica Gravel		& 2.27m(btoc): Shallow Well			
Soil Sample Retained	Lithology	Geologic and/or Lithic Log	Depth (m)	Well Log	Well Construction
1	Damp dark brown sand with organic material (TOPSOIL).		0		Stickup
2,3,4	Wet, angular to subrounded fine GRAVELS with sand. Becoming poorly size-sorted with depth. Water ingress at 3.5 m.		2		Bentonite Seal
5	Moist firm dense dark grey homogenous SILT		4		Gravel Pack
6 - 11	Dry firm dense dark grey homogenous SILT		6		Bentonite Seal
12/13	Wet pale grey silt. Slight water ingress at 10.5 m		8		Backfill
14/15	Wet brown fine SAND with silt. Strong water ingress at 15 m		10		Bentonite Seal
16 -18	Wet brown medium to coarse GRAVEL with silt/sand		12		Gravel Pack
	SILT – no sample recovered		14		
	Bedrock		16		
		EOB	18		Silt In Base Of Borehole
			20	EOB	
			22		
			24		
			26		
			28		

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
<b>CONTRACT:</b> Ballymore Eustace Development					<b>BOREHOLE NO:</b> BH1 Sheet 1 of 1		
<b>CLIENT:</b> K.T.K		<b>GROUND LEVEL (mOD)</b> 0.00		<b>DATE STARTED:</b> 21/03/2001			
<b>ENGINEER:</b> E.R.M.L.		<b>BOREHOLE DIAMETER (mm)</b> 200		<b>DATE COMPLETED:</b> 21/03/2001			
<b>CO-ORDINATES:</b> E 0.00 N 0.00		<b>BOREHOLE DEPTH (m)</b> 6.00		<b>BORED BY:</b> R. Rowlands			
<b>CASING DEPTH (m)</b> 6.00							

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
1	Medium dense becoming dense, grey sandy GRAVEL with cobbles				4338	DB	0.00-1.00	17/300mm	
					4339	DB	1.00-2.00		
					4340	DB	2.00-2.70		36/300mm
3	Stiff, brown gravelly CLAY with cobbles			2.70	4341	DB	2.70-3.00	23/300mm	
					4342	DB	3.00-4.00		
					4343	DB	4.00-5.00		23/300mm
					4344	DB	5.00-6.00		24/300mm
6	End of Borehole at 6.00 m			6.00					


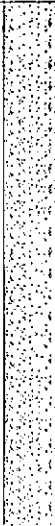

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
2.50	2.60	1.00							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					21/03/2001	6.00	0.00	0.00	Borehole dry at end of boring

**Remarks:**

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL																											
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH2 Sheet 1 of 2																												
CLIENT: K.T.K		GROUND LEVEL (mOD) 0.00			DATE STARTED: 20/03/2001																												
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm) 200			DATE COMPLETED: 21/03/2001																												
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m) 10.70			BORED BY: E. Leahy																												
		CASING DEPTH (m) 10.70																															
DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS																									
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)																										
	TOPSOIL			0.30																													
1	Dense, grey slightly gravelly SAND				4131	DB	1.00	31/300mm																									
2					4132	DB	2.00	33/300mm																									
3					4133	DB	3.00	34/300mm																									
4					4134	DB	4.00	35/300mm																									
5	Medium dense, grey silty slightly gravelly SAND			4.50	4135	DB	5.00	11/300mm																									
6					4136	DB	6.00	10/300mm																									
7					4137	DB	7.00	10/300mm																									
8					4138	DB	8.00	21/300mm																									
9	Stiff, grey CLAY				4139	DB	9.00	20/300mm																									
					4140	DB	10.00	27/300mm																									
Continued next sheet																																	
<b>Hard Strata Boring / Chiselling</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>From (m)</th> <th>To (m)</th> <th>Hours</th> <th>Comments</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>					From (m)	To (m)	Hours	Comments									<b>Water Strike Details</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Water Strike</th> <th>Casing Depth</th> <th>Sealed at</th> <th>Rise to</th> <th>Time</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>5.00</td> <td>5.00</td> <td>0.00</td> <td>3.10</td> <td></td> <td>Medium ingress</td> </tr> </tbody> </table>					Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments	5.00	5.00	0.00	3.10		Medium ingress
From (m)	To (m)	Hours	Comments																														
Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments																												
5.00	5.00	0.00	3.10		Medium ingress																												
<b>Standpipe Installation Details</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Tip Depth</th> <th>RZ Top</th> <th>RZ Base</th> <th>Type</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>					Date	Tip Depth	RZ Top	RZ Base	Type						<b>Groundwater Observations</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Hole Depth</th> <th>Casing Depth</th> <th>Depth to Water</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>21/03/2001</td> <td>10.70</td> <td>0.00</td> <td>0.00</td> <td>Borehole dry at end of boring</td> </tr> </tbody> </table>					Date	Hole Depth	Casing Depth	Depth to Water	Comments	21/03/2001	10.70	0.00	0.00	Borehole dry at end of boring				
Date	Tip Depth	RZ Top	RZ Base	Type																													
Date	Hole Depth	Casing Depth	Depth to Water	Comments																													
21/03/2001	10.70	0.00	0.00	Borehole dry at end of boring																													
Remarks:																																	

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
CONTRACT: Dallymore Eustace Development					BOREHOLE NO: BH2 Sheet 2 of 2		
CLIENT: K.T.K		GROUND LEVEL (MOD) 0.00		DATE STARTED: 20/03/2001			
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm) 200		DATE COMPLETED: 21/03/2001			
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m) 10.70		BORED BY: E. Leahy			
		CASING DEPTH (m) 10.70					

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (MOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Stiff, grey CLAY			10.70	4140	DB	10.00	27/300mm
11	End of Borehole at 10.70 m							
12								
13								
14								
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
				5.00	5.00	0.00	3.10		Medium ingress

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					21/03/2001	10.70	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development						BOREHOLE NO: BHC Sheet 1 of 2	
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 21/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 21/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		11.00		BORED BY: D. Harrington	
CASING DEPTH (m)		11.00					

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
1	MADE GROUND (comprised of soft brown clay, brick, timber and plastic)			1.30	5656	DB	1.00	9/300mm
2	MADE GROUND (comprised of soft black clay, tin and plastic)				5657	DB	2.00	
3					5658	DB	3.00	7/300mm
4	Soft, brown gravelly CLAY with cobbles			3.80	5659	DB	4.00	6/300mm
5	Loose, brown silty SAND			4.30	5660	DB	5.00	
6					5661	DB	6.00	
7					5662	DB	7.00	
8	Firm to stiff, grey SILT			7.80	5663	DB	8.00	11/300mm
9					5664	DB	9.00	21/300mm
	Stiff, grey CLAY			9.40				
	Continued next sheet				5665	DB	10.00	

Hard Strata Boring / Chiselling				Water Strike Details			
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to
0.50	0.90	1.00		5.00	5.00	0.00	5.00
2.20	2.70	0.50					
3.90	4.10	0.50					

Standpipe Installation Details					Groundwater Observations			
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water
21/03/2001	8.00	1.00	8.00	50mm	21/03/2001	11.00	0.00	0.00

Comments	
Borehole dry at end of boring	

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL		
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH3 Sheet 2 of 2			
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 21/03/2001		
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 21/03/2001		
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		11.00		BORED BY: D. Harrington		
		CASING DEPTH (m)		11.00				
DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Stiff, grey CLAY				5665	DB	10.00	36/300mm
11	End of Borehole at 11.00 m			11.00				
12								
13								
14								
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
				5.00	5.00	0.00	5.00		Slow ingress

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
21/03/2001	8.00	1.00	8.00	50mm	21/03/2001	11.00	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO. BH4		Sheet 1 of 1
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 23/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 23/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.00		BORED BY: G. Hughes	
		CASING DEPTH (m)		10.00			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	TOPSOIL			0.10				
	Loose, brown sandy GRAVEL							5/300mm
1				1.00	8671	DB	1.00	
	Loose, brown sandy GRAVEL (with bands of soft clay)							8/300mm
2					8672	DB	2.00	
								9/300mm
3				2.90	8673	DB	3.00	
	Medium dense, brown grey SAND							15/300mm
4					8674	DB	4.00	
								13/300mm
5					8675	DB	5.00	
								14/300mm
6					8676	DB	6.00	
								13/300mm
7				6.90	8677	DB	7.00	
	Firm, brown sandy CLAY			7.20				18/300mm
	Firm to stiff, grey sandy CLAY with occasional cobbles				8678	DB	8.00	
8								18/300mm
					8679	DB	9.00	
9								29/300mm
	End of Borehole at 10.00 m			10.00	8680	DB	10.00	

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
8.00	8.20	0.75		2.90	2.90	0.00	2.90		Seepage
9.20	9.40	1.00							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					23/03/2001	10.00	0.00	6.90	End of boring





  

Remarks:



<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH5 Sheet 1 of 1		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 20/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 21/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.00		BORED BY: D. Harrington	
		CASING DEPTH (m)		10.00			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
1	Loose, brown silty SAND				5645	DB	1.00	7/300mm
2					5646	DB	2.00	8/300mm
3					5647	DB	3.00	10/300mm
4					5648	DB	4.00	8/300mm
5	Soft to firm, brown grey sandy SILT			4.30	5649	DB	4.40	
6					5650	U100	5.00	10/300mm
7	Firm to stiff, grey sandy CLAY			6.00	5651	DB	6.00	16/300mm
8					5652	DB	7.00	22/300mm
9					5653	DB	8.00	29/300mm
	Dense, grey sandy clayey GRAVEL with some cobbles			8.10	5654	DB	9.00	37/225mm
					End of Borehole at 10.00 m		10.00	5655

Hard Strata Boring / Chiselling				Water Strike Details			
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to
8.40	8.80	1.00		2.50	2.50	4.00	2.50
9.00	10.00	2.00					

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
21/03/2001	7.00	1.00	7.00	50mm	21/03/2001	10.00	0.00	3.30	End of boring

Remarks:

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH6 Sheet 1 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 13/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 14/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		14.00		BORED BY: D. Harrington	
		CASING DEPTH (m)		14.00			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
1	Loose, brown silty SAND				5632	DB	1.00	9/300mm
2				2.00	5633	DB	2.00	
3	Soft, grey sandy CLAY				5634	DB	3.00	7/300mm
4				3.80	5635	DB	4.00	
5	Dense, grey sandy GRAVEL with some very large cobbles				5636	DB	5.00	45/300mm
6				4.90	5637	DB	6.00	
7	Loose, brown silty SAND				5638	DB	7.50	12/300mm
8	Firm, grey sandy SILT			7.30	5639	U100	7.80-8.30	
9				9.00	5640	DB	9.00	14/300mm
	Firm to stiff, grey CLAY				5641	DB	10.00	
Continued next sheet								

Hard Strata Boring / Chiselling				Water Strike Details			
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to
3.90	4.30	1.50		4.60	4.60	7.40	4.60
14.00	14.00	2.00					
							Slow ingress

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
14/03/2001	13.50	1.00	13.50	50mm	14/03/2001	14.00	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH6 Sheet 2 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 13/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 14/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		14.00		BORED BY: D. Harrington	
		CASING DEPTH (m)		14.00			

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Firm to stiff, grey CLAY				5641	DB	10.00	15/300mm
11					5642	DB	11.00	
12					5643	DB	12.00	18/300mm
13					5644	DB	13.00	26/300mm
14	Large obstruction/boulder End of Borehole at 14.00 m			14.00				
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling			
From (m)	To (m)	Hours	Comments

Standpipe Installation Details				
Date	Tip Depth	RZ Top	RZ Base	Type
14/03/2001	13.50	1.00	13.50	50mm

Water Strike Details					
Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
4.60	4.60	7.40	4.60		Slow ingress

Groundwater Observations				
Date	Hole Depth	Casing Depth	Depth to Water	Comments
14/03/2001	14.00	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH7 Sheet 1 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 09/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 12/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		13.70		BORED BY: D. Harrington	
		CASING DEPTH (m)		13.70			

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
1	Medium dense, brown silty SAND				5618	DB	1.00	10/300mm
2	Medium dense, grey silty SAND			2.00	5619	DB	2.00	
3	Firm, grey CLAY			2.50				
4					5620	DB	3.00	12/300mm
5	Firm, brown CLAY (with bands of silty sand)			4.40				15/300mm
6					5621	DB	4.00	
7					5623	DB	5.00	
8					5622	U100	5.10-5.50	
9					5624	DB	6.00	11/300mm
10	Loose, brown silty SAND			6.80				
11					5625	DB	7.00	6/300mm
12					5626	DB	8.00	
13	Firm, grey CLAY			8.30	5627	U100	8.30-8.80	
14								13/300mm
15	Dense, grey sandy GRAVEL with some very large cobbles			9.40				
16	Continued next sheet				5628	DB	10.00	

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
10.30	13.70	3.50	Hard strata boring	4.20	4.20	0.00	4.20		Seepage
13.70	13.70	1.50							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					12/03/2001	13.70	0.00	3.60	End of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH7 Sheet 2 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 09/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 12/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		13.70		BORED BY: D. Harrington	
		CASING DEPTH (m)		13.70			

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Dense, grey sandy GRAVEL with some very large cobbles				5628	DB	10.00	16/75mm
11					5629	DB	11.00	
12					5630	DB	12.00	44/300mm
13								23/75mm
14	Large obstruction/boulder End of Borehole at 13.70 m			13.70				
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
				4.20	4.20	0.00	4.20		Seepage

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					12/03/2001	13.70	0.00	3.60	End of boring

Remarks:

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH8 Sheet 1 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 08/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 09/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.90		BORED BY: P. Thomas	
		CASING DEPTH (m)		10.90			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
1	Medium dense, grey slightly clayey sandy GRAVEL (becoming loose and very sandy from 2.5m)				9074	DB	1.00	23/300mm	
2					9075	DB	2.00		
3					9076	DB	3.00		6/300mm
4	Soft, grey sandy gravelly CLAY			3.40	9077	DB	4.00	5/300mm	
5					9078	DB	5.00		
6					Firm to stiff, grey CLAY				5.20
7	9080	DB	7.00	13/300mm					
8	9081	DB	8.00						
9					9082	DB	9.00	22/300mm	
Continued next sheet					9083	DB	10.00		

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
10.50	10.90	2.00		7.70	7.70	0.00	6.70		Medium ingress

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					09/03/2001	10.90	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development						BOREHOLE NO: BH8 Sheet 2 of 2	
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 08/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 09/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.90		BORED BY: P. Thomas	
		CASING DEPTH (m)		10.90			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Firm to stiff, grey CLAY				9083	DB	10.00	61/150mm 40/75mm
11	End of Borehole at 10.90 m			10.90				
12								
13								
14								
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
				7.70	7.70	0.00	6.70		Medium ingress

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					09/03/2001	10.90	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH9 Sheet 1 of 1		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 03/12/2011	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 13/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		9.50		BORED BY: E. Leahy	
		CASING DEPTH (m)		9.50			

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Hard, grey brown sandy gravelly CLAY			0.80				
1	Very dense, grey coarse sandy GRAVEL with cobbles				4122	DB	1.00	56/300mm
2					4123	DB	2.00	30/75mm
	Hard, brown sandy CLAY			2.30 2.35				
3	Very dense, grey coarse sandy GRAVEL with cobbles				4124	DB	3.00	85/300mm
	Hard, grey CLAY			3.10				
4					4125	DB	4.00	68/300mm
5					4126	DB	5.00	30/75mm
6					4127	DB	6.00	72/300mm
7					4128	DB	7.00	30/0mm
8				8.10 8.30	4129	DB	8.00	64/300mm
	Very dense, grey SAND							
	Hard, grey CLAY							
9					4130	DB	9.00	30/75mm
				9.50				
	End of Borehole at 9.50 m							

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
1.90	2.30	1.50		4.60 8.10	4.60 8.10	5.00 0.00	4.80 8.00		Slow ingress Seepage

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					13/03/2001	9.50	0.00	8.00	End of boring.

Remarks:



REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development						BOREHOLE NO: BH10 Sheet 1 of 1	
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 22/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 22/03/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		6.50		BORED BY: R. Rowlands	
CASING DEPTH (m)		6.50					

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
1	MADE GROUND (comprised of clay and rubble fill)			2.40	4345	DB	0.00-1.10	64/300mm	
					4346	DB	1.10-2.00		
					4347	DB	2.00-3.00		25/300mm
3	MADE GROUND (comprised of medium dense grey sandy clayey gravel with cobbles)			5.60	4348	DB	3.00-4.00	23/300mm	
					4349	DB	4.00-5.00		27/300mm
					4350	DB	5.00-5.60		29/300mm
6	Dense, grey clayey sandy GRAVEL with cobbles			6.50	4351	DB	5.60-6.00	32/300mm	
					4352	DB	6.00-6.50		
End of Borehole at 6.50 m									
7									
8									
9									

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
1.60	1.80	1.00							
2.70	2.90	2.00							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					22/03/2001	6.50	0.00	0.00	Borehole dry at end of boring

Remarks:

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
<b>CONTRACT:</b> Ballymore Eustace Development					<b>BOREHOLE NO:</b> BH11 Sheet 1 of 1		
<b>CLIENT:</b> K.T.K		<b>GROUND LEVEL (mOD)</b> 0.00		<b>DATE STARTED:</b> 23/03/2001			
<b>ENGINEER:</b> E.R.M.L.		<b>BOREHOLE DIAMETER (mm)</b> 200		<b>DATE COMPLETED:</b> 24/03/2001			
<b>CO-ORDINATES:</b> E 0.00 N 0.00		<b>BOREHOLE DEPTH (m)</b> 6.00		<b>BORED BY:</b> G. Hughes			
<b>CASING DEPTH (m)</b> 6.00							

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	TOPSOIL			0.10				
	Loose, brown sandy GRAVEL				8681	DB	0.50	8/300mm
1				1.50	8682	DB	1.50	4/300mm
	Soft to firm, brown sandy gravelly CLAY							
2				2.40	8683	DB	2.50	17/300mm
	Medium dense, brown sandy GRAVEL							
3				4.00	8684	DB	3.50	15/300mm
4				4.00	8685	DB	4.50	36/300mm
	Dense, grey brown clayey sandy GRAVEL with cobbles							
5					8686	DB	5.50	31/300mm
				6.00				
6	End of Borehole at 6.00 m							
7								
8								
9								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
4.10	4.40	1.50							
5.30	5.50	1.00							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					24/03/2001	6.00	0.00	0.00	Borehole dry at end of boring

Remarks:

<b>REPORT NO. 6988</b>	<b>GEOTECHNICAL BORING RECORD</b>	<b>IGSL</b>
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<b>CONTRACT:</b> Ballymore Eustace Development		<b>BOREHOLE NO:</b> BH12 Sheet 1 of 2
<b>CLIENT:</b> K.T.K	<b>GROUND LEVEL (mOD)</b> 0.00	<b>DATE STARTED:</b> 30/03/2001
<b>ENGINEER:</b> E.R.M.L.	<b>BOREHOLE DIAMETER (mm)</b> 200	<b>DATE COMPLETED:</b> 02/04/2001
<b>CO-ORDINATES:</b> E 0.00 N 0.00	<b>BOREHOLE DEPTH (m)</b> 10.20 <b>CASING DEPTH (m)</b> 10.20	<b>BORED BY:</b> M. Collins

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
1	Loose to medium dense, grey sandy GRAVEL				4077	DB	1.00	10/300mm
2					4078	DB	2.00	13/300mm
3					4079	DB	3.00	16/300mm
	Medium dense, dark grey sandy GRAVEL (with bands of peat)			3.50 3.60				
4	Medium dense, grey SAND				4080	DB	4.00	19/300mm
5					4081	DB	5.00	16/300mm
6					4082	DB	6.00	19/300mm
7	Medium dense, grey sandy GRAVEL			7.00	4083	DB	7.00	18/300mm
8					4084	DB	8.00	23/300mm
9					4085	DB	9.00	27/300mm
	Stiff, black sandy gravelly CLAY with cobbles			8.80				
	Stiff, black CLAY			9.60				
	Stiff, brown CLAY							
	Continued next sheet			10.00	4086	DB	10.00	25/75mm

Hard Strata Boring / Chiselling			
From (m)	To (m)	Hours	Comments
10.00	10.20	2.00	

Water Strike Details					
Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details				
Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations				
Date	Hole Depth	Casing Depth	Depth to Water	Comments
02/04/2001	10.20	0.00	0.00	Borehole dry at end of boring

Remarks:

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH12 Sheet 2 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 30/03/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 02/04/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.20		BORED BY: M. Collins	
		CASING DEPTH (m)		10.20			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Stiff, brown CLAY			10.00	4086	DB	10.00	25/75mm
	Obstruction/large boulders			10.20				
	End of Borehole at 10.20 m							
11								
12								
13								
14								
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					02/04/2001	10.20	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 6988		GEOTECHNICAL BORING RECORD				IGSL	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH14 Sheet 1 of 2		
CLIENT:- K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 04/04/2001	
ENGINEER: E.R.M.L		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 05/04/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.50		BORED BY: M. Collins	
		CASING DEPTH (m)		10.50			

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
1	Firm to stiff, sandy gravelly CLAY				4098	DB	1.00	17/300mm
2					4099	DB	2.00	21/300mm
3					4100	DB	3.00	31/300mm
4					9301	DB	4.00	34/300mm
5	Stiff, brown sandy gravelly CLAY with cobbles			4.70	9302	DB	5.00	34/300mm
6					9303	DB	6.00	24/300mm
7					9304	DB	7.00	23/300mm
8					9305	DB	8.00	23/300mm
9					9306	DB	9.00	25/300mm
					9307	DB	10.00	22/300mm
Continued next sheet								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments
5.00	5.50	0.50							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					05/04/2001	10.50	0.00	0.00	Borehole dry at end of boring

Remarks:

<b>REPORT NO. 6988</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL</b>	
CONTRACT: Ballymore Eustace Development					BOREHOLE NO: BH14 Sheet 2 of 2		
CLIENT: K.T.K		GROUND LEVEL (mOD)		0.00		DATE STARTED: 04/04/2001	
ENGINEER: E.R.M.L.		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 05/04/2001	
CO-ORDINATES: E 0.00 N 0.00		BOREHOLE DEPTH (m)		10.50		BORED BY: M. Collins	
		CASING DEPTH (m)		10.50			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)	
	Stiff, brown sandy gravelly CLAY with cobbles				9307	DB	10.00	22/300mm
	End of Borehole at 10.50 m			10.50				
11								
12								
13								
14								
15								
16								
17								
18								
19								

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					05/04/2001	10.50	0.00	0.00	Borehole dry at end of boring

Remarks:



# Appendix 7





VIEW 1: TOWARDS SITE FROM ADJACENT FIELD LOOKING SOUTH /WEST



VIEW NO 2: FROM SITE ACROSS LIFFEY VALLEY LOOKING SOUTH/WEST



VIEW NO 3: ALONG SOUTH BOUNDARY WITHIN SITE LOOKING NORTH/EAST



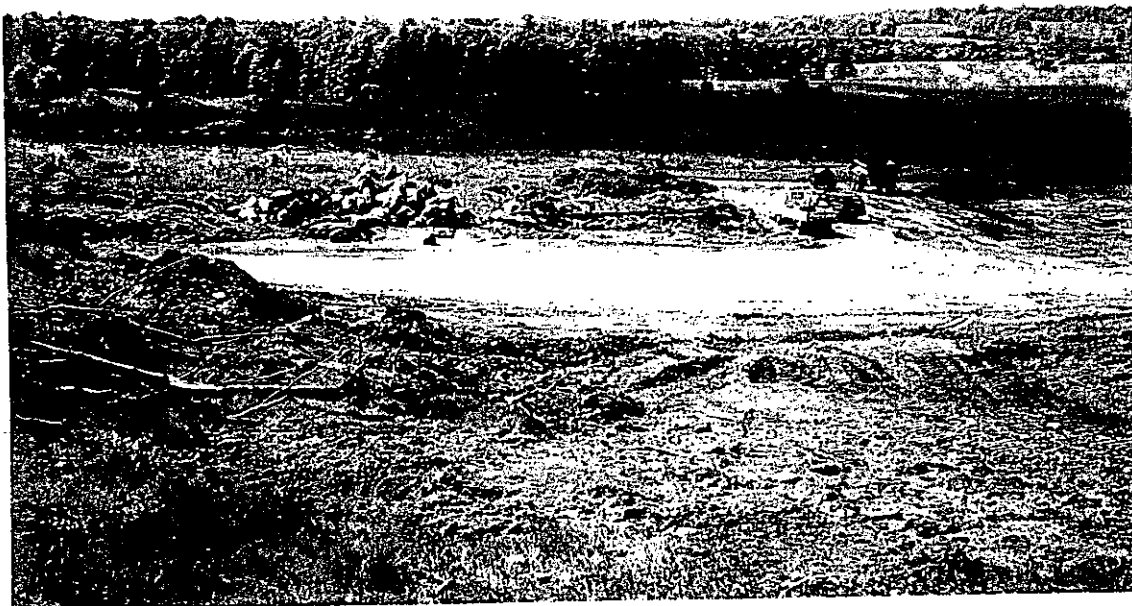
VIEW NO 4: 1 OF 2 LOOKING SOUTH/WEST FROM WITHIN SITE (WEST END)



VIEW NO 4: 2 OF 2 LOOKING SOUTH WEST FROM WITHIN SITE (WEST END)



VIEW NO 5: ACROSS TOP OF WATERMAIN INDICATING WILLOW THICKET



VIEW NO 6: ACROSS FRONT OF SITE AT ROADWAY LOOKING SOUTH



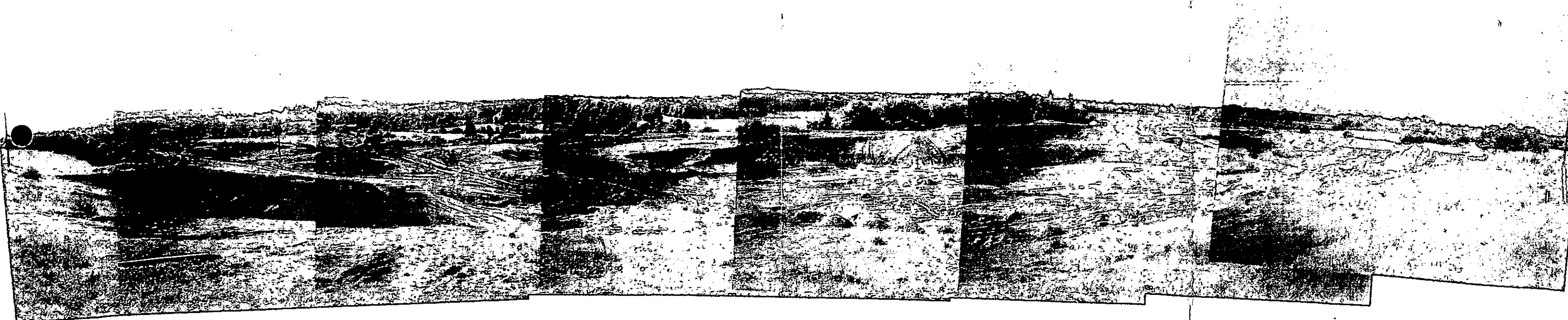
VIEW NO 7: FROM FRONT OF SITE AT ROADWAY LOOKING WEST



VIEW NO 8: FROM CENTRE OF LANDFILL SITE LOOKING NORTH



VIEW 9 : 1 of 2 PANORAMIC VIEW FACING  
NORTH FROM CENTRE OF SITE



VIEW 10 : 2 of 2 PANORAMIC VIEW FACING  
SOUTH FROM CENTRE OF SITE



# Appendix 8





**tms environment ltd**

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## ***Confidential Report***

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**Customer:** Environmental & Resource Management Ltd.  
21 Link Business Park  
Kilcullen  
Co Kildare

**Customer Ref:**

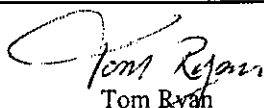
**F.T.A.O.:** Paul van der Werf

**TMS Environment Ref:** 3407

Order No.	Commencement Date: 11/04/2001	Completion Date: 21/05/2001
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**Report title:** Environmental noise survey at Ballymore Eustace, Co Kildare

**Report by:**

  
Tom Ryan

**Approved by:**

  
Dr I Shanahan

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TMS Environment Ltd., 53 Broomhill Drive, Tallaght, Dublin 24.  
Tel: +353-1-462 6710 Fax: +353-1-462 6714; e-mail: [tmsenvironment@eircom.net](mailto:tmsenvironment@eircom.net)  
Registration No. 217750

## **CONTENTS**

### **1.0 SCOPE**

### **2.0 REGIONAL ENVIRONMENTAL SETTING**

### **3.0 RECEPTORS**

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### **4.0 SURVEY PROTOCOL**

#### **4.1 CHOICE OF MEASUREMENT POSITIONS**

#### **4.2 INSTRUMENTATION AND METHODOLOGY**

#### **4.3 SURVEY IMPLEMENTATION**

### **5.0 SURVEY RESULTS**

### **6.0 EVALUATION OF RESULTS**

## **1.0 Scope**

This report presents the results of a baseline environmental noise survey carried out in the vicinity of the site of a proposed Industrial Park and Landfill development which is located in Ballymore Eustace, Co Kildare. The existing noise climate at the boundaries of the proposed development site was assessed, with particular attention focused on the noise sensitive receptors in close proximity to the site.

