
ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION



# ENVIRONMENTAL IMPACT STATEMENT FOR THE CONTINUED OPERATION & INTENSIFICATION OF POWERSTOWN LANDFILL, CO. CARLOW

## VOLUME 2 – MAIN REP0RT

## FEBRUARY 2012

CARLOW COUNTY COUNCIL
COMHAIRLE CHONTAE CHEATHARLOCHA

FEHILY TIMONEY & COMPANY

# ENVIRONMENTAL IMPACT STATEMENT FOR THE CONTINUED OPERATION & INTENSIFICATION OF POWERSTOWN LANDFILL, CO. CARLOW

## VOLUME 2 – MAIN REPORT

## CARLOW COUNTY COUNCIL



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**Client:** Carlow County Council

**Keywords:** Landfill, time extension, cells, final contours, waste licence

**Abstract:** This report forms the main volume of the Environmental Impact Statement for the continued operation and intensification of the landfill at Powerstown, Co. Carlow.

# TABLE OF CONTENTS

PAGE

# TABLE OF CONTENTS

PAGE

# TABLE OF CONTENTS

PAGE

## LIST OF FIGURES

PAGE

## LIST OF TABLES

**PAGE**

## LIST OF TABLES

**PAGE**

# 1 INTRODUCTION

This chapter of this environmental impact statement (EIS) introduces the facility at Powerstown, Co. Carlow and documents the procedure that was followed in completing this EIS

## 1.1 The Applicant

The applicant is Carlow County Council which is a local authority. The Council has been operating a waste management facility at the Powerstown site and is the holder of the waste management licence issued by the Environmental Protection Agency (EPA).

## 1.2 The Site in Summary

The Powerstown facility is located just off Junction 6 of the M9 Motorway. The facility comprises of a non-hazardous municipal solid waste landfill and a civic amenity.

The landfill has been developed in three phases:

- Phase 1 is unlined and operated on the principal of dilute and disperse
- Phases 2 and Phase 3 of are made up of 17 cells, Cells 1-6 are lined with a single HDPE liner, cells 7-13 and 15 to 18 are fully engineered

The facility has been in operation since 1975 and is licensed (W0025-03) to accept 40,000 tonnes per annum (tpa) of waste. Phases 1 and 2 of the landfill have been permanently capped, while cells 15 and 16 have been largely filled.

Cells 17 and 18 have been constructed but remain unfilled since the cessation of landfilling activities on-site on 21st January 2012.

The civic amenity is open to the general public and provides for the recovery of glass, paper, cardboard, green waste, metal, household hazardous waste amongst others. It has an estimated 18,400 customers in 2011.

Other ancillary infrastructure on-site include weighbridges, a surface water management system and attenuation pond, leachate lagoon, leachate holding tank, administration office, landfill gas flare and waste inspection/quarantine areas.



## 1.3 The Development in Summary

Figure 1.1 indicates the location of Powerstown Landfill.

Carlow County Council (CCC) was granted permission by An Bord Pleanála in 2004 (01.EL2020) for an extension of the landfill which included the development of a new site entrance, site offices, civic amenity as well as four engineered cells. Condition 1 of this permission included a time limit of 8 years, requiring landfilling activities to cease at the site on 21st January 2012:

1. *This approval relates only to an 8 year period from the date of this order. At the end of this period the landfill shall be capped and the lands reinstated to grassland, unless approval has been granted for an extension of landfilling on the site.*

   ***Reason:*** *In order to clarify the period to which the approval relates and to enable a reassessment of the development in the light of circumstances then prevailing, including the implementation of an integrated waste management strategy for the region, which implementation is considered to be in the interest of the proper planning and sustainable development of the area.*

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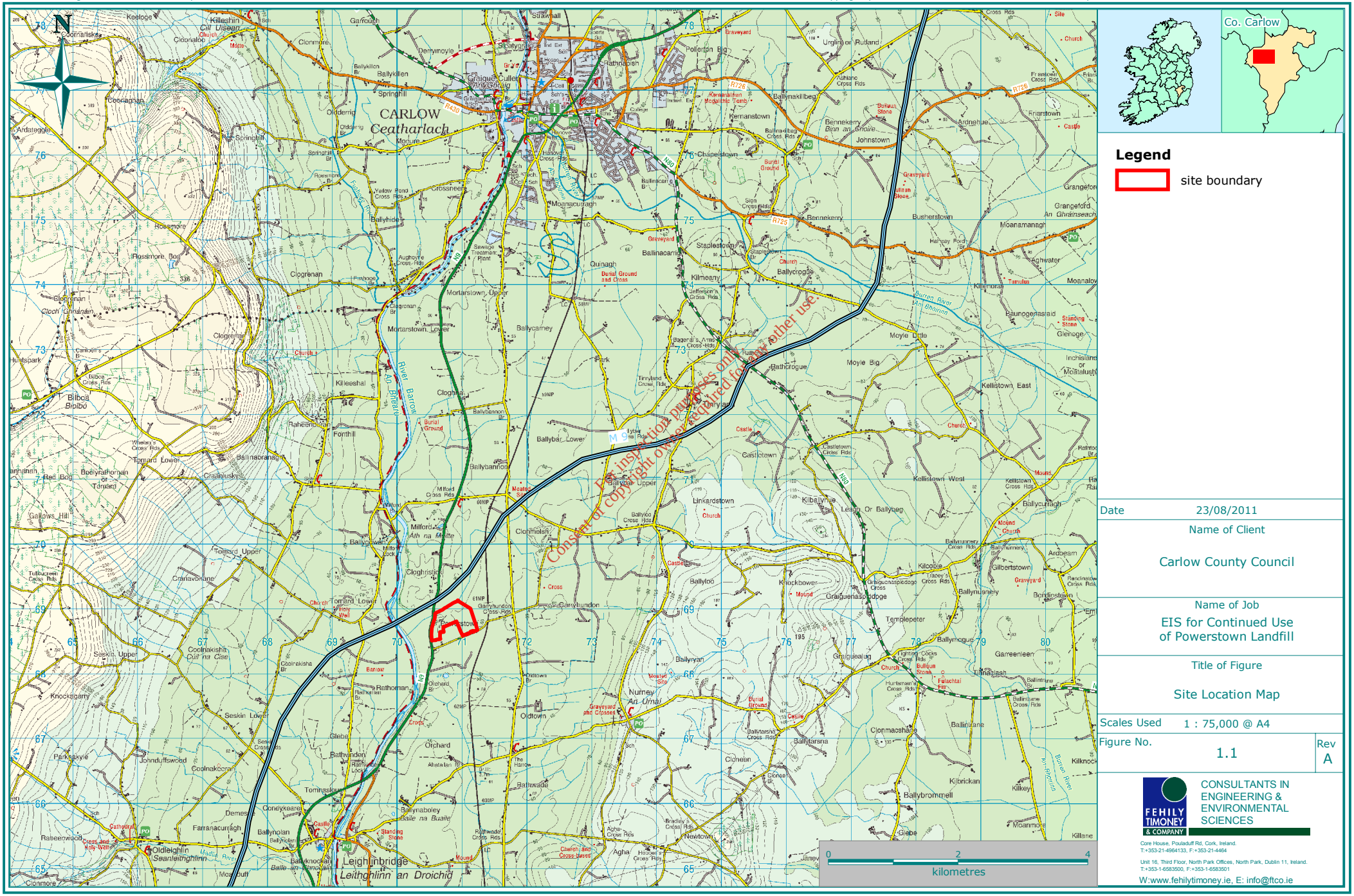
LW11-120-03_Figure 1.1_Site Location Map_Rev A






| | |
|---|---|
| Date | 23/08/2011 |
| Name of Client | Carlow County Council |
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| Title of Figure | Site Location Map |
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There has been a marked decline in the amount of waste received at the facility between 2006 and 2010. This decline is in part due to the economic downturn and in part due to market forces within the Irish waste industry. This has resulted in two of the four cells constructed as part of phase 3 prior to the 2012 deadline.

As a consequence, CCC is applying to An Bord Pleanála for approval to continue landfilling operations at the site until such time as the two cells are filled and the final restoration contours of the site are reached.

While it is proposed to increase the annual tonnage from 40,000 tonnes per annum (tpa) to 50,000 tpa it is not proposed to increase the footprint of the landfill, nor is it proposed to construct any additional infrastructure. This application is for the extension of the life of landfilling activities and an increase in waste acceptance only until such time as the remaining constructed cells are filled.

## 1.4 The application process and requirement for environmental impact assessment

Directive 2011/92/EU on the *Assessment of the Effects of Certain Public and Private Projects on the Environment* requires that certain developments undertake an environmental impact assessment (EIA) before planning permission can be granted. In this instance, an Environmental Impact Statement (EIS) must accompany a planning application.

Part 1 and 2 of Schedule 5 of the Planning and Development Regulations 2001 – 2011 sets out certain projects that require an EIS. With respect to waste disposal sites, Part (11)(b) states that:

> *11. Other projects*
> *(b) Installations for the disposal of waste with an annual intake greater than 25,000 tonnes not included in Part 1 of this Schedule.*

Therefore, as this application is for a landfill development with an annual tonnage of 50,000 tpa, an EIS is required.

This application is being made to An Bord Pleanála under the Section 175/Section 177AE of the Planning and Development Act 2000 as amended.



## 1.5 Technical Difficulties

There were no technical difficulties encountered during the preparation of this EIS.

## 1.6 EIS Structure

This document has been structured according to the grouped format structure as set down in the EPA's guidelines. The report is broken down into the following chapters:

- A description of the existing and proposed development and the site and its existing environment are provided in two separate chapters in this report.
- Subsequent chapters deal with specific environmental topics for example, human beings, air, water etc. The grouped format examines each topic as a separate section referring to the proposed development, impacts and mitigation measures.
- A concluding chapter provides a summary of the key impacts and mitigation measures and provides an overall conclusion to the EIS.

The advantages of using this type of format are that it is easy to examine each environmental topic and it facilitates easy cross-reference to specialist studies undertaken as part of the assessment.

The EIS comprises three volumes:

Volume 1: Non-Technical Summary
Volume 2: Main Report
Volume 3: Appendices

## 1.7 Contributors to this EIS

Fehily Timoney and Company (FTC) was retained by CCC to prepare the EIS and was responsible for all elements of the project. FTC was established in 1990 and is one of the largest Irish-owned independent consultants. The company has four key competencies: waste management, environment, renewable energy and civils infrastructure.

Mr. Pascal Sweeney was appointed by CCC to prepare the Natura Impact Statement (NIS).

## 1.8 Viewing and Purchasing the EIS

Any member of the public can view the planning application, accompanying EIS and NIS documentation, free of charge, at the offices of Carlow County Council, County Buildings, Athy Road, Carlow during office hours, from the date of receipt of the documentation for a period of at least six weeks.

CCC will, on request, sell copies of any part of a planning application or EIS, at a fee not exceeding the reasonable cost of making a copy.

# 2 BACKGROUND TO THE PROJECT

## 2.1 The Need for the Development

FTC prepared a needs assessment to determine the viability of applying for an extension to the time limit imposed on operations at Powerstown Landfill by An Bord Pleanála. A copy of the need assessment report is included in Appendix 1 and a summary is outlined hereunder.

The structure of the waste management industry in Ireland has changed considerably since An Bord Pleanála granted the time limited permission (PL01.EL2020) in 2004. In 2004, there were c. 34 active landfills in Ireland accepting municipal solid waste (MSW)[1], with four located in the South East Waste Management Region (SEWMR).

In 2012, there are 16 no. active landfills accepting residual waste nationally. A dramatic drop in the number of operational landfills between 2009 and 2012 has been observed with 27 operational facilities in the country in 2009. It is anticipated that, by 2015, a maximum of seven operational landfills will remain in Ireland, in addition to the Carranstown Energy from Waste (EfW) facility (online in Q4 of 2011) and the Poolbeg EfW (assumed online in 2016).

Of the 3 no. landfills located in the SEWMR in 2012 i.e. Powerstown, Donohill & Holmestown Wood, it is unclear what capacity will be provided by these facilities in the future.

Donohill landfill, operated by South Tipperary County Council, is due to cease waste acceptance at the end of 2012 as the remaining void is utilised.

In November 2011, it was confirmed that the operation of the Wexford County Council Holmestown Wood landfill was under review with a possible closure date of the end of February 2012 being identified[2]. While a formal decision has yet to made regarding the future of Holmestown, lack of clarity as to the future of the facility, at the very least, raises significant concerns as to its continued operation.

With no current landfilling activities on site Powerstown, it is possible that there will be no landfill capacity within the SEWMR from 2012 onwards with all residual waste generated in the region being disposed of outside the Region.

Table 2.1 presents the anticipated number of operational landfills nationally over the coming years to 2020. The information presented in Table 2.1 is based on an assessment carried out by FTC as well as information presented in the most recent annual environmental returns (AERs) for each facility. Figures 2.1 and 2.2 present this information graphically until 2015.

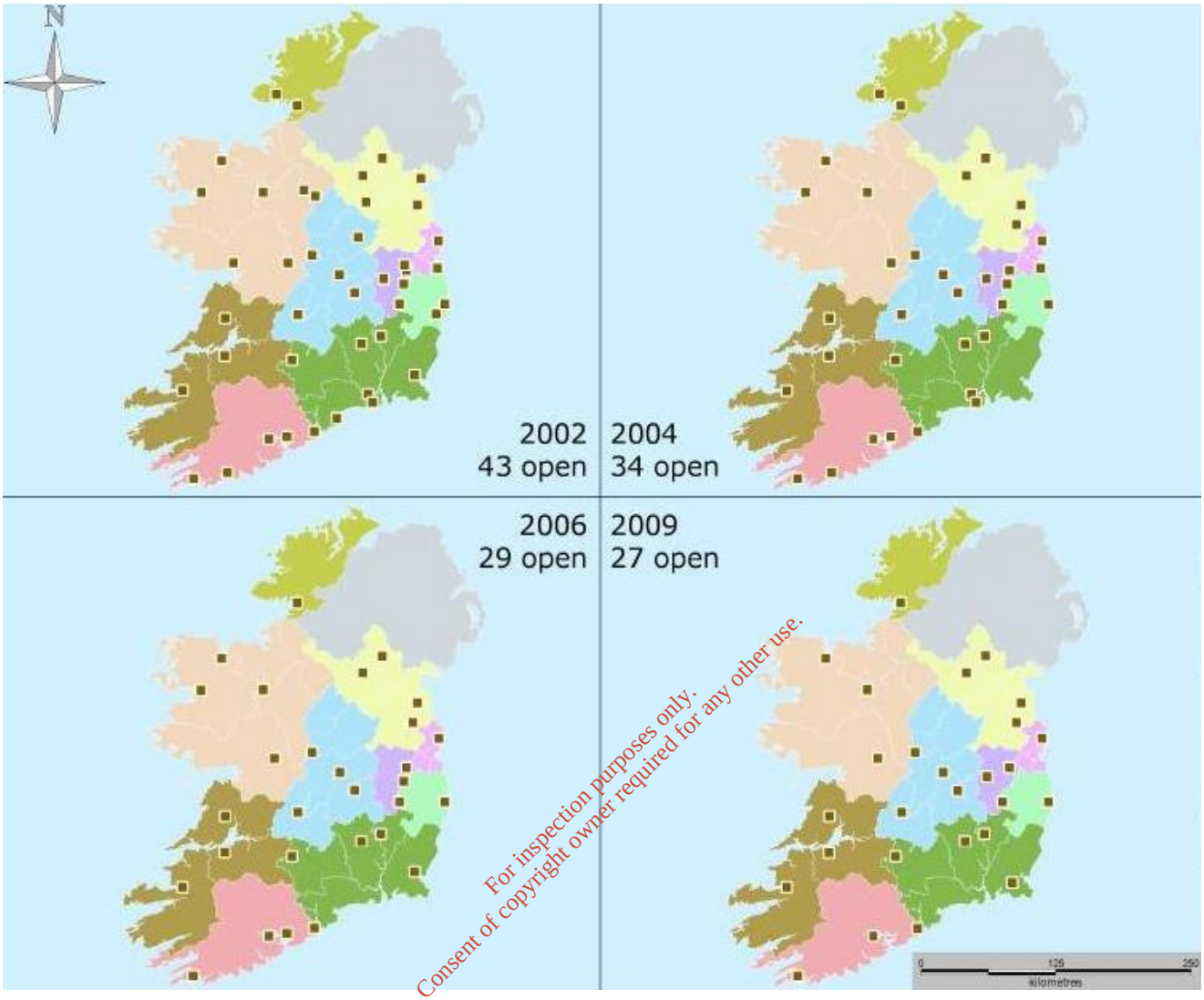


[1] National Waste Report 2004; www.epa.ie
[2] http://www.enniscorthyecho.ie/news/eycwaucwcw/

## Table 2.1: Current and predicted future Landfill capacity

| Landfill Facility | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Balleally | Closed in 2011 | - | - | - | - | - | - | - | - | - |
| 2 | Knockharley | 88,000 | 88,000 | 88,000 | 88,000 | 88,000 | 88,000 | 88,000 | 88,000 | 88,000 | 88,000 |
| 3 | White River | 96,000 | 96,000 | 96,000 | 96,000 | 96,000 | 96,000 | 96,000 | 70,000 | - | - |
| 4 | Scotch Corner | 39,500 | 39,500 | 36,000 | - | - | - | - | - | - | - |
| 5 | KTK | 90,000 | 30,000 | - | - | - | - | - | - | - | - |
| 6 | Drehid | 360,000 | 360,000 | 360,000 | 120,000 | 120,000 | 120,000 | 120,000 | 120,000 | 120,000 | 120,000 |
| 7 | Rampere | Closed in 2011 | - | - | - | - | - | - | - | - | - |
| 8 | Ballynagran | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 |
| 9 | Powerstown | Ceased landfilling on site early 2012 | - | - | - | - | - | - | - | - | - |
| 10 | Holmestown Wood | 55,000 | 12,500 | - | - | - | - | - | - | - | - |
| 11 | Donohill | 30,000 | 15,000 | - | - | - | - | - | - | - | - |
| 12 | Gortadroma | 130,000 | 65,000 | - | - | - | - | - | - | - | - |
| 13 | Inagh | Closed in 2011 | - | - | - | - | - | - | - | - | - |
| 15 | North Kerry | 35,000 | 35,000 | 33,000 | - | - | - | - | - | - | - |
| 16 | Youghal | Closed in Jan 2012 | - | - | - | - | - | - | - | - | - |
| 17 | Derryclure | Closed in 2011 | - | - | - | - | - | - | - | - | - |
| 18 | Kyletelesha | 47,100 | 47,100 | 47,100 | 47,100 | 47,100 | 47,100 | - | - | - | - |
| 19 | East Galway | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | - | - |
| 20 | Derrinumera | 10,000 | 2,000 | - | - | - | - | - | - | - | - |
| 21 | Rathroeen | 35,000 | 35,000 | 35,000 | 35,000 | 35,000 | 35,000 | 30,000 | - | - | - |
| 22 | Ballynacarrick | 29,000 | 15,000 | - | - | - | - | - | - | - | - |
| **Available Landfill Capacity (tonnes)** | | **-** | **1,090,100** | **945,100** | **636,100** | **636,100** | **636,100** | **584,000** | **528,000** | **358,000** | **358,000** |