## **2.0 Regional environmental setting**

The site of the proposed development is situated in Ballymore Eustace, Co Kildare. The site is situated immediately to the northwest of Ballymore Eustace village which is situated approximately 12km south of Naas and approximately 38km southwest of Dublin city centre. The site is a disused sand and gravel pit and is currently being prepared for reinstatement and development. The site is bounded to the southeast by Ballymore Eustace village and is surrounded on all other sides by agricultural land. There is no industry currently located in the area. Access to the site is off the Naas – Ballymore Eustace Road the R411. The Kilcullen – Ballymore Eustace Road the R413 runs along the southern boundary of the site. The River Liffey also runs along the southern boundary of the site and at the closest point to the site is approximately 25m away. There are two private residences situated along the R413 Road and approximate eight private residences along the R411 in close proximity to the site.

## **3.0 Receptors**

Noise measurements were taken at a number of private properties and adjacent to the National School in Ballymore Eustace village, which can be classed as Noise Sensitive Receptors that are situated in the vicinity of the site of the proposed development. The existing noise climates at these locations were assessed during daytime periods when the ambient noise levels could be considered typical of the area. These locations were selected for noise monitoring due to their close proximity to the site and since they have the potential to be affected by any redevelopment of land in the area. A description of the measurement positions is presented in Table 1.

There is a new house approximately 20m north of the site and noise measurements were recorded on site at a point closest to the house (N-3). There are three private properties situated across the R411 Road which forms the eastern boundary of the site. Noise measurements were taken on site at the closest point to these houses (N-4). There is a house adjacent the southeast corner of the site and measurements were also recorded here (N-5). Measurements were also recorded 100m south of this point outside the rear gates of Ballymore Eustace National School (N-7) and also in the school yard 5m from the school (N-9). Approximately 150m west of N-7 there is a private residence situated adjacent to the site boundary. Measurements were also recorded here (N-6). There is a private residence situated along the R413 road 140m southwest of the site and noise measurements were also recorded here (N-8).

**Table 1** Description of Noise Measurement Positions

MONITORING POINT	DESCRIPTION	APPROXIMATE DISTANCE FROM MEASUREMENT POSITION TO NOISE SENSITIVE RECEPTOR (m)	APPROXIMATE DISTANCE FROM NOISE SENSITIVE RECEPTOR TO NEAREST SITE BOUNDARY (m)
N-1	Southwestern boundary of site	150	140
N-2	Western boundary of site	-	-
N-3	Northern boundary of site	25	20
N-4	Eastern corner of site	15	10
N-5	Southeastern corner of site	10	5
N-6	Southern boundary of site	35	25
N-7	Adjacent rear gate of National School	30	100
N-8	Adjacent residence on the R413 Road nearest the southwestern boundary	25	140
N-9	Basketball court in schoolyard	5	125

## **4.0 Survey Protocol**

### **4.1 Choice of measurement positions**

The noise monitoring locations chosen for this survey were selected in order to assess the existing noise climates at the boundaries of the proposed site, (N-1 to N-6) and to assess the existing noise climates at six noise sensitive receptors (N-3 to N-9) that are situated in close proximity to the site.

The monitoring points chosen for locating the noise measuring instrument were chosen according to the guidelines in ISO 1996: Acoustics - Description and Measurement of Environmental Noise. In all cases the sound level meter was located 1.3m above ground and at least 3.5m away from any sound reflecting objects. A wind cover was placed on the microphone to reduce any wind interference during measurements. A description of the monitoring points is presented in Table 1.

### **4.2 Instrumentation and methodology**

The measurements were made according to the requirements of ISO 1996: Acoustics - Description and Measurement of Environmental Noise. The measurements were made using a Cirrus 703A Data logging integrating sound level meter. The instrument was calibrated at 94 dB prior to use using a Cirrus CRL 511E Sound Level Calibrator. The microphone was mounted on an outdoor microphone stand, which in turn was mounted on a tripod at 1.3m above ground level. This instrument is a Type 1 instrument in accordance with IEC 651 regulations. The Time Weighting used was Fast and the Frequency Weighting was A-weighted as per IEC 651.

### **4.3 Survey implementation**

The survey was conducted by TMS Environment Ltd personnel on 11<sup>th</sup> and 18<sup>th</sup> April and 9<sup>th</sup> May 2001. The measurement parameters included meteorological observations of prevailing conditions at the time of the survey. The main measurement parameter was the equivalent continuous A-Weighted Sound Pressure Level,  $L_{Aeq, T}$ , over 60 minute measurement intervals.  $L_{Aeq, T}$ , over 30 minute measurement intervals were also recorded at five locations as additional background information. A statistical analysis of the measurement results was also completed so that the percentile levels,  $L_{AN, T}$ , for N = 90% and 10% over 60-minute measurement intervals and 30-minute measurement intervals were also recorded. The percentile levels represent the noise level in dB(A) exceeded for N% of the measurement time. Noise measurements were taken at each of the eight monitoring locations during the course of the survey. The results of this survey are presented in Table 2.

## **5.0 Survey results**

The Environmental noise measurement results are reported in Table 2.

**Table 2** Results of Environmental Noise Survey

MONITORING LOCATION	SURVEY DATE AND TIME INTERVAL	$L_{Aeq, 60min}$ dB(A)	$L_{A90, 60min}$ dB(A)	$L_{A10, 60min}$ dB(A)	SOURCES OF NOISE
N-1	11/04/2001 15:25 to 16:25	50	35	51	2 water pumps running in the centre of the site; excavation activity audible
N-2	11/04/2001 16:30 to 17:30	50	44	53	Excavation activity audible from centre of site
	17:55 to 18:25	39	30	41	Occasional passing roadside traffic Sheep bleating
N-3	11/04/2001 14:10 to 15:10	51	47	52	Excavation activity audible from centre of site
	18:30 to 19:00	40	32	40	Airplane flew overhead
N-4	11/04/2001 10:20 to 11:20	72	64	74	Dumper trucks unloading clay near monitoring point; reverse beepers audible
	19:02 to 19:32	47	32	51	Passing roadside traffic
N-5	11/04/2001 11:25 to 12:25	50	38	54	Dumper trucks audible; reverse beepers audible; passing roadside traffic
N-6	11/04/2001 12:30 to 13:30	53	35	57	Excavation activity audible from centre of site; Nearby lawnmower audible
	19:35 to 20:05	44	37	47	Passing roadside traffic; Nearby lawnmower audible
N-7	18/04/2001 10:30 to 11:30	63	35	65	Frequent passing roadside traffic; No site activities
N-8	18/04/2001 11:40 to 12:40	56	39	53	Occasional passing roadside traffic; Wind in trees audible
N-9	09/05/2001 17:00 to 17:30	50	31	54	Passing roadside traffic

**NOTE**

- The observed weather conditions during monitoring were as follows:  
11/04/2001      very warm, low humidity, slight southeast breeze (0-1 m/sec)  
18/04/2001      cool, moderate humidity, north wind (2-5 m/sec)  
09/05/2001      warm, low humidity, slight breeze (0-1 m/sec)

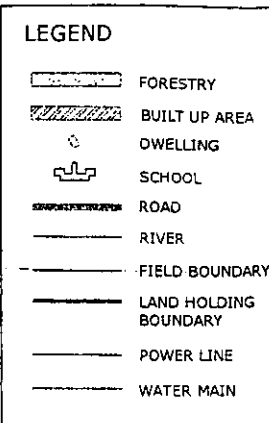
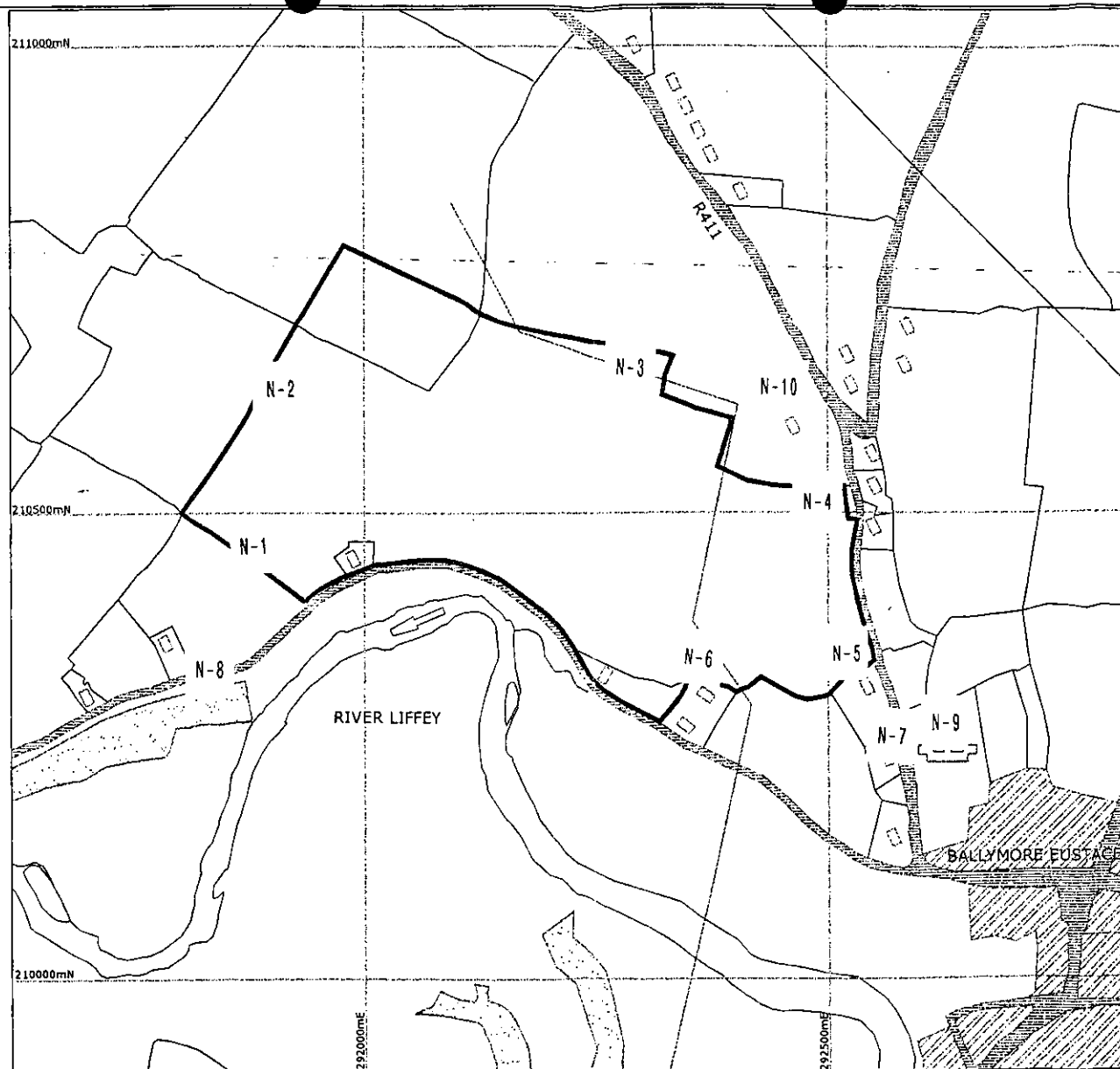
## 6.0 EVALUATION OF RESULTS

The main on-site noise sources at the Ballymore Eustace site are the excavation activities, which are concentrated in the centre of the site and involve up to eight items of plant operating simultaneously. Two pumps located in the northern half of the site were also operating intermittently during monitoring. There is a low volume of traffic entering and leaving the site. The vast majority of off-site noise is passing roadside traffic.

Noise measurements were recorded on-site at six different boundary locations (N-1 to N-6) and off-site at three locations (N-7 to N-9). Four of the on-site boundary locations were located adjacent to or near to private residences (N-3 to N-6) and were considered as Noise Sensitive Receptors. The three off-site locations (N-7 to N-9) were considered as Noise Sensitive Receptors removed from the site.

According to EPA BATNEEC Guidance Notes for Noise, if the total noise level from all sources is taken into account, the daytime noise level at noise sensitive receptors should be kept below a decibel level of approximately 55dB(A) in order to avoid disturbance. The day time  $L_{Aeq}$  values measured at five of the six monitoring positions at the site boundaries (N-1 to N-6) range between 50 – 53dB(A). The only on-site monitoring location to exceed the 55dB(A) guideline value is (N4), which gave a result of 72dB(A). However, this value was influenced by the high level of site activity that was occurring close by at the time of monitoring. Dumper trucks were continuously unloading clay in the northeastern corner of the site and an earth mover was simultaneously levelling the ground. This activity lasted for 2 to 3 hours in the morning. Measurements recorded at (N-7 and N-8) were both over the guideline value of 55dB(A). This was due to passing roadside traffic, which is supported by the low  $L_{A90}$  values.  $L_{A90}$  values can be regarded as representative of the background noise level in that area. This is further supported by the value recorded at (N-9), which is below the 55dB(A) limit value as the monitoring point is further away from the passing traffic than N-7 and is therefore less influenced by the traffic. The  $L_{A90}$  values recorded for all the points (N-1 to N-9) are low ranging from 30 to 47 dB(A) except for N-4 which was 64 dB(A) and this is due to the site activities occurring at the time of monitoring.

$L_{Aeq, 30min}$  measurements were also recorded at (N-2, N-3, N-4 and N-6) after site activities had ceased as additional background information. The  $L_{Aeq}$  values ranged from 39 to 47 dB(A) which was a reduction of approximately 10 dB(A) at 3 of the monitoring locations and a reduction of 25 dB(A) at N-4. These are significant reductions and would easily be detected by the human ear. However, since the background noise levels are generally very low and the  $L_{Aeq}$  values are below 55 dB(A) (except for N-4) the overall noise levels from the site would not be expected to cause disturbance at local residential properties. This could be further enhanced by minimising the amount of work carried out near N-4 in the northeastern corner of the site. This is the case as the work in that area of the site has been completed. Overall the area is free of any significant noise sources. The results of this survey indicate that the current noise climate in the vicinity of the proposed development at Ballymore Eustace is predominantly rural in character and current site activities do not have a significant impact on the local noise climate of the area.



Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 3

SITE SETTING

Scale: 1:5,000 A3

Drawn By: NH

Date: 02/05/01



## CONTENTS

### CONSTRUCTION PHASE NOISE IMPACTS

#### *CLOSEST DISTANCE FROM SCREENING BANK CONSTRUCTION*

Table 1A	Construction Phase Noise Impacts at N-4
Table 1B	Construction Phase Noise Impacts at N-5
Table 1C	Construction Phase Noise Impacts at N-6
Table 1D	Construction Phase Noise Impacts at N-8
Table 1E	Construction Phase Noise Impacts at N-10

#### *AVERAGE DISTANCE FROM SCREENING BANK CONSTRUCTION*

Table 2A	Construction Phase Noise Impacts at N-4
Table 2B	Construction Phase Noise Impacts at N-5
Table 2C	Construction Phase Noise Impacts at N-6
Table 2D	Construction Phase Noise Impacts at N-8
Table 2E	Construction Phase Noise Impacts at N-10

#### *MAIN CONSTRUCTION PHASE FOR LANDFILL*

Table 3A	Construction Phase Noise Impacts at N-4
Table 3B	Construction Phase Noise Impacts at N-5
Table 3C	Construction Phase Noise Impacts at N-6
Table 3D	Construction Phase Noise Impacts at N-8
Table 3E	Construction Phase Noise Impacts at N-10

### OPERATIONAL PHASE IMPACTS

#### *CLOSEST DISTANCE FROM SCREENING BANK CONSTRUCTION*

Table 4A	Operation Phase Noise Impacts at N-4
Table 4B	Operation Phase Noise Impacts at N-5
Table 4C	Operation Phase Noise Impacts at N-6
Table 4D	Operation Phase Noise Impacts at N-8
Table 4E	Operation Phase Noise Impacts at N-10

***AVERAGE DISTANCE FROM SCREENING BANK CONSTRUCTION***

<b>Table 5A</b>	<b>Operation Phase Noise Impacts at N-4</b>
<b>Table 5B</b>	<b>Operation Phase Noise Impacts at N-5</b>
<b>Table 5C</b>	<b>Operation Phase Noise Impacts at N-6</b>
<b>Table 5D</b>	<b>Operation Phase Noise Impacts at N-8</b>
<b>Table 5E</b>	<b>Operation Phase Noise Impacts at N-10</b>

TABLE 1B

NOISE PREDICTION AT N-5 (residence 130m SE of site boundary)

CONSTRUCTION PHASE (CLOSEST DISTANCE TO SCREENING BANKS)

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE	$L_{Aeq}$ AT 1m, dB	$L_{Aeq}$ AT 10m, dB	DISTANCE, m	ADJUSTMENTS (dB)				RESULTANT $L_{Aeq}$ , dB	FRACTION ON TIME	CORRECTIONS TO $L_{Aeq}$ , 1 HR		ACTIVITY $L_{Aeq}$ , 1 HR
				DISTANCE	SCREENING	REFLECTION				$t_c = T_s \times F$	$(t_c)(10^{0.1L})$	
List all noise sources	Average		Average distance to receptor, m	$K_s = 20 \log_{10}(R/10)$	$K_r = (25 \log_{10}(R/10) - 2)$	0, 5, 10, calculate	0, 3	$L_{WA} - \text{adjustments}$	(Activity duration / working period)			$L_{Aeq, 1hr} = 10 \log_{10} [1/1 \sum (t_c)(10^{0.1L})]$
EXCAVATOR		80	140		26.7	0	0	53.3	1	1	216112.5	
DUMP TRUCK		76	140		26.7	0	0	49.3	1	1	86035.9	

## NOTE

1. This assessment is based on the closest distance to screening bank construction
2. A stand-off distance of 10m has been allowed from the site perimeter for accommodation of screening banks

ACTIVITY $L_{Aeq}$ , 1 HR	
SIGMA $(t_c)(10^{0.1L})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/1 \sum (t_c)(10^{0.1L})]$
302148.5	55

CONSTRUCTION PHASE (CLOSEST DISTANCE TO SCREENING BANKS)

[illegible]

1. This assessment is based on the closest distance to screening bank construction
2. A stand-off distance of 10m has been allowed from the site perimeter for accommodation of screening banks

accommodation of screening banks

ACTIVITY $L_{\text{avg}}$ 1 HR	SIGMA $(10^{10} \text{ IU})^{(2)} (10^{10} \text{ IU})^{(2)}$ $= L_{\text{avg}}^{(2)}$ $10 \log 10^{10} \text{ IU} / 10^{10} \text{ IU}^{(2)}$	185959.4
--------------------------------	---	----------

**NOISE PREDICTION AT N-6 (residence 30m S of site boundary)**

### PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

### NOTE

- |  |  |
|--|--|
|  | ACTIVITY $L_{\text{Aeq}, 1 \text{ HR}}$  |
| $\Sigma GMA$<br>( $t_i$ )( $10^{0.1L_i}$ ) | $L_{\text{Aeq}, 1 \text{ hr}} =$<br>$10 \log_{10} [1/T \sum (t_i)(10^{0.1L_i})]$ |
| 6924532.9                                  | 68   |

PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

[illegible]

1. This assessment is based on the closest distance to screening bank construction

accommodation of screening banks

accommodation of screening banks

ACTIVITY 1	$L_{\text{avg}} = 10 \log_{10} \left( \frac{1}{N} \sum_{i=1}^N  x_i ^2 \right)$	254280.1	54
------------	---	----------	----

### PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

2. A stand-off distance of 10m has been allowed from the site perimeter for accommodation of screening banks

	ACTIVITY $L_{Aeq, 1 HR}$
$SIGMA(t_c)(10^{0.1L_i})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/11 \sum (t_c)(10^{0.1L_i})]$
911872.6	60

TABLE 2A

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

CONSTRUCTION PHASE (AVERAGE DISTANCE TO SCREENING BANKS)

**NOISE PREDICTION AT N-4 (residence 160m E of site boundary)**

[illegible]

**NOTE**

1. This assessment is based on the average distance to screening bank construction
2. A stand-off distance of 10m has been allowed from the site perimeter for accommodation of screening banks.

ACTIVITY $L_{\text{avg}, 1 \text{ hr}}$	$L_{\text{avg}, 1 \text{ hr}} = \frac{10 \log (10^{10} I) (10^{10} I_{\text{ref}})^{-1}}{52}$	161197.8
---	---	----------



**NOISE PREDICTION AT N-5 (residence 130m SE of site boundary)**

### PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

**NOTE**

- |  |  |
|--|--|
|  | ACTIVITY $L_{\text{Aeq},1 \text{ HR}}$   |
| $\text{SIGMA}$<br>$(\text{t})/(10^{0.1L})$ | $L_{\text{Aeq},1 \text{ hr}} =$<br>$10 \log_{10} [1/1 \sum (t_i)/(10^{0.1L})]$ |
| 254280.1                                   | 54   |

**NOISE PREDICTION AT N-6 (residence 30m S of site boundary)**

# PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEO METHOD)

PLANT TYPE / NOISE	$L_{Aeq}$ AT 1m	$L_{Aeq}$ AT DISTANCE	ADJUSTMENT
--------------------	-----------------	-----------------------	------------

[illegible]

1. This

accommodation of screening banks.

99	39639633.9
$L_{\text{MAG,INT}} = (101001)(111101)101010101$	$SIGMA (111001)(111101)$

99	39639633.9
$L_{\text{MAG,INT}} = (101001)(111101)101010101$	$SIGMA (111001)(111101)$

**CONSTRUCTION PHASE (AVERAGE DISTANCE TO SCREENING BANKS)**

[illegible]

1. This assessment is based on the average distance to screening bank construction
2. A stand-off distance of 10m has been allowed from the site perimeter for accommodation of screening banks.

	ACTIVITY $L_{\text{Aeq, 1 hr}}$
$SIGMA (t_c)(10^{0.1L_i})$	$L_{\text{Aeq, 1 hr}} = 10 \log_{10} [1/t \sum (t_c)(10^{0.1L_i})]$
216391.7	53

TABLE 2E

### PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

**NOTE**

	ACTIVITY $L_{Aeq, 1 \text{ hr}}$
$SIGMA$ $(t_c)(10^{0.1W})$	$L_{Aeq, 1 \text{ hr}} =$ $10 \log_{10} [1/\Sigma (t_c)(10^{0.1W})]$
67.4	18

# PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEG METHOD)

PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

[illegible]

1. This assessment is based on the average distance from the centre of the landfill footprint

**NOTE**

ACTIVITY $L_{\text{avg}}$ 1 hr	$L_{\text{avg}} 1 \text{ hr} = 10 \log \frac{10^{10} \text{ IU}}{10^{10} \text{ IU}} = 0$	45.4
		17

TABLE 3C

NOISE PREDICTION AT N-6 (residence 30m S of site boundary)

CONSTRUCTION PHASE (AVERAGE DISTANCE TO CENTRE OF LANDFILL)

PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

PLANT TYPE / NOISE SOURCE	L <sub>Asp</sub> AT 1m, dB		DISTANCE, m	ADJUSTMENTS (dB)				RESULTANT L <sub>Asp</sub> , dB	FRACTION ON TIME	CORRECTIONS TO L <sub>Asp</sub> , 1 HR		ACTIVITY L <sub>Asp</sub> , 1 HR
	L <sub>Asp</sub> AT 10m, dB	DISTANCE		SCREENING	REFLECTION							
		Average				Average distance to receptor, m	$K_A = 20\log_{10}(R/10)$			$K_S = (25\log_{10}(R/10)) - 2$	0, 5, 10, calculate	
List all noise sources								L <sub>WA</sub> - adjustments	(Activity duration / working period)	$t_c = T_1 \times F$	$(t_c)(10^{0.1L_u})$	$L_{Asp, 1hr} = 10\log_{10}[1/1 \sum (t_c)(10^{0.1L_u})]$
BULLDOZER	88	68	360		36.9	10	0	21.1	0.5	0.5	64.3	
JCB	77	57	360		36.9	10	0	10.1	1	1	10.2	
DUMP TRUCK #1	76	56	360		36.9	10	0	9.1	0.5	0.5	4.1	
DUMP TRUCK #2	76	56	360		36.9	10	0	9.1	0.5	0.5	4.1	
EXCAVATOR	80	60	360		36.9	10	0	13.1	0.5	0.5	10.2	
TRACTOR	70	50	360		36.9	10	0	3.1	0.2	0.2	0.4	

## NOTE

1. This assessment is based on the average distance from the centre of the landfill footprint

ACTIVITY L <sub>Asp</sub> , 1 HR	
SIGMA $(t_c)(10^{0.1L_u})$	$L_{Asp, 1hr} = 10 \log_{10} [1/1 \sum (t_c)(10^{0.1L_u})]$
93.2	20

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAO METHOD]

PLANT TYPE / NOISE SOURCE	L <sub>avg,AT</sub> 1m, dB	L <sub>avg,AT</sub> 10m, dB	m	DISTANCE, m	ADJUSTMENTS (dB)			RESULTANT L <sub>avg,AT</sub> dB	FRACTION ON TIME	CORRECTIONS	TOTAL L <sub>avg,AT</sub> dB	ACTIVITY L <sub>avg,AT</sub> dB
					SCREENING	REFLECTION						

1. This assessment is based on the average distance from the centre of the landfill footprint

**NOTE**

ACTIVITY 1118	$L_{\text{avg},1118} = 10 \log_{10} \left( \frac{1}{10} \right) (10 \log_{10} 10) = -10$	67.4
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### PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

**NOTE**

	ACTIVITY $L_{\text{Aeq}, 1 \text{ HR}}$
$SIGMA(t_c)(10^{0.1L})$	$L_{\text{Aeq}, 1 \text{ hr}} = 10 \log_{10} [1/1 \sum(t_c)(10^{0.1L})]$
125.1	21

TABLE 4A  
NOISE PREDICTION AT N-4 (residence 160m E of site boundary)  
OPERATIONAL PHASE (CLOSEST DISTANCE TO EDGE OF LANDFILL)  
PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEO METHOD)

NOTE											
PLANT TYPE / NOISE SOURCE	L <sub>AT</sub> 1m, dB	L <sub>AT</sub> 10m, dB	Average distance to receptor, m	$K_1 = 20 \log_{10}(R/10)$ $K_2 = (25 \log_{10}(R/10)) - 2$	0.5, 10, calculate	0.3	L <sub>WA</sub> - adjustments	RESULTANT L <sub>Aeq, dB</sub>	FRACTION ON TIME	CORRECTIONS TO L <sub>Aeq, dB</sub>	ACTIVITY L <sub>Aeq, dB</sub> 1 HR
List all noise sources											
WASTE COMPACTOR	88	68	190	30.0	10	0	28.0	0.5	0.5	317.8	
BULLDOZER	88	68	190	30.0	10	0	28.0	1	1	635.5	
JCB	77	57	190	30.0	10	0	17.0	1	1	50.5	
DUMP TRUCK #1	76	56	190	30.0	10	0	16.0	0.5	0.5	20.0	
DUMP TRUCK #2	76	56	190	30.0	10	0	16.0	0.5	0.5	20.0	
EXCAVATOR	80	60	190	30.0	10	0	20.0	0.5	0.5	50.4	
TRACTOR	70	50	190	30.0	10	0	10.0	0.2	0.2	2.0	
$L_{Aeq, dB} = 10 \log_{10} [1/11 \sum (i_p)(10^{0.1L_p})]$											

NOTE  
1. This assessment is based on the closest distance to the edge of the landfill footprint

ACTIVITY L <sub>Aeq, dB</sub>	1096.2	30
SIGMA	(i <sub>p</sub> )(10 <sup>0.1L<sub>p</sub></sup> )	10log <sub>10</sub> [1/1 Σ(i <sub>p</sub> )(10 <sup>0.1L<sub>p</sub></sup> )]

TABLE 4B

## NOISE PREDICTION AT N-5 (residence 130m E of site boundary)

## OPERATIONAL PHASE (CLOSEST DISTANCE TO EDGE OF LANDFILL)

## PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE	L <sub>Aeq</sub> AT 1m, dB	L <sub>Aeq</sub> AT 10m, dB	DISTANCE, m	ADJUSTMENTS (dB)				RESULTANT L <sub>Aeq</sub> , dB	FRACTION ON TIME	CORRECTIONS TO L <sub>Aeq</sub> , 1 HR		ACTIVITY L <sub>Aeq</sub> , 1 HR
				DISTANCE	SCREENING	REFLECTION						
List all noise sources	Average		Average distance to receptor, m	$K_A = 20 \log_{10}(R/10)$	$K_S = (25 \log_{10}(R/10)) - 2$	0, 5, 10, calculate	0, 3	L <sub>WA</sub> - adjustments	(Activity duration / working period)	$t_c = T_c \times F$	$(t_c)/(10^{0.1L_i})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/1 \sum (t_c)/(10^{0.1L_i})]$
WASTE COMPACTOR	88	68	270		33.8	10	0	24.2	0.5	0.5	132.0	
BULLDOZER	88	68	270		33.8	10	0	24.2	1	1	264.0	
JCB	77	57	270		33.8	10	0	13.2	1	1	21.0	
DUMP TRUCK #1	76	56	270		33.8	10	0	12.2	0.5	0.5	8.3	
DUMP TRUCK #2	76	56	270		33.8	10	0	12.2	0.5	0.5	8.3	
EXCAVATOR	80	60	270		33.8	10	0	16.2	0.5	0.5	20.9	
TRACTOR	70	50	270		33.8	10	0	6.2	0.2	0.2	0.8	

## NOTE

1. This assessment is based on the closest distance to the edge of the landfill footprint

	ACTIVITY L <sub>Aeq</sub> , 1 HR
SIGMA ( $t_c)/(10^{0.1L_i}$ )	$L_{Aeq, 1hr} = 10 \log_{10} [1/1 \sum (t_c)/(10^{0.1L_i})]$
455.4	27

TABLE 4C

NOISE PREDICTION AT N-6 (residence 30m S of site boundary)

OPERATIONAL PHASE (CLOSEST DISTANCE TO EDGE OF LANDFILL)

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE	L <sub>max</sub> AT 1m, dB	L <sub>max</sub> AT 10m, dB	Average distance to receptor, m	ADJUSTMENTS (dB)			RESULTANT L <sub>req</sub>	FRACTION ON TIME	CORRECTIONS		ACTIVITY L <sub>req, 1 hr</sub>
				DISTANCE	SCREENING	REFLECTION			TO L <sub>req, 1 hr</sub>	TO L <sub>req, 1 hr</sub>	
List all noise sources				$K_s = 20\log_{10}(R/R_{10})$	$K_s = (25\log_{10}(R/R_{10}) - 2)$ calculate	0.3	L <sub>WA</sub> - adjustments	(activity duration / working period)	$L_c = T_c \times F$	$(L_c)(10^{0.1L_c})$	$L_{req, 1hr} = 10\log_{10}[1/12 \sum (L_i)(10^{0.1L_i})]$
WASTE COMPACTOR	88	68	135	26.3	10	0	31.7	0.5	0.5	746.7	
BULLDOZER	88	68	135	26.3	10	0	31.7	1	1	1493.4	
JCB	77	57	135	26.3	10	0	20.7	1	1	118.6	
DUMP TRUCK #1	76	56	135	26.3	10	0	19.7	0.5	0.5	47.1	
DUMP TRUCK #2	76	56	135	26.3	10	0	19.7	0.5	0.5	47.1	
EXCAVATOR	80	60	135	26.3	10	0	23.7	0.5	0.5	118.3	
TRACTOR	70	50	135	26.3	10	0	13.7	0.2	0.2	4.7	

NOTE

1. This assessment is based on the closest distance to the edge of the landfill footprint

ACTIVITY L <sub>req, 1 hr</sub>	2576.0	34
$L_{req, 1hr} = \text{SIGMA } (L_i)(10^{0.1L_i})$	$10 \log_{10} [1/12 \Sigma (L_i^2)(10^{0.1L_i})]$	

**TABLE 4D**  
**NOISE PREDICTION AT N-8 (residence 140m SW of site boundary)**  
**OPERATIONAL PHASE (CLOSEST DISTANCE TO EDGE OF LANDFILL)**

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE	L <sub>Aeq</sub> AT 1m, dB	L <sub>Aeq</sub> AT 10m, dB	DISTANCE, m	ADJUSTMENTS (dB)				RESULTANT L <sub>Aeq</sub> , dB	FRACTION ON TIME	CORRECTIONS TO L <sub>Aeq</sub> , 1 HR		ACTIVITY L <sub>Aeq</sub> , 1 HR
				DISTANCE	SCREENING	REFLECTION						
List all noise sources	Average		Average distance to receptor, m	$K_A = 20 \log_{10}(R/10)$	$K_A = (25 \log_{10}(R/10)) - 2$	0, 5, 10, calculate	0, 3	L <sub>WA</sub> - adjustments	(Activity duration / working period)	$t_c = T_s \times F$	$(t_c)(10^{0.1L_A})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/t_c \sum (t_c)(10^{0.1L_A})]$
WASTE COMPACTOR	88	68	180		29.4	10	0	28.6	0.5	0.5	363.7	
BULLDOZER	88	68	180		29.4	10	0	28.6	1	1	727.5	
JCB	77	57	180		29.4	10	0	17.6	1	1	57.8	
DUMP TRUCK #1	76	56	180		29.4	10	0	16.6	0.5	0.5	23.0	
DUMP TRUCK #2	76	56	180		29.4	10	0	16.6	0.5	0.5	23.0	
EXCAVATOR	80	60	180		29.4	10	0	20.6	0.5	0.5	57.6	
TRACTOR	70	50	180		29.4	10	0	10.6	0.2	0.2	2.3	

**NOTE**

1. This assessment is based on the closest distance to the edge of the landfill footprint

ACTIVITY L <sub>Aeq</sub> , 1 HR	
SIGMA $(t_c)(10^{0.1L_A})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/t_c \sum (t_c)(10^{0.1L_A})]$
1254.9	31

TABLE 4E

NOISE PREDICTION AT N-10 (residence 60m NE of site boundary)  
 OPERATIONAL PHASE (CLOSEST DISTANCE TO EDGE OF LANDFILL)  
 PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE		L <sub>max</sub> AT 1m, dB	L <sub>max</sub> AT 10m, dB	Average distance to receptor, m	ADJUSTMENTS (dB)		RESULTANT L <sub>max</sub> , dB	FRACTION ON TIME	CORRECTIONS TO L <sub>max</sub> , 1HR		ACTIVITY L <sub>max</sub> , 1HR			
List all noise sources					Average	$K_s = 20\log_{10}(R/10)$	$K_r = (25\log_{10}(R/10) - 2)$	0.5, 10, calculate	0.3	L <sub>WA</sub> - adjustments	(Activity duration / working period)	$L_c = T_1 \times F$	$(10^{0.1L_c})$	$10\log_{10}[1/11 \sum (10^{0.1L_c})]$
WASTE COMPACTOR	88	68	90	21.9	10	0	36.1	0.5	1	1	4115.2	326.9	129.8	
BULLDOZER	88	68	90	21.9	10	0	36.1	1	1	1	4115.2	326.9	129.8	
JCB	77	57	90	21.9	10	0	25.1	1	1	1	326.9	129.8	129.8	
DUMP TRUCK #1	76	56	90	21.9	10	0	24.1	0.5	0.5	0.5	129.8	129.8	129.8	
DUMP TRUCK #2	76	56	90	21.9	10	0	24.1	0.5	0.5	0.5	129.8	326.1	129.8	
EXCAVATOR	80	60	90	21.9	10	0	28.1	0.5	0.5	0.5	13.0			
TRACTOR	70	50	90	21.9	10	0	18.1	0.2	0.2	0.2				

NOTE

1. This assessment is based on the closest distance to the edge of the landfill footprint

ACTIVITY L <sub>max</sub> , 1HR	$L_{max, 1hr} = 10 \log_{10} [1/11 \sum (10^{0.1L_{max}})]$	7098.5
39		

**TABLE 5A**  
**NOISE PREDICTION AT N-5 (residence 160m E of site boundary)**  
**OPERATIONAL PHASE (AVERAGE DISTANCE TO CENTRE OF LANDFILL)**

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE	L <sub>Aeq</sub> AT 1m, dB	L <sub>Aeq</sub> AT 10m, dB	DISTANCE, m	ADJUSTMENTS (dB)				RESULTANT L <sub>Aeq</sub> , dB	FRACTION ON TIME	CORRECTIONS TO L <sub>Aeq</sub> , 1 HR		ACTIVITY L <sub>Aeq</sub> , 1 HR
				DISTANCE	SCREENING	REFLECTION						
List all noise sources	Average		Average distance to receptor, m	$K_A = 20 \log_{10}(R/10)$	$K_S = (25 \log_{10}(R/10) - 2)$	0, 5, 10, calculate	0, 3	L <sub>WA</sub> - adjustments	(Activity duration / working period)	$t_c = T_c \times F$	$(t_c)(10^{0.1L_i})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/t_c \sum (t_c)(10^{0.1L_i})]$
WASTE COMPACTOR	88	68	480		40.0	10	0	18.0	0.5	0.5	31.3	
BULLDOZER	88	68	480		40.0	10	0	18.0	1	1	62.6	
JCB	77	57	480		40.0	10	0	7.0	1	1	5.0	
DUMP TRUCK #1	76	56	480		40.0	10	0	6.0	0.5	0.5	2.0	
DUMP TRUCK #2	76	56	480		40.0	10	0	6.0	0.5	0.5	2.0	
EXCAVATOR	80	60	480		40.0	10	0	10.0	0.5	0.5	5.0	
TRACTOR	70	50	480		40.0	10	0	0.0	0.2	0.2	0.2	

**Note**

1. This assessment is based on the average distance to the centre of the landfill footprint

ACTIVITY L <sub>Aeq</sub> , 1 HR	
SIGMA ( $t_c)(10^{0.1L_i})$	$L_{Aeq, 1hr} = 10 \log_{10} [1/t_c \sum (t_c)(10^{0.1L_i})]$
108.1	20

TABLE 5B

NOISE PREDICTION AT N-5 (residence 130m E of site boundary)

OPERATIONAL PHASE (AVERAGE DISTANCE TO CENTRE OF LANDFILL)

PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

PLANT TYPE / NOISE SOURCE	L <sub>max</sub> AT 1m, dB	L <sub>max</sub> AT 10m, dB	DISTANCE, m	ADJUSTMENTS (dB)			RESULTANT L <sub>max</sub> (dB)	FRACTION ON TIME	CORRECTIONS TO L <sub>max</sub> 1 HR		ACTIVITY L <sub>max</sub> 1 HR	
				SCREENING	REFLECTION	ADJUSTMENTS			WORKING PERIOD	L <sub>max</sub> 1 HR		
List all noise sources												
			Average distance to receptor, m	$K_s = 20 \log_{10}(R/10)$	$K_s = (25 \log_{10}(R/10) - 2)$	calculate	0.3	L <sub>max</sub> - adjustments	(activity duration / working period)	$L_{eq} = T_1 \times F$	$(L_p)(10^{0.1L_p})$	$10 \log_{10}[1/11 \sum (L_p)(10^{0.1L_p})]$
WASTE COMPACTOR	88	68	480		40.0	10	0	18.0	0.5	0.5	31.3	
BULLDOZER	88	68	480		40.0	10	0	18.0	1	1	62.6	
JCB	77	57	480		40.0	10	0	7.0	1	1	5.0	
DUMP TRUCK #1	76	56	480		40.0	10	0	6.0	0.5	0.5	2.0	
DUMP TRUCK #2	76	56	480		40.0	10	0	6.0	0.5	0.5	2.0	
EXCAVATOR	80	60	480		40.0	10	0	10.0	0.5	0.5	5.0	
TRACTOR	70	50	480		40.0	10	0	0.0	0.2	0.2	0.2	

Note

1. This assessment is based on the average distance to the centre of the landfill footprint

ACTIVITY L <sub>max</sub> 1 HR	SIGMA	108.1
	$(L_{eq})_{10^{0.1L}}$	$10 \log_{10} [1/11 \sum (L_{eq})_{10^{0.1L}}]$
		20



**TABLE 5C**  
**NOISE PREDICTION AT N-6 (residence 30m S of site boundary)**  
**OPERATIONAL PHASE (AVERAGE DISTANCE TO CENTRE OF LANDFILL)**

PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

PLANT TYPE / NOISE SOURCE	L <sub>Aeq</sub> AT 1m, dB	L <sub>Aeq</sub> AT 10m, dB	DISTANCE, m	ADJUSTMENTS (dB)				RESULTANT L <sub>Aeq</sub> , dB	FRACTION ON TIME	CORRECTIONS TO L <sub>Aeq</sub> , 1 HR		ACTIVITY L <sub>Aeq</sub> , 1 HR
				DISTANCE		SCREENING	REFLECTION			t <sub>c</sub> = T <sub>t</sub> x F	(t <sub>c</sub> )(10 <sup>0.1L</sup> )	
List all noise sources	Average		Average distance to receptor, m	K <sub>s</sub> = 20log <sub>10</sub> (R/10)	K <sub>r</sub> = (25log <sub>10</sub> (R/10) - 2	0, 5, 10, calculate	0, 3	L <sub>WA</sub> - adjustments	(Activity duration / working period)			L <sub>Aeq,1hr</sub> = 10log <sub>10</sub> [1/H Σ(t <sub>c</sub> )(10 <sup>0.1L</sup> )
WASTE COMPACTOR	88	68	360		36.9	10	0	21.1	0.5	0.5	64.3	
BULLDOZER	88	68	360		36.9	10	0	21.1	1	1	128.6	
JCB	77	57	360		36.9	10	0	10.1	1	1	10.2	
DUMP TRUCK #1	76	56	360		36.9	10	0	9.1	0.5	0.5	4.1	
DUMP TRUCK #2	76	56	360		36.9	10	0	9.1	0.5	0.5	4.1	
EXCAVATOR	80	60	360		36.9	10	0	13.1	0.5	0.5	10.2	
TRACTOR	70	50	360		36.9	0	0	13.1	0.2	0.2	4.1	

Note

1. This assessment is based on the average distance to the centre of the landfill footprint

	ACTIVITY L <sub>Aeq</sub> , 1 HR
SIGMA (t <sub>c</sub> )(10 <sup>0.1L</sup> )	$L_{Aeq, 1hr} = 10 \log_{10} [1/H \sum (t_c)(10^{0.1L})]$
225.5	24

TABLE 5D  
NOISE PREDICTION AT N-8 (residence 140m SW of site boundary)  
OPERATIONAL PHASE (AVERAGE DISTANCE TO CENTRE OF LANDFILL)  
PREDICTION OF NOISE FROM STATIONARY PLANT (ACTIVITY LAEQ METHOD)

PLANT TYPE / NOISE SOURCE		L <sub>avg</sub> AT 1m, dB	L <sub>avg</sub> AT 10m, dB	Average distance to receptor, m	ADJUSTMENTS (dB)		RESULTANT L <sub>avg</sub> dB	FRACTION ON TIME	CORRECTIONS		ACTIVITY L <sub>avg</sub> 1 HR			
List all noise sources					Average	$K_s = 20\log_{10}(R/10)$	$K_r = (25\log_{10}(R/10) - 2)$	0.5, 10, calculate	0.3	L <sub>wa</sub> - adjustments	(Activity duration / working period)	$t_c = T_c \times F$	$(t_c)(10^{0.1t_c})$	$L_{avg,10} = 10\log_{10}[1/11 \sum (t_c)(10^{0.1t_c})]$

Note  
1. This assessment is based on the average distance to the centre of the landfill footprint

ACTIVITY L <sub>eq,AT</sub> 1 HR	160.3
L <sub>eq,AT</sub> = 10log <sub>10</sub> [1/11 Σ(t <sub>c</sub> )(10 <sup>0.1t<sub>c</sub></sup> )]	22

## PREDICTION OF NOISE FROM STATIONARY PLANT [ACTIVITY LAEQ METHOD]

### Note

1. This assessment is based on the average distance to the centre of the landfill footprint

	ACTIVITY $L_{Aeq, 1 \text{ hr}}$
$SIGMA(t, \epsilon)(10^{0.1U})$	$\frac{L_{Aeq, 1 \text{ hr}}}{10 \log_{10} \{1/\Sigma(t, \epsilon)(10^{0.1U})\}}$
303.2	25







# Appendix 9

# KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

FIGURE: 3.1.1  
MONITORING LOCATIONS  
Scale: 1:10,000 A3  
Drawn By: NH  
12/06/01

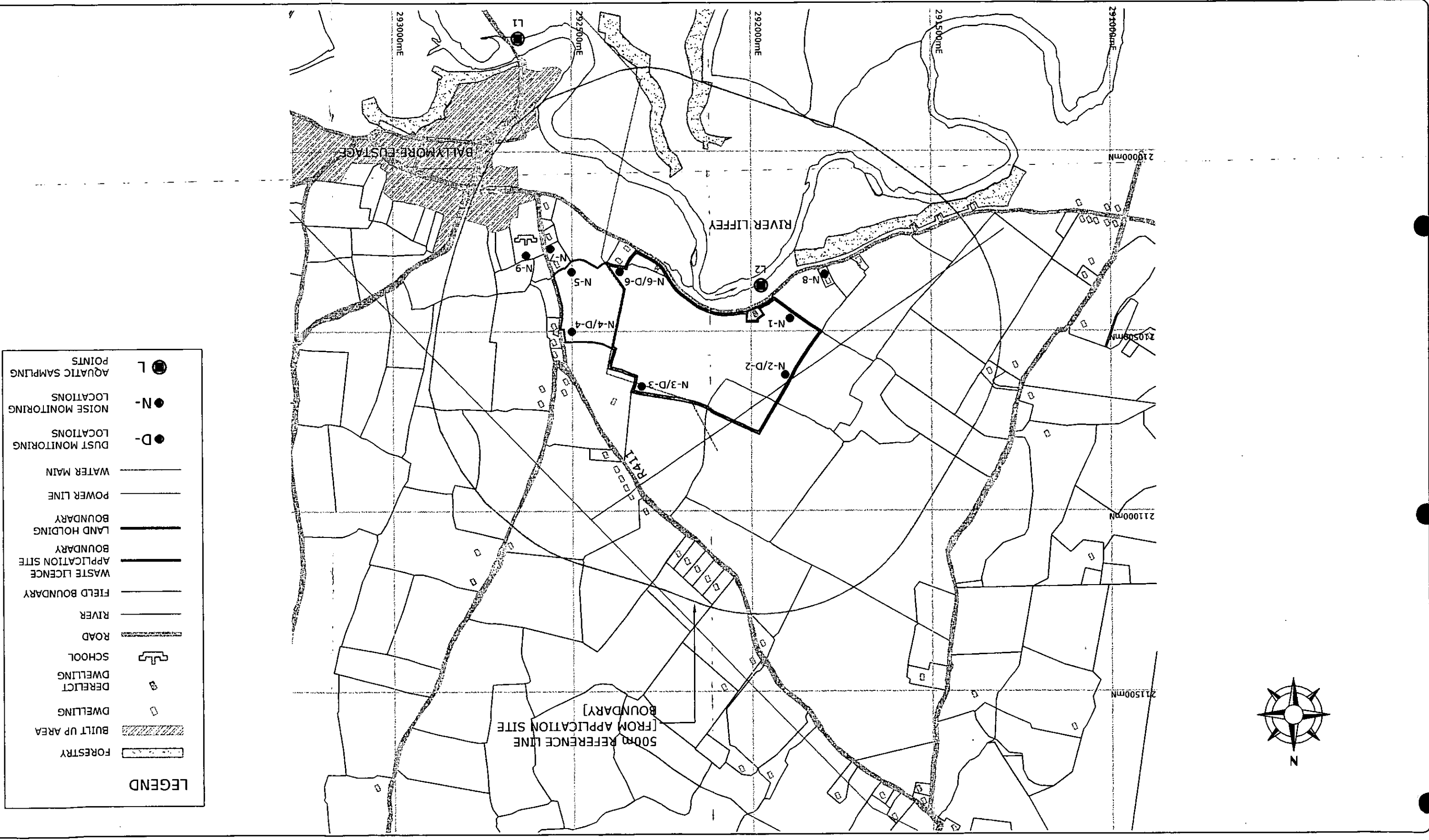
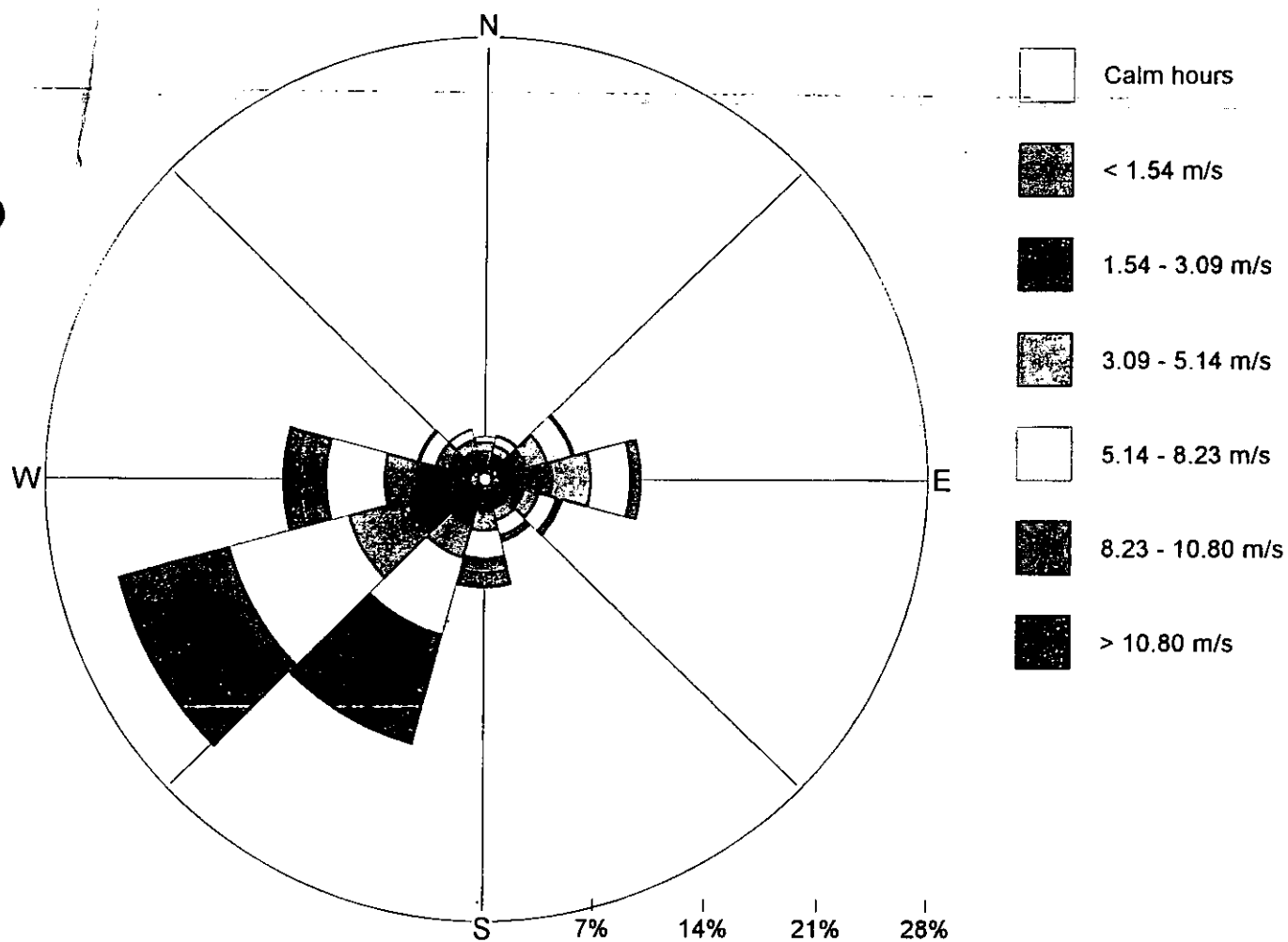
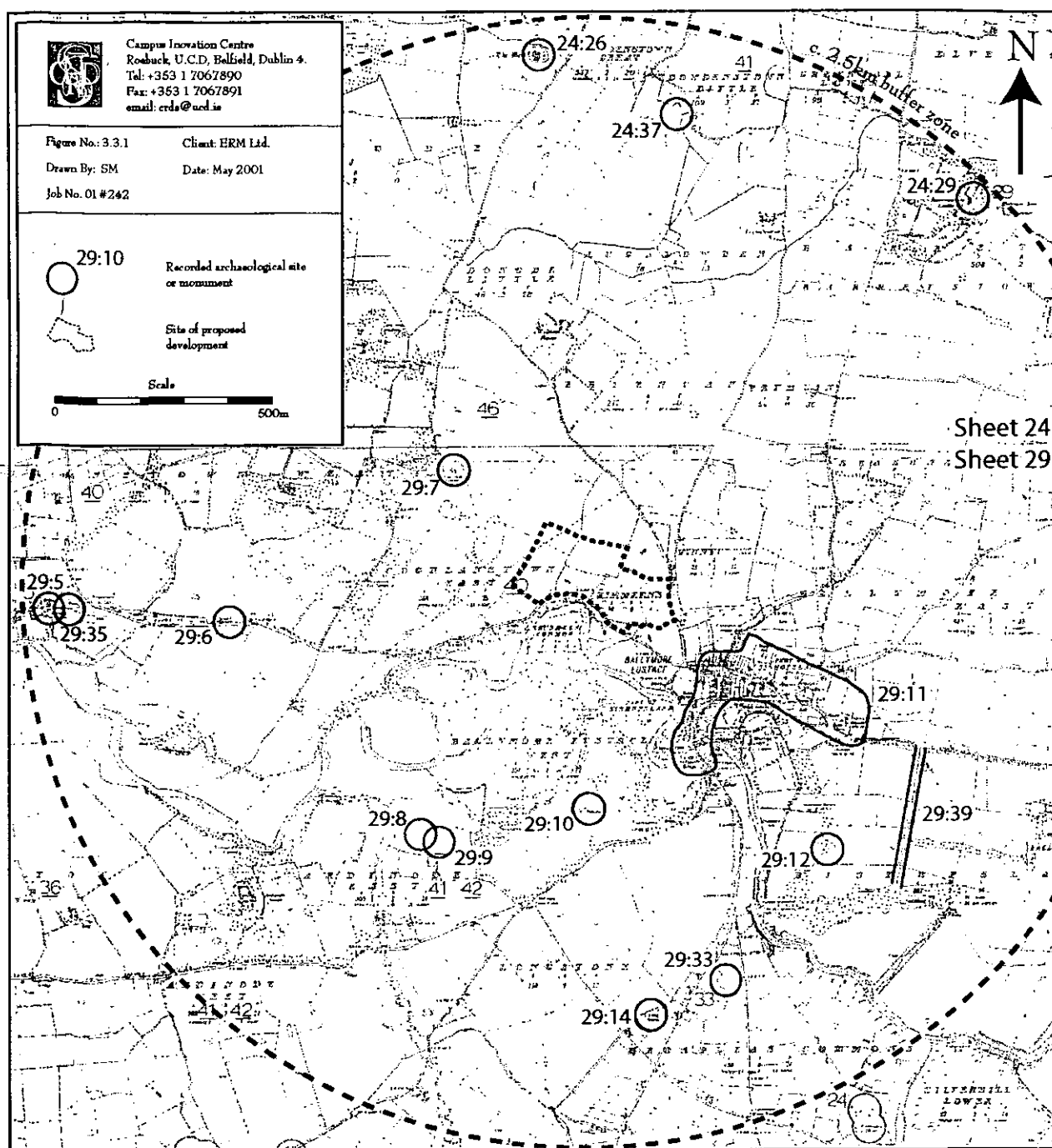