## Figure 2.1: Landfill Distribution 2002 - 2009





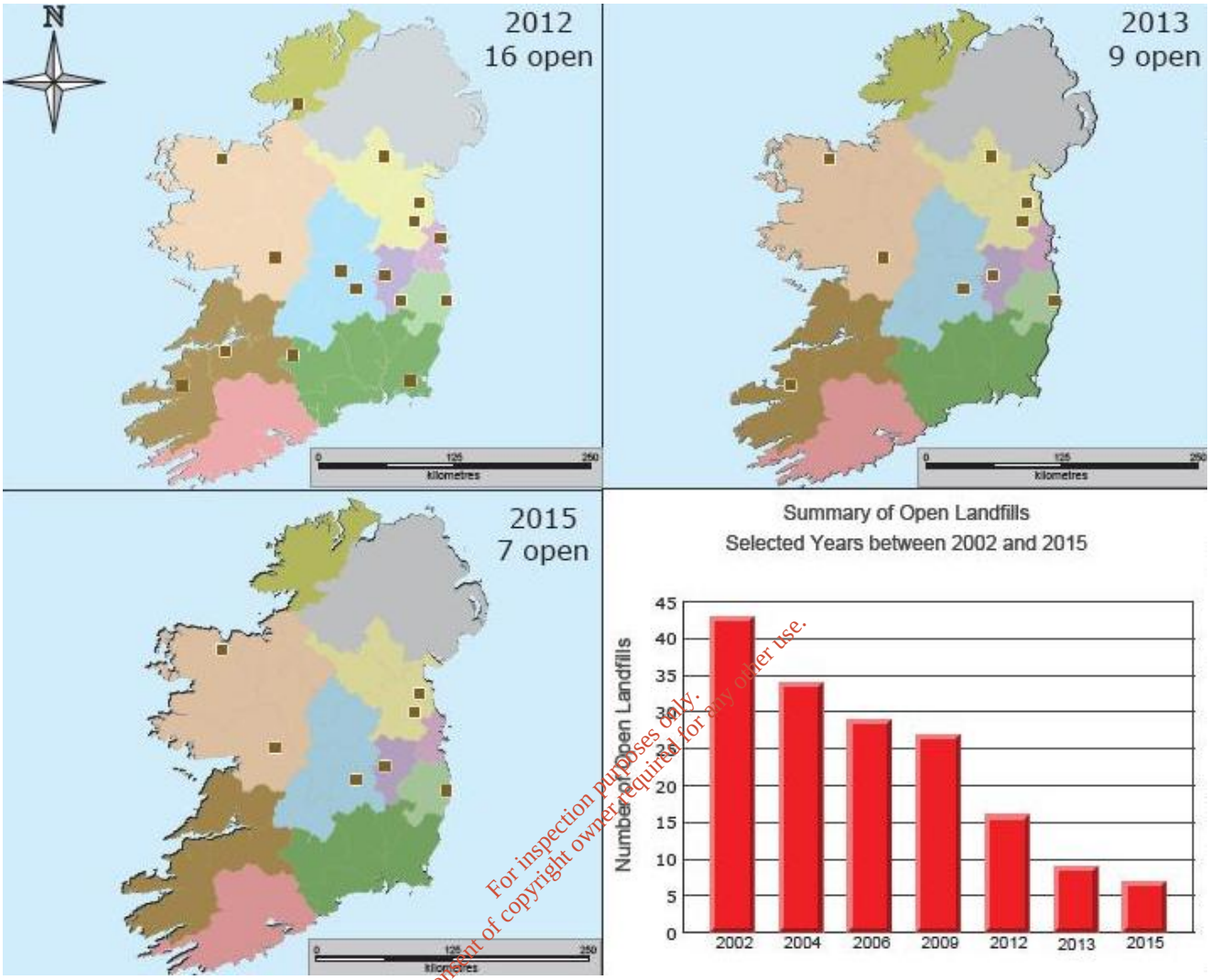

**Legend**

- open landfill

*Waste Management Regions*

- Connaught
- Cork
- Donegal
- Dublin
- Kildare
- Limerick, Clare and Kerry
- Midlands
- N. Ireland
- North East
- South East
- Wicklow

## Figure 2.2: Landfill Distribution 2012 - 2015



A number of assumptions have been made in relation to the facilities listed in Table 2.1, as follows:

1. Knockharley landfill continues to accept waste at a rate of 88,000 tpa following the recent withdrawal of an intensification application to An Bord Pleanála[3]
2. Whiteriver landfill continues operations until 2018
3. Scotch Corner landfill fills its final cell and ceases waste acceptance at the end of 2013
4. KTK landfill operates until the end of 2012 after been given permission by the EPA to accept 150,000 $m^3$ waste until its final contours have been achieved – it is assumed that 30,000 tonnes of waste is accepted in 2012
5. Waste acceptance at Drehid landfill decreases to 120,000 tonnes per annum from 2014 in line with the existing permission
6. Holmestown landfill is modelled as continuing waste acceptance until the end of quarter 1, 2012
7. Donohill landfill closes at the end of 2012, 15,000 tonnes assumed accepted in 2012
8. Gortadroma landfill utilises its remaining void and closes at the end of 2012
9. North Kerry landfill closes at the end of 2013
10. Kyletalesha landfill operates until the end of 2016[4]
11. It is assumed that East Galway landfill accepts waste until 2018 such that the available development area is maximised
12. Derrinumera landfill closes during the first quarter of 2012 with an assumed 2,000 tonnes accepted in 2012
13. Rathroeen landfill continues to operate until the end of 2017
14. Ballynacarrick landfill closes mid 2012 with an assumed 15,000 tonnes accepted in 2012[5]

In addition:

- It is assumed that no further operations are carried out in Corranure Landfill further to this facility closure in March 2011
- The landfill development at the Naul by Murphy Environmental is not included in this assessment as it will not accept MSW
- Waste acceptance at Powerstown landfill has not been modelled
- Bottlehill landfill does not commence operations in the foreseeable future

Table 2-1 demonstrates the reduced national landfill capacity in 2012. As landfill capacity reduces, the remaining landfills will play a more important role in providing landfill capacity on a national basis, as is evident in Table 2-1, where, in 2015, only 5 of the 10 waste management regions will have landfill facilities.

Further detail on the needs assessment is provided in Appendix 1.



## 2.2 Alternatives

The development is an existing landfill and civic amenity where as a result of a marked decline in the amount of waste received at the facility, two of the constructed landfill cells remain unfilled post January 2012 when the planning permission for landfilling activities lapsed.

The fundamental alternative considered for this development is whether to continue the operation of the landfill or to cease deposition in 2012 (the 'do nothing' alternative).

In the 'do nothing' scenario, landfilling activities would cease in January 2012 indefinitely and the capping and restoration of the waste filled cells would be undertaken following this. The capping and restoration levels proposed for the landfill and agreed with the planning authority and EPA would not be achieved for the site as two cells remain empty. This would result in an elevated section of the site leading to two empty cells which would impact on the local landscape of the area. The current capping plan and restoration of the site would need to be revised to accommodate the appropriate grading of landfill slopes and examine the options for dealing with surface water collection in the empty cells.

With regard to land availability and engineering capacity, the existing development has already constructed landfill cells sufficient for the acceptance of waste. These landfill cells have been fully engineered to minimise impacts on the existing environment from landfilling.

[3] http://www.irishtimes.com/newspaper/ireland/2011/0910/1224303850573.html
[4] http://www.leinsterexpress.ie/news/local/council_to_spend_3m_on_kyletalesha_before_closing_it_1_2391845
[5] As per facility AER 2010

The filling of these cells is permitted under the existing waste licence. Due to the decline in the rate of waste acceptance for disposal at the facility; the cells have not been filled.

The site has existing on-site infrastructure for the efficient continued operation of a landfill such as a landfill gas collection system and flare, a surface water collection system and pond, leachate collection system and storage tank, etc. In the case where an alternative location for two landfill cells is considered, it is appropriate to locate these cells where they exist. As the landfill cells infrastructure itself is already constructed in Powerstown, this was the only site location considered.

With regards to alternative layouts and systems, there is no scope to assess this with regards to the proposed development, as the landfill cells are currently constructed in the layout permitted under and these cells connect into the existing landfill site processes such as leachate and gas collection management systems. The proposed development would not alter this layout or system.

# 3 THE DEVELOPMENT

## 3.1 Introduction

This chapter of the EIS details the principal elements of the Powerstown facility. It includes a description of the operations and infrastructure at the existing and proposed facilities.

## 3.2 Existing Operations

### 3.2.1 General

The Powerstown facility is located in a rural setting in the townland of Powerstown approximately 8 km south of Carlow Town in County Carlow. The facility is located close to Junction No. 6 on the M9 Motorway.

The Powerstown Facility operates as a landfill and civic amenity in accordance with the conditions of Waste Licence Register No W0025-03, as described below.

### 3.2.2 Hours of Operation and Waste Acceptance Hours

**Waste Licence Requirements**

In accordance with Condition 1.5 of the waste licence, waste can be accepted for disposal at the landfill between the hours of 08:00 and 17:30 Monday to Friday inclusive (bank Holidays excepted) and 08:00 to 12:30 on Saturdays.

The landfill facility can be operated only between 07:00 and 18:30 Monday to Friday inclusive (Bank Holidays excepted) and 07:00 and 13:30 on Saturdays.

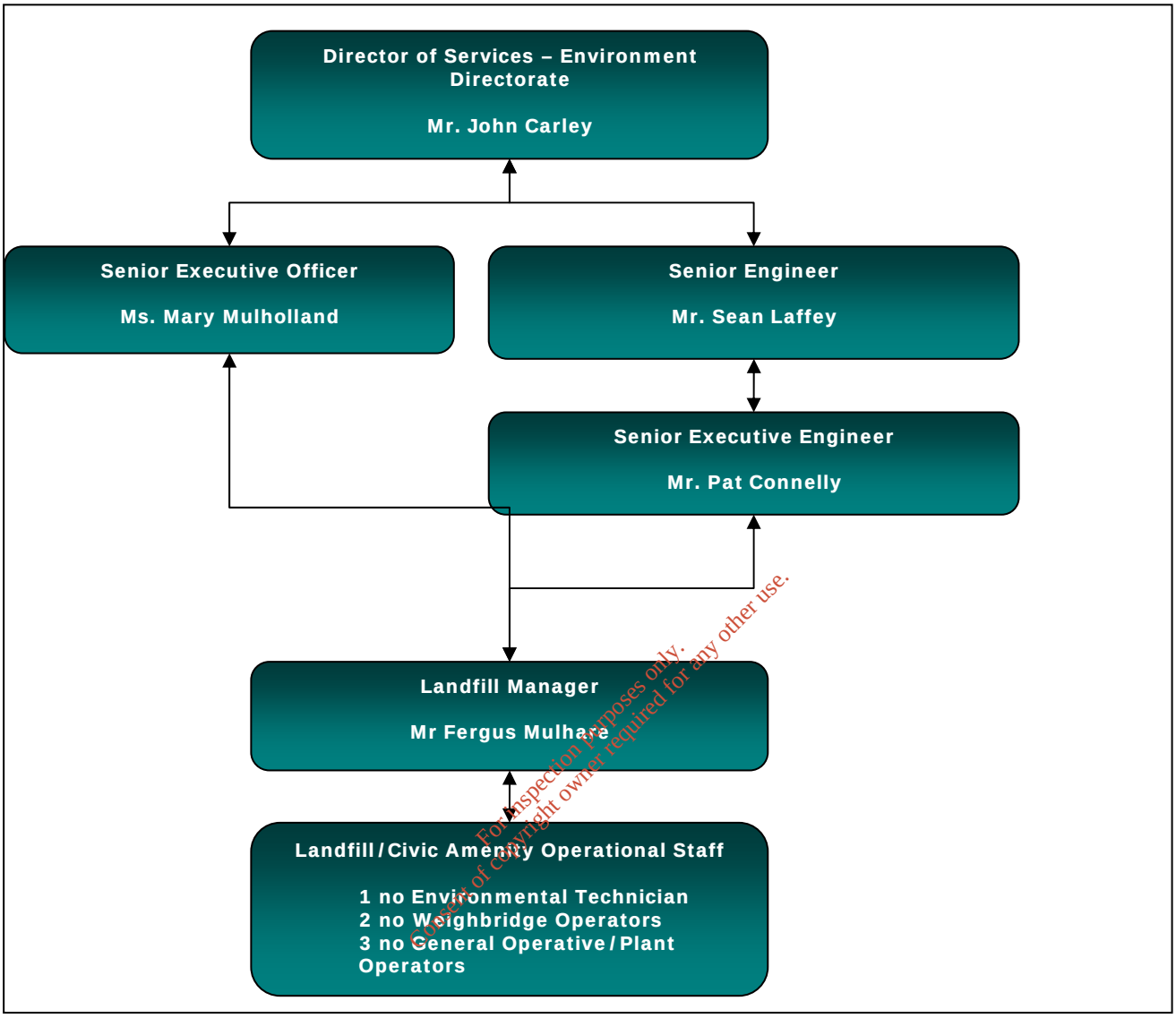
Waste can be accepted at the civic amenity only between the hours of 08:00 to 17:30 Monday to Friday inclusive (Bank Holiday excepted), 08:00 and 16:30 on Saturdays and 08:00 and 12:30 on Sundays.



### 3.2.3 Management Structure

The Powerstown facility falls within the operational control of the Water and Environment Directorate of CCC. The management of the facility is shown in Figure 3.1 below.

**Figure 3.1: Management Structure at Powerstown Landfill & Civic Amenity**






### 3.2.4 Access to the Facility and Site Security

Access to the site is via the main site entrance only along the L3045 off the old N9 as shown on Figure 3.2.

The entire facility is surrounded by a 2 m high security fence. Secure gates are located at the facility's entrance and these are locked when the site is closed.

When opened the site is staffed at all times. The site has a number of CCTV cameras to monitor activities on site when the site is open and closed. The administration building is fitted with a monitored burglar alarm.

M9 Junction 6

Phase 3 Landfill
Cells 15 & 16
Active Area
(as of July 2011)

Phase 3 Landfill
Cells 17 & 18
Empty Cells (as of July 2011)

Phase 2 Landfill
Cells 1 - 14
(Closed & Capped)

Phase 1 Landfill
(Closed & Capped)

Buffer Zone
(Farm Land)

CELL 15
CELL 16
CELL 17
CELL 18

Storm Water
Settling Pond

Discharge
to Powerstown
stream

Leachate Lagoon

Existing
Chainlink Fence
to be retained

Flare
Compound

Access roadway
to S.W Pond

10m x 10m Plant
Refuelling Area.

Haul Road to Tighead

Wheel Bath

2.4m High Security
Fence.

Access roadway

Green Waste
Holding Slabs

Waste Inspection/
Quarantine Slabs

Leachate Tank
Farm

Civic
Amenity Area

Weighbridge hut &
2 no. Weighbridges

Site Entrance

Administration Building

2.4m High Security
Fence.

License Boundary

Pond

Gravel Pit

Liable to Flooding

RIVER BARROW

Sand&Gravel

54.99 46.16 48.04 48.96 48.79 52.49 50.95 55.13 54.68 54.16 55.85 56.93 54.34 54.33 56.71 56.49 54.87

0m 20.00m 40.00m 60.00m 80.00m 100.00m 120.00m 140.00m 160.00m 180.00m 200.00m

Scale 1:2000

SCALE - VERTICAL 1:100 50 20 10 5 2 1

SCALE HORIZ. 0 10 20 50 100

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**Name of Client**

CARLOW COUNTY COUNCIL

**Name of Job**

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**Title of Drawing**

EXISTING SITE LAYOUT

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## 3.2.5 Existing Plant at the Facility

**Mobile Items of Plant**

The existing facility has several items of plant which are required to operate the facility effectively. These items of plant include for example:

- 1 no 360° tracked excavator
- 1 no front loader
- 1 no tractor and trailer
- 1 no forklift

From time to time additional items of plant are brought to site to operate and maintain the facility. These items of plant include, for example, road sweepers, grass mowing equipment, mini diggers, water tanker/bowsers. A leachate tanker (road going truck) also visits site on a daily basis to remove leachate from the site (refer to leachate section 3.3.14).

When landfill capping works are being carried out as required by the waste licence, construction plant is also required as described later in this section.