FIGURE 3.2.1

WINDROSE FOR CASEMENT AERODROME, 1992-1996





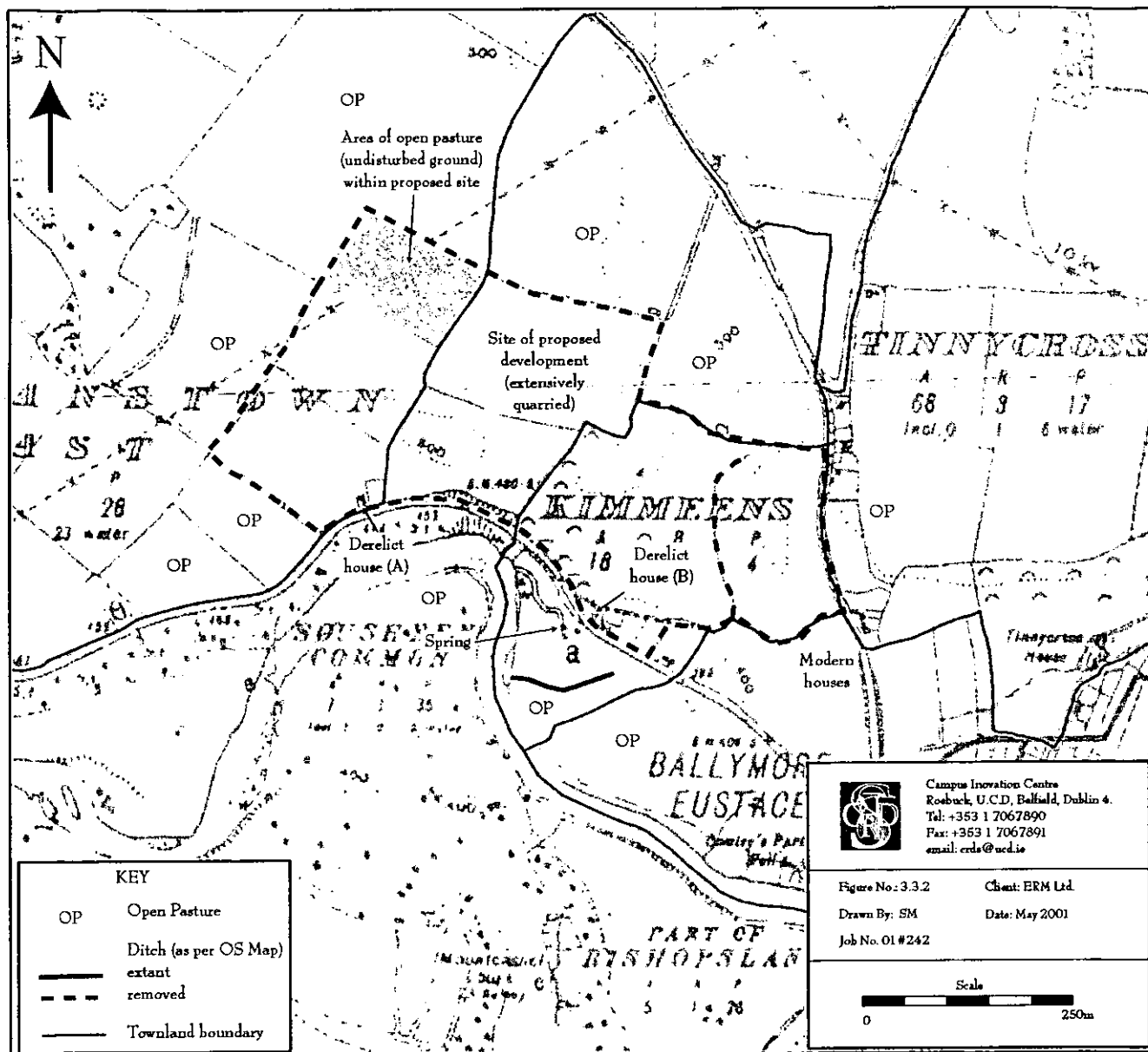


Figure 3.3.2. Extract from R.M.P. Map for County Kildare (Sheet 29), showing the results of the field survey

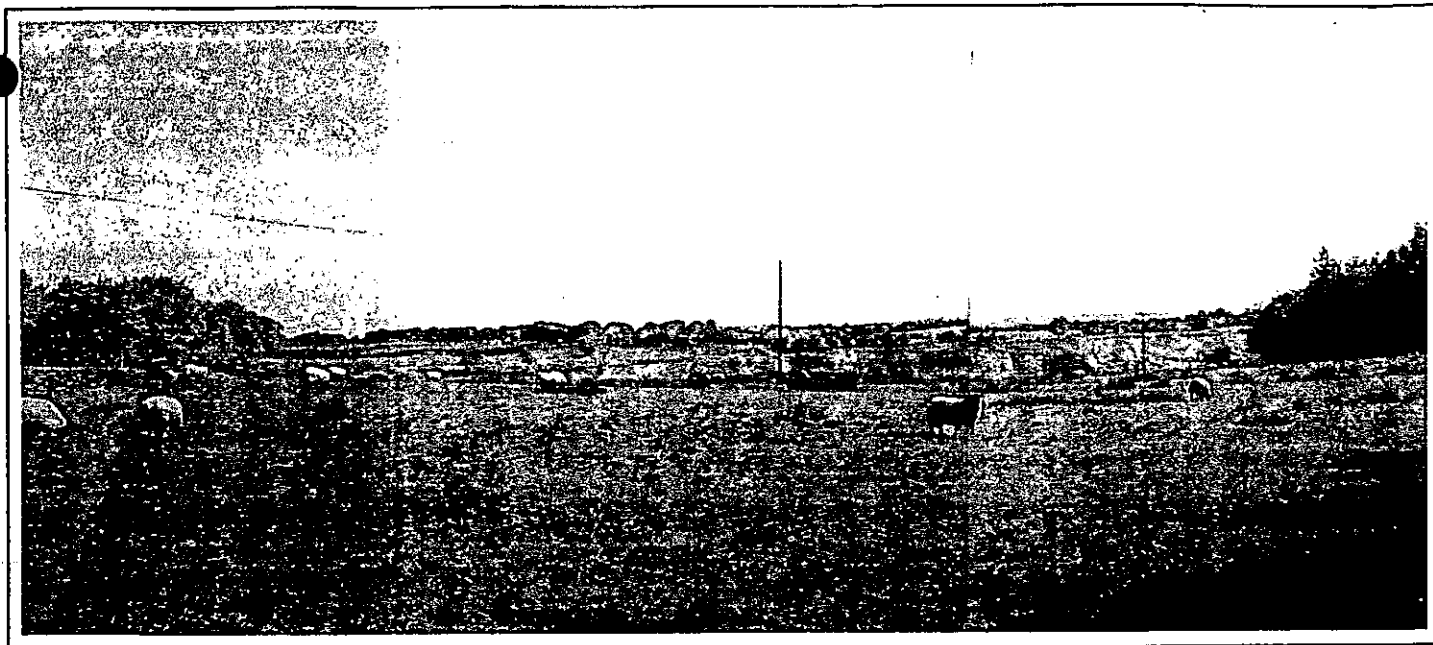


Plate 3.3.1. View of proposed development from Ballymore Eustace to Harristown Road, facing northeast.

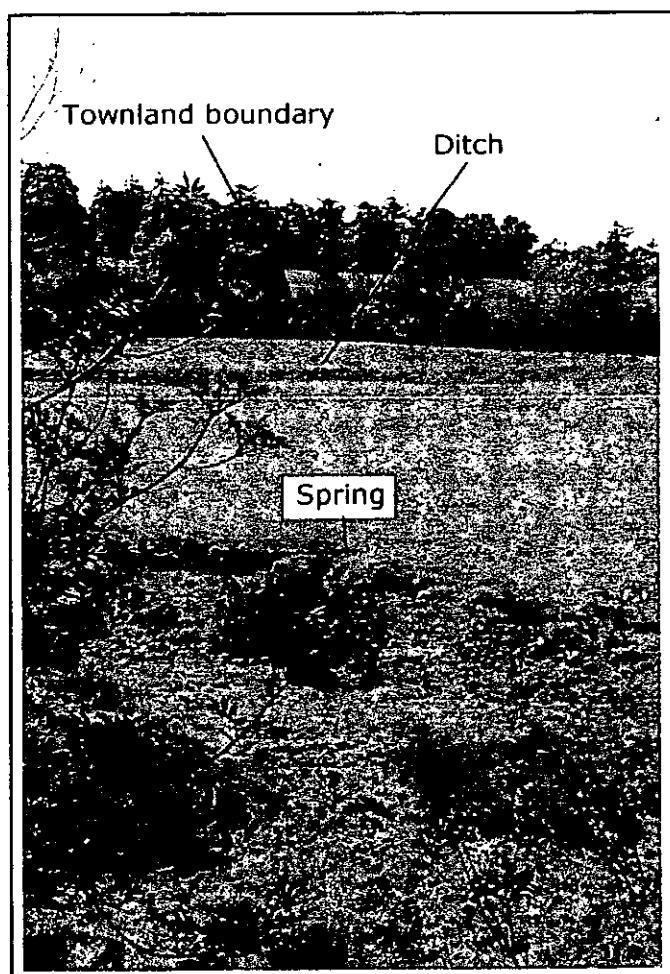


Plate 3.3.2. Spring, ditch and townland boundary, from Ballymore Eustace to Harristown Road, facing south (outside of proposed development).

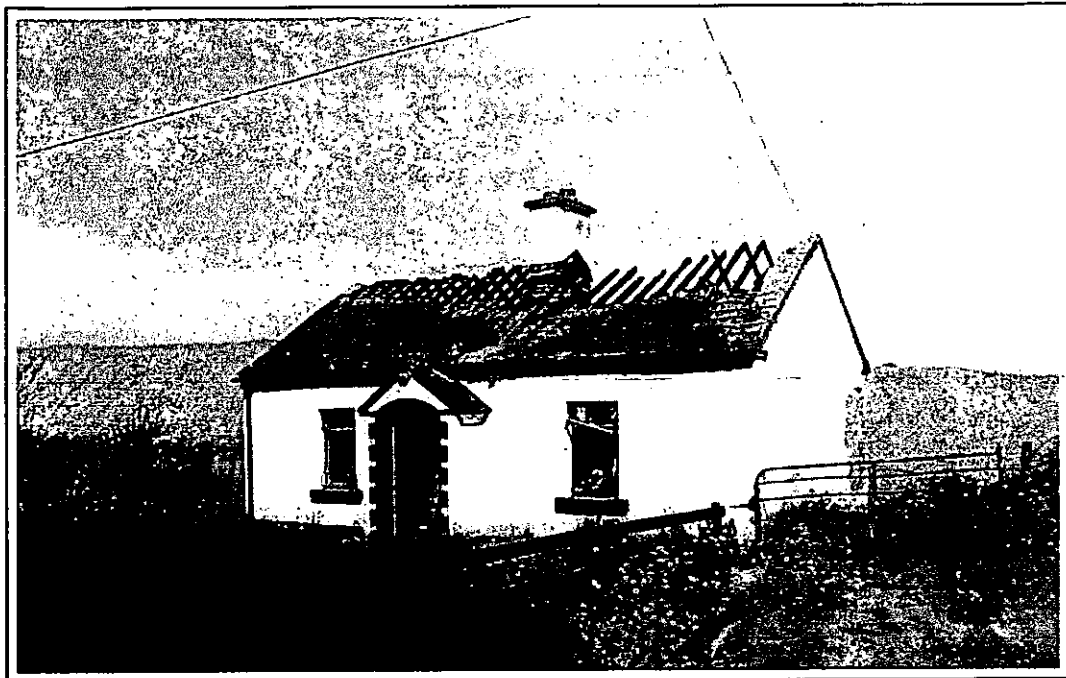
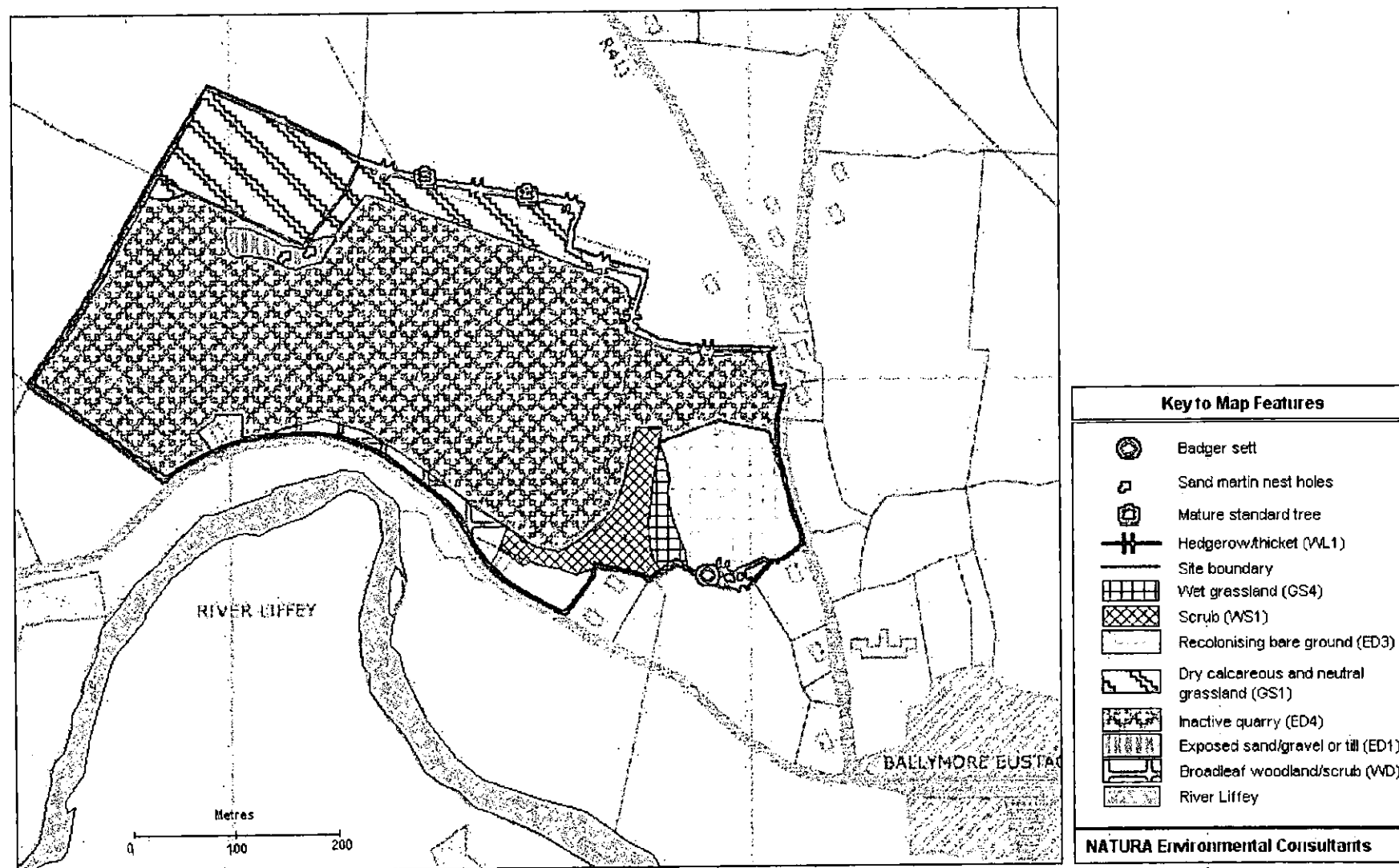


Plate 3.3.3. View of derelict house (see Figure 3.3.2 (A)), with quarry bunding in background; taken from Ballymore Eustace to Harristown Road, facing north.

**Figure 3.4.1: Ballymore Eustace Industrial Park: Habitat Map**





LEGEND	
	FORESTRY
	BUILT UP AREA
	DWELLING
	SCHOOL
	ROAD
	RIVER
	FIELD BOUNDARY
	WASTE LICENCE APPLICATION SITE BOUNDARY
	LAND HOLDING BOUNDARY
	POWER LINE
	WATER MAIN

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

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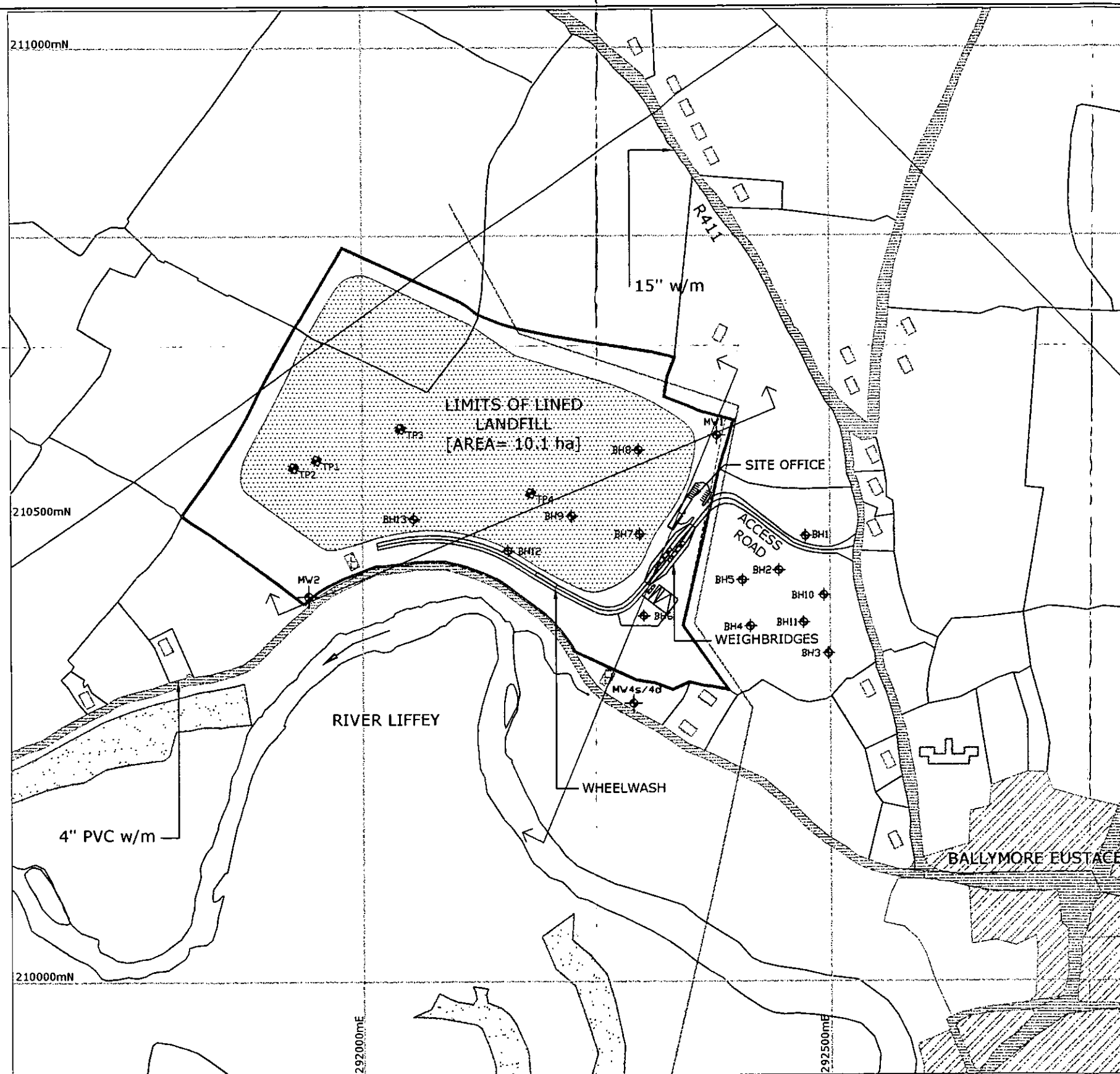
FIGURE: 3.5.1

LOCAL INFRASTRUCTURE AND DEVELOPMENT

Scale: 1:10,000 A3

Drawn By: NH

Date: 12/06/01



# LEGEND

- FORESTRY
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- WASTE LICENCE APPLICATION BOUNDARY
- POWER LINE
- DUBLIN CORPORATION WATER MAIN
- 15" w/m
- 4" PVC w/m
- MW MONITORING BOREHOLES
- BH GEOTECHNICAL BOREHOLES
- TRIAL PITS

NOTE: REFER TO FIGURES 3.6.2 AND 3.6.3 FOR CROSS-SECTIONS

Prepared by:  
**Environment & Resource Management Ltd.**

21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE TELEPHONE 045 482248 FAX 045 482288

**KTK SAND & GRAVEL**

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FIG: 3.6.1.

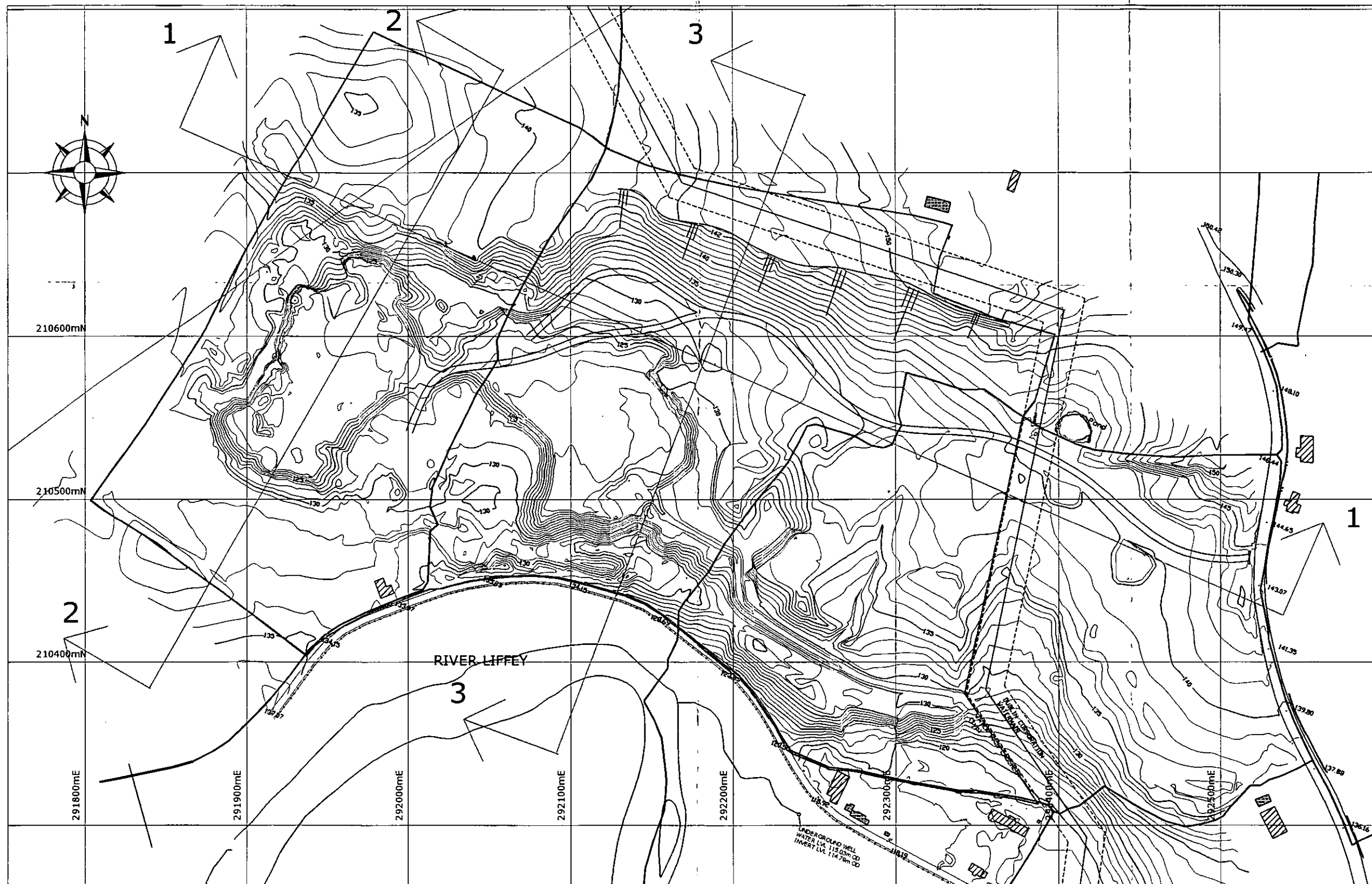
BOREHOLE LOCATION PLAN

Scale: 1:5,000 A3

Drawn By: NH

Date: 12/06/01





Base Map Prepared by:  
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SURVEYS CURRENT TO END OF JANUARY 2001

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LANDSCAPE ASSESSMENT

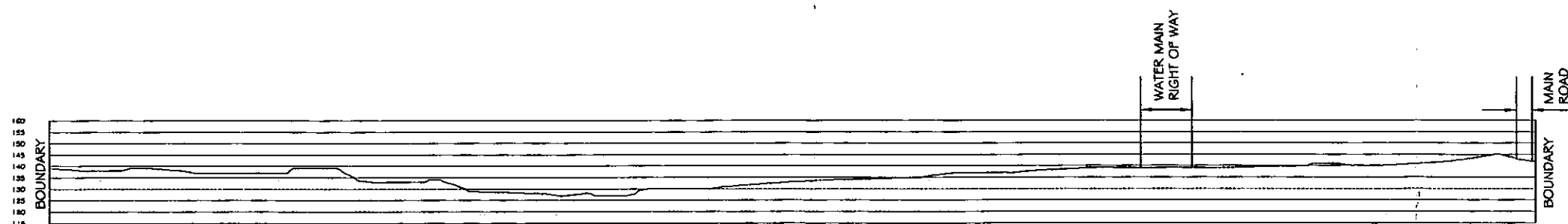
FIG: 3.7.1

EXISTING SITE SURVEY [CONTOURS ONLY]

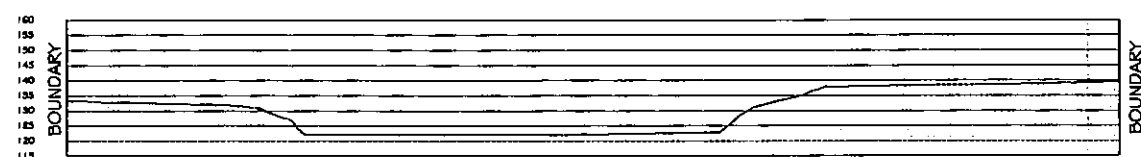
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Drawn By: CB

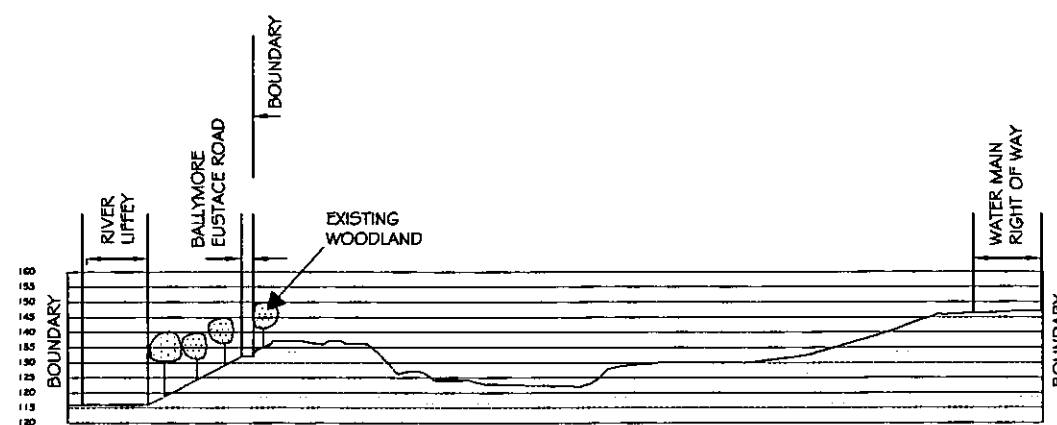
Date: 25/05/01



CONTOUR PROFILE 1-1  
EXISTING



CONTOUR PROFILE 2-2  
EXISTING



CONTOUR PROFILE 3-3  
EXISTING

NOTE: REF EXISTING SITE SURVEY 3.7.1  
FOR LOCATION OF SECTIONS

Prepared by:

**RICHARD WEBB & ASSOC.**  
LANDSCAPE ARCHITECTS

SPRINGFIELD, HOLLYBROOK,  
BRAY, Co. WICKLOW.  
TEL: 01 2866991 FAX: 01 2866990

in  
association  
with

**MARTIN MURRAY**  
ARCHITECTS

10-11 MARINE TERRACE,  
DUN LAOGHAIRE, Co. DUBLIN.  
TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**

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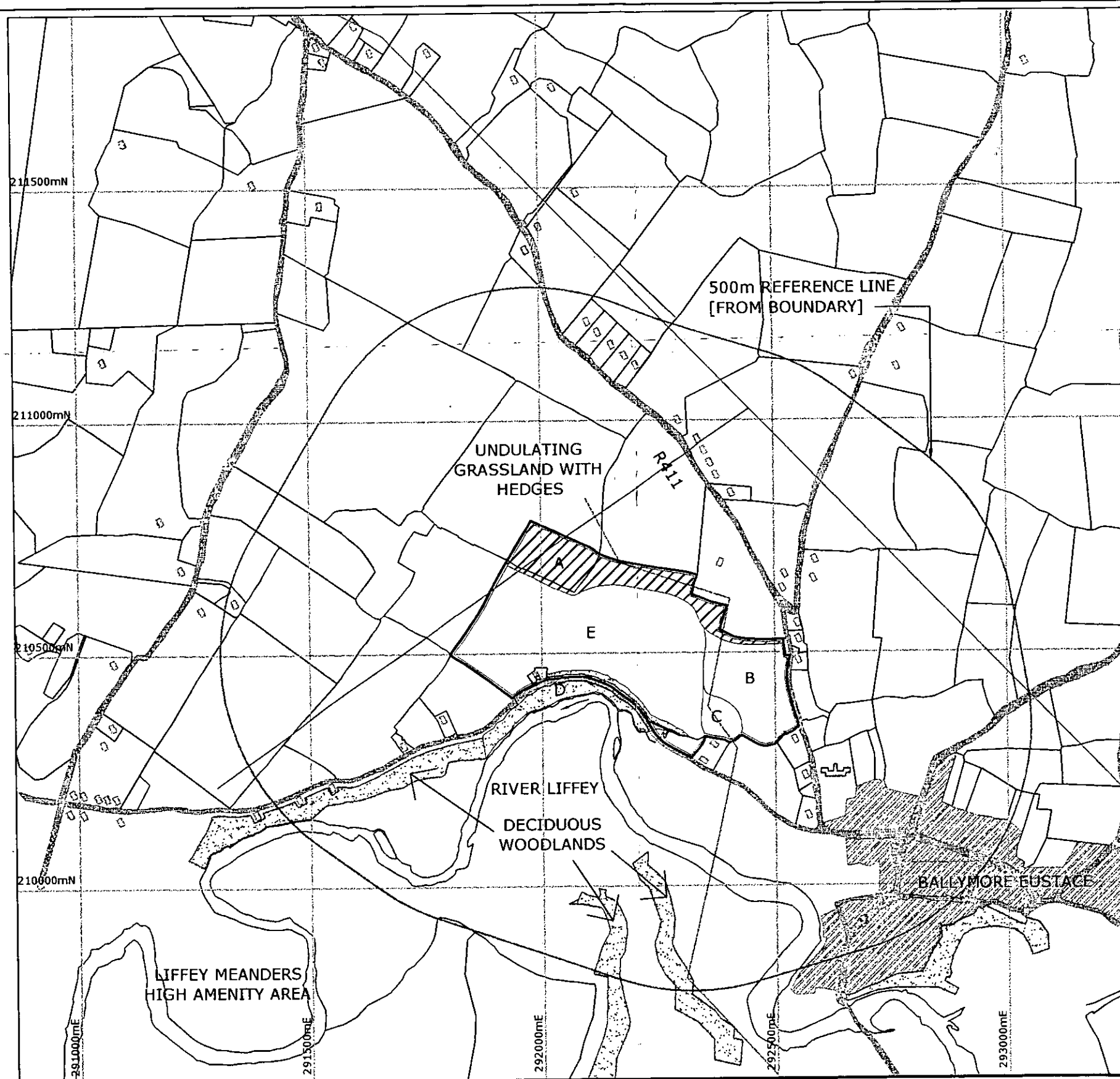
FIG 3.7.1 a

EXISTING GROUND PROFILE SECTIONS

Scale: 1:2,500 A3

Drawn By: CB

Date: 25/05/01



# LEGEND

- WOODLAND
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- LAND HOLDING BOUNDARY
- POWER LINE
- WATER MAIN

## LANDSCAPE CHARACTER AREAS

- A- MEADOW & HEDGEROW
- B- DISTURBED GROUND
- C- WILLOW THICKET & MARSH
- D- BEECH WOODLAND
- E- GRAVEL QUARRY

Prepared by:

**RICHARD WEBB & ASSOC.**  
LANDSCAPE ARCHITECTS

SPRINGFIELD, HOLLYBROOK,  
BRAY, Co. WICKLOW.  
TEL: 01 2866991 FAX: 01 2866990

in  
association  
with

**MARTIN MURRAY**  
ARCHITECTS

10-11 MARINE TERRACE,  
DUN LAOGHAIRE, Co. DUBLIN.  
TEL: 01 2844400 FAX: 01 2844507

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

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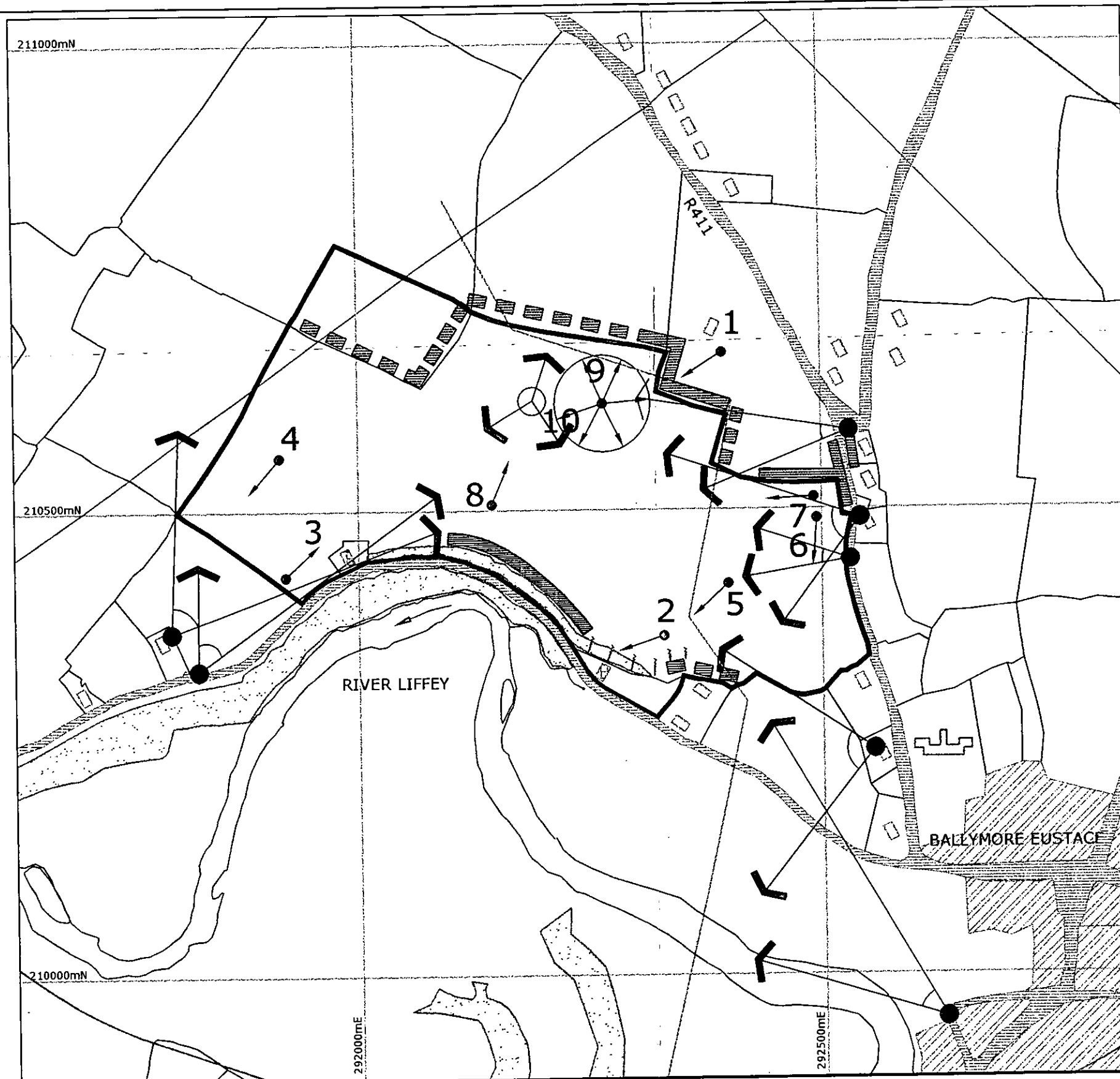
FIG: 3.7.1 b

EXISTING LANDSCAPE

Scale: 1:10,000 A3

Drawn By: CB

Date: 25/05/01



# LEGEND

- WOODLAND
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- LAND HOLDING BOUNDARY
- POWER LINE
- WATER MAIN
- VIEW
- VISUAL BARRIER
- INTERMEDIATE BARRIER
- PHOTO LOCATION

Prepared by:  
**RICHARD WEBB & ASSOC.**  
 LANDSCAPE ARCHITECTS  
 SPRINGFIELD, HOLLYBROOK,  
 BRAY, Co. WICKLOW.  
 TEL: 01 2866991 FAX: 01 2866990

in  
 association  
 with

**MARTIN MURRAY**  
 ARCHITECTS  
 10-11 MARINE TERRACE,  
 DUN LAOGHAIRE, Co. DUBLIN.  
 TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**  
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LANDSCAPE ASSESSMENT

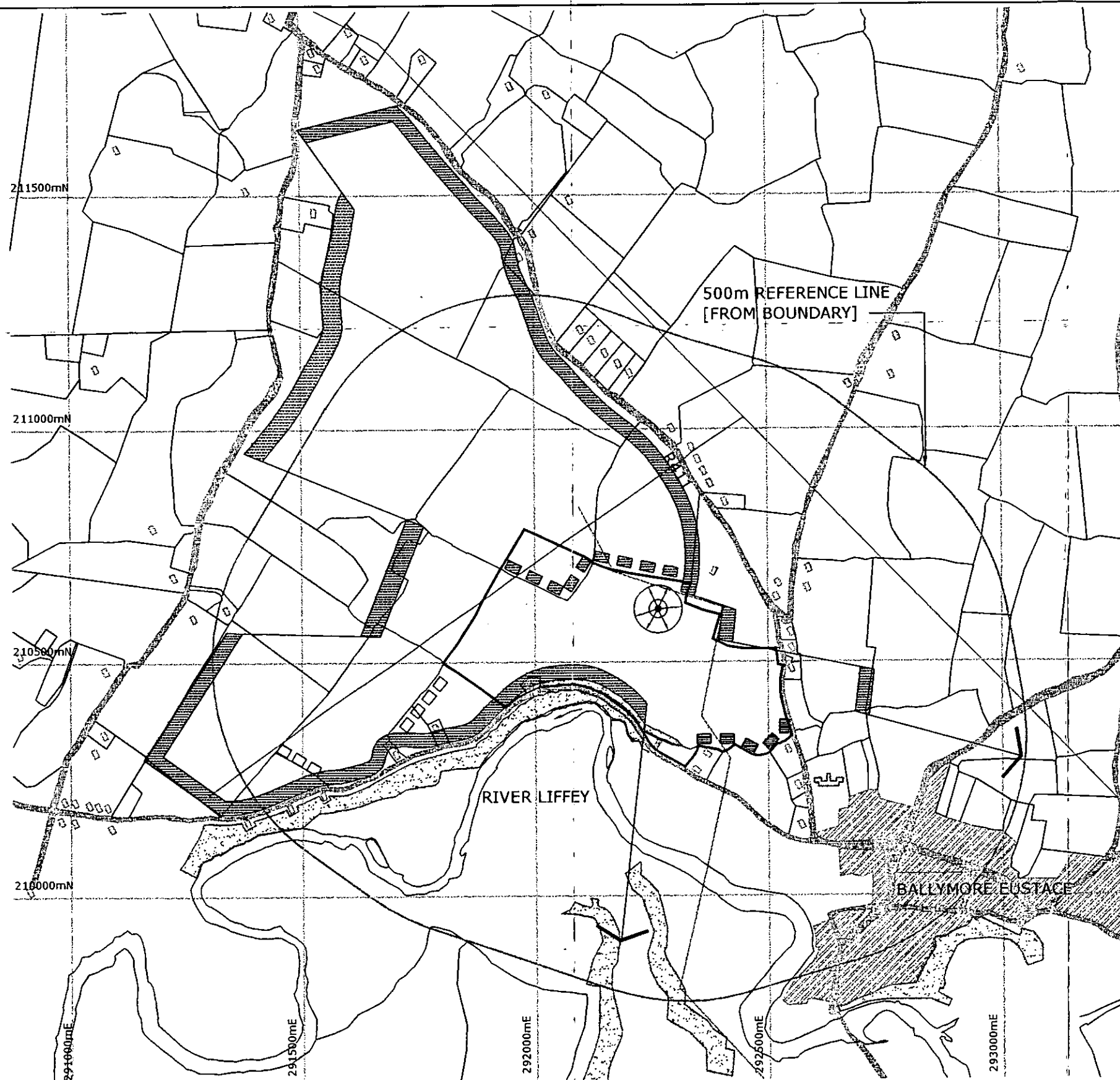
FIG 3.7.1 c

VIEWS INTO SITE & PHOTO LOCATIONS

Scale: 1:5,000 A3

Drawn By: CB

Date: 25/05/01



**LEGEND**

- WOODLAND
- BUILT UP AREA
- DWELLING
- DELECT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- LAND HOLDING BOUNDARY
- POWER LINE
- WATER MAIN
- VISUAL BOUNDARY
- INTERMEDIATE HORIZON
- EXTENT OF VIEW
- VIEW POINT

Prepared by:  
**RICHARD WEBB & ASSOC.**  
 LANDSCAPE ARCHITECTS  
 SPRINGFIELD, HOLLYBROOK,  
 BRAY, Co. WICKLOW.  
 TEL: 01 2866991 FAX: 01 2866990

in  
 association  
 with

**MARTIN MURRAY**  
 ARCHITECTS  
 10-11 MARINE TERRACE,  
 DUN LAOGHAIRE, Co. DUBLIN.  
 TEL: 01 2844400 FAX: 01 2844507

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE ASSESSMENT

FIG: 3.7.1 d

VISUAL BOUNDARY OF SITE

Scale: 1:10,000 A3

Drawn By: CB

Date: 25/05/01



# LEGEND

- WOODLAND
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- SCHOOL
- ROAD
- RIVER
- FIELD BOUNDARY
- LAND HOLDING BOUNDARY
- POWER LINE
- WATER MAIN
- SITE VIEWS

POINT NUMBER	m OD	
	EASTING	NORTHING
1	291320.889	210169.041
2	291786.135	210359.809
3	291994.684	210431.418
4	292549.489	210484.856
5	292368.425	210303.226
6	292563.222	210235.405
7	292631.083	209957.189

Prepared by:

**RICHARD WEBB & ASSOC.**  
LANDSCAPE ARCHITECTS

SPRINGFIELD, HOLLYBROOK,  
BRAY, Co. WICKLOW.  
TEL: 01 2866991 FAX: 01 2866990

in  
association  
with

**MARTIN MURRAY**  
ARCHITECTS

10-11 MARINE TERRACE,  
DUN LAOGHAIRE, Co. DUBLIN.  
TEL: 01 2844400 FAX: 01 2844507

## KTK SAND & GRAVEL

Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE ASSESSMENT

FIG: 3.7.1 e

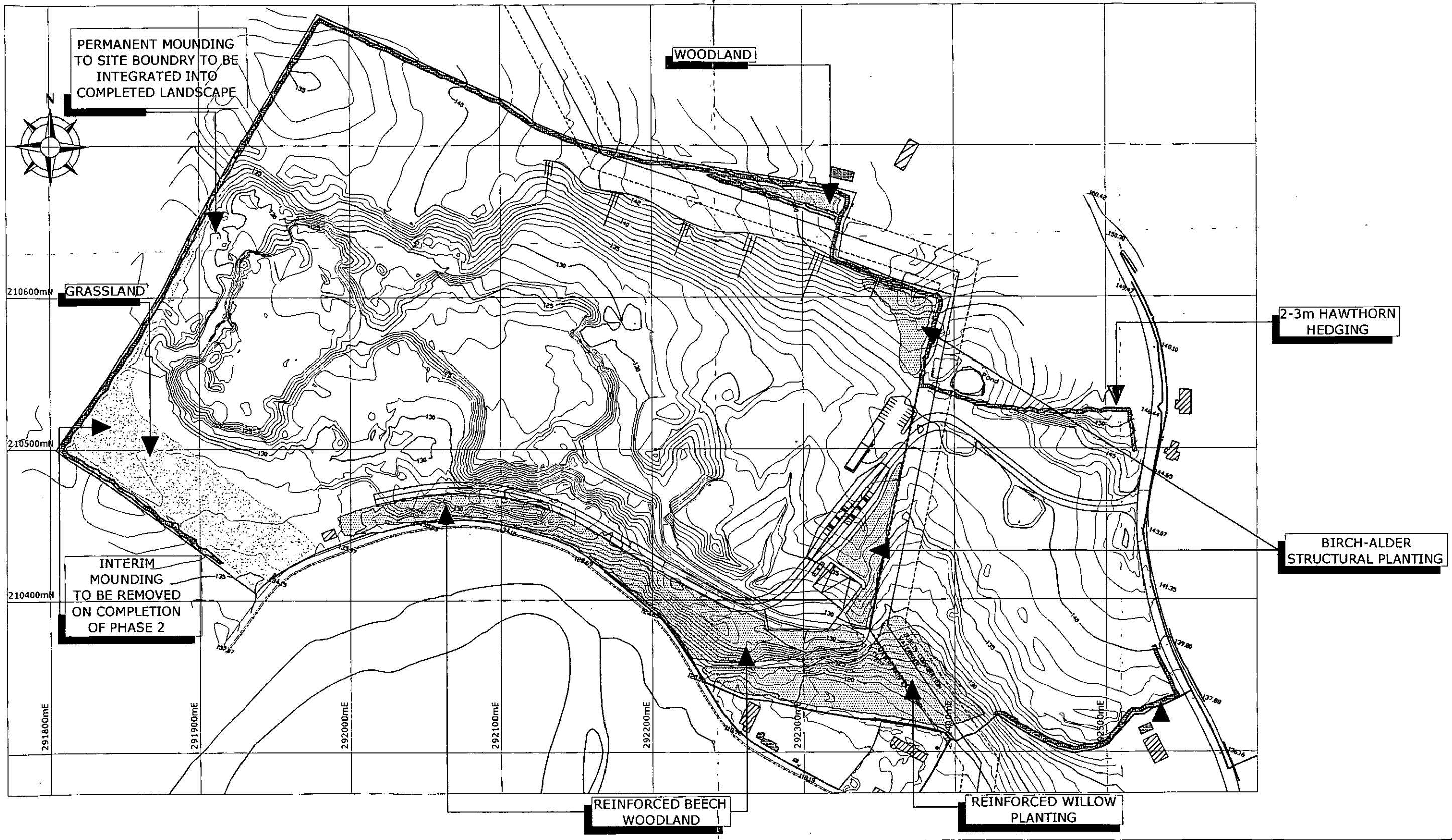
LOCAL SETTING/ SITE VIEWS

Scale: 1:10,000 A3

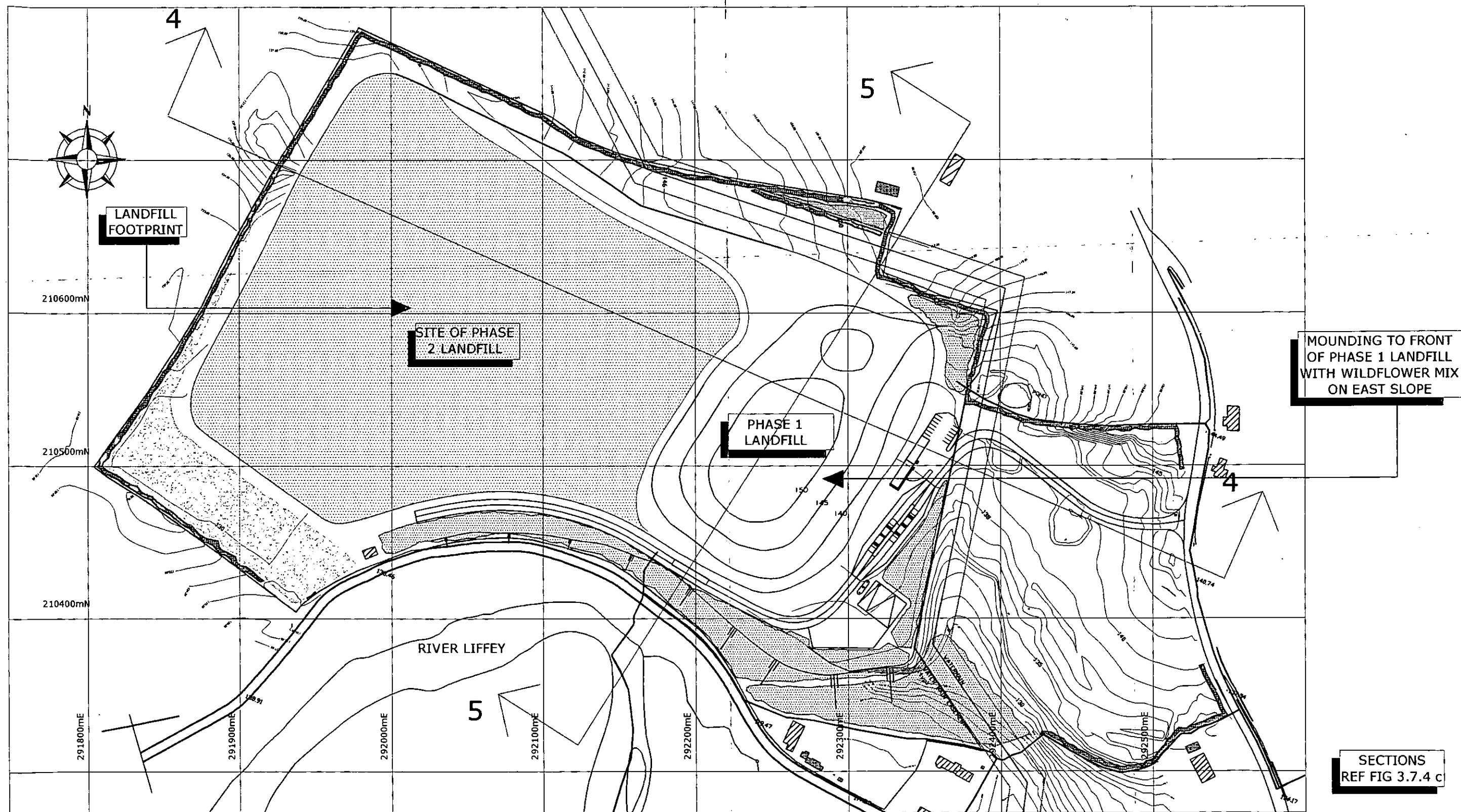
Drawn By: CB

Date: 25/05/01





Prepared by: <b>RICHARD WEBB &amp; ASSOC.</b> LANDSCAPE ARCHITECTS SPRINGFIELD, HOLLYBROOK, BRAY, Co. WICKLOW. TEL: 01 2866991 FAX: 01 2866990		in association with <b>MARTIN MURRAY</b> ARCHITECTS 10-11 MARINE TERRACE, DUN LAOGHAIRE, Co. DUBLIN. TEL: 01 2844400 FAX: 01 2844507	<b>KTK SAND &amp; GRAVEL</b> Kimmeens, Ballymore Eustace, Co. Kildare.		LANDSCAPE PROPOSALS ENABLING LANDSCAPE WORKS Scale: 1:2,500 A3 Drawn By: CB Date: 25/05/01	FIG: 3.7.4 a
---	--	---	---	--	--	--------------