**Fixed Items of Plant**

Fixed items of plant on site include:

- Weighbridge
- Landfill gas flare and associated equipment

## 3.2.6 Waste Acceptance

The landfill is licensed to carry out the following waste disposal activities in accordance with the Third Schedule of the Waste Management Acts 1996 to 2010:



**Table 3.1: Waste Disposal Activities, in accordance with the Third Schedule of the Waste Management Acts 1996 to 2010**

| | |
|---|---|
| **Class 2** | **Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes):** *This activity is limited to the composting of green waste from households and the collection of wastes at the recycling facility.* |
| **Class 4** | **Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons:** *This activity is limited to the storage of leachate/ collected surface water in lagoon(s)/ retention ponds.* |
| **Class 5** | **Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment**: *This activity is limited to the disposal of non-hazardous waste into lined cells.* |
| **Class 6** | **Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule:** *This activity is limited to the biological treatment of wastewater generated on site.* |
| **Class 7** | **Physico-chemical treatments not referred to elsewhere in this Schedule (including evaporation, drying and calcination) which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule:** *The activity is limited to the removal of grit from leachate in the leachate lagoon(s).* |
| **Class 13** | **Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced:** *This activity is limited to the storage of waste in receptacles and designated areas prior to disposal on or off site.* |

In addition to the disposal activities, the landfill is licensed to carry out the following waste recovery activities, in accordance with the Fourth Schedule of the Waste Management Acts 1996 to 2010:

**Table 3.2: Waste Recovery Activities, in accordance with the Fourth Schedule of the Waste Management Acts 1996 to 2010**

| | |
|---|---|
| **Class 2** | **Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes):** *This activity is limited to the composting of green waste from households and the collection of wastes at the recycling centre.* |
| **Class 3** | **Recycling or reclamation of metals and metal compounds:** *This activity is limited to the collection of wastes at the recycling facility.* |
| **Class 4** | **Recycling or reclamation of other inorganic materials:** *This activity is limited to the collection of waste at the recycling facility and re-use of construction and demolition waste at the facility as capping or on site road material.* |
| **Class 9** | **Use of any waste principally as a fuel or other means to generate energy:** *This activity is limited to the use of landfill gas for the generation of electricity/ energy.* |
| **Class 11** | **Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.** *This activity is limited to the use of compost generated on site in restoration works.* |
| **Class 13** | **Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.** *This activity is limited to the storage of waste in receptacles and designated areas prior to recovery on or off site.* |



### 3.2.7 Quantity and Composition of Waste Landfilled

From 2008 to 2011 waste landfilled at Powerstown included household and commercial waste, local authority clean ups, street cleaning waste, fly tipping, screenings, filter sand and treated sludge. A breakdown of the waste types/tonnages is provided in Table 3.3.

**Table 3.3: Waste Received and Disposed to Landfill (2008 to 2011)**

| Waste type | 2008 (Tonnes) | 2009 (Tonnes) | 2010 (Tonnes) | 2011 (Tonnes) |
|---|---|---|---|---|
| Municipal Solid Waste | 32,353 | 15,710 | 4,717 | 3,163 |
| Street Cleaning [Note 1] | 1,101 | 1,091 | 2,338 | 1,566 |
| Sludge/ Screenings/filter sand | 400 | 379 | 545 | 2,186 |
| Garden Park Waste | 661 | 599 | 444 | 817 |
| Community Clean Up | 1,662 | 2,934 | 5,040 | 1,023 |
| Other | | 971 | 613 | 1,390 |
| **Total** | **36,177** | **21,684** | **13,697** | **10,145** |

Note 1: Total includes street cleaning residues, fly tipping, litterbins, road sweeper and drain cleaning
Since 2008, waste intake decreased by approximately 70%.

### 3.2.8 Civic Amenity – Existing Operations

The civic amenity at Powerstown serves the general public. In 2011, approximately 18,400 customers used the facility. It offers a wide range of recycling/recovery facilities in accordance with the waste licence for the facility. Table 3.4 below details the tonnages of waste accepted at the civic amenity from 2008 to 2011 (excluding the re-use of clay and rubble on-site for construction activities).

**Table 3.4: Tonnages accepted at the civic amenity**

| Year | 2008 (tonnes) | 2009 (tonnes) | 2010 (tonnes) | 2011 (Tonnes) |
|---|---|---|---|---|
| Tonnage | 1,215 | 1,408 | 1,736 | 1,533 |

In April 2011, the South East Waste Management Region (of which CCC is part of) entered into a regional contract with Greenstar for the provision of and emptying of receptacles at all civic amenities in the region. This contract duration is 2 years.

Under this contract Greenstar is responsible for the collection of all material with the exception of:

- WEEE Ireland - Waste Electrical and Electronic Equipment (WEEE) & batteries
- O'Toole Waste - brown bin waste
- Danielle Recycling -polystyrene
- Irish lamps - fluorescent light bulbs
- Ray Whelan - residual skips



### 3.2.9 Description of Existing Landfilling Operations

Landfilling at Powerstown is carried out in accordance with the conditions of waste licence. Waste enters the facility in a variety of vehicles including refuse collection vehicles (RCVs), heavy goods vehicles (HGVs), trucks carrying skips and smaller trucks/trailers.

Waste is inspected and accepted at the facility in accordance with written waste acceptance procedures approved by the EPA.

Typically the landfilling operations on site involve the following:

- Waste is inspected/accepted in accordance with requirement of the waste licence. All loads are passed over the weighbridge on site and recorded appropriately
- In accordance with written procedures waste may be sent to the dedicated waste inspection and/or quarantine area on site for further inspection and/or quarantine
- If suitable, waste is directed to the active face of the landfill and tipped. The location of the active face moves as the waste is placed. When waste is tipped the vehicle/truck moves off and is weighed again over the weighbridge. Vehicles pass over a wheelwash when required or when directed by site personnel
- Waste is placed and compacted in a systematic planned manner at the active waste face using special waste compactors and/or bull dozers – refer to Figure 3.3
- At the end of each day the waste receives a 'daily cover' of soil (or proprietary biodegradable roll out cover) to prevent windblown litter, bird scavenging and malodours
- When waste has reached predetermined levels/contours a temporary soil cap (generally between 300 mm and 500 mm deep) is placed over the waste
- A permanent landfill cap is later constructed in accordance with the requirement of the waste licence

**Figure 3.3: Typical landfilling operation using waste compactor**

Landfilling activities on-site ceased on 21st January 2012 in accordance with the An Bord Pleanála planning decision.



### 3.2.10 Biodegradable Municipal Waste (BMW)

In April 2010, the EPA initiated reviews of all landfill waste licences to restrict the quantity of biodegradable municipal waste going to landfill. As a result of these reviews, limits and dates have been set for the acceptance of BMW at Powerstown as follows:

*'1.13. Limit on acceptance of biodegradable municipal waste*

*1.13.1. Unless otherwise as may be specified by the Agency. The following limits shall apply:*

*(i) From 1 July 2010 to 30 June 2013 inclusive, a maximum of 47% by weight of municipal solid waste (MSW) accepted for disposal to the body of the landfill shall comprise biodegradable municipal waste (BMW), measured on a calendar year basis or, in 2010 and 201, part thereof.*

*(ii) From 1 July 2013 to 30 June 2016 inclusive, a maximum of 30% by weight of MSW accepted for disposal to the body of the landfill shall comprise BMW, measured on a calendar year basis or, in 2013 and 2016, part thereof, and*

*(iii) From 1 July 2016, a maximum of 15% by weight of MSW accepted for disposal to the body of the landfill shall comprise BMW, measured on a calendar year basis or, in 2016. part thereof.'*

The BMW reports submitted to the Agency during 2010/2011 reported the following results:

| | |
|---|---|
| Q3 2010 | Percentage of BMW landfilled was 55.5% |
| Q4 2010 | Percentage of BMW landfilled was 56.4% |
| Q1 2011 | Percentage of BMW landfilled was 57.2% |
| Q2 2011 | Percentage of BMW landfilled was 55.7% |
| Q3 2011 | Percentage of BMW landfilled was 56.6% |
| O4 2011 | Percentage of BMW landfilled was 54.4% |

CCC submitted revised waste acceptance procedures to the EPA in September 2010 setting out steps to minimise the quantities of biodegradable waste being accepted at the site. Copies of these are included in Appendix 3.

### 3.2.11 Environmental Liabilities Risk Assessment (ELRA)

In May 2011, an Environmental Liabilities Risk Assessment (ELRA) was prepared by Malone O'Regan Consulting Engineers on behalf of Carlow County Council and submitted to the Agency for approval.

## 3.3 Existing Development

### 3.3.1 General

Powerstown landfill and civic amenity was developed over a number of years in three discrete phases namely Phase 1, Phase 2 and Phase 3. These phases of development are described in detail below and illustrated on Figure 3.1.

### 3.3.2 Phase 1 Development (old unlined landfill)

**Phase 1 Landfill Development**

Landfilling commenced in Phase 1 in 1975 and ceased in 1990. Phase 1 (or the 'old landfill') is located on the south western portion of the site. Phase 1 is an unlined landfill which was developed in a spent sand and gravel quarry and operated as a 'dilute and disperse' type landfill. It has an area of approximately 3.7 hectares (9.2 acres) and contains an estimated 130,000 tonnes of municipal solid waste (MSW).

**Phase 1 Landfill Capping**

In 2006, the Phase 1 landfill was permanently capped in accordance with the requirements of the waste licence. The specification of the cap used in Phase 1 was as follows:

- 150 mm of topsoil on
- 850 mm of subsoil on
- Drainage geocomposite on
- 1mm fully welded LLDPE geomembrane on
- Geosynthetic clay liner (GCL) on
- Gas collection geocomposite.



### 3.3.3 Phase 2 Development (lined cells 1-13)

**Phase 2 Landfill Development**

Phase 2 of the landfill is located within the north western portion of the site. It has an area of approximately 4.5 hectares and consists of 13 no engineered landfill cells. Cells 1 -13 were constructed over a number of years and the engineered basal liner varies from cells 1 - 6 and cells 7 – 13 as follows:

**Cells 1 – 6**

- 500 mm of drainage stone on
- Protective geotextile on
- 2.0 mm fully welded HDPE liner

**Cells 7 -13**

- 500 mm of drainage stone on
- Protective geotextile on
- 2.0 mm fully welded HDPE liner on
- 1 m engineered clay layer ($1 \times 10^{-9}$ m/s)

Landfilling in Phase 2 took place between 1991 and 2006.

**Phase 2 Landfill Capping**

The capping work for Phase 2 was complete by 2008. The specification of the landfill cap used for Phase 2 was as follows:

- 150 mm of topsoil on
- 850 mm of subsoil on
- Drainage geocomposite on
- 1 mm fully welded LLDPE geomembrane on
- Gas collection geocomposite.

### 3.3.4 Phase 3 Development (General overview)

Phase 3 involved a major capital investment at the Powerstown Facility including the construction of four new landfill cells (cells 15, 16, 17 & 18) providing estimated void space of 240,000 $m^3$. The Phase 3 development works took place largely in 2006 and in addition to new cells 15-18, development included:

- New facility entrance off a minor road off the old N9 and various site roads (Figure 3.4)
- A split level civic amenity (Figure 3.5)
- Leachate holding tank and installation of floating cover to existing leachate lagoon
- Green waste composting area
- Conversion/renovation of an existing dwelling house into a site office
- Weighbridges and weighbridge office
- Perimeter fencing
- Surface water management infrastructure comprising pipework, settling pond, swales etc.
- Foul drainage system and treatment unit
- Ducts for power, telemetry, CCTV etc.
- Car parking
- Waste quarantine and inspection area
- Wheelwash
- Capping part of the existing landfill
- Landscaping



**Figure 3.4: Facility Entrance at Powerstown Landfill and Civic Amenity**

**Figure 3.5: Civic Amenity at Powerstown Landfill**

### 3.3.5 Development of Cells 15-18 including Liner Specification

Cells 15, 16, 17 and 18 were constructed in 2006. These cells were developed with a very high specification of basal liner. The basal liner included the following elements (from top down):

- Drainage/protection layer (500 mm of stone on floor and stone/geocomposite on side slopes) on
- Protective geotextiles on
- 2.5 mm fully welded HDPE Liner on
- Geocomposite leak detection layer on
- 2.5 mm fully welded HDPE Liner on
- 500 mm of bentonite enhanced sand (BES) with a maximum permeability of 1 x $10^{-11}$ m/s.

Figure 3.6 below shows the new cells under construction in 2006.



**Figure 3.6: Cells 15-18 under construction in 2006**

### 3.3.6 Construction Quality Assurance – Cells 15-18

Cells 15 -18 were constructed in accordance with the requirement of EPA Waste Licence Register No 25-2[6] dated 11 April 2005. This included the requirement for independent construction quality assurance (CQA) of the cells constructed. This CQA included a comprehensive schedule of inspection and testing of the bentonite enhanced sand (BES) layer and the HDPE liners which were installed.

The CQA work was coordinated by an independent specialist and also included an electrical leak location survey (ELL) which was carried out after the stone drainage/protection layer was placed.

A comprehensive construction quality assurance validation report was prepared in accordance with requirements of the waste licence.

### 3.3.7 Landfill Capping Works

The waste licence and the conditions of the existing An Bord Pleanála decision require that a permanent landfill cap is constructed at Powerstown Landfill. This cap has been developed over Phase 1 and Phase 2. The permanent landfill cap has yet to be constructed over Phase 3.

The Phase 3 cap will be in accordance with the requirements of the EPA, however, typically the landfill capping system will include:

- 150mm to 200mm of topsoil (seeded with grass)
- 200mm to 850mm of clean subsoil
- Drainage geocomposite and a network of drainage pipes to capture and convey water from the subsoil
- 1mm fully welded LLDPE liner
- Gas collection geocomposite and a network of pipes to capture gas from beneath the cap.



### 3.3.8 Final Capping Profile

The proposed final profile of the landfill (when capped) is shown on Figure 3.7 with no slopes steeper than 1 in 3. The maximum final height of the landfill will be 64.0 m.

The extension of time sought in this planning application will allow for waste to be placed in already constructed landfill cells so that the profile of the site stipulated in the waste licence can be achieved.

[6] Waste Licence Register No 25-2 dated 11 April 2005 was superseded by Waste Licence Register No 25-3 issued on 21 December 2009.

Note: This Drawing Is Based On Dwg 2005-120-01-012 Proposed Final Contours As Referenced In Condition 4.3.1 Of Waste License Register No 25-3

M9 Junction 6

Proposed Final Contours
See Note

License Boundary

Phase 1 Landfill
(Closed & Capped)

| Rev. | Drawn | Chk'd | App'd | | |
|---|---|---|---|---|---|
| A | | | | Cork 07.11.11 | ISSUE FOR PLANNING |
| Revision History | A | | | Rev Origin Date | Description |

**Name of Client**

CARLOW COUNTY COUNCIL

**Name of Job**

POWERSTOWN LANDFILL
EIS FOR EXTENSION OF TIME

**Title of Drawing**

PROPOSED FINAL CONTOURS

| Scales Used | This Drowing was printed to |
|---|---|
| A1 1:1250, A3 1:2500 | ISO A1 |

| Dwg. No. | Rev. |
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| LW11-120-03-Figure 3.7 | A |

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Scale 1:1250

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ORIGINAL DRAWING SIZE A1 - (841 x 594)

### 3.3.9 Construction work during landfill capping

Landfill capping works are generally executed under civil engineering contract procured in accordance with local authority procurement policy. Only experienced civil engineering contractors and lining contractors are engaged to carryout landfill capping works.

It is envisaged that the capping works for Phase 3 will occur in a number of stages using a number of discrete civil engineering contractors. The exact number of timing of capping works contracts will depend largely on the rate of filling within the landfill cells.

Additional construction traffic will occur during the construction of the cap. This may include truck movements to deliver plant, soils, materials, concrete etc and also vehicles driven by construction workers. Typically, the number of construction workers is not high on landfill capping projects (generally < 25 workers per day). However the nature and extent of traffic movements will not increase as a result of the proposed continued operation of the landfill.

### 3.3.10 Existing Buffer Zone

The waste licence requires a 50 m wide 'buffer zone' at the eastern side of the landfill. This buffer zone is adjacent to the facility boundary but no waste activities take place in this area. The buffer zone is currently being used for tillage farming by third parties under agreement from CCC. A copy of the letter of agreement from the landowner has been included with the application to An Bord Pleanála.

### 3.3.11 Filling of Cells 15 - 18

Cells 15 – 18 provided a void space of approximately 240,000 $m^3$. When the cells were fully constructed and tested CCC proceeded to place waste in cells 15 and 16. A portion of the waste filled in cells 15 and 16 has been temporarily capped and will in time receive a permanent landfill cap in accordance with the requirements of the waste licence.

In January 2012, an estimated 165,000 $m^3$ of void space remained within Phase 3 (Figure 3.8).



**Figure 3.8: Cell 17 and 18 at Powerstown Landfill**

### 3.3.12 Existing Surface Water Drainage Infrastructure

Surface water is generated on site from paved areas, handstanding areas, roofs of buildings, empty landfill cells and run off from other areas (grassed/ungrassed). Surface water arising from the site is directed, using open swales, towards the surface water settling pond at the north of the site (refer to Figure 3.9).

**Figure 3.9: Surface water pond at Powerstown Landfill**

The floor level of the surface water pond is approximately 1 m below the outlet level. This allows for suspended solids and grit to settle in the pond. The rate of discharge from the pond is controlled by a floating arm device at a rate of 15.9 L/sec. The outflow from the pond discharges to the Powerstown stream which in turn discharges to the River Barrow.

The outflow from the pond is directed though an oil interceptor to remove any small amounts of oils should it enter the surface water on the site. The pond/outlet is also equipped with instrumentation to detect conductivity, pH, dissolved oxygen (DO) and water level in the pond. In addition, an actuated penstock/valve is located on the outlet from the pond which will shut should predetermined levels of pH, conductivity or dissolved oxygen be exceeded. All of the above instrumentation is connected to the SCADA system on site and is maintained regularly.



## 3.3.13 Existing Landfill Gas Infrastructure

Landfill gas (LFG) is extracted from the waste using a combination of vertical and horizontal gas wells. Gas wells are constructed from the cell floor upwards as waste is placed in each cell. Further gas wells are installed as part of the landfill capping works by drilling into the waste body upon reaching a predetermined filling height. This drilling is typically carried out by a specialist drilling subcontractor. Gas extraction commences from each cell once sufficient waste has been placed to prevent air infiltration into the gas extraction system.

A vacuum pump (known as a 'blower') is located at the gas flare compound. This blower develops a negative pressure gradient within the gas collection pipe work and essentially 'sucks' the gas from the landfill though the pipe work.

Gas is flared off in an enclosed landfill gas flare in accordance with the requirements of the waste licence. The flare has a capacity of 1,200 $m^3$/hour. There is a second flare onsite near the old entrance to the site however, this flare has been decommissioned.