Prepared by:  
**RICHARD WEBB & ASSOC.**  
 LANDSCAPE ARCHITECTS  
 SPRINGFIELD, HOLLYBROOK,  
 BRAY, Co. WICKLOW.  
 TEL: 01 2866991 FAX: 01 2866990

in  
 association  
 with

**MARTIN MURRAY**  
 ARCHITECTS  
 10-11 MARINE TERRACE,  
 DUN LAOGHAIRE, Co. DUBLIN.  
 TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**  
 Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE PROPOSALS

FIG: 3.7.4 b

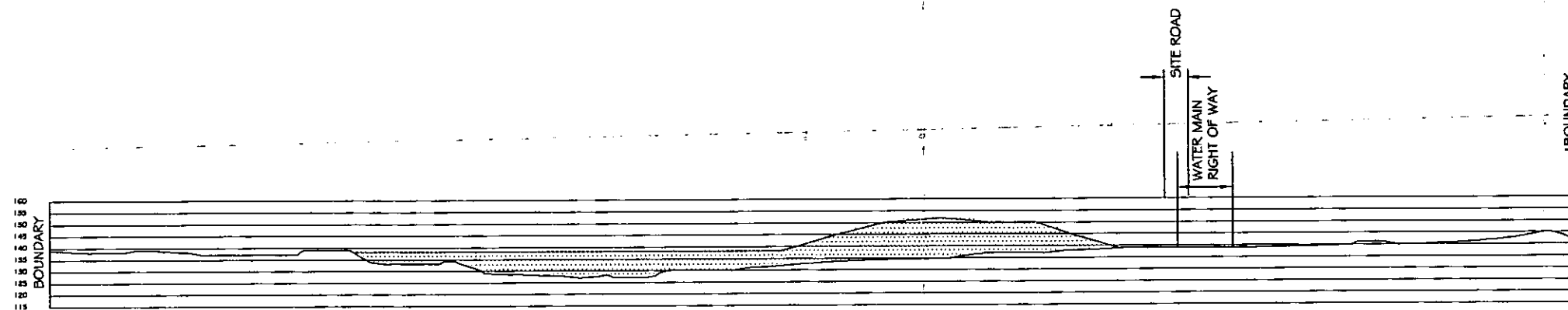
STATE OF WORKS AT COMPLETION  
 OF PHASE 1 LANDFILL

Scale: 1:2,500 A3

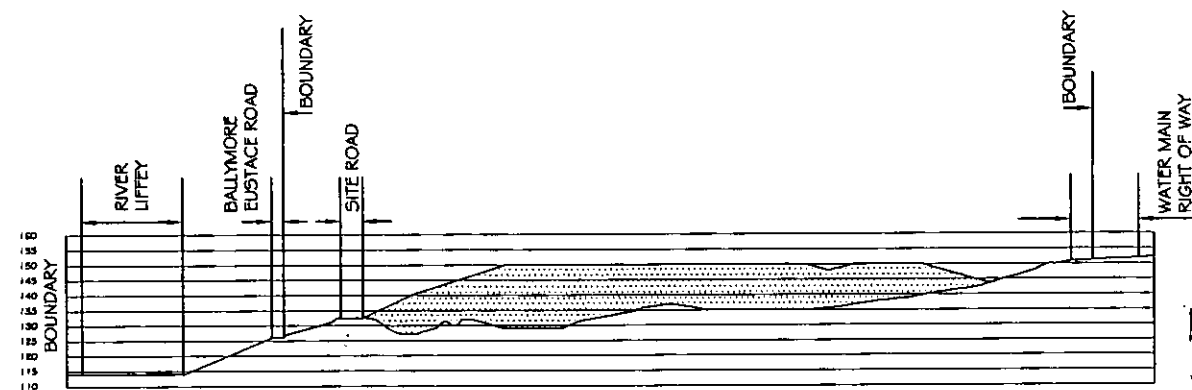
Drawn By: CB

Date: 25/05/01





CONTOUR PROFILE 4-4



CONTOUR PROFILE 5-5

NOTE: PLANTING NOT SHOWN ON  
SECTIONS DUE TO SCALE

Prepared by:

**RICHARD WEBB & ASSOC.**  
LANDSCAPE ARCHITECTS

SPRINGFIELD, HOLLYBROOK,  
BRAY, Co. WICKLOW.  
TEL: 01 2866991 FAX: 01 2866990

in  
association  
with

**MARTIN MURRAY**  
ARCHITECTS

10-11 MARINE TERRACE,  
DUN LAOGHAIRE, Co. DUBLIN.  
TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**  
Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE PROPOSALS

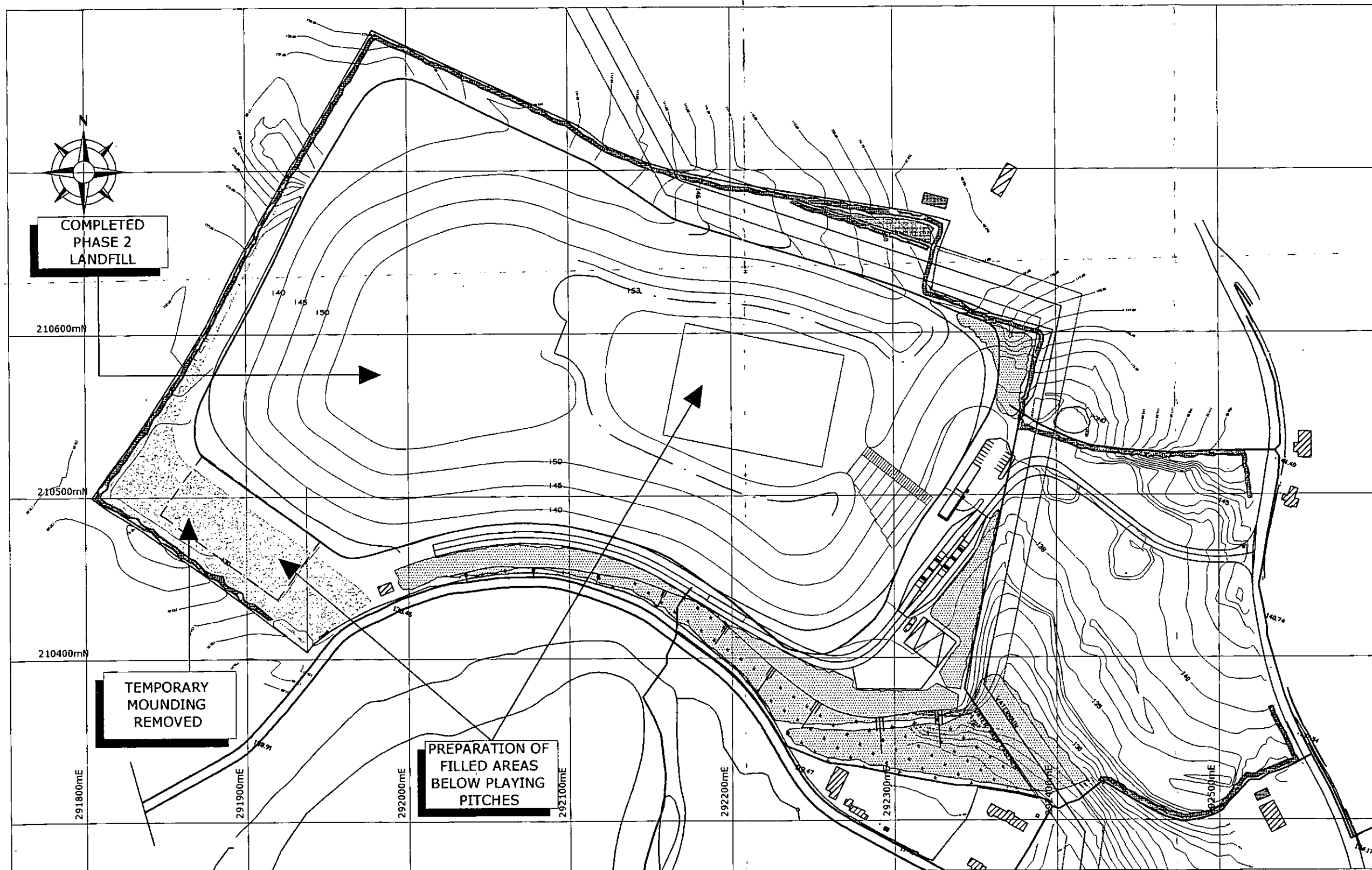
FIG: 3.7.4 c

SECTIONS- AT COMPLETION OF PHASE 1 LANDFILL

Scale: 1:2,500 A3

Drawn By: CB

Date: 25/05/01



Prepared by:  
**RICHARD WEBB & ASSOC.**  
 LANDSCAPE ARCHITECTS  
 SPRINGFIELD, HOLLYBROOK,  
 BRAY, Co. WICKLOW.  
 TEL: 01 2866991 FAX: 01 2866990

in  
 association  
 with

**MARTIN MURRAY**  
 ARCHITECTS  
 10-11 MARINE TERRACE,  
 DUN LAOGHAIRE, Co. DUBLIN.  
 TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**  
 Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE PROPOSALS

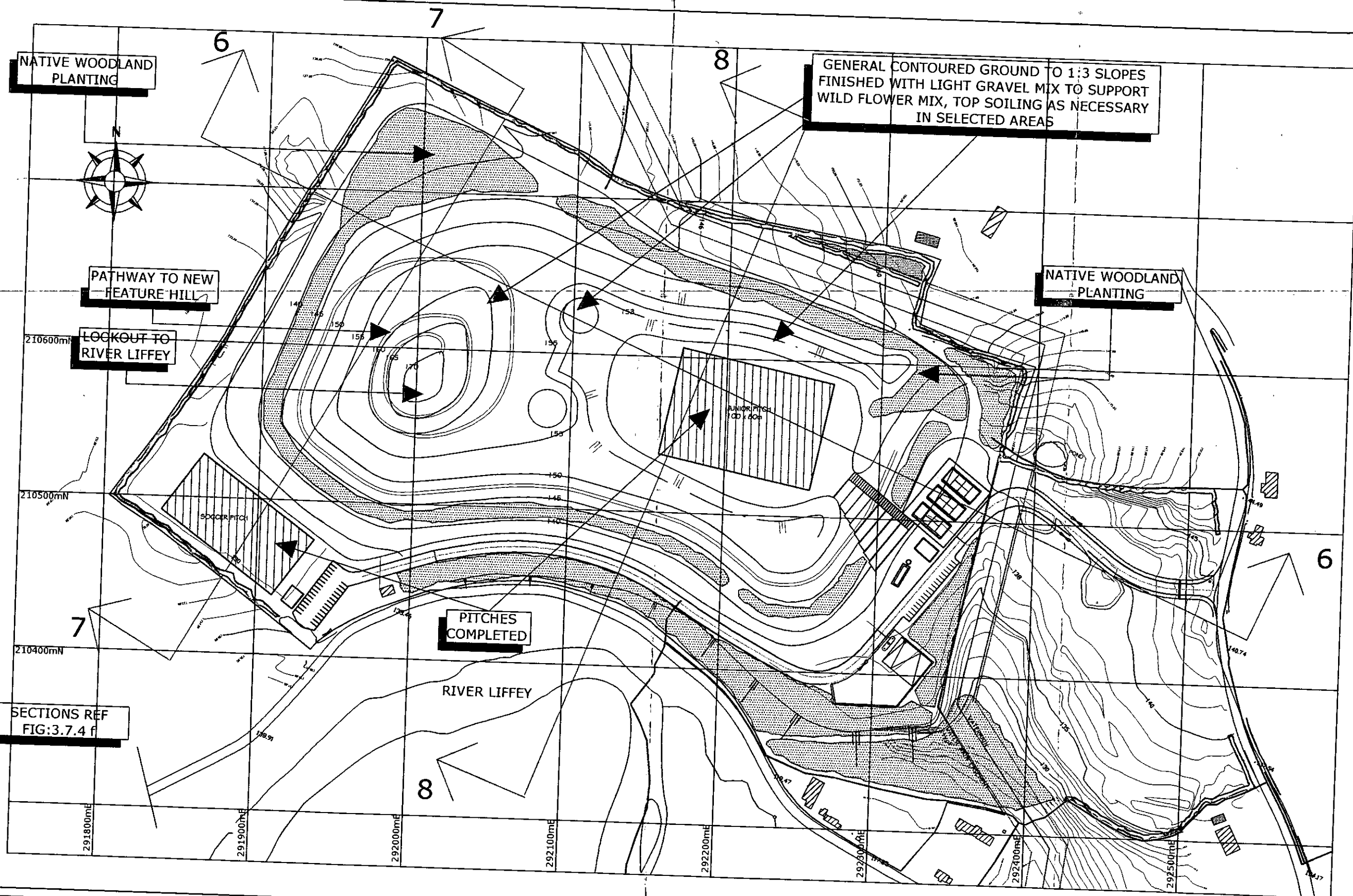
FIG: 3.7.4 d

STATE OF WORKS AT COMPLETION  
 OF PHASE 2 LANDFILL

Scale: 1:2,500 A3

Drawn By: CB

Date: 25/05/01



Prepared by:

**RICHARD WEBB & ASSOC.**  
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SPRINGFIELD, HOLLYBROOK,  
BRAY, Co. WICKLOW.  
TEL: 01 2866991 FAX: 01 2866990

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association  
with

**MARTIN MURRAY**  
ARCHITECTS

10-11 MARINE TERRACE,  
DUN LAOGHAIRE, Co. DUBLIN.  
TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**

Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE PROPOSALS

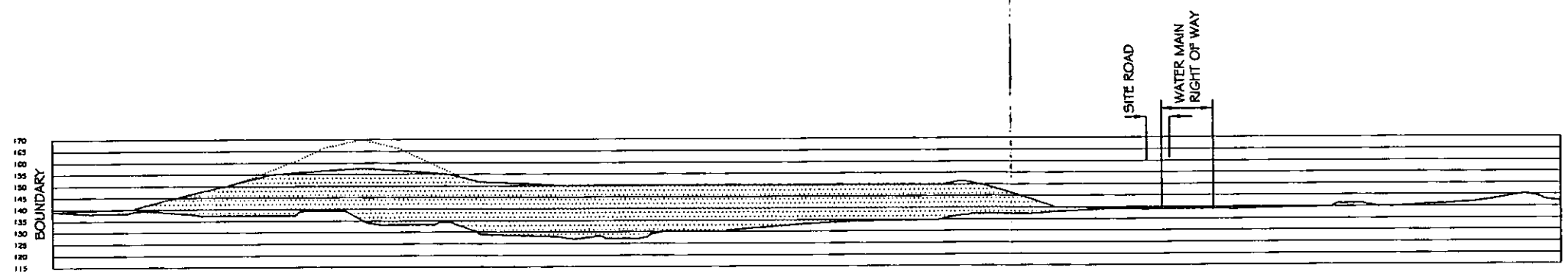
FIG: 3.7.4 e

STATE OF WORKS AT COMPLETION  
OF LANDSCAPING

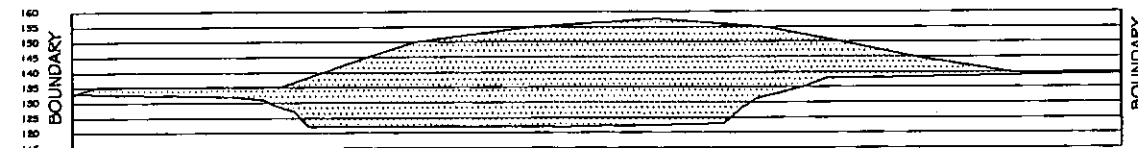
Scale: 1:2,500 A3

Drawn By: CB

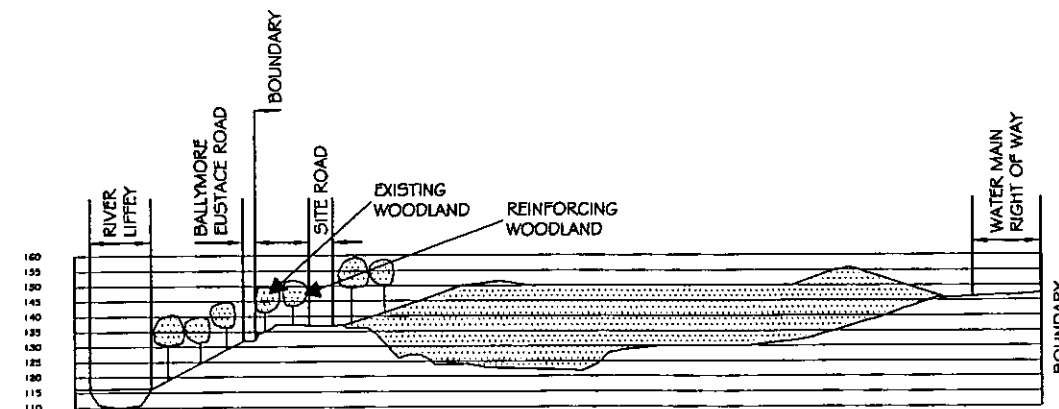
Date: 25/05/01



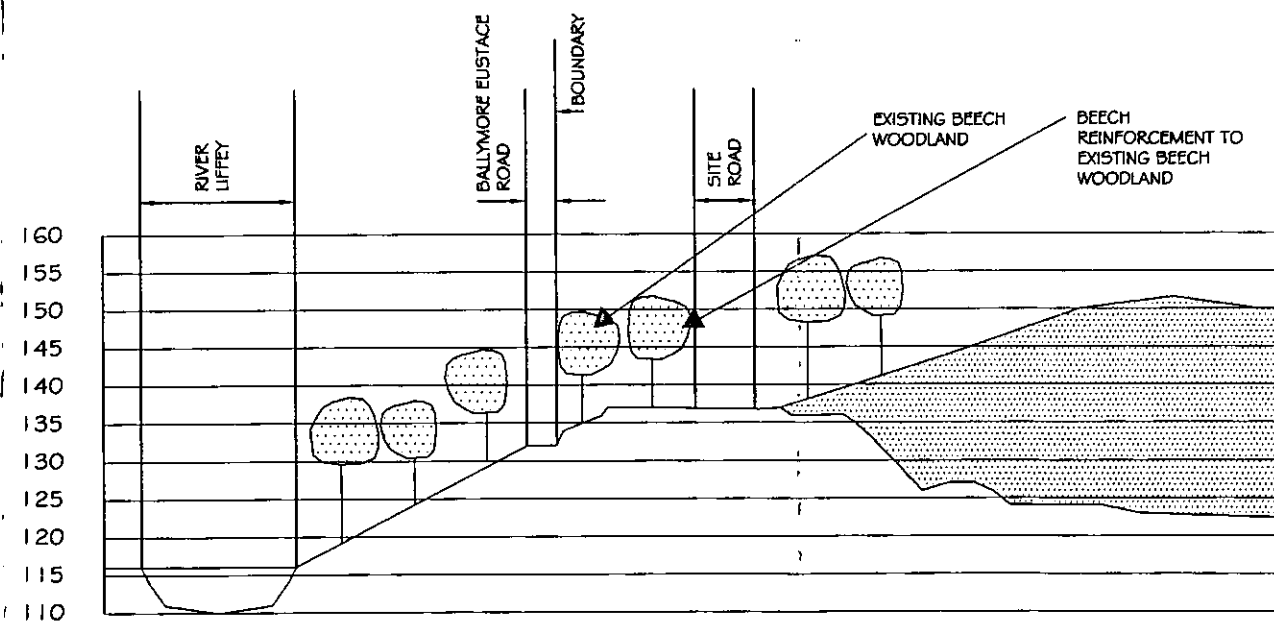
CONTOUR PROFILE 6-6



CONTOUR PROFILE 7-7



CONTOUR PROFILE 8-8



SECTION OF CONTOUR PROFILE 8-8  
SCALE 1:1000

NOTE: PLANTING NOT SHOWN ON  
SECTIONS DUE TO SCALE

Prepared by:  
**RICHARD WEBB & ASSOC.**  
LANDSCAPE ARCHITECTS  
SPRINGFIELD, HOLLYBROOK,  
BRAY, Co. WICKLOW.  
TEL: 01 2866991 FAX: 01 2866990

in  
association  
with

**MARTIN MURRAY**  
ARCHITECTS  
10-11 MARINE TERRACE,  
DUN LAOGHAIRE, Co. DUBLIN.  
TEL: 01 2844400 FAX: 01 2844507

**KTK SAND & GRAVEL**  
Kimmeens, Ballymore Eustace, Co. Kildare.

LANDSCAPE PROPOSALS

FIG: 3.7.4 f

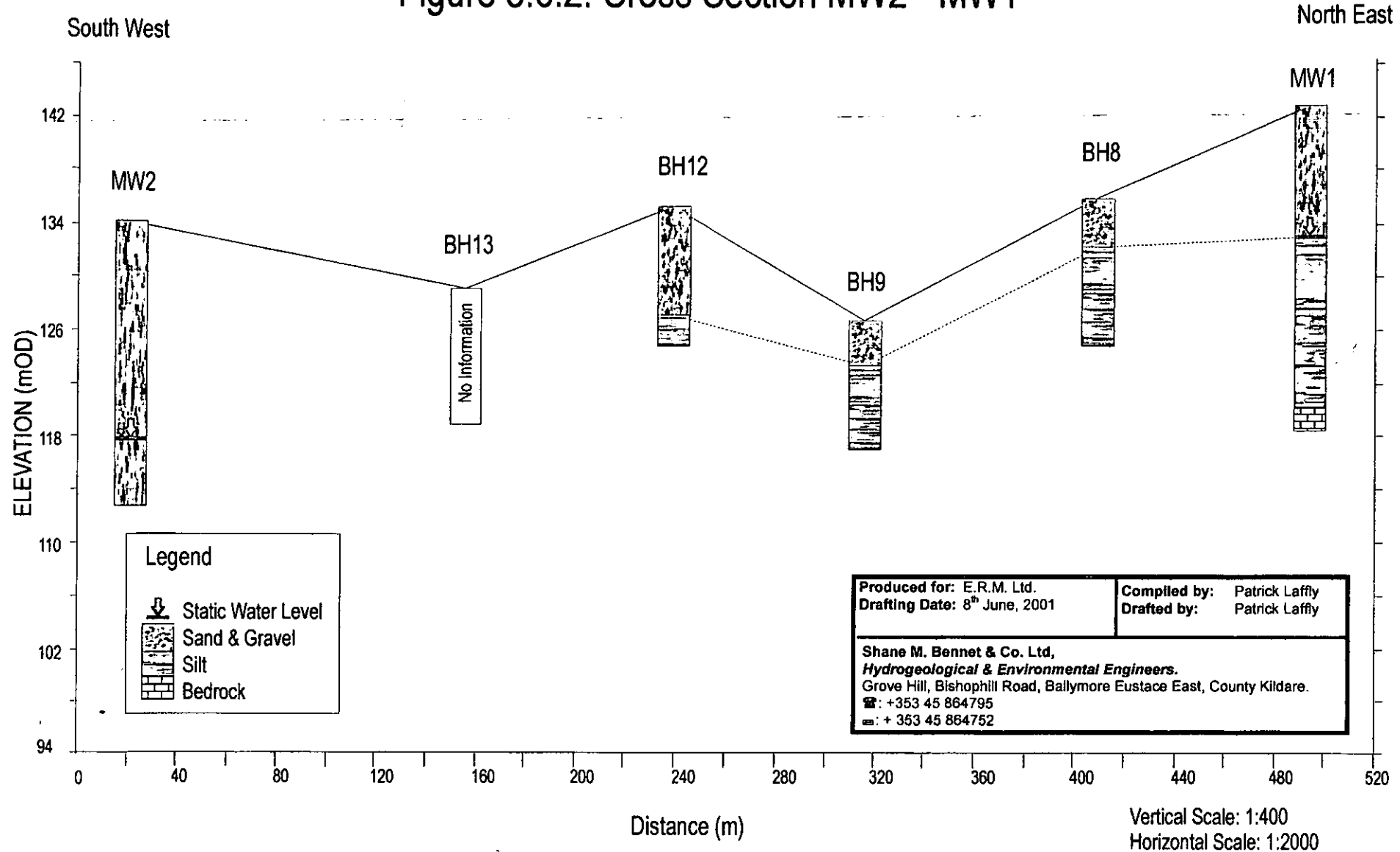
SECTIONS- AT COMPLETION OF LANDSCAPING

Scale: 1:2,500 A3

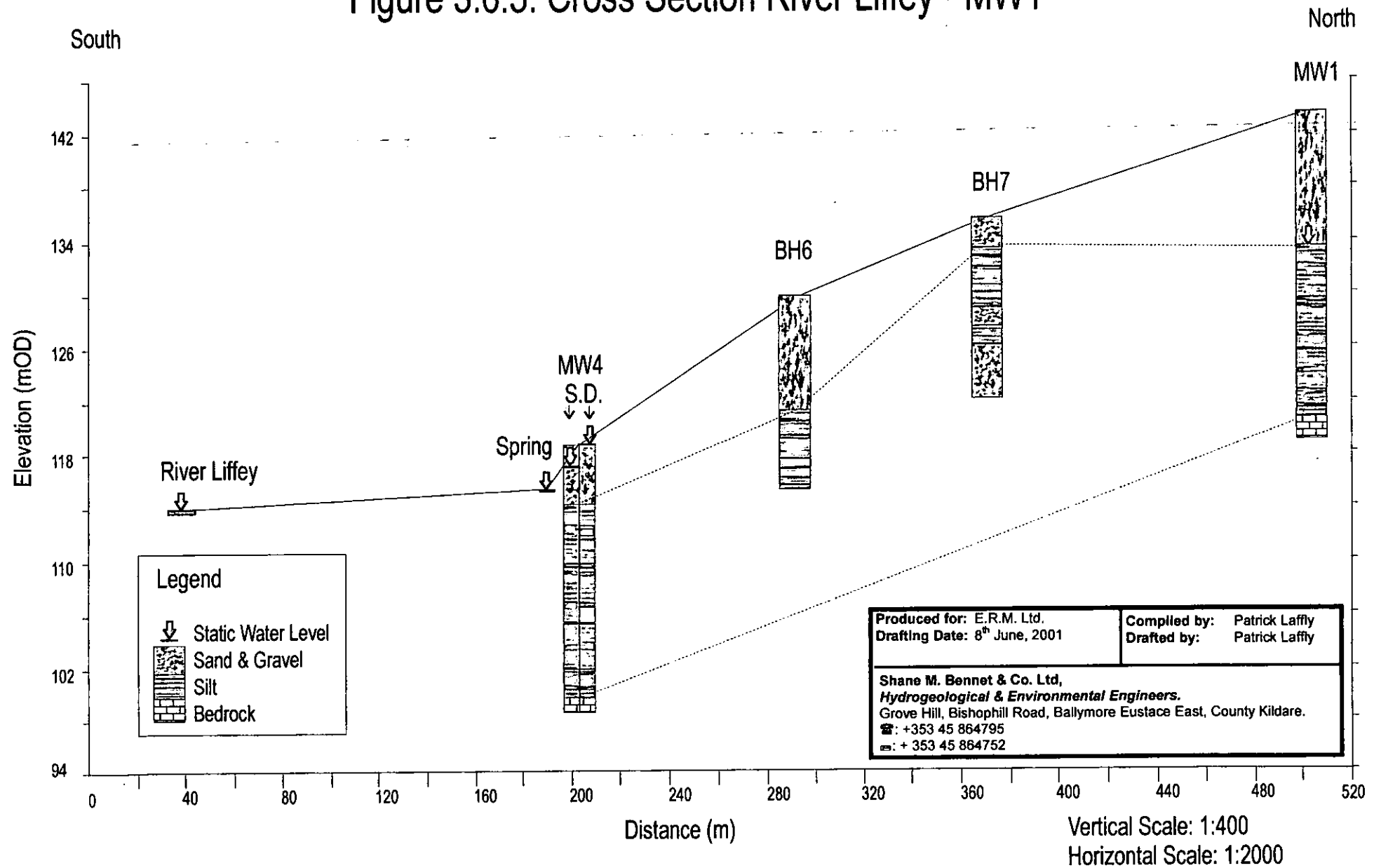
Drawn By: CB

Date: 25/05/01

Figure 3.6.2: Cross Section MW2 - MW1



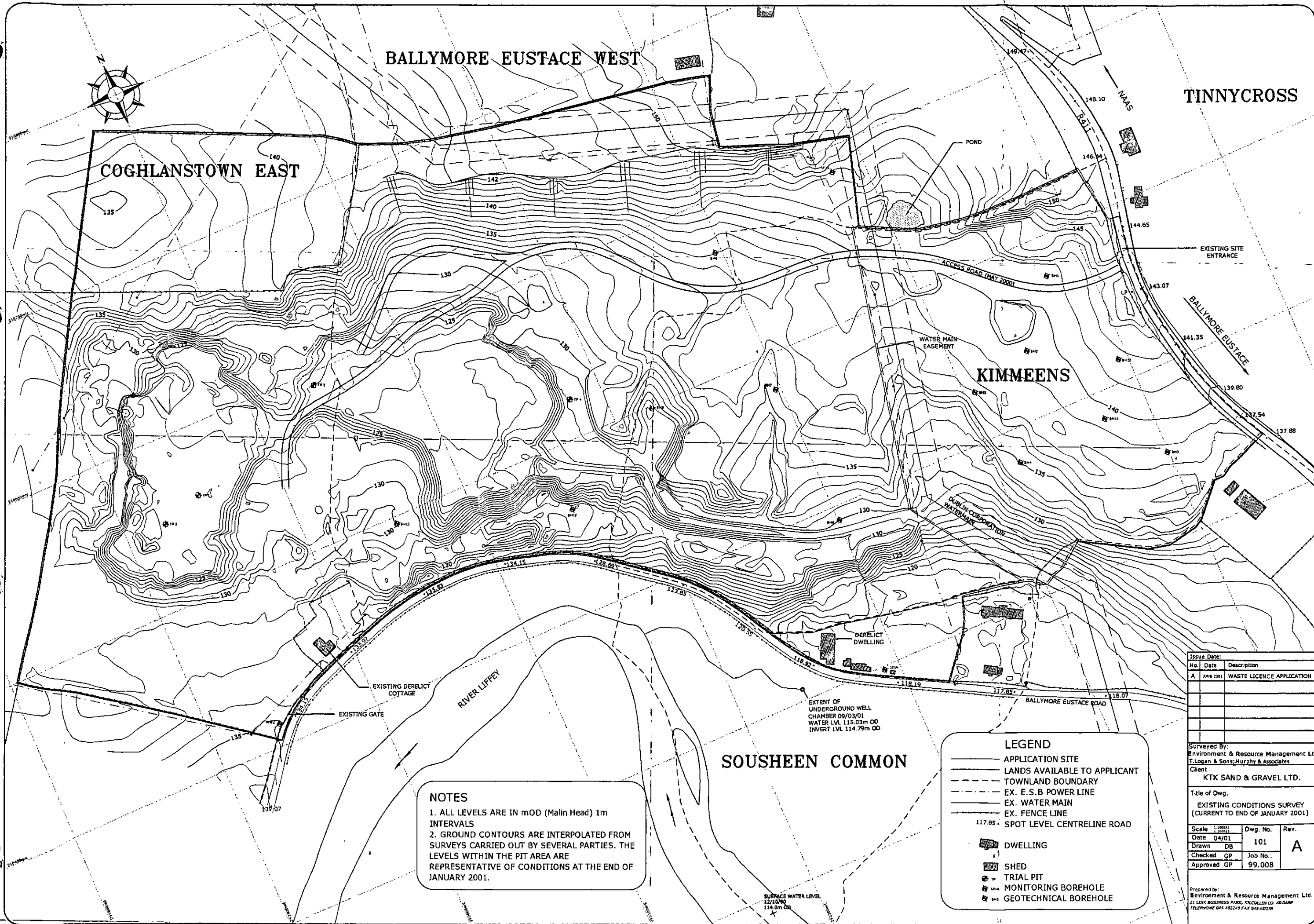
# Figure 3.6.3: Cross Section River Liffey - MW1





# Appendix 10





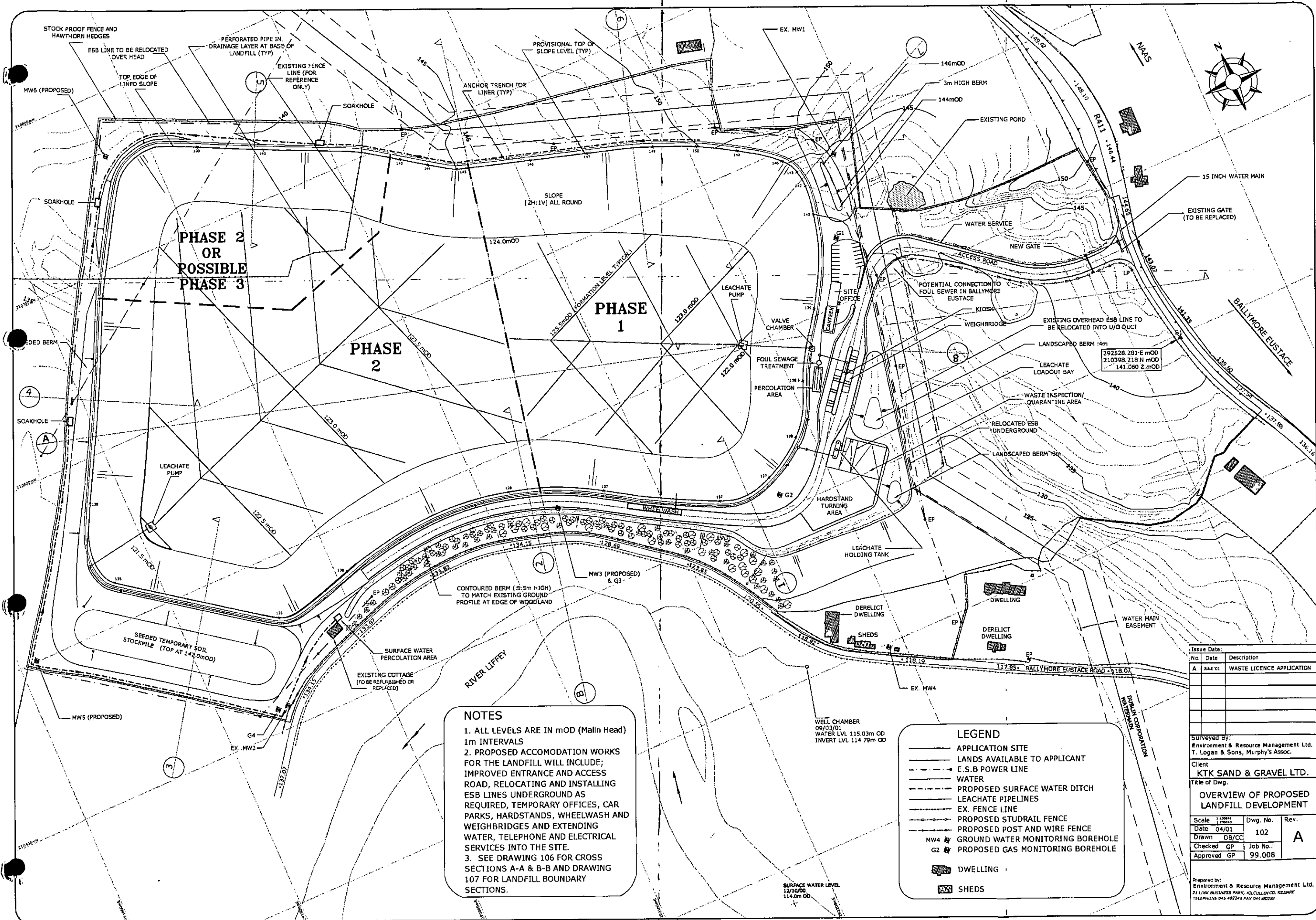
**NOTES**

1. ALL LEVELS ARE IN mOD (Malin Head) 1m INTERVALS
2. GROUND CONTOURS ARE INTERPOLATED FROM SURVEYS CARRIED OUT BY SEVERAL PARTIES. THE LEVELS WITHIN THE PIT AREA ARE REPRESENTATIVE OF CONDITIONS AT THE END OF JANUARY 2001.

**LEGEND**

- APPLICATION SITE
- LANDS AVAILABLE TO APPLICANT
- TOWNLAND BOUNDARY
- EX. E.S.B POWER LINE
- EX. WATER MAIN
- EX. FENCE LINE
- SPOT LEVEL CENTRELINE ROAD
- DWELLING
- SHED
- TRIAL PIT
- MONITORING BOREHOLE
- GEOTECHNICAL BOREHOLE

Issue Date:		
No.	Date	Description
A	04/01	WASTE LICENCE APPLICATION
Surveyed By:		
Environment & Resource Management Ltd.		
T. Logan & Sons; Murphy & Associates		
Client		
KTX SAND & GRAVEL LTD.		
Title of Dwg.		
EXISTING CONDITIONS SURVEY		
[CURRENT TO END OF JANUARY 2001]		
Scale 1:1000	Dwg. No.	Rev.
Date 04/01	101	A
Drawn DB		
Checked GP	Job No.	
Approved GP	99.008	
Prepared by:		
Environment & Resource Management Ltd.		
21 LUX BUSINESS PARK, KILCULLEN CO. KILDARE		
TELEPHONE 015 432249 FAX 015 432258		



**NOTES**

1. ALL LEVELS ARE IN mOD (Malin Head) 1m INTERVALS

2. PROPOSED ACCOMODATION WORKS FOR THE LANDFILL WILL INCLUDE; IMPROVED ENTRANCE AND ACCESS ROAD, RELOCATING AND INSTALLING ESB LINES UNDERGROUND AS REQUIRED, TEMPORARY OFFICES, CAR PARKS, HARDSTANDS, WHEELWASH AND WEIGHBRIDGES AND EXTENDING WATER, TELEPHONE AND ELECTRICAL SERVICES INTO THE SITE.

3. SEE DRAWING 106 FOR CROSS SECTIONS A-A & B-B AND DRAWING 107 FOR LANDFILL BOUNDARY SECTIONS.

**LEGEND**

- APPLICATION SITE
- LANDS AVAILABLE TO APPLICANT
- E.S.B POWER LINE
- WATER
- PROPOSED SURFACE WATER DITCH
- LEACHATE PIPELINES
- EX. FENCE LINE
- PROPOSED STUDRAIL FENCE
- PROPOSED POST AND WIRE FENCE
- GROUND WATER MONITORING BOREHOLE
- PROPOSED GAS MONITORING BOREHOLE
- DWELLING
- SHEDS

Issue Date: No. Date Description

A	JUNE 01	WASTE LICENCE APPLICATION
---	---------	---------------------------

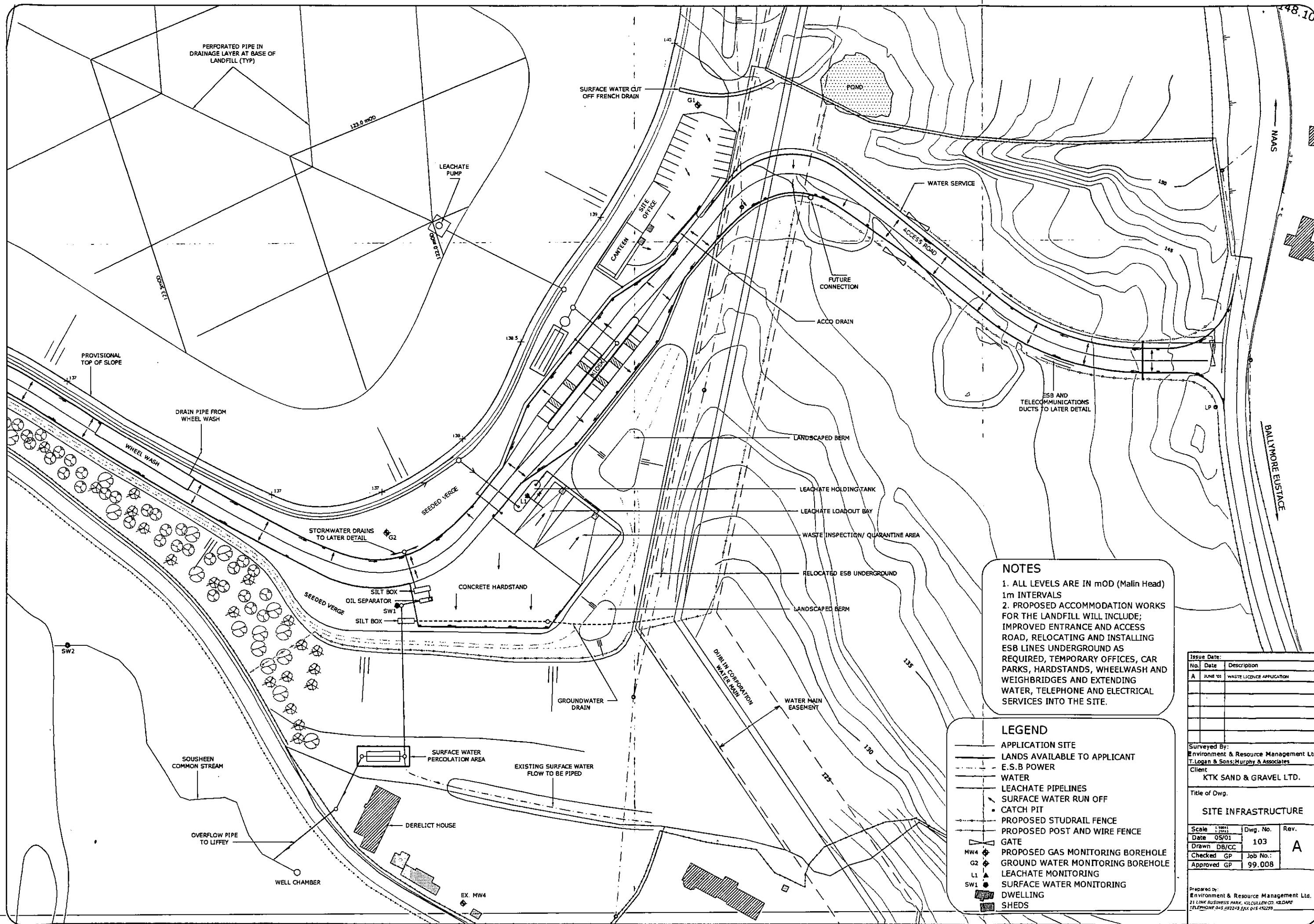
Surveyed By: Environment & Resource Management Ltd. T. Logan & Sons, Murphy's Assoc.

Client: KTK SAND & GRAVEL LTD.

Title of Dwg: OVERVIEW OF PROPOSED LANDFILL DEVELOPMENT

Scale: 1:1000	Dwg. No. 102	Rev. A
Date: 04/01	Drawn: DB/CC	
Checked: GP	Job No.: 99.008	
Approved: GP		

Prepared by: Environment & Resource Management Ltd. 21 LINK BUSINESS PARK, WILLOWBOY CO. KILDARE TELEPHONE 045 482249 FAX 045 482289



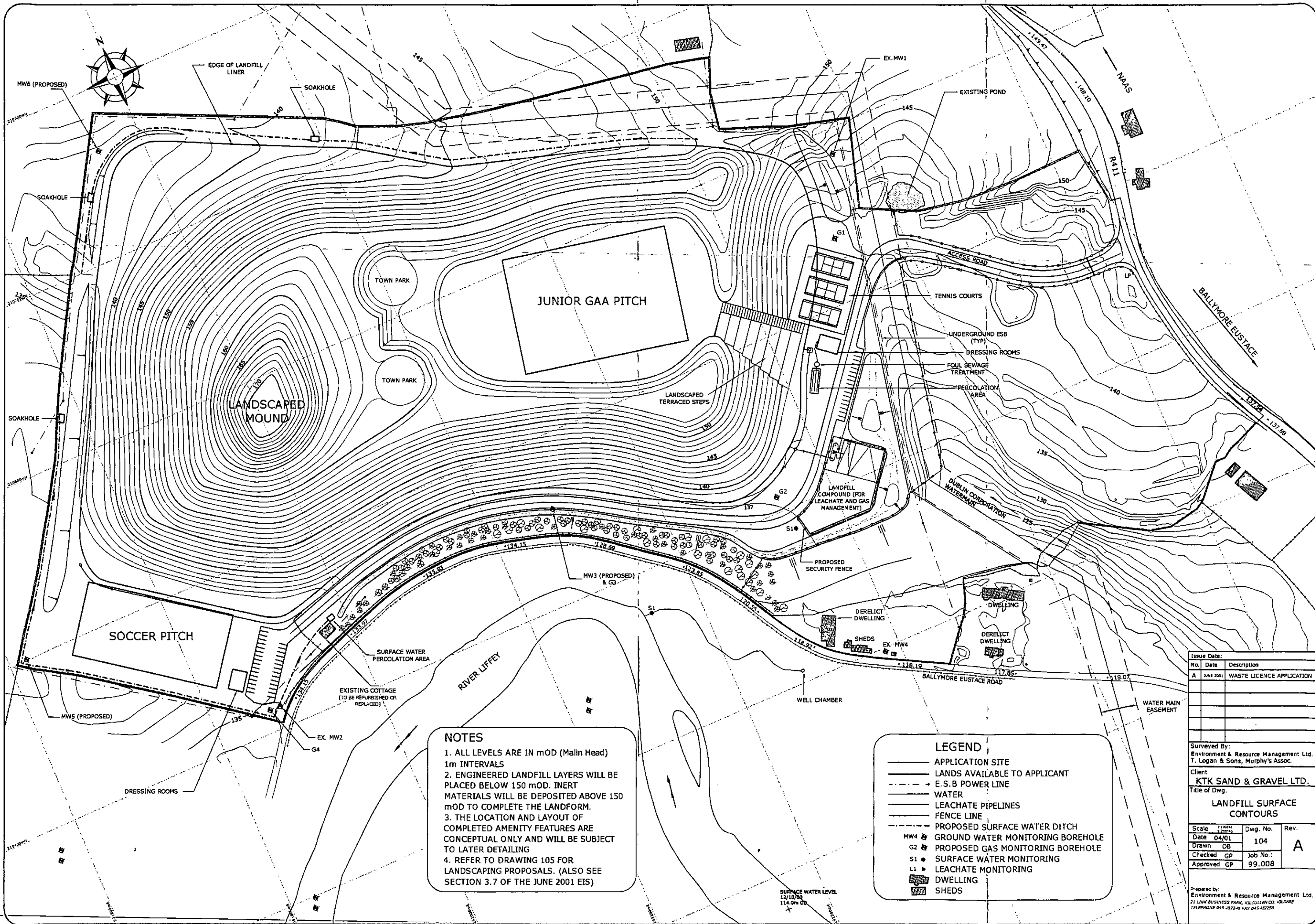
### NOTES

1. ALL LEVELS ARE IN MOD (Malin Head) 1m INTERVALS
2. PROPOSED ACCOMMODATION WORKS FOR THE LANDFILL WILL INCLUDE; IMPROVED ENTRANCE AND ACCESS ROAD, RELOCATING AND INSTALLING ESB LINES UNDERGROUND AS REQUIRED, TEMPORARY OFFICES, CAR PARKS, HARDSTANDS, WHEELWASH AND WEIGHBRIDGES AND EXTENDING WATER, TELEPHONE AND ELECTRICAL SERVICES INTO THE SITE.