**Figure 3.10: Enclosed Landfill Gas Flare at Powerstown landfill**

### 3.3.14 Leachate Infrastructure

Leachate is generated on-site from the waste mass, runoff from the waste quarantine/inspection area and composting slab. Leachate is directed from these areas to either the covered leachate lagoon or to a leachate holding tank located near the civic amenity as indicated on Figure 3.2.

Leachate is collected from the leachate lagoon and leachate holding tank at Powerstown Landfill and is transported off site using road going tankers. Leachate is brought for treatment to Mortarstown, Tullow or Muine Beag waste water treatment plants in County Carlow.

The frequency of leachate truck movements depends on the weather and time of year. Typically, leachate tankering takes place 4 days a week with at least 4 - 5 loads a day being removed. Table 3.5 below details the amount of leachate removed off site from 2007 to 2011.

**Table 3.5: Volume of leachate tankered off site 2007 to 2011 (source AER 2011)**

| Leachate 2007 ($m^3$) | Leachate 2008 ($m^3$) | Leachate 2009 ($m^3$) | Leachate 2010 ($m^3$) | Leachate 2011 ($m^3$) |
|---|---|---|---|---|
| 15,251 | 14,754.3 | 13,274 | 25,194 | 16,676 |

*Leachate Monitoring*

It was agreed with the Agency during 2009 that the following locations would be used for leachate quality reporting purposes:

- L7: this collects leachate from Cells 7 and 8
- LG: the Leachate Lagoon which collects leachate from Cells 1 - 6 and 8 - 13
- LT: the Leachate Tank which collects leachate from Cells 15 and 16



Levels are monitored within Phase 2 and 3 of the landfill to ensure that a leachate levels of less than 1 m are maintained by the pumping and collection system. Leachate levels are monitored on a continuous basis for Cells 15 and 16. Leachate levels are monitored weekly for Cells 1 - 13 to ensure that levels remain less than one metre above the liner level. These results are submitted to the Agency on a quarterly basis.

The quality of municipal landfill leachate changes with time as the degradation of waste progresses inside the landfill as a result of internal bio-reactions within the landfill that leads to the formation of leachate. The process of leachate generation occurs in a series of stages and the quality of the leachate in any given generation stage has particular characteristics. The stages of decomposition and leachate characteristics include:

- Stage I - Aerobic Processes (degradation)
- Stage II - Anaerobic Acid Formation (hydrolysis and fermentation)
- Stage III - Unstable Anaerobic Methane Formation/Acetogenesis (low pH, BOD;COD >0.4)
- Stage IV - Stable Anaerobic Methane Formation/Methanogenesis (higher pH, BOD;COD <0.25)
- Stage V - Air Penetration (Oxidation)

In addition to annual chemical testing, quarterly leachate monitoring is carried out for temperature, odour and a visual description. This data is reported to the Agency in the form of leachate quarterly reports.

Table 3.6 contains results from leachate samples taken from the leachate lagoon at Powerstown landfill.

## Table 3.6: Leachate Characteristics – Powerstown Landfill

| Date | Aug-07 | 21/07/08 | 13/05/09 | 19/10/10 | 08/03/11 |
|---|---|---|---|---|---|
| **Parameter** | | | | | |
| Visual | Amber brown colour | - | - | Brown | Dark Amber |
| Ammonia mg/l N | 620 | 1100 | 1300 | 1200 | 1200 |
| Conductivity µS/cm | 10580 | 15200 | 17900 | 17900 | 19700 |
| pH | 7.9 | 7.8 | 7.7 | 7.8 | 7.8 |
| Temperature °c | 20 | 23 | 13.2 | 12.2 | 7.1 |
| Orthophosphate mg/l P | 1.5 | 4.4 | 6.3 | 5.7 | 4.9 |
| Total Oxidised Nitrogen mg/l N | 2.2 | 0.1 | nm | 142.11 | 178.91 |
| BOD mg/l $O_2$ | 30.8 | 65 | 104 | NM | 36 |
| COD mg/l $O_2$ | 1337 | 1336 | 1375 | 1480 | 1530 |
| Chloride mg/l Cl | 1248 | 1928 | 2338 | 2282 | 2559 |
| Fluoride mg/l F | 0.6 | 2.9 | 2.5 | NM | 6.3 |
| Sulphate mg/lSO4 | 39.9 | 57.4 | 110 | NM | 100 |
| Aluminium ug/l | 102 | <250 | <250 | 170 | 410 |
| Antimony ug/l | <5 | <10 | <5 | <5 | 2.1 |
| Arsenic ug/l | 139 | 152 | 20.3 | 110 | 73 |
| Barium ug/l | 280 | 121 | 46.7 | 160 | 240 |
| Beryllium ug/l | <5 | <10 | <5 | <5 | <0.5 |
| Boron ug/l | 2950 | 4350 | 510 | 3500 | 3800 |
| Cadmium ug/l | <5 | <10 | <5 | <5 | <0.5 |
| Calcium mg/l | 62.7 | 80.6 | 10.9 | 54 | 66 |
| Chromium ug/l | 81.5 | <10 | 23.4 | 69 | 140 |
| Cobalt ug/l | 25.4 | 32.6 | 7.04 | 41 | 65 |
| Copper ug/l | 31.5 | <10 | <30 | 35 | 380 |
| Iron ug/l | 5330 | 5320 | 1020 | 5100 | 13000 |
| Lead ug/l | 9.06 | <10 | <5 | <5 | 1.6 |
| Magnesium mg/l | 80.4 | 116 | 14.6 | 76 | 94 |
| Manganese ug/l | 337 | 721 | <250 | 360 | 620 |
| Mercury ug/l | <5 | <5 | <5 | <5 | <0.5 |
| Molybdenum ug/l | <5 | <10 | <5 | 5.7 | 8.7 |
| Nickel ug/l | 142 | 70.5 | 31.6 | 220 | 280 |
| Potassium mg/l | <5 | 728 | 102 | 690 | 1100 |
| Selenium ug/l | 17.4 | 23 | <5 | 35 | 45 |
| Sodium mg/l | <5 | 1450 | 190 | 1400 | 2000 |
| Thallium ug/l | <5 | <10 | <5 | <5 | <0.5 |
| Tin ug/l | 13.1 | 22 | <10 | <10 | 26 |
| Total Cyanide mg/l | <0.05 | <0.05 | <0.05 | 0.211 | 2.19 |
| Uranium ug/l | <5 | <10 | <5 | <5 | 0.8 |
| Vanadium ug/l | 49.5 | 74.5 | 12.2 | 61 | 110 |
| Zinc ug/l | 136 | <60 | <100 | 10 | 57 |
| nm = not measured | | | | | |



### 3.3.15 Existing Road Infrastructure

The Powerstown facility is located approximately 200 m (on plan) from the M9 Motorway. The entrance to the site is located approximately 1,400 m from Junction No 6 on the M9.

The access to the site is off a local road – L3045 which is in turn located off the R448 (part of the old N9). Approximately 500m of the L3045 from the site entrance to the R448/old N9 was upgraded in circa 2006 in line with the requirement of the An Bord Pleanála planning conditions. The upgraded road near the site includes a footpath and lighting as shown in Figure 3.11 and 3.12.

All vehicles access the site via the main site entrance. Vehicles typically approach the site from the R448 located to the west of the facility. Further details about traffic are given in Section 10 of this EIS.

**Figure 3.11: Local road outside Powerstown Landfill (looking west)**

**Figure 3.12: Local Road outside Powerstown Landfill (looking east)**



## 3.4 Proposed Development

### 3.4.1 General

The proposed development involves the continued operation of the landfilling activities. Specifically, the proposed development will involve filling the remaining void space within Phase 3 which is largely confined to Cells 17 and 18. When the cells are filled, a permanent cap will be constructed in accordance with the waste licence for the facility and as described below.

### 3.4.2 New infrastructure requirements

The proposed development does not require the development of any new infrastructure or cells. The planning application seeks to obtain permission to extend the period of time during which landfilling can occur as described elsewhere in this EIS.

### 3.4.3 Filling of remaining void in Cell 15 - 18

The proposed development will involve filling the remaining void space within Cells 15 - 18 with municipal solid waste. The remaining void is estimated at 165,000 $m^3$ (or 140,250 tonnes)[7] (January 2012 estimate), most of this being within Cells 17 and 18.

It is proposed to continue to fill waste in Cells 15 - 18 until the cells are full and the contours permitted by the waste licence achieved.

### 3.4.4 Waste Tonnages

The sites waste licence limits the total amount of waste accepted at the facility to 40,000 tpa.

It is proposed to increase the maximum annual waste input from 40,000 tpa to 50,000 tpa. Due to the current economic situation and waste market forces it is difficult to predict whether this throughput can be achieved year on year and therefore it is, proposed to continue to landfilling operations until the void space is utilised. The time required to fill the cells will depend on market conditions in the Irish waste sector and the availability of landfill void. CCC will be required apply to the EPA for a review of the waste licence to facilitate this increase in tonnage.



### 3.4.5 Main Environmental Changes Arising from Proposal

**Leachate Production**

The proposed increase in allowable waste intake from 40,000 tpa to 50,000 tpa will have an impact on the leachate production profile. The projected leachate volumes for both scenarios are presented in Table 3.7 below. The results are also depicted graphically overleaf. These volumes are derived from the calculations presented in Appendix 4.

**Table 3.7: Estimated Annual Leachate Generation (based on waste intakes of 40,000 and 50,000 tonne per annum)**

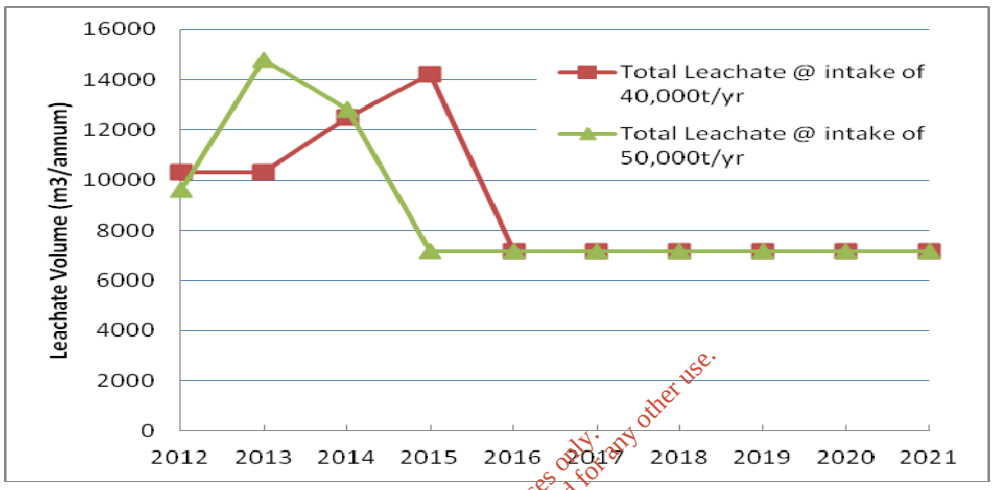
| Year | Total Estimated Leachate Produced @ intake of 40,000t/yr | Total Estimated Leachate Produced @ intake of 50,000t/yr |
|---|---|---|
| 2012 | 10,305 | 9,605 |
| 2013 | 10,305 | 14,786 |
| 2014 | 12,486 | 12,799 |
| 2015 | 14,199 | 7,177 |
| 2016 | 7,177 | 7,177 |
| 2017 | 7,177 | 7,177 |
| 2018 | 7,177 | 7,177 |
| 2019 | 7,177 | 7,177 |
| 2020 | 7,177 | 7,177 |
| 2021 | 7,177 | 7,177 |
| Total 2012 - 2021 | 90,359 | 87,430 |

[7] 165,000 cubic meters of void multiplied by 0.85 tonnes/$m^3$ = 140,250 tonnes

The estimates presented are based on an intake of 40,000 and 50,000 tpa and the likely impact on leachate volumes associated with the increased intake. The increase will lead to a slight reduction in the volume of leachate produced. This is linked to the absorptive capacity of the waste and fact that cells can be permanently capped sooner if they are filled sooner.

However, these predictions should be viewed with some caution as recent intake volumes have been far less than 40,000 tpa. If this trend continues the available void will take longer to fill and the leachate production profile will differ from that presented. Specifically, if the cells take longer to fill then the cells will remain uncapped for longer resulting in prolonged (and ultimately increased) leachate production.

**Estimated Annual Leachate Generation (based on waste intakes of 40,000 and 50,000 tonne per annum)**






**Landfill Gas Production**

A landfill gas production model was prepared as part of the EIS using LandGem Landfill Gas Emissions Model version 3.02. The model outputs are outlined in Section 6.4.5 of this EIS and presented in Appendix 5. In this landfill gas model, a number of scenarios were examined to assess what impacts the proposed development would have on landfill gas production.

The current landfill gas prediction curve (Scenario 1) with waste acceptance finishing at the end of 2011 was calibrated using actual volumes of gas flared at the site and multiplied by a collection efficiency factor. The model shows that peak landfill gas production occurred in 2009, at 4.3 million $m^3$/yr (493 $m^3$/hr).

Scenario 2 was included to illustrate what the landfill gas production would have been onsite if waste inputs to the site had continued at 40,000 tpa, as per the existing planning permission. This predicts that peak landfill gas would be produced in 2013 at 4.6 million $m^3$/yr.

Scenario 3 examines the effect of waste acceptance of 40,000 tpa from 2012 until the remaining constructed cells are filled (c2015). This gas curve shows a peak of 4.3 million $m^3$/yr (493 $m^3$/hr) of landfill gas in 2009. It shows a secondary peaking 2015 of 3.9 million $m^3$/yr (455 $m^3$/hr) of landfill gas.

Scenario 4 examines the effect of an increase in the annual tonnage from 40,000 tpa to 50,000 tpa from 2012 until the remaining constructed cells are filled (c2014). This gas curve shows peak gas production of 4.3 million $m^3$/yr (493 $m^3$/hr)in 2009.It predicts a secondary peak in 2014 of 4.1 million $m^3$/yr (473 $m^3$/hr) of landfill gas.

The last scenario, Scenario 5, examines the effect the continued acceptance of 10,000 tpa of waste from 2012 (considered worst-case scenario) until the remaining constructed cells are filled. The model shows that gas production has peaked in 2009 at 4.3 million $m^3$/yr (493 $m^3$/hr). Due to the lower rate of waste acceptance, the predicted gas volumes will be higher than for other scenarios from c. 2020 to 2040.

According to the gas prediction model, peak landfill gas production was reached onsite in 2009. Due to the lower quantities of waste accepted onsite since 2009, the landfill gas produced since 2009 is less than what was predicted based on a 40,000 tpa deposition rate.

The proposal to increase the acceptance tonnage to 50,000 tpa and extend the life of the landfill until current cells are filled, will result in a secondary peak in landfill gas production in 2014, of 4.1 million $m^3$/yr (473 $m^3$/hr). This is less than that what was produced in 2009 (4.3 million $m^3$/yr of landfill gas (493 $m^3$/hr).

Also, if in the worst case scenario, only 10,000 tpa of waste is received onsite from 2012 and the landfill continues until the remaining constructed cells are filled, gas production will continue but the drop-off in volume will be slower.

### 3.4.6 Closure Restoration and Aftercare

In May 2011, a Closure Restoration and Aftercare Management Plant (CRAMP) was prepared by Malone O'Regan Consulting Engineers on behalf of CCC and is currently under consideration by the Agency.

## 3.5 Environmental Controls & Monitoring

It is not proposed, nor is it deemed necessary, to implement changes to the comprehensive environmental controls and monitoring that are presently in operation. Table 3.8 summarises the monitoring which is currently undertaken at the site in accordance with the waste licence W0025-03. A number of the historic monitoring locations were revised in 2008 following consultation with the Agency to reflect changes at the site, mainly the development of Phase 3 of the landfill.

**Table 3.8: Environmental Monitoring Locations (Source: 2010 AER)**

| Landfill Gas | Dust Deposition | Noise | Surface Water | Ground Water | Leachate | Odour |
|---|---|---|---|---|---|---|
| G1 – G46 Note 1 | D2<br>D4<br>D5<br>D6<br>D7<br>D8 | S1<br>S2<br>N4<br>N5<br>N6 | ST1<br>ST2<br>SWLO<br>SWLI | RCA1<br>RCA2<br>GW1<br>GW2<br>GW3<br>GW6<br>GW7<br>GW8 | LG<br>LT<br>L7<br>Note 2 | OD1<br>OD2<br>OD3 |
| TP11 – TP17 | | | | Private Wells as per Condition 8.8.1 of Licence | L1, L2, L3, L4, L10, L11, L12, L13 Note 3<br>Cell 15<br>Cell 16<br>Cell 17<br>Cell 18 Note 4 | Nolan residence<br>McDonalds Residence<br>M9 Roundabout<br>NE site boundary<br>Note 5 |



Note 1: G42 not included
Note 2: Cells to be monitored for Leachate composition (quarterly / annually)
Note 3: Cells to be monitored for leachate levels (weekly)
Note 4: Cells 15-18 levels monitored continuously on SCADA
Note 5: Daily Odour Monitoring Locations

The location of each of these monitoring points in indicated on Figure 3.13.

The following sections describe the environmental controls that are currently in operation and will continue as under the proposed development.

### 3.5.1 Litter

Litter netting is erected on site along the perimeter of the active cells and is located in such a manner so as to capture the maximum amount of windblown litter. The placement of daily cover material also helps in controlling litter. In addition, patrols/inspections are carried out on a weekly basis to establish if any incidents are arising. At least one staff member is assigned to litter picking duties on a weekly basis.

### 3.5.2 Noise

Site roads are constructed between the fill areas, so that the completed cells provide shelter against noise from site plant and equipment, thereby minimising the risk of noise nuisance to nearby noise sensitive receptors.

### 3.5.3 Dust

Dust generated on site is kept to a minimum by use of a wheel wash system and the procedure of water sprinkling as necessary. Dust is monitored at least 3 times per to assess whether or dust is causing a nuisance at the site.

### 3.5.4 Odour Control

A number of changes have been made at Powerstown landfill since the 2004 application which has resulted in a significant reduction in the number of odour complaints. This is reflected in the fact that only 3 odour complaints were received in 2010 and none in 2011. This is in contrast to some 19 odour complaints in 2009, 29 in 2008 and over 300 in 2006.

An Odour Management Plan (OMP) was prepared for the site in March 2010 to ensure that best practice is implemented on a continued basis in the management of odour emissions at Powerstown Landfill.

The completed final capping of cells 6-13, the installation of a new gas collection system and the continuous operation of the new flare all helped to improve odour control and reduce odour emanating from the landfill. Other mitigation measures include the careful scrutiny and screening of waste intake to prevent particularly odorous material being accepted at the landfill for disposal in addition to twice daily odour patrols at three off-site locations to examine for any odour problems.



In addition, Odour Monitoring Ireland (OMI) was retained to carry out volatile organic compounds (VOCs) surveys in 2009 which identified a number of zones of surface landfill gas emissions from flanked and open areas and a number of wellheads that exceeded recommended limits (as per condition 8.14.6 of the waste licence). These were mainly associated with inadequate landfill gas extraction from the active cells (Cells 15 and 16). A number of mitigation measures were recommended by OMI which included:

- Partial permanent capping on the northern and eastern flanks of Cells 15 and 16
- Extension of the temporary capping on some flanks
- Installation of vertical extraction wells and pipework.

All of these recommendations were implemented by CCC.

On a day-to day basis the primary odour control from waste tipping is the use of daily cover in accordance with the provisions of the waste licence and the OMP. Daily cover comprises a minimum of 150 mm soil-like material. Before being covered the waste is compacted. The immediate compaction of the waste within a small controlled area serves to minimise the available area for odours to escape from the daily tipping area.

The progressive development of the landfill gas collection and treatment infrastructure enhances odour control as landfill gas combustion effectively destroys its odorous compounds. All landfill gas extraction points are connected to an enclosed flare.

Additional odour controls include the daily removal of leachate by a licensed waste contractor thus minimising the potential for odours which can form as a result of leachate stagnating and becoming anaerobic. The leachate lagoon on the western boundary of the site is covered with a floating cover, while the new holding tank located in the eastern extension is fully enclosed. Leachate is loaded from both these areas to tankers via a carbon filter to prevent odorous emissions.

### 3.5.5 Bird and Pest Control

The bird species that scavenge at Powerstown facility are mainly the corvid (crow) family, which include rooks and occasionally hooded crows and jackdaws. Bird Control Ireland Ltd. is contracted to visit the site twice per week at varying times both during and outside operating hours. Only trained birds of prey are used which include the harris hawk and peregrine falcon. There are also visual and acoustic deterrents used on site such as an automated bird scarer, a hand pistol and kites. In general, scavenger birds numbers in the area are low and do not present many problems. This is due to the success of the falconry method of control, operational practices and restricting the size of the tipping area.

Pestguard Ltd. is employed to control rodent and flying insect infestations. The site is visited on a monthly basis. There are approximately 50 rodent bait stations located around the site, all clearly identifiable. Each box is monitored and re-baited during monthly site inspections. The risk of fly infestations is kept to a minimum by good operating practices which include efficient compaction of waste, restricting the size of the tipping area and covering of waste at the end of each day. As an additional precautionary measure, the tipping area, plant, machinery and landfill are sprayed as required with appropriate insect repellent.

M9 Junction 6

Licence Boundary

Phase 1 Landfill (Closed & Capped)

GAS MONITORING POINT TP13

GAS MONITORING POINT TP16

GAS MONITORING POINT TP14

GAS MONITORING POINT TP15

N2 NOISE MONITORING POINT

GM9 Damaged in quarry

GM40 No found

GM 42 No found

LFGF1 (FLARE)

Liable to Flooding

Gravel Pit

Pond

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Note: This Drawing Is Based On Dwg 2005-120-01-012 Proposed Final Contours As Referenced In Condition 4.3.1 Of Waste License Register No 25-3

LEGEND

GM = GAS WELLS

SW = SURFACE WATER

LFG1 = LANDFILL GAS FLARE

GW+RCA = GW WELLS

N1+S1 = NOISE MONITORING LOCATIONS

D1 - D6 = DUST MONITORING LOCATIONS

L1 - L17 = LANDFILL GAS MONITORING LOCATIONS

| Rev. | Drawn | Chk'd | App'd | DOS | |
|---|---|---|---|---|---|
| A | SF | ME | | Cork | ISSUE FOR PLANNING |
| | | | | 06.08.11 | |
| | | | | Rev Origin | Description |
| | | | | Date | |
| Revision History | A | | | | |

Name of Client

CARLOW COUNTY COUNCIL

Name of Job

POWERSTOWN LANDFILL
EIS FOR EXTENSION OF TIME

Title of Drawing

LANDFILL GAS MONITORING LOCATIONS

Scales Used 1:2000

This Drawing was printed to A1-Landscape

Dwg. No. LW11-120-03-Figure 3.13

Rev. A

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Scale 1:2000

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ORIGINAL DRAWING SIZE A1 - (841 x 594)

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# 4 POLICY & PLANNING CONTEXT

## 4.1 Introduction

This chapter examines the general waste management, planning and regional policy contexts at national and regional levels.

## 4.2 National Policy

### 4.2.1 Changing Our Ways 1998

Government policy in relation to waste management is set out in the policy statement entitled *Waste Management: Changing Our Ways* published by the Department of the Environment and Local Government (DoELG) in September 1998. The policy statement incorporates the EU Waste Management hierarchy of waste prevention/minimisation/reuse/recycling/energy, recovery/disposal as well as earlier policy statements including Government strategy documents such as *Recycling for Ireland* (July 1994) and *Sustainable Development: A Strategy for Ireland* (April 1997).

It outlines a clear commitment to reduce dependency on landfill as a primary waste disposal route. It encourages the development of a smaller number of well-designed and managed landfills for the receipt of residual waste. Residual waste is waste which has undergone some form of treatment to remove recyclable material or to further process the waste in order to achieve a volumetric reduction.

The policy document *Waste Management: Changing Our Ways* outlines ambitious targets for waste management as follows:

- a diversion of 50% of overall household waste away from landfill
- a minimum 65% reduction in biodegradable wastes consigned to landfill
- the development of waste recovery facilities employing environmentally beneficial technologies as an alternative to landfill, including the development of composting and other feasible biological treatment facilities capable of treating up to 300,000 tonnes of biodegradable waste per annum nationally
- recycling of 35% of municipal waste
- recycling at least 50% of construction and demolition (C & D) waste within a five year period, with a progressive increase to at least 85% over fifteen years
- rationalisation of municipal waste landfills, with progressive and sustained reductions in numbers, leading to an integrated network of some 20 state-of-the-art facilities incorporating energy recovery and high standards of environmental protection
- an 80% reduction in methane emissions from landfill, which will make a useful contribution to meeting Ireland's international obligations.



### 4.2.2 Waste Management: Preventing and Recycling Waste - Delivering Change (2002)

A second policy statement was issued by the Minister for the Environment and Local Government in 2002. In this policy statement entitled 'Preventing and Recycling Waste - Delivering Change', the Government sets out objectives for developing recycling and recovery facilities.

This policy statement incorporates the EU waste management hierarchy of waste prevention, minimisation, reuse, recycling, recovery and disposal as outlined in '*Waste Management: Changing our Ways*' published in September 1998, as well as earlier policy statements, including Government strategy documents such as 'Recycling for Ireland' (July 1994) and 'Sustainable Development: A Strategy for Ireland' (April 1997). This policy document:

- highlights the necessary disciplines that must be imposed within waste management systems to secure real progress on waste prevention, reuse and recovery
- outlines a range of measures that will be undertaken in the interests of minimising waste generation and ensuring a sustained expansion in reuse and recycling performance and

- sets out a number of clear objectives which the Government propose to implement to meet the targets identified in *Changing Our Ways*.

### 4.2.3 Waste Management: Taking Stock and Moving Forward – 2004

On 5th April 2004, a further national waste management policy document – *'Waste Management: Taking Stock and Moving Forward'* – was launched. 'Taking Stock' assesses progress on the implementation of a variety of aspects of the Waste Management Act 1996 over the preceding five years. It sets down new challenges in light of the findings of this assessment.

Chapter 3.5.3 of this policy document addresses the issue of landfill and notes that in the absence of timely delivery on recycling and thermal treatment objectives there will be increased pressure for an extension of landfill capacity which will require local authorities to provide further short-term solutions without prejudicing the achievement of the longer term goal of achieving maximum diversion from landfill.

The document summarises the estimated remaining landfill capacity for each of the 10 waste management regions in 2004.

Chapter 4.3 of the policy document states that:

*"There is not an automatic implication of waste management plans that waste facilities provided in the region have to be used exclusively for the region/county concerned… clearly facilities provided in the region must serve primarily the waste management needs of that region. That is entirely consistent with the concept of regional waste management planning where each region has to take lead responsibility for its own waste, …however careful consideration needs to be given to whether the imposition of blanket prohibitions on all cross-regional movements of waste is inappropriate and measured interpretation of the philosophy underlying regional waste management planning… it is noteworthy that the EPA in its most recent National Waste Database Report for 2001 has recommended that the inter-regional movement and treatment of wastes should be provided for… in appropriate circumstances."*

Chapter 4.3 concludes with key point 3 namely that "*an examination of the issues arising in terms of the inter-relationship between regional boundaries and waste facilities will be completed with a view to providing guidance to the relevant authorities…*"



The above guidance referred to in Chapter 4.3 was provided in circular WIR:04/05 published by the DoEHLG in May 2005. It stated that:

*"One of the fundamental components of policy in regard to the regulation of the movement of waste is the application of the proximity principle… the application of the proximity principle does not entail interpreting administrative waste management planning boundaries in such a manner as to inhibit the development of waste infrastructure which will support the attainment of national waste management policy objectives through the rational development and use of such infrastructure."*

Chapter 4.5.7 of 'Taking Stock' states that any update of waste management plans will need to provide for an appropriate balance between "*having sufficient landfill capacity available in the short to medium term pending the delivery of alternative 'higher-in-hierarchy' infrastructure, and guarding against the overprovision of landfill…*"

### 4.2.4 National Strategy on Biodegradable Waste (2006)

The National Strategy on Biodegradable Waste was launched in April 2006 by the DoEHLG, and clearly highlights the urgent need for waste management facilities with infrastructure to deal with biodegradable waste. It focuses on biodegradable waste from municipal sources, such as from domestic dwellings and commerce.

Ireland's performance in terms of these targets in outlined in the most recent national waste data outlined in the National Waste Report 2009 and presented in Table 4.1

**Table 4.1: Ireland's current performance versus Landfill Directive obligations**

| Target Year | Maximum Quantity allowed to be landfilled |
|---|---|
| **2010** | 916,000 |
| **2013** | 610,000 |
| **2016** | 427,000 |
| **Current Position** | **Quantity biodegradable municipal waste landfilled** |
| **as per 2009** | 1,059,852 |
| **Current Position** | **Distance to first EU Landfill Target (July 2010)** |
| **as per 2009** | 144,000 |

Data sourced from EPA National Waste Report 2009 (2011)

The Strategy also sets down targets for individual waste streams. Each regional waste management plan is required to propose arrangements on how these targets are met:

- for paper and cardboard, the recycling targets for 2010 were set at 45% for households and 61% for commerce going up to 55% and 71% in 2013 and to 60% and 73% respectively in 2016. It is acknowledged that these levels will require significant investment in both kerbside collection arrangements, as well as 'bring' facilities and civic waste sites
- a national home composting target of 20% of in urban households and 55% of rural households has been set.

The means by which these targets will be achieved has been recently augmented by a number of actions taken by the EPA in terms of limitation being placed on landfill with respect to the amount of BMW that can be accepted at these facilities. In addition, clear guidance on the means of calculating BMW content has been developed.



### 4.2.5 National Spatial Strategy 2002 -2020

The National Spatial Strategy (NSS) is a planning framework document that is designed to achieve a better balance of social, economic, physical development and population growth between the various regions of the country. The Strategy introduces the concept of particular locations as 'hubs' and 'gateways' which will deliver the services and infrastructure required and drive development in particular regions.

Under the Strategy, Waterford had been identified as the gateway city for the South East Region with Wexford and Kilkenny acting as hubs. *"County towns, other towns, villages and more rural areas should be positioned to support the full realisation of the potential for economic development throughout the region, with a particular emphasis on complementing the gateway and hub approach".* The location of the Powerstown facility, adjacent to the M9 motorway, is well situated to service these three towns.

The plans also states that "*In the southern and eastern parts of the Midlands adjacent to the Greater Dublin Area there are a number of strong county towns that are experiencing extensive commuter-based development e.g. Portlaoise and Carlow. These towns must be developed in terms of their economic self-sufficiency to minimise the need for commuting and support the development of surrounding area*".

The continued operation of Powerstown landfill will provide employment for *c.* 6 persons and in turn will provide support for local goods and services that will be required by the facility e.g. fuel, consumables, office equipment etc.

### 4.2.6 The National Development Plan 2007 – 2013

The management of waste is identified as a central tenet of the National Development Plan 2007 – 2013. It is stated that '*a sustainable approach to dealing with this (waste management) requires the integration of a number of elements — reducing the extent of waste generation through waste prevention strategies, maximising the recycling and recovery of waste and minimising the environmental impacts of the final disposal of waste, particularly through reducing the reliance on landfill.*'

The plan further states that; "*Considerable progress has been made in modernising our landfill infrastructure, but the legacy issues of older, poorly managed landfills have also to be dealt with and a comprehensive programme is being put in place to address this. All landfills currently operating, and those to be developed, will be engineered facilities licenced by the EPA to the highest standards. Local authorities and other landfill operators will be required to make proper provision for future remediation and aftercare costs, as mandated by the Environmental Liability Directive.*"

Powerstown is an engineered landfill, licenced by the EPA and operating in accordance with the highest environmental standards.

## 4.3 Regional Policy

This section sets out the regional policy in relation to planning and waste management.

### 4.3.1 Joint Waste Management Plan for the South East Region 2006 -2011

The waste management policy for County Carlow is outlined in the Joint Waste Management Plan for the South East Region (JWMPSE) (2006 - 2011). The Plan was commissioned by South Tipperary County Council (being the lead authority) and includes the functional areas of Carlow County Council, Kilkenny County Council, South Tipperary County Council, Wexford County Council and Waterford City Council and Waterford County Council.



The plan sets out the specific waste management policy for the region under the following key headings:

- Public awareness & education
- Prevention & minimisation
- Waste collection & charging
- Waste recovery and recycling
- Waste treatment/final disposal
- Location of waste management facilities
- Litter prevention
- Sludge management
- National hazardous waste management plan
- Policy on joint management & procurement
- Market development
- Unauthorised landfilling
- Complaints

With relevance to this application, is the policy on waste treatment/final disposal. Section 11.5 (Residual Waste Treatment) states the following in respect of the short term requirements of the Region – '*It is the policy of the Region to ensure adequate residual landfill capacity in the region particularly in the short term. This capacity may be provided either by the public or private sectors.*'

In relation to final disposal, the plan states the following:

*"Even after maximum recycling and recovery efforts, a residual waste stream will remain, it will be necessary to deal with this as outlined below. The specific policy for final disposal details necessary actions to be undertaken by the Region as follows:*

- *Non-combustible residual waste is to be disposed of in residual landfills in the region*
- *Non- hazardous bottom ash from the thermal treatment process to be disposed of in residual landfills in the region*
- *Untreated fly ash (hazardous waste) from the thermal treatment process to be managed in an environmentally secure manner at an appropriate facility*
- *Excess residual waste which cannot otherwise be dealt with is consigned to residual landfill in the region, pending provision of alternative or additional treatment/recovery facilities in accordance with the Landfill Directive*

- *The Region will promote the provision of residual landfill capacity to deal with either inert, non-combustible waste streams, bottom ash or excess residual waste by the public and/or private sector.*
- *Provision of other residual waste disposal facilities within the Region must demonstrate compliance with the diversion targets set out in the Plan and the Landfill Directive."*

Chapter 6 of the Plan sets out the existing and proposed waste management infrastructure, with Table 6.10 making specific reference to Powerstown Landfill, estimating it to have a remaining life span of 1.5 years. It must be noted that this table did not include the Phase 3 extension as the application was pending at that time of writing of the Plan.

The primary means for treatment of residual waste, as identified in the JWMPSE 2006 – 2011, is through thermal treatment of residual MSW with energy recovery, with a nominal treatment capacity of 150,000 tonnes per annum suggested in Table 8.5.

Section 8.2.1 of the JWMPSE 2006 – 2011 identifies that 'in the short term':

*"To cater for this short term deficiency within the region, landfill capacity should be maintained and/or developed either by extension and/or development of at least one significant (capacity >150,000 tpa) facility. It may also be prudent to progress a second new facility to preconstruction stage (in the event of delays in the procurement process of the regional integrated facility) and to ensure the region is self sufficient in this transition period".*

'Short term', in this context, refers to the timeline for the provision of further waste infrastructure i.e. thermal treatment, biological treatment, materials recovery facilities such that recycling and /or recovery rates are increased to rates set out in the JWMPSE.



### 4.3.2 Regional Planning Guidelines for the South East Region 2010 - 2022

The South-East Regional Authority is a statutory authority covering the five counties in the South-East Region of Ireland which include Carlow, Kilkenny, South Tipperary, Waterford and Wexford. The Regional Planning Guidelines (RPG) provides a strategic planning framework for the Region with the objective of implementing the NSS at regional level while achieving balanced regional development. The RPGs incorporate high level policies, including the JWMPSE:

"*…which inform and advise local authorities in the preparation and review of their respective Development Plans, thus providing clear integration of planning and development policy from national to regional to local level*".

The RPG states that "*The provision and maintenance of sufficient infrastructure in the areas of wastewater treatment, adequate water supply, water conservation, flood prevention and control, renewable energy, sustainable transport and waste management are critical to ensure maintenance of a good quality environment*".

It makes reference to regional landfill capacity and highlights that capacity in *local authority landfills is approximately 2 years in the case of local authority landfills at Powerstown, Co. Carlow (Carlow County Council) and Donohill, Co. Tipperary (South Tipperary County Council).* Similar reference is also made to Homestown Landfill which is operated by Wexford County Council and an anticipated life span of 20 years. However, at the time of writing of this EIS, the lack of clarity as to the future of Holmestown landfill, raises significant concerns as to the continued operation of the facility.

Section 5.3 of the guidelines sets out specific policy objectives for waste management:

- *"PPO 5.25 - It is an objective of the Regional Authority to support the implementation of the Joint Waste Management Plan and it will support the review of the Plan to ensure that its recommendations and objectives comply with the Regional Development Strategy for the South-East.*
- *PPO 5.26 - Local authorities in the region should ensure that the majority of the recycling and recovery infrastructure recommended in the Joint Waste Management Plan be provided before 2013.*
- *PPO 5.27 - Local authorities in the South-East Region should incorporate energy from waste into the overall local authority waste management strategy.*

- *All waste projects should comply with the principles of sustainable development".*

### 4.3.3 County Carlow Development Plan 2009 - 2015

The continued operation of Powerstown landfill has relevance to a number of areas considered within the County Carlow Development Plan 2009 – 2015, most notably economic development, infrastructure, environment and energy, heritage and culture and landscape. These policies and objectives are discussed in further detail below.

#### Chapter 3 Economic Development

Chapter 3 of the Development Plan addresses the employment and enterprise strategy for the county over the plan lifetime. The provision of and investment in infrastructure is identified as being of paramount importance "*to assist the development of all economic sectors future economic development activity within the county".*

#### Chapter 6 Infrastructure, Environment and Energy

The section highlights the importance of the opening of the M9 motorway and the Carlow bypass providing reduced commuter times from Carlow to Dublin and the South East. Other relevant policies in this chapter include:

**Air quality -** Support the goals of the National Climate Change Strategy 2007-2012 particularly in the reduction of greenhouse gas emissions. "*The role of the Council in this regard is to protect, enhance and control air and noise pollution and to ensure the provision of the highest standards* and to *implement the provisions of national policy and air pollution legislation, in conjunction with other agencies as appropriate.*

**Noise and Dust – "***The Council will seek to minimise noise through the planning process by ensuring that the design of future developments incorporate measures to prevent or mitigate the transmission of noise and vibration, where appropriate".*

**Groundwater**:

- *"Have regard to the Groundwater Protection Scheme and to the South East River Basin District Management Plan in decision-making on the location, nature and control of developments and activities in order to protect groundwater.*
- *All Groundwater extraction shall comply with the requirements of the South East River Basin district Management Plan".*



**Water Quality –** The Council will **"***protect and to ensure an adequate supply of clean water".*

**Waste Management – "***Section 4 of the Waste Management Amendment Act 2001 provides that the development plan in force in an area shall be deemed to include the objectives contained in the waste management plan made by the local authority. Therefore this development plan is deemed to contain the policies and objectives of the Joint Regional Waste Management Plan, as reviewed".*

**Waste Infrastructure – "***The Landfill and Civic Amenity site is located at Powerstown....accepts all non-hazardous waste for disposal in addition to providing recycling facilities for hazardous and nonhazardous waste. It is expected that the landfill element will close during the lifetime of this plan, to be replaced by an integrated regional facility, as outlined in the JWMP".*

#### Chapter 8 Heritage and Culture

Carlow County is described as having a great variety of natural heritage, including rivers, woodlands, hedgerows, mammals, birds, plants, diverse landscapes and geological features. It is the Councils policy to:

- *"Protect, conserve and enhance County Carlow's natural heritage and biodiversity, to include the diversity of habitats found in the county e.g. watercourses and waterbodies; trees; woodlands and hedgerows; fens; marshes; estuaries and wetlands; geological and geomorphological sites/features; improved and semi-natural grasslands; etc.*
- *Encourage and promote access to our Natural Heritage*
- *Prepare a phased and coordinated programme of Habitat Mapping of Carlow County".*

With respect to designated sites including Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) the plan states that there are "*36 designated natural heritage sites of international and national importance in County Carlow, covering approximately 4.5% of the county*".

**Inland Waters, Rivers, Streams and Wetlands**

Specific reference is made in this chapter to the Rivers Barrow, Slaney and tributaries with the following policy objectives outlined with the purpose of protecting these as an amenity resource and wildlife habitat:

- *"Protect and enhance the natural heritage and landscape character of waterway corridors and wetlands and to maintain them free from inappropriate development and provide for public access*
- *In partnership with the National Parks and Wildlife Service, Waterways Ireland and other relevant stakeholders to facilitate public access to, and understanding of, waterways corridors and wetlands where feasible and appropriate.*
- *Protect items of architectural heritage and industrial archaeological interest associated with waterways corridors.*
- *Consult with the Southern Regional Fisheries Board and the National Parks and Wildlife Service prior to undertaking, approving or authorising any works or development which may have an impact on rivers, streams and waterways.*
- *Consideration to be given to the scheduling for Habitat Mapping and a Wetland Survey subject to available funding. The scope of these surveys and mapping should be agreed in consultation with the National Parks and Wildlife Service – Department of the Environment Heritage and Local Government, the Heritage Council, Waterways Ireland and other relevant statutory and non statutory nature conservation interest groups".*

**Landscape**

The management of the county's landscapes involves:

- *"Sustaining, conserving and enhancing the landscape diversity, character and quality*
- *Protecting sensitive areas from injurious development, while providing for development and change that will benefit the rural community.*
- *That applicant's and developers shall satisfactorily demonstrate that new development can be adequately absorbed into its surrounding landscape without significant adverse visual impacts to its overall landscape value.*
- *That the proposed development would not conflict with the objectives set out in the Landscape Character Assessment in the appendices".*



**Views and Prospects**

With respect to views and prospects the Plan states that while it is important to protect them …. "*it is not proposed that this should give rise to the prohibition of development along these routes but development, where permitted, should not seriously hinder or obstruct these views and should be designed and located to minimize their impact".*

Views and prospects in the vicinity of the Powerstown facility are discussed in greater detail in Section 14.

Chapter 9 Tourism

The Rivers Barrow and Slaney and their associated tributaries are identified as providing angling and leisure facilities to visitors. In addition, the Barrow is navigable for 69 km between Athy and St. Mullins and this stretch is known as the Barrow Navigation. The plan states that the "*River Barrow thus constitutes one of the most significant industrial heritage monuments in the country with bridges, corn-mills, locks and lock-houses largely unchanged for the past 250 years and its history alone is an important tourism resource. However, the current absence of any boat hire company on the River Barrow is negative, reducing traffic and activity and mitigates against further development of the river".*

## 4.4 Compliance of Powerstown Landfill with National and Regional Policy

The proposed continued operation at Powerstown landfill is in compliance with both national and regional policy. National waste policy documents recognise the importance of the waste management hierarchy in particular prevention, preparing for reuse, recycling, other recovery but also recognise that landfills or disposal must continue to play a key role in the management of waste, particularly while alternative treatment infrastructure to reduce dependency on landfilling, are being developed.

The continuation operation of landfilling activities will provide additional landfill capacity in the short-term both nationally and regionally until such time as alternative waste treatment infrastructure is available.

It is expected that as a result of a number of landfill facilities closing over the coming years, the remaining landfills will provide landfill capacity to the country as a whole. Therefore, the inter-regional movement of waste will increase. This is recognised in national waste policy documents that while waste facilities in a region must primarily serve the waste management needs of that region, the inter-regional movement and treatment of wastes should be provided for in appropriate circumstances. Therefore, Powerstown Landfill will contribute to the national landfill capacity as other landfill facilities close over the coming years.

With regards to the South East waste management area, it is possible that there will be a "*critical capacity shortage stage*" in this region alone when Donohill landfill (Tipperary) closes and if Holmestown (Wexford) also ceases accepting waste. Therefore, the proposed development will also provide regional landfill capacity in the South East. This is in compliance with the regional waste policy documents such as the *Joint Waste Management Plan for the South East 2006-2011* as it also recognises that in the short term landfill capacity should be maintained and/or developed to ensure the region is self-sufficient.

The proposed development is also in line with the Regional Planning Guidelines (RPG) for the South East and the County Carlow Development Plan, as it will provide sufficient waste management landfill capacity within the region.

# 5 EIA SCOPING, CONSULTATION AND KEY ISSUES

This chapter describes the consultation process and EIA scoping that was undertaken in order to identify key impacts from the proposed development to be assessed as part of the EIS.

## 5.1 Scoping Process & Identification of Key Impacts

EIA scoping was undertaken to ensure that all the relevant issues are identified and concerns that are important are assessed within the EIA process. This is done through consultation with the planning authority and interested parties such as government organisations and non-government organisations.

Scoping was conducted during the initial stages of the EIA. The exercise established the terms of reference for the EIA and identified the concerns and issues that warranted particular attention during the assessment phases. The scoping process for this EIS was based on:

- Consultation with the National Parks and Wildlife Services (NPWS), Health Service Executive (site visit)
- Review of the Environmental Impact Statement for the N9/N10 Kilcullen to Waterford Scheme (Kilcullen to Powerstown)
- The examination of environmental impact statements for developments which were deemed to be of an acceptable standard by the relevant authorities
- The experience of the project team in preparing environmental impact statements for landfill developments.

The EIA scoping determined that the following issues were likely to be important with respect to potential impacts resulting from the proposed development:

- Protection of the River Barrow habitat as a Special Conservation Area (SAC)
- Human beings with respect to nuisance
- Traffic



## 5.2 Consultation Process & Responses Received

Consultation letters were sent to 21 statutory bodies and non-governmental organisations as presented in Table 5.1.

### Table 5.1: List of Organisation Consulted

| Organisations | |
|---|---|
| Planning Section, Carlow County Council | Geological Survey of Ireland |
| The National Roads Authority | The Department of Transport, Tourism & Sport |
| The National Heritage Council | National Monuments |
| An Taisce | National Parks and Wildlife Service |
| Inland Fisheries Ireland | Health Service Executive |
| Department of Environment Community and Local Government | Bord Failte Eireann |
| Department of Communications Energy and Natural Resources | Health and Safety Authority |
| Birdwatch Ireland | Office of Public Works |
| Irish Wildlife Trust | Bat Conservation Ireland |
| EPA | South-Eastern River Basin District |
| Department of Agriculture, Fisheries and Food | |

A summary of the replies received are provided in Table 5.2 with a copy of all correspondence received included in Appendix 2. The final column in this table shows the location in this EIS where the particular concern raised is addressed.

## Table 5.2: Summary of Submissions Received

| Consultee | Date of Response | Comments | Relevant Section |
|---|---|---|---|
| South-Eastern River Basin District | 2nd August 2011 | Acknowledging receipt of the letter and stating they had no comments at that time. | N/A |
| Department of Agriculture, Fisheries & Food | 2nd August 2011 | Acknowledging receipt of the letter. | N/A |
| Dept. of Arts, Heritage and the Gaeltacht | 23rd August 2011 | The Department of the Arts, Heritage and the Gaeltacht submission stated the following:<br>• With regard to any EIS for this proposed development, an ecological survey should be carried out of the proposed development site to survey the habitats and species present by suitably qualified persons at an appropriate time of the year depending on the species being surveyed for.<br>• The EIS should also address the issue of invasive alien species, such as Japanese Knotweed, and detail the methods required to ensure they are not accidentally introduced or spread during construction.<br>• The impact of the development on the flora, fauna and habitats present should be assessed. In particular, the impact of the proposed development should be assessed with regard to: Natura 2000 sites, i.e. Special Areas of Conservation (SAC) designated under the EC Habitats Directive (Council Directive 92/42/EEC) and Special Protection Areas designated under the EC Birds Directive (Council Directive 79/409 EEC), the Habitats Directive etc<br>• To assess the above impacts it may be necessary to obtain hydrological and/or geological data.<br>• The EIS should assess cumulative impacts with other plans or projects if applicable.<br>• Where negative impacts are identified, suitable mitigation measures should be detailed if appropriate.<br>• Where there are impacts on protected species and their habitats, resting or breeding places, licenses may be required under the Wildlife Acts or derogations under the Habitats Regulations.<br>• Licenses will be required if there are any impacts on other protected species such as on protected plants, badger setts or birds nests.<br>• The EIS should address the issue of any spills that may accidentally enter Powerstown stream and in turn impact on the river barrow SAC and that mitigation and emergency plans would include notifying local NPWS staff.<br>• Because this project has the potential to impact on a Natura 2000 site, in accordance with Article 6.3 of the Habitats Directive, this project should be subject to appropriate assessment of its implications for the site in view of the sites conservation objectives.<br>• Recommend that you consult with the relevant Local Authorities to determine if there are any projects or plans, which, alone or in combination could impact on any Natura sites. | Section 11 – Flora & Fauna |

| Consultee | Date of Response | Comments | Relevant Section |
|---|---|---|---|
| HSE | 23rd August 2011 | In response to the consultation letter a HSE representative visited Powerstown landfill. Their submission listed the environmental health issues likely to arise from the proposed construction & operation phases of the project:<br>• The EIS shall address the issue of undertaking and completing meaningful public consultation with the local community.<br>• The EIS shall indicate the consideration given to identifying alternatives to the continued use of the landfill<br>• The EIS shall indicate proposed closure date of the landfill.<br>• The Closure, Restoration and Aftercare Management Plan (CRAMP) shall be assessed in EIS and updated as necessary.<br><br>**Construction Phase**<br><br>Assessments should be undertaken and detailed in EIS on the following likely impacts during construction phase.<br>• The EIS shall indicate and identify the presence and location of any private water supply sources which may be at risk from activities generated in connection with the continued use of the landfill.<br>• The potential impacts on surface water and groundwater arising from on site run-off, silting etc. during construction phase shall be addressed in EIS.<br>• The impact of dust generation from construction should be assessed and a Dust Minimisation Plan or similar mitigation measure that meets current National Standards for construction sites should be addressed in EIS.<br>• EIS should contain a Construction Management Plan for the proposed site.<br>• Potential impacts of noise pollution (including vibration) from construction phase should be clearly identified in EIS.<br><br>**Operational Phase**<br><br>• Existing on-site traffic control measures should be assessed by EIS.<br>• Consideration should be given to assessing and updating, if necessary, the Odour Management Plan to include the activation of cells 17 and 18.<br>• EIS shall include commitment to continued monitoring of surface water and groundwater quality at existing monitoring stations.<br>• On site arrangements for the storage of fuels, oils lubricants and proposed mitigation measures in the event of accidental spillage shall be outlined in EIS.<br>• Consideration should be given to assessing and updating pest and bird control measures in EIS.<br>• Fly and wasp control measures, particularly in the civic amenity area should be assessed by EIS.<br>• Daily capping measures should be assessed by EIS to ensure best practice.<br>• Current dust monitoring measures should be assessed by EIS. | Section 3 – The Development, Section 7 – Human Environment<br>Section 8 - Noise<br>Section 9- Climate & Air<br>Section 12 – Surface water<br>Section 13 – Geology & Hydrogeology<br>Section 16 – Material Assets |

| | | | |
|---|---|---|---|
| | | • Litter patrol procedures around the boundary of the site should be assessed by EIS. Mitigation measures to prevent illegal dumping should be addressed in EIS.<br>• General site management operations within the existing landfill should be assessed by EIS and improvements introduced in mitigation, if deemed necessary.<br>• Consideration should be given in EIS to management of the site and efficiency of the flare during harsh climate conditions.<br>• Procedures for final capping should be assessed by EIS.<br>• The current complaints procedure should be assessed by EIS | |
| NRA | 22nd August 2011 | The letter makes reference to issues which may affect the national roads network namely:<br>• Consultation with the relevant local authority/national roads design office<br>• Assess the potential impacts on any national roads and associated junctions<br>• Assess visual impacts from existing national roads<br>• Consider cumulative impacts of any nearby road schemes<br>• Have regard to the NRA DMRB and the NRA Manual of Contract Documents for Road Works<br>• Have regard to the Guidelines for the treatment of Air Quality During the Planning and Construction of National Road Schemes<br>• Consideration of the Environmental Noise Regulations 2006<br>• Where appropriate, conduct a Traffic and Transport Assessment taking account of the cumulative impacts on the national road junction (M9 Junction 6)<br>• Consider if a Road Safety Audit is required. | Section 10 Traffic & Section 14 Landscape |
| Bord Failte | 11th August 2011 | The submission received from Bord Failte including a copy of the Guidelines on the treatment of tourism in an Environmental Impact Statement. | Section 16 – Material Assets &<br>Section 7 – Human Environment |
| OPW | 3rd Oct 2011 | This letter made reference to the fold information due to the proximity of Powerstown landfill to the River Barrow. | Section 12 – Surface water |

# 6 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

An EIS sets out the findings of an EIA which is undertaken to assess the potential effects of certain development projects on the environment.

The primary objective of an EIA is to ensure that projects which are likely to have significant effects on the environment are assessed and impacts avoided, where possible. This assessment process aims to achieve the most sustainable and environmentally friendly integration of a development with the local environment.

Firstly, the planning context, the background to the project including the need for the development, the alternatives assessed and the existing and proposed development is described. This sets the reader in context as to the practical and dynamic process undertaken, in order to arrive at the layout and design of the proposed development that will cause least impact on the environment.

Subsequent chapters deal with specific environmental topics for example, human beings, air, water, noise, etc. These assessments may involve specialist studies and evaluations. The methodology applied during these specific environmental assessments is a systematic analysis of the proposed development in relation to the existing environment. The broad methodology framework for these assessments is outlined below and is designed to be clear and concise and allow the reader to logically follow the assessment process through each environmental topic. In some instances, more specific topic related methodologies are outlined in the relevant chapters of the EIS.

The broad methodology framework used in all chapters includes:

- Introduction
- Assessment Methodology
- Existing Environment
- Summary of Key Possible Impacts
- Mitigation Measures
- Predicted Impacts after Mitigation
- Monitoring
- Conclusion and Summary



The advantage of using this framework is that it is easy to investigate each environmental topic and it facilitates easy cross-reference to specialist studies undertaken as part of the assessment.

The following sections outline the methodology used during this assessment process. The EIA methodology has been undertaken in accordance with best practice EIA guidelines:

- *Guidelines on the Information to be contained in Environmental Impact Statements*, (EPA, 2002)
- *Advice notes on Current Practice (in the preparation of Environmental Impact Statements)* (EPA, 2003).

## 6.1 Environmental Assessment Methodology

### 6.1.1 Introduction

This section generally introduces the environmental topic to be assessed and the areas to be examined with the assessment.

### 6.1.2 Assessment Methodology

Specific topic related methodologies are outlined in this section. This will include the methodology used in describing the existing environment and undertaking the impact assessment. It is important that the methodology is documented so that the reader understands how the assessment was undertaken. This can also be used as a reference if future studies are required.

### 6.1.3 Existing Environment

An accurate description of the existing environment is necessary to predict the likely significant impacts of a new development. Existing baseline environmental monitoring data can also be used as a valuable reference for the assessment of actual impacts from a development once, it is in operation.

To describe the existing environment desktop reviews of existing data sources were undertaken for each specialist area. This literature review relied on published reference reports and datasets to ensure the objectivity of the assessment. Desktop studies are also supplemented by specialised field walkovers or studies in order to confirm the accuracy of the desktop study or to gather more baseline environmental information for incorporation into the EIS.

The existing environment was evaluated to highlight the character of the existing environment that is distinctive and what the significance of this is. The significance of a specific environment can be derived from legislation, national policies, local plans and policies, guidelines or professional judgements. The sensitivity of the environment was also described.

### 6.1.4 Summary of Key Possible Impacts

In this section individual specialists predict how the receiving environment will interact with the proposed development. The full extent of the proposed development's effects and emissions before the proposed mitigation measures are introduced is outlined here. Impacts from both the construction and operation phases of the proposed development are outlined. Interactions and cumulative impacts with other environmental topics are also included in this assessment. The evaluation of the significance of the impact is also undertaken. Where possible, pre-existing standardised criteria for the significance of impacts will be used. Such criteria can include Irish legislation, international standards, EPA guidelines or good practice guidelines. Where appropriate criteria do not exist the assessment methodology section states the criteria used to evaluate the significance.



### 6.1.5 Mitigation Measures

If significant impacts are anticipated mitigation measures are devised to minimise impacts on the environment. Mitigation measures by avoidance, by reduction and by remedy can be outlined. In the identification of mitigation measures best available techniques from the EPA *BAT Note – Waste Sector Landfilll (2011)* will be identified, where appropriate.

### 6.1.6 Predicted Impacts after Mitigation

The assessment identifies the likely impact that will occur after the proposed mitigation measures have been put in place. These impacts are described in detail and assessment of their significance undertaken.

### 6.1.7 Monitoring

This section outlines specific monitoring programmes for the individual environmental topic to be undertaken to ensure the effectiveness of mitigation measures put forward in the EIS. Monitoring results can be compared with baseline monitoring undertaken as part of the EIS or with other regulatory standards, planning or waste licence conditions, etc.

### 6.1.8 Conclusion and Summary

An overall summary of the assessment undertaken, specific impacts predicted, mitigation measures outlined and final residual impacts is provided in this section.

## 6.2 EIS Conclusion: Development and its Impacts in Context

This section provides a summary of the key impacts and mitigation measures associated with the proposed development. It also discusses cumulative impacts and interactions and inter-relationships between environmental topics. This section provides an overall conclusion to the EIA.

## 6.3 References

Reports and data sources referred to in the EIS will be provided in this section.

# 7 HUMAN ENVIRONMENT

## 7.1 Introduction

This section examines the existing human environment and potential effects of the proposed development on this environment. It covers the existing nature of the environment at and near the site, and predicts the impacts that may be expected and the measures proposed to mitigate these effects. Consideration is given to both the construction and operational phases of the development. The main areas examined with respect to the potential effects of the proposed development on human environment are:

- Socio-economic factors
- Noise
- Traffic
- Air
- Visual

Socio-economic factors are discussed in this chapter. Noise, traffic, air and visual impacts are discussed in detail in individual chapters within this EIS.

## 7.2 Methodology

A desk-top study was undertaken to outline the existing human environment as well as a visit to the site and the surrounding area on a number of occasions in 2011. The areas studied included local residents and settlements, community facilities, industry and commerce, land use, amenity and tourism, local employment and economic activity. An onsite survey was also undertaken to identify dwellings with 500 m and 1 km of the site boundary.

Literature and data sources reviewed as part of this assessment included:

- EIS for the extension of Powerstown Landfill (June 2003)
- Carlow County Council Development Plan 2009 - 2015
- Carlow Town Council Town Development Plan 2003
- Muinebheag/Royal Oak Local Area Plan 2010 - 2016
- Ballinabranagh/Raheendoran Village Draft Local Area Plan
- Leighlinbridge Local Area Plan 2010 - 2016
- Ordinance Survey Mapping Sheet No. 61
- Google Earth/OSI Orthophotography.



Following the describing of the baseline environment, the positive and negative impacts of the proposed development on the human environment was assessed.

## 7.3 Existing Environment

### 7.3.1 Local Settlement

The existing landfill is located in the townland of Powerstown, approximately 8 km south of Carlow town and 7 km north of Bagenalstown. The town and villages of Nurney are *c*.2.5 km south east of the site, Leighlinbridge *c*.3.5 km south west of the site and Ballinabrannagh *c*.2.5 km north west of the site.

County Carlow's population was 52,500 in the 2008 Census which was a 14 % increase since 2002. This was above the national average of 10 % and is most likely a result of its proximity to Dublin. The Carlow County Development Plan identifies that in 2008 over 70 % of Carlow people live at established, serviced towns or villages. The population of nearby settlements of Powerstown landfill is provided in Table 7.1 below.

**Table 7.1: Populations of Nearby Settlements (Source: Carlow County Development Plan)**

| Town | Population in 2008 |
|---|---|
| Carlow Town & its Environs | 22,000 |
| Muinebheag (Bagenalstown) | 2,940 |
| Ballinabranna/Raheendoran | 521 |
| Lieghlinbridge | 540 |
| Nurney | 110 |

Powerstown landfill is located in a rural agricultural setting. There are currently some 13 dwellings within 500 m of the site boundary and 41 dwellings within 1 km of the site boundary. This data was collated using an on-site survey by FTC. These dwellings are typically detached residential single-family dwellings and are concentrated along the road network surrounding the facility south and east of the site.

Figure 7.1 shows the location of thses residences with 1 km of the site boundary.

### 7.3.2 Community Facilities

Community facilities generally comprise facilities serving the cultural, health, educational, recreational, religious and general leisure needs of the population. Such facilities include schools, libraries, churches, health care, childcare, theatres and community buildings.

The Carlow County Development plan recognises that leisure and social facilities are essential to the well-being and functioning of Carlow's communities. Carlow town and the local towns and villages such as Bagenalstown, Nurney, Leighlinbridge etc are the main central locations for community's facilities. These towns and villages provide the needs of the area with residential, commercial, recreational and industrial to the surrounding catchment area.



There is a range of sporting and recreational amenity facilities in the wider area including a new gymnasium by Co Carlow Vocational Educational Committee and McGrath Park in Muinebheag. It is also an objective of the Council to facilitate the development of a linear park along the River Barrow and lands for recreational and amenity purposes on the west side of Muinebheag.

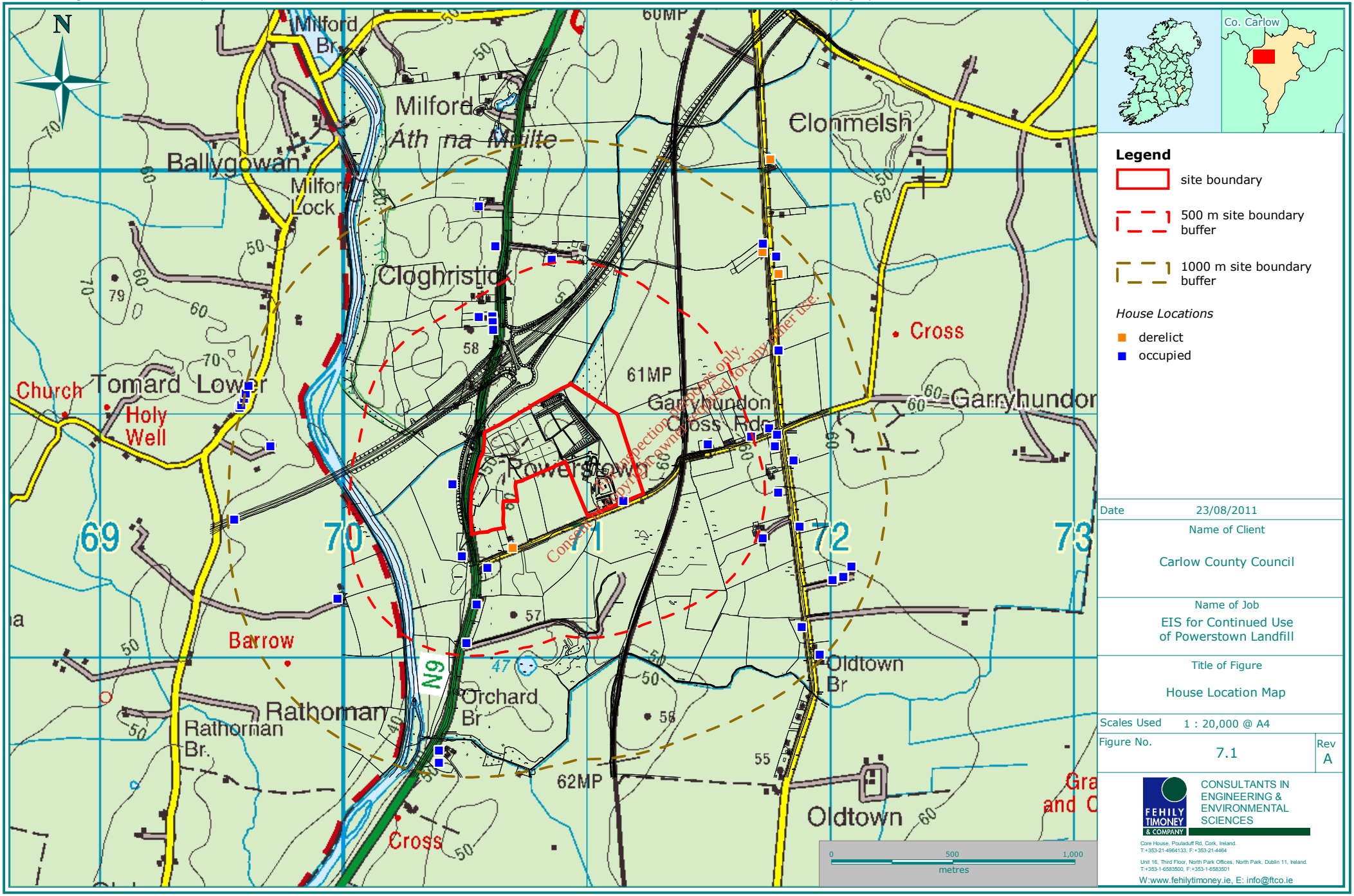
Smaller towns and villages within the County have a limited number of social and recreational services e.g. primary schools, parish church/graveyard and sports fields such as school sports pitch and GAA field's and clubhouses. It is also an objective of the Council to facilitate the development of a village park in Ballinabranagh Village and provide additional sports fields.

Carlow town has two large educational facilities including St. Patrick's College and Carlow Institute of Technology. There are four hospitals serving the needs of the community. These are Carlow District Hospital, St. Brigid's, St. Dympna's and the Sacred Heart Hospital. Nursing homes, shelters for the homeless and other valuable community services are also provided by voluntary bodies and by the HSE. Other villages and town are served by primary and secondary schools and students can then avail of third level educational facilities at Carlow town.

There are currently no community facilities within 1 km of the Powerstown landfill site. Condition 12.5 of the sites waste licence requires that a Community Fund be set up, consisting of €1 for every tonne of waste accepted for disposal. This fund has been set up and currently stands at €130,000. Carlow County Council in conjunction with local residents and elected members are currently attempting to establish a community fund committee to manage and discharge this fund for the benefit of the social and physical environment of the local community.

R:\Map Production\2011\LW11\120\03\Workspace\
LW11-120-03_Figure 7.1_House Location Map_Rev A









**Legend**

- site boundary
- 500 m site boundary buffer
- 1000 m site boundary buffer

*House Locations*

- derelict
- occupied

| | |
|---|---|
| Date | 23/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | House Location Map |
| Scales Used | 1 : 20,000 @ A4 |
| Figure No. | 7.1 |
| Rev | A |

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### 7.3.3 Industry, Commerce and Local Employment

Carlow has had considerable economic growth in recent years. The County has developed and remained firm in growth sectors such as financial services, healthcare, mechanical engineering and information technology. This has helped to attract employment and population growth into the town and county.

Carlow town plays a vital role in the functioning of Carlow County. It is the administrative and judicial centre and is a major centre of employment in the county and the region. The town is an important industrial centre, supporting foreign investment, with large multi-national companies established in the town, such as Merck Sharp & Dohme and UNUM.

As the Powerstown Facility is located is a predominately rural location, agricultural, in particular arable farming, is an important sector in the area and despite its continuing decline in employment, it is still a major driver for sustaining, enhancing and maintaining the rural economy and culture. The utilisation of other rural resources such as tourism, forestry, horticulture, renewable energy and varied agri-business services also adds to the economy of the county.

Carlow also has numerous sand and gravel and stone resources within the County. Quarry industries are important to the local and national economy as valuable sources of raw material for industry in general and the construction industry. There are currently three sand and gravel pit/quarries located in close proximity to Powerstown landfill. One of these quarries abut the boundary of the landfill, the second is located just south of the landfill and a third is located further east of the site. Approximately 1 km north east of the landfill site, is Clonmelsh Quarry and there is also an open cast lime quarry (Clogrennane Lime Ltd.) and associated industry west of Raheendoran village approximately 3 km north west of the landfill site.

Within the County the smaller towns and villages have some established industries and business. For example Muinebheag/Royal Oak has over 300 industrial jobs with Autolaunch Car Factors, a major addition to County Carlow Industrial Association. The smaller towns and villages serve the rural catchment areas surrounding them for retail purposes such as restaurants, hotel and licenced premises. An example of this is Arboretum Lifestyle and Garden Centre located at Leighlinbridge, some 2.5 km to the south of Powerstown landfill which not only severs the local community but also attracts significant visitors to the area.



As the area is within easy reach of Carlow town, local residents in the Powerstown area commute to the town for the working opportunities and services. In addition, due to the central location of Carlow and the transport networks that serves it, residents can commute to towns/cities to the south such as Kilkenny and Waterford, to the north to Athy and Portlaoise and the M9 motorway provides opportunities to commute to the north east to Killcullen, Newbridge, Naas, Wicklow and Dublin.

### 7.3.4 Amenity and Tourism

Tourism makes an important contribution to the economy of Carlow. Carlow has made significant progress in developing its profile as a holiday destination in recent years, with considerable expansion in the product and services base. In 2007, Carlow welcomed 74,000 overseas visitors whose presence contributed €28.6 million to the local economy, an increase of €7.6 million on the previous year.

As a primarily rural area with extensive historical heritage, Carlow is ideally positioned to maximise the benefits associated with tourism while preserving the character, natural resources and environment on which the attraction of the county as a holiday destination is built. One such natural attraction which runs in a north/south direction, 300 m west of the landfill is the River Barrow.

The Barrow is historically renowned as a premier salmon and coarse fishing river. The River Barrow is navigable for 69 km between Athy and St. Mullins and this stretch is known as the Barrow Navigation. The most attractive visual stretches of this waterway flow through the county and the river is widely respected as one of the most beautiful waterway in Ireland. The river is also known for its significant industrial heritage monuments with bridges, corn-mills, locks and lock-houses largely unchanged for the past 250 years therefore its history alone is an important tourism resource.

Culture and heritage is fundamental to tourism in Ireland and Carlow has much to offer such as churches, cathedrals, missionaries, castles, historic houses, archaeological artefacts and old stone built estate towns such as Nurney. The culture and heritage in the area of the development is discussed in detail in Section 15 of this EIS.

The area surrounding the Powerstown facility has a high degree of amenity in the form of the backdrop of the Castlecomer Plateau, Killeshen hills and the River Barrow to the west. These areas offer amenity and recreational opportunities in the form of Clogrenna Woods located *c*.3.5 km to the north west while the Backstairs mountain range is located *c*.18 km to the south east, across the low-lying county.

The Millford area located to the north and west of the landfill and is a recognised tourist destination in Carlow County. Its unique combination of natural amenity, river amenity and manmade historical structures linked with the historical use of the River Barrow as an important industrial and transport corridor. In this area there are amenities and attractions such as the Millford old mill, natural amenity area, picnic area, fishing, a number of old manors and the Barrow Way walk. The nearest section of the Barrow Way walk is located *c*. 500 m east of the Powerstown facility.

Further details on amenity areas and scenic routes in proximity to the landfill are outlined in Section 14 - Landscape.

## 7.4 Summary of Key Possible Impacts

In the absence of mitigation measures, potential impacts on the human environment in the immediate environs from the continued operation of Powerstown landfill may arise principally from a combination of visual, noise, traffic and air impacts. These topics are addressed in detail in individual sections in this EIS.

The site has been in operation since 1975 and due to the rural nature of the site and the distances between the site and the nearest settlements (Carlow town, Bagenalstown, Nurney, Leighlinbridge and Ballinabrannagh) it is considered that there will be no impacts on these settlements.

CCC will continue to contribute to the community fund. This money can be used by the local community, to help develop needed community facilities and fund other community projects to benefit the social and physical community environment of the area.



Potential impacts on amenity and tourism arises principally from a visual perspective. Under the current planning permission and facility waste licence, the existing landfill will be capped and restored. As the landfill has not accepted enough waste to fill the constructed cells, only cells that have accepted waste can be capped and restored. This has a potential negative impact on the existing landscape. While the proposed development may extend the life of the landfill, and thus the visibility of landfill activities, it will ensure that the landfill is filled and restored to the required profiles as per the existing planning and waste licence.

The River Barrow, the Barrow Way and the Millford area are the nearest tourism and amenity areas to the landfill. Visibility from these amenities is limited due to the lowlying nature of the landscape. Mature vegetation along roadways and scattered in the general landscape also provides screening. At elevated locations, the impacts of the proposed development are minimised due to the distance from the facility.

Further details on landscape and visual impacts on amenity areas are provided in Section 14 - Landscape.

## 7.5 Mitigation Measures

Potential impacts from the proposed development on local residences, local settlements, community facilities, industry and commerce and amenity and tourism mainly occur from visual, noise, traffic and air impacts. Individual assessments of these impacts have been conducted and are outlined separately within the EIS. Following the implementation of the outlined mitigation measures, the continued operation of Powerstown landfill will not have a significant impact on the human environment.

## 7.6 Predicted Impacts after Mitigation

No additional mitigation measures have been outlined in this human beings chapter, over and above what is outlined in individual visual, noise, traffic and air impact assessments.

Following the implementation of mitigation measures outlined for visual amenity, noise emissions, traffic and air emissions, the continued operation of landfilling activities at Powerstown will not have a significant impact on the human environment.

## 7.7 Monitoring

Monitoring programmes specifically for noise, air and water from the facility will continue in line with the current waste licence for the facility. These are discussed in more detail in Section 3 of this EIS.

## 7.8 Conclusion and Summary

A desk-top study and site walkover was undertaken to outline the existing human environment of the area and assess the impacts of the proposed development on this environment.

Potential impacts from the continued operation of landfilling activities on local residences, local settlements, community facilities, industry and commerce and amenity and tourism mainly occur from visual, noise, traffic and air impacts. Individual assessments of these impacts have been conducted and are outlined separately within the EIS.

Following the implementation of the mitigation measures outlined in the individual assessment chapters, it is considered that the proposed development will not have a significant impact on the human environment. It is evident that given the significant reduction in complaints, the site can be managed in such a way as to have no significant impact on the Human Environment.

# 8 NOISE

This section assesses the impact of the potential noise emissions from the continued operation of the proposed development on local noise sensitive receptors. Data collected on-site is considered in terms of assessing the impacts, if any, of the current operating conditions. The objective of this assessment is to identify significant impacts on the noise environment and, if significant adverse impacts are identified, to propose mitigation measures, where necessary to reduce the impact.

## 8.1 Introduction

Noise is defined as unwanted sound. The impacts of noise are subjective and vary from person to person. Factors such as frequency, tonal patterns, existing background noise levels and other activities being carried out, all impact on how noise levels are experienced by individuals.

Noise is measured as sound pressure level with the unit of sound pressure level being the decibel (dB). This is calculated as a logarithm of sound. A change of 10 dB corresponds approximately to halving or doubling of the loudness of sound. The use of decibels (A-weighted), dB(A), as the basic unit for general environmental and traffic noise is widely accepted. Noise is measured on sound level meters which incorporate this frequency differentiating between sounds of varying frequency in a manner similar to the human ear.

Noise readings derived from different neighbouring sources should not be directly added to one another. This is because two sound levels of 30 dB do not result in a combined sound level of 60 dB. As a result of the logarithmic method of measurement, the combined sound level would instead be 33 dB. This means that every increase of 3 dB represents a doubling of the sound energy level. In this respect, it is also important to understand that the smallest noise change detectable by the human ear is 3 dB.

Another key property of the decibel scale is that if a sound is 10 dB less than another sound, then the total noise level is simply the louder of the two noises. For example, the combined noise level from two sources, one at 30 dB and the other of 40 dB, is 40 dB. As a result, noise assessments focus on the loudest sources on a site, which determine the sound levels experienced at any noise sensitive locations.

To assist in the understanding of the noise measurement scales, Table 8.1 is presented below. This gives the A-weighted decibel scale (dB(A)) for some common place activities.



### Table 8.1: Examples of Indicative Noise Levels[8]

| Situation / Noise Source | Approximate Noise Level dB(A) | Sound Pressure µPa | Subjective Description |
|---|---|---|---|
| 30 m from a military jet aircraft take-off | 140 | 200,000,000 | Painful, intolerable |
| Rock/ Pop concert | 105 | 3,500,000 | |
| Nightclub | 100 | 2,000,000 | |
| Pop/ Concert at mixer desk | 98 | 1,600,000 | |
| Passing Heavy Goods Vehicle at 7 m | 90 | 630,000 | Very noisy |
| Ringing Alarm Clock at 1 m | 80 | 200,000 | |
| Domestic Vacuum cleaner at 3 m | 70 | 63,000 | Noisy |
| Busy Office | 60 | 20,000 | |
| Normal Conversation at 1 m | 55 | 11,000 | |
| Reading room of the British National Museum | 35 | 1,100 | |

[8] Brüel & Kjær. (2000). Environmental Noise. Brüel&Kjær Sound & Vibration Measurement A/S.

| Situation / Noise Source | Approximate Noise Level dB(A) | Sound Pressure μPa | Subjective Description |
|---|---|---|---|
| Bedroom in a quiet area with the windows shut | 30 | 360 | Very quiet |
| Remote location without any identifiable sound | 20 | 200 | |
| Theoretical threshold of hearing | 0 | 20 | Uncanny Silence |

Noise level and frequency varies constantly with time. It cannot be described with a single number. As a result, statistical metrics are commonly used to describe the noise levels. To understand the terms used in this report, definitions are outlined below:

**$L_{A10}$** Refers to those noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of traffic.

**$L_{A90}$** Refers to those noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level.

**$L_{Aeq}$** The average level recorded over the sampling period. The closer the $L_{Aeq}$ value is to either the $L_{A10}$ or $L_{A90}$ value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

**$L_{Ar}$** The equivalent continuous A-weighted sound pressure level ($L_{AQ}$) with specified adjustments/ rating allowance for tonal character and/or impulsiveness of the sound. It is only permitted during daytime hours. A rating allowance is not permitted to be applied to night-time measurements.

**Impulsive noise:** a noise of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

**Tonal noise:** A noise source that is concentrated in a narrow band of the frequency spectrum.

A-weighted sound levels emphasise the middle frequencies of the noise spectrum, while putting less emphasis on the higher and lower frequencies. This emulates the way that the human ear responds to sound.



## 8.2 Existing Noise Environment

Noise monitoring is conducted on an annual basis in accordance with Schedule D of the waste licence at five locations as indicated in Table 8.2 and illustrated on Figure 3.13. Measurements were taken by CCC staff in accordance with ISO 1996 Acoustics: Description and Measurement of Environmental Noise Part 1 (ISO, 2003) & Part 2 (ISO, 2007), EPA Environmental Noise Survey Guidance Document (EPA, 2003) and EPA Guidance Note for Noise in Relation to Schedule Activities, 2nd Edition (EPA, 2006).

### Table 8.2: Noise monitoring points

| Location | Description |
|---|---|
| N4 | Inside western site boundary, at old entrance to landfill |
| N5 | NSL outside southern site boundary |
| N6 | NSL approx 310 m to the east of the facility |
| S1 | NSL outside north western boundary of facility |
| S2 | NSL outside south western boundary of facility |

**Note:** NSL = Noise Sensitive Location

The results of monitoring events are compared to limits set in the sites waste licence which are as follows:

### Table 8.3: Powerstown Landfill Noise limits

| Day dB(A) $L_{Aeq}$ (15min) | Night dB(A) $L_{Aeq}$ (15min) |
|---|---|
| 55 | 45 |

Although the noise limit values are expressed as $L_{Aeq\ 15min}$, the licence requires that monitoring is carried out over a 30-minute period. Monitoring is not carried out during night-time hours (22:00– 08:00) as the facility does not operate during these times.

A summary of noise results for Powerstown landfill from 2009 to 2011 are outlined in Table 8.4.

### Table 8.4: Noise Monitoring Results for Powerstown Landfill 2009, 2010 & 2011

| Location | Monitoring Event | $L_{Aeq,\ 30min}$ | $L_{A10,\ 30min}$ | $L_{A90,\ 30min}$ |
|---|---|---|---|---|
| N4 | 2011 | **58** | 62 | 51 |
| | 2010 | 50 | 53 | 44 |
| | 2009 | 54 | 57 | 45 |
| N5 | 2011 | 55 | 54 | 47 |
| | 2010 | 53 | 50 | 42 |
| | 2009 | 53 | 48 | 37 |
| N6 | 2011 | 55 | 55 | 47 |
| | 2010 | 49 | 49 | 43 |
| | 2009 | 47 | 45 | 36 |
| S1 | 2011 | **69** | 73 | 56 |
| | 2010 | **68** | 73 | 49 |
| | 2009 | **65** | 68 | 54 |
| S2 | 2011 | **66** | 64 | 51 |
| | 2010 | **61** | 61 | 37 |
| | 2009 | **63** | 61 | 53 |

*Exceedances in bold



*Discussion of Noise Monitoring Results*

As indicated in Table 8.4 elevated noise levels were recorded at S1 ($L_{Aeq}$ 69, 68 & 65 dB(A)) and S2 ($L_{Aeq}$ 66, 61 & 63 dB(A)) during each of the 3 annual events. Elevated noise levels were recorded at N4 in 2011 at 58 $L_{Aeq.}$ The Annual Noise Report 2011 stated the following with respect to these exceedances:

> *"However, observations recorded at the time of the survey indicate that landfill operations were not audible during the survey at locations S1 and S2. Passing traffic was the dominant noise source at these locations and it is therefore considered that operations at Powerstown Landfill did not contribute to the exceedances recorded at S1 and S2. Monitoring Location N4 is the only location that is situated inside the boundary of Powerstown Landfill. The $L_{Aeq}$ recorded at this location was 58dB(A). This result exceeds the noise emission limit value of 55dB(A) set out in Waste Licence W0025-03. Passing traffic along the R448 was considered to be the main noise source at this location. Landfill operations were audible intermittently at location N5 only. The $L_{Aeq}$ recorded at N5 was 55dB(A). This result is equal to the stipulated daytime noise emission limit".*

The $LA_{90}$ noise levels, excluding the upper 10% of noise, were lower than the $L_{Aeq}$ noise levels at all locations, with $L_{A90}$ results ranging from 36 – 56 dB(A) in the period 2009 to 2011. In contrast the $L_{A10}$ levels recorded during the 3 year period at S1 (68 – 73 dB(A)) and N4 (53 -62 dB(A)) are higher than the $L_{Aeq}$ levels indicating traffic influence on noise levels at these monitoring locations. Although the $L_{Aeq}$ is greater than the $L_{A10}$ at S2, the results indicate the influence of traffic at this point, because the $L_{A10}$ is closer to the $L_{Aeq}$ than the $L_{A90}$ is to the $L_{Aeq}$.

*Historic Noise Monitoring*

As the tonnages accepted at the facility have significantly decreased since 2008, a review of historical data recorded at the site during 2006 – 2008 when the facility was operating at or near to 40,000 tpa was carried out as part of this EIS to ascertain what impacts activities at the landfill had on the local noise environment. During this period, annual noise monitoring was conducted by Malone O''Regan Environmental Services Ltd at the following locations:

**Table 8.5: Noise Monitoring Locations for Powerstown Landfill 2006 -2008**

| Location | Description |
|---|---|
| N3 | Southern site boundary of old landfill |
| N4 | Western site boundary of old landfill at previous site entrance |
| N5 | Southern site boundary of new civic amenity, between site entrance and receptor 30 m to the east |
| N6 | At noise sensitive receptor (dwelling) approximately 310 m top the east on the site |
| S2 | Northern site boundary near Powerstown Stream |
| N7 | NSL outside north western boundary of facility |
| N8 | NSL outside south western boundary of facility |
| S1 | On boundary of Phase 2 (inside site) |



As stated in Section 6.5 of this EIS, a number of environmental monitoring points were changed in 2009 in consultation with the Agency to reflect the changes brought about to the site through the operation of Phase 3.

A summary of the noise monitoring results for this period are presented in Table 8.6.

**Table 8.6: Summary of historic noise monitoring results (2006 - 2008)**

| Location | Monitoring Event | $L_{Aeq, 30min}$ | $L_{A10, 30min}$ | $L_{A90, 30min}$ | Noise attributed to landfill operations |
|---|---|---|---|---|---|
| **N3** | 2008 | 57 | 50 | 39 | Yes |
| | 2007 | 63 | 51 | 43 | No |
| | 2006 | 68 | 58 | 48 | No |
| **N4** | 2008 | 63 | 57 | 44 | No |
| | 2007 | 64 | 68 | 59 | No |
| | 2006 | 75 | 80 | 60 | No |
| **N5** | 2008 | 50 | 53 | 46 | No |
| | 2007 | 63 | 56 | 49 | No |
| | 2006 | - | - | - | - |

| Location | Monitoring Event | LAeq, 30min | LA10, 30min | LA90, 30min | Noise attributed to landfill operations |
|---|---|---|---|---|---|
| N6 | 2008 | 53 | 45 | 34 | No |
| | 2007 | 58 | 52 | 44 | No |
| | 2006 | - | - | - | - |
| S2 | 2008 | 57 | 60 | 51 | No |
| | 2007 | 55 | 58 | 51 | Yes |
| | 2006 | 61 | 60 | 53 | No |
| N7 | 2008 | 59 | 62 | 63 | No |
| | 2007 | 59 | 62 | 53 | Yes |
| | 2006 | - | - | - | - |
| N8 | 2008 | **51** | 55 | 47 | No |
| | 2007 | **51** | 53 | 47 | Yes |
| | 2006 | **-** | - | - | - |
| S1 | 2008 | **64** | 65 | 51 | Yes |
| | 2007 | **45** | 48 | 41 | No |
| | 2006 | **61** | 60 | 53 | No |

The noise reports highlighted a number of external influences on the local noise environment in and around Powerstown landfill such as the traffic along the N9 road, the local network and quarrying activities from the adjacent quarry which resulted in elevated noise levels at a number of monitoring locations namely N3, N4. N5 and N6. At locations where landfilling activities were the dominant noise source, this was attributed to the location of these monitoring points in close proximity to the active cells. All reports concluded that "*no adverse impact is expected at nearby sensitive receptors*".



## 8.3 Potential Impacts

### 8.3.1 Construction Phase

As the proposed continuation of Powerstown landfill will not require the construction of any new infrastructure, there will be no impact on the noise environment from additional construction activities.

Construction works will be associated with the permanent capping of Phase 3 of the project, but these were assessed as part of the 2003/2004 application.

### 8.3.2 Operational Phase

The increase in waste landfilling activities from 40,000 tpa to 50,000 tpa will result in an increase in traffic to and from the site (one extra delivery per hour) which may give rise to noise nuisance i.e reversing sirens, revving of engines etc.

The noise impact of the predicted traffic increase along a well defined haul route on-site is assessed (as per BS 5228-1:2009) and compared to the existing baseline noise levels in the area, using the follow equation:

$$L_{Aeq} = L_{WA} - 33 + 10\log Q - 10\log V - 10\log d$$

Where: $L_{WA}$ = is the sound power of the plant in dB
Q = is the number of vehicles per hour
V = is the average vehicle speed in km/hr
d = is the distance of the receiving point from the centre of the haul road, in m

Haulage vehicle sound power information from BS 5228-1:2009 is used in the prediction calculation.

Based on the existing identified noise monitoring locations, approximate distances to the active area of the facility were determined. The existing situation was calculated to indicate existing noise emission conditions due to heavy goods vehicles (HGV) movements to the active area of the site (Table 8.7).

**Table 8.7: Calculated noise emissions of existing traffic movements to site**

| NSL | $L_{WA}$ | Q | V | d | $L_{Aeq}$ |
|---|---|---|---|---|---|
| **N3** | 110.0 | 32 | 80 | 75 | 54.3 |
| **N4** | 110.0 | 32 | 80 | 500 | 46.0 |
| **N5** | 110.0 | 32 | 80 | 100 | 53.0 |
| **N6** | 110.0 | 32 | 80 | 310 | 48.1 |
| **S1** | 110.0 | 32 | 100 | 300 | 47.3 |
| **S2** | 110.0 | 32 | 100 | 300 | 47.3 |



Based on traffic modelling it has been calculated that the increase in HGV movements to the site would be 2 HGV movements per hour as presented in Table 8.8.

**Table 8.8: Calculated noise emissions of proposed traffic movements to site**

| NSL | $L_{WA}$ | Q | V | d | $L_{Aeq}$ |
|---|---|---|---|---|---|
| **N3** | 110.0 | 34 | 80 | 75 | 54.5 |
| **N4** | 110.0 | 34 | 80 | 500 | 46.3 |
| **N5** | 110.0 | 34 | 80 | 100 | 53.3 |
| **N6** | 110.0 | 34 | 80 | 310 | 48.4 |
| **S1** | 110.0 | 34 | 100 | 300 | 47.5 |
| **S2** | 110.0 | 34 | 100 | 300 | 47.5 |

Results from Table 8.8 indicate that the predicted increase in HGV traffic levels will have an imperceptible impact on the noise existing measured noise emissions from the local road network.

## 8.4 Mitigation Measures

### 8.4.1 Construction

As there will be no construction activities required for the continued operation of landfilling activities, no mitigation measures are required. Nonetheless, CCC will continue to implement best practice at the site during the permanent capping works of Phase 3, including the development of a noise management plan.

### 8.4.2 Operations

The increased intake rate of 50,000 tpa will not result in any significant noise impacts on the local environment as additional machinery will not be required to place the waste. The predictive assessment carried out on the increased traffic movements indicated that they will have an imperceptible impact on noise emissions.

Nonetheless, the following mitigation measures will continue to be implemented at the site:

- Operational hours will be restricted to day-time hours
- All vehicles will comply with the speed limit on the site
- Site vehicles will not be over revved, or left with engines idling during operations
- Auxiliary equipment will be shut down when not in use
- Maintenance of plant and machinery will occur on a regular basis and will ensure correct operation of these items to manufacturers specifications.

### 8.4.3 Monitoring

The facility will continue to conduct annual noise monitoring in accordance with the conditions sets out in the waste licence granted by the EPA. These reports will be submitted to the Agency and will also be kept on file at the site office for inspection