### LEGEND

- APPLICATION SITE
- LANDS AVAILABLE TO APPLICANT
- E.S.B POWER
- WATER
- LEACHATE PIPELINES
- SURFACE WATER RUN OFF
- CATCH PIT
- PROPOSED STUDRAIL FENCE
- PROPOSED POST AND WIRE FENCE
- GATE
- PROPOSED GAS MONITORING BOREHOLE
- GROUND WATER MONITORING BOREHOLE
- LEACHATE MONITORING
- SURFACE WATER MONITORING
- DWELLING
- SHEDS

Issue Date:		
No.	Date	Description
A	JUNE 01	WASTE LICENCE APPLICATION
Surveyed By:		
Environment & Resource Management Ltd.		
T. Logan & Sons/Murphy & Associates		
Client:		
KTK SAND & GRAVEL LTD.		
Title of Dwg.		
SITE INFRASTRUCTURE		
Scale	Dwg. No.	Rev.
Date 05/01	103	A
Drawn DB/CC	Job No.:	
Checked GP	99.008	
Approved GP		
Prepared by:		
Environment & Resource Management Ltd.		
21 LINK BUSINESS PARK, KILCULLLEN CO. DUBLIN		
TELEPHONE 015-832248 FAX 015-832250		



**NOTES**

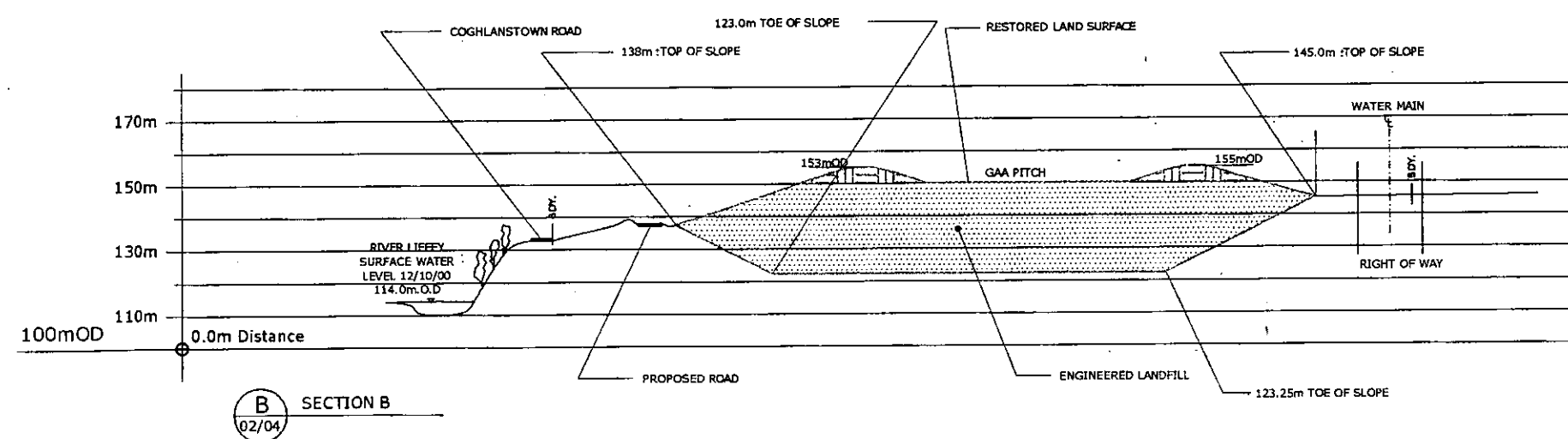
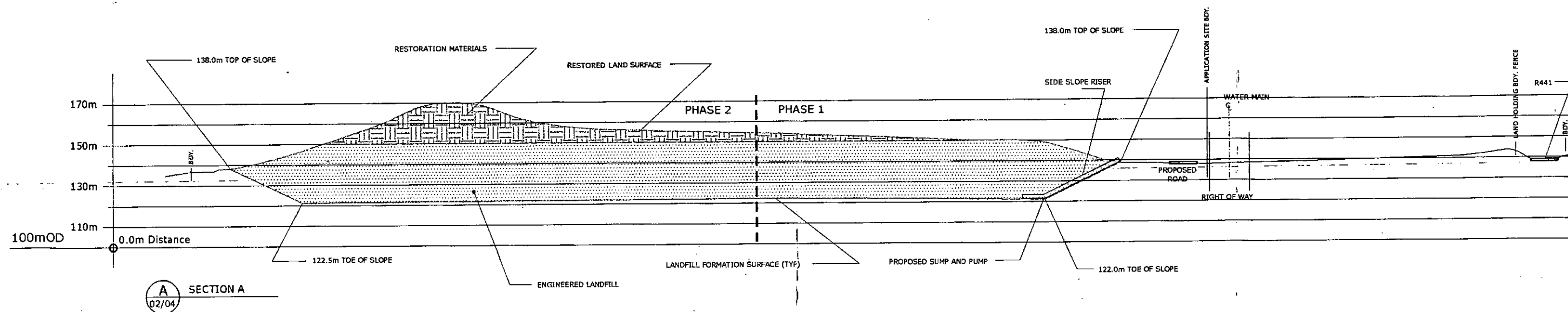
1. ALL LEVELS ARE IN MOD (Malin Head) 1m INTERVALS
2. ENGINEERED LANDFILL LAYERS WILL BE PLACED BELOW 150 MOD. INERT MATERIALS WILL BE DEPOSITED ABOVE 150 MOD TO COMPLETE THE LANDFORM.
3. THE LOCATION AND LAYOUT OF COMPLETED AMENITY FEATURES ARE CONCEPTUAL ONLY AND WILL BE SUBJECT TO LATER DETAILING
4. REFER TO DRAWING 105 FOR LANDSCAPING PROPOSALS. (ALSO SEE SECTION 3.7 OF THE JUNE 2001 EIS)

- LEGEND**
- APPLICATION SITE
  - LANDS AVAILABLE TO APPLICANT
  - E.S.B POWER LINE
  - WATER
  - LEACHATE PIPELINES
  - FENCE LINE
  - PROPOSED SURFACE WATER DITCH
  - GROUND WATER MONITORING BOREHOLE
  - PROPOSED GAS MONITORING BOREHOLE
  - SURFACE WATER MONITORING
  - LEACHATE MONITORING
  - DWELLING
  - SHEDS

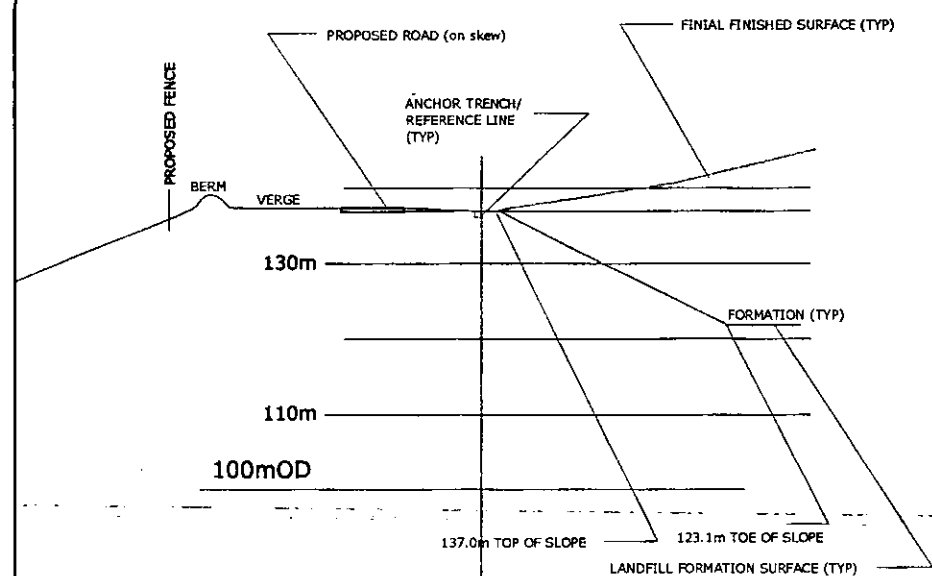
Issue Date:		
No.	Date	Description
A	June 2001	WASTE LICENCE APPLICATION
Surveyed By:		
Environment & Resource Management Ltd.		
T. Logan & Sons, Murphy's Assoc.		
Client:		
KTK SAND & GRAVEL LTD.		
Title of Dwg.		
LANDFILL SURFACE CONTOURS		
Scale	Dwg. No.	Rev.
1:1000	104	A
Date	04/01	
Drawn	DB	
Checked	GP	
Approved	GP	
Job No.: 99.008		
Prepared by:		
Environment & Resource Management Ltd.		
21 LINK BUSINESS PARK, KILCULLEN CO. KILDARE		
TELEPHONE 045-182248 FAX 045-157288		



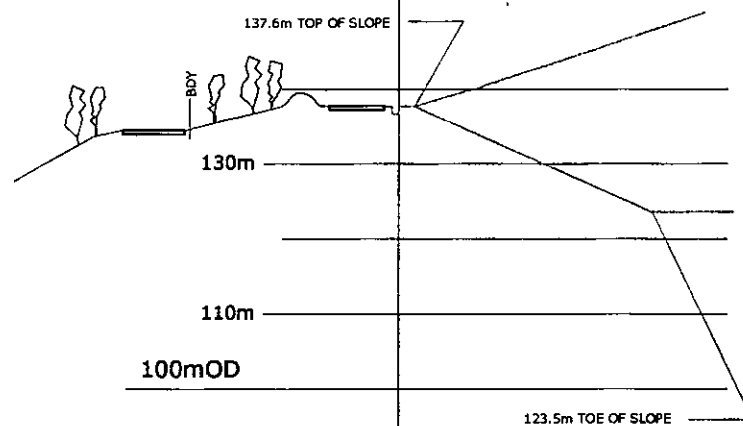




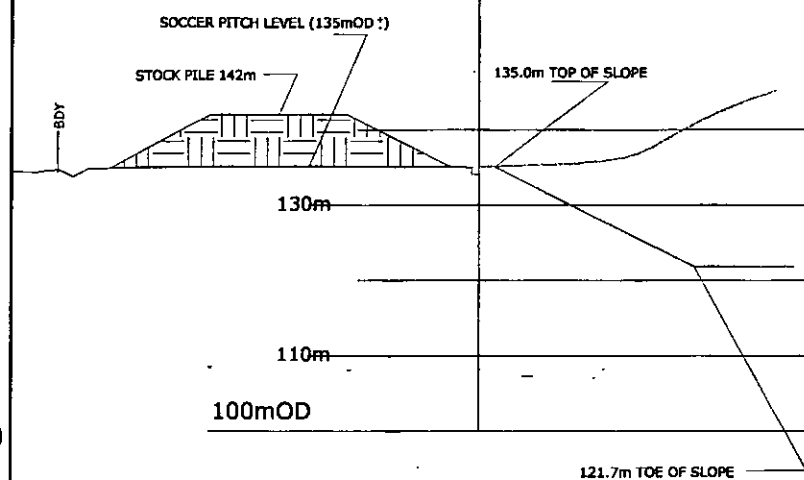
Issue Date:		
No.	Date	Description
A	JUNE '01	WASTE LICENCE APPLICATION
Prepared By: ENVIRONMENT & RESOURCE MANAGEMENT LTD. THOMAS LOHAN AND SONS MURPHY & ASSOCIATES		
Client		
KTK SAND & GRAVEL Ltd.		
Title of Dwg.		
LANDFORM CROSS SECTIONS		
Scale 1:1000A1	Dwg. No.	Rev.
Date 04/01	106	A
Drawn CC		
Checked GP		
Approved GP		
Prepared by: Environment & Resource Management Ltd. 21 LINK BUSINESS PARK, KILCULLIN CO. DUBLIN TELEPHONE 045 482248 / FAX 045 482288		



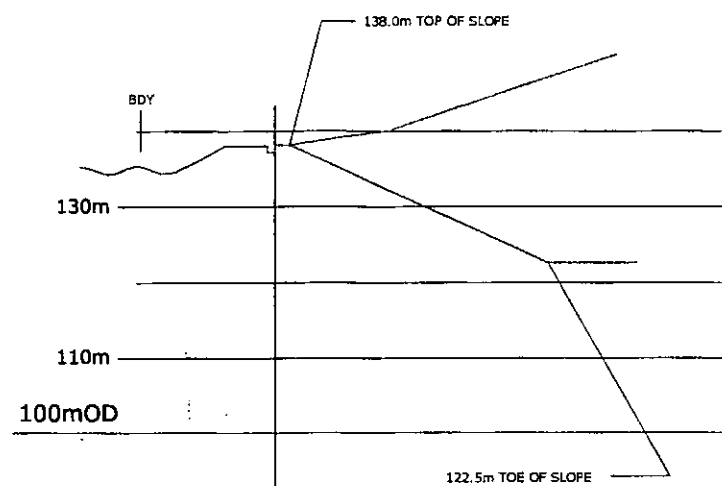
1 SECTION 1  
02/04



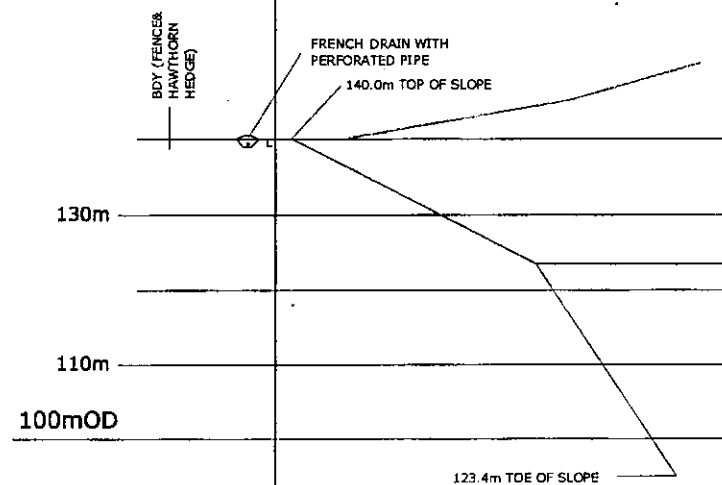
2 SECTION 2  
02/04



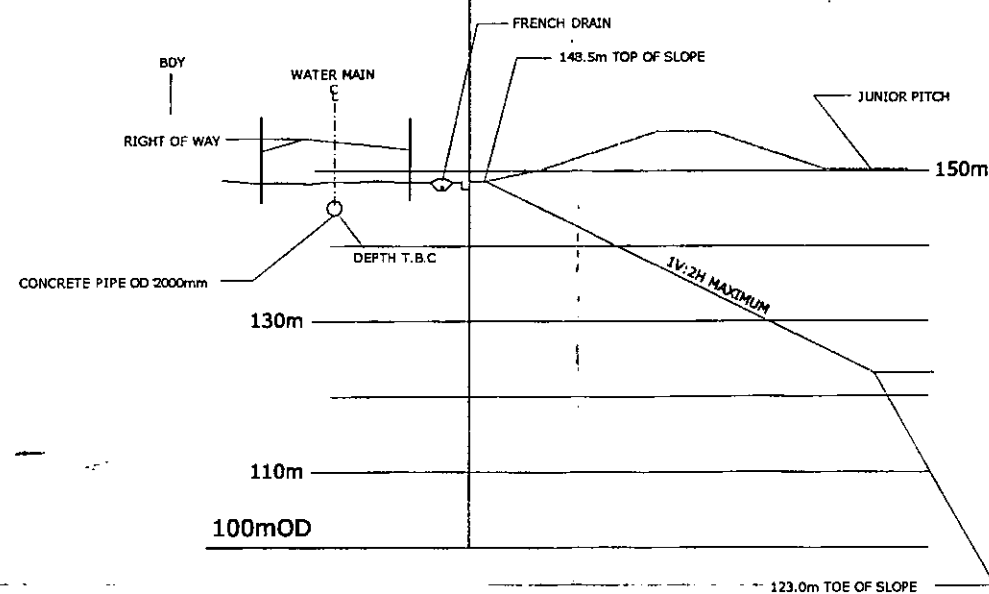
3 SECTION 3  
02/04



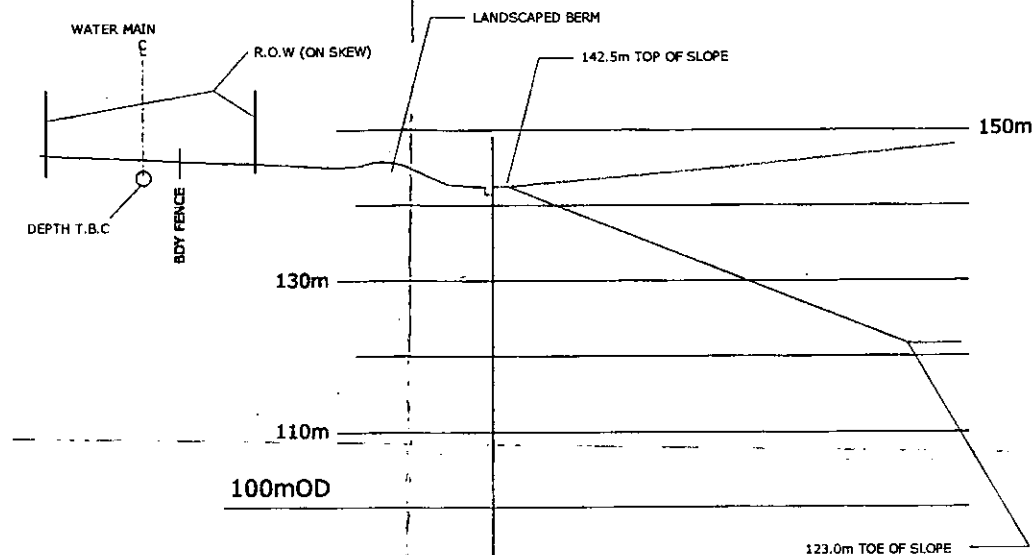
4 SECTION 4  
02/04



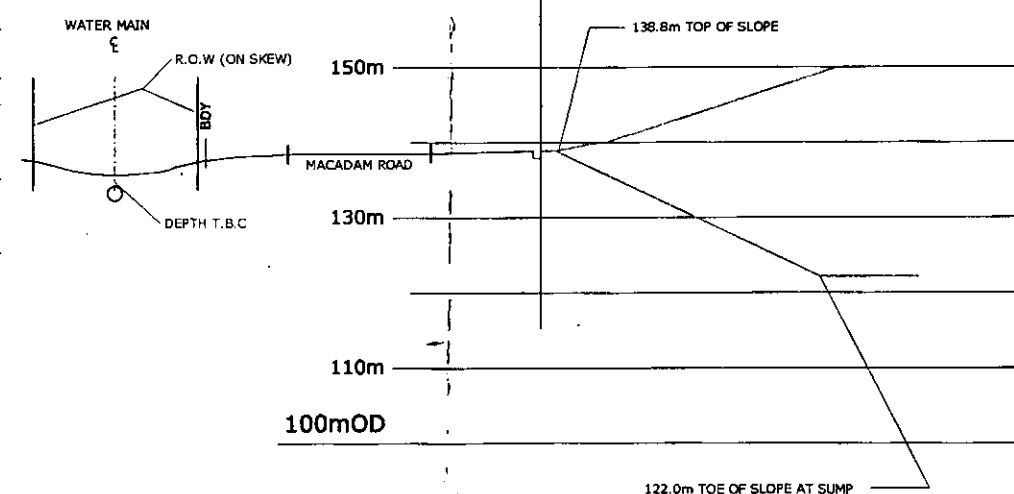
5 SECTION 5  
02/04



6 SECTION 6  
02/04



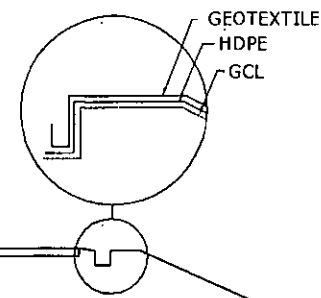
7 SECTION 7  
02/04



8 SECTION 8  
02/04

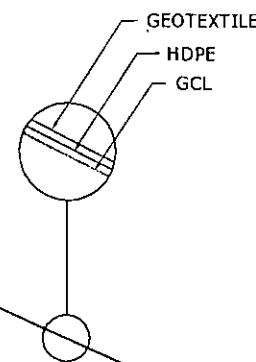
Issue Date:		
No.	Date	Description
A	JUNE '01	WASTE LICENCE APPLICATION
Signed By: ENVIRONMENT & RESOURCE MANAGEMENT LTD. THOMAS LOOM AND SONS MURPHY & ASSOCIATES		
Client		
KTK SAND & GRAVEL Ltd.		
Title of Dwg.		
LANDFILL BOUNDARY CONTOURS		
Scale 1:500A1	Dwg. No.	Rev.
Date 04/01	107	A
Drawn CC		
Checked GP		
Approved GP		
Prepared by: Environment & Resource Management Ltd. 21 LINC BUSINESS PARK, KILCULLIN, KILDARE TELEPHONE 045 482248 FAX 045 482208		

ANCHOR TRENCH DETAIL A

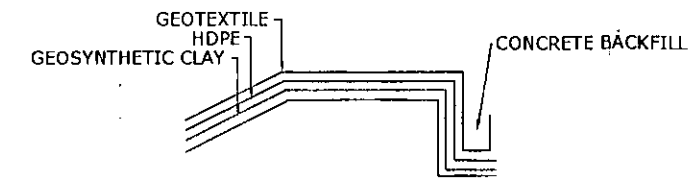
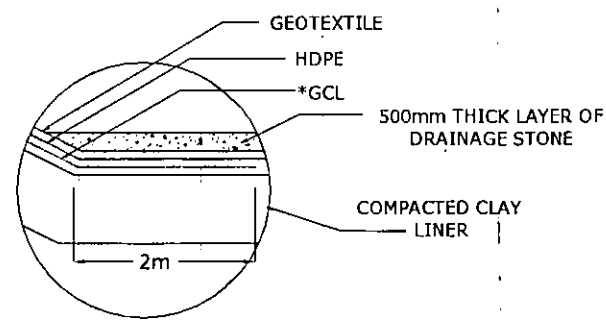
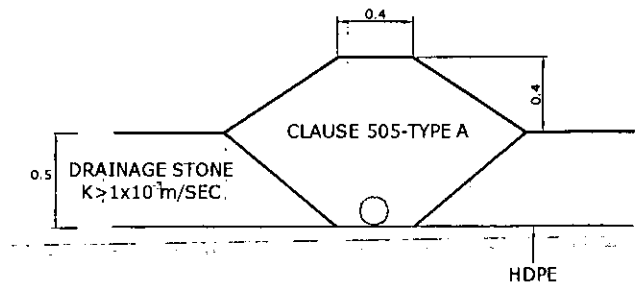
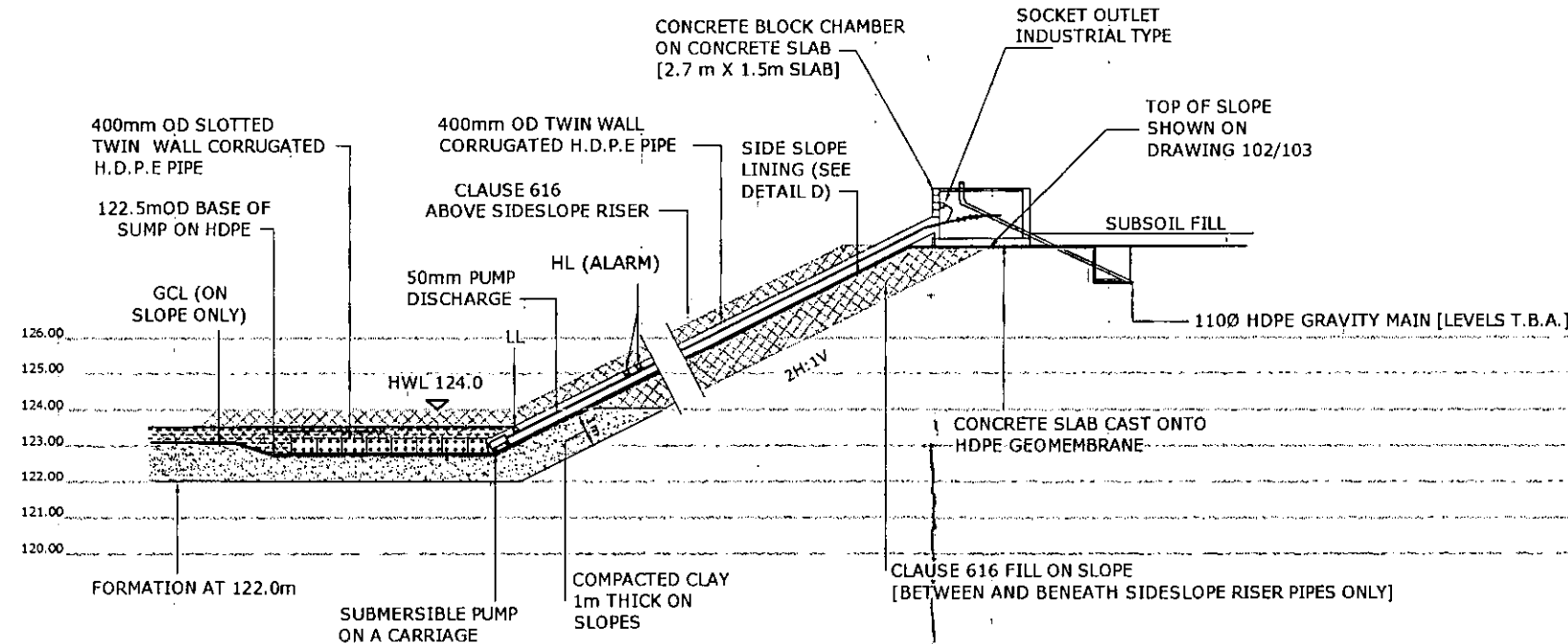
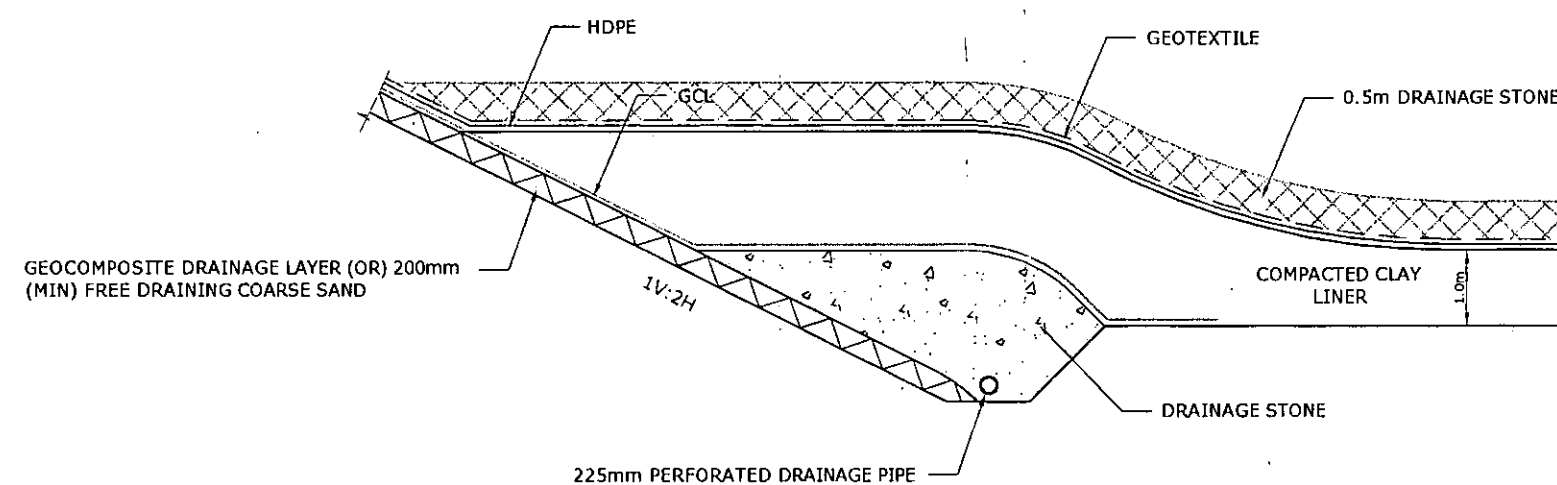


\*Note:  
2m LAP OF GCL  
ONTO CLAY  
FLOOR

SIDE SLOPE LINING DETAIL B



TOE OF SLOPE DETAIL C

DETAIL D - SCHEMATIC OF ANCHOR  
TRENCH BELOW HEADWORKS  
N.T.SDETAIL E - 150mm I.D. HDPE  
PERFORATED LEACHATE MAIN LINE  
Scale 1:20 A1 1:40A3DETAIL SECTION F - LEACHATE SIDE SLOPE RISER  
Scale 1:100 A1 1:200A3DETAIL G - NORTH SLOPE SUBLINER DRAIN  
SCALE 1:50 A1 1:100 A3

Issue Date:		
No.	Date	Description
A	JUNE 01	WASTE LICENCE APPLICATION
Surveyed By:		
Client:		
KTK SAND & GRAVEL Ltd.		
Title of Dwg.		
DETAILS		
Scale AS SHOWN	Dwg. No.	Rev.
Date 04/01	108	A
Drawn CC		
Checked GP		
Approved GP		
Prepared by:		
Environment & Resource Management Ltd.		
21 LINK BUSINESS PARK, KILCULLIN CO. KILDARE		
TELEPHONE 045 482248 FAX 045 482250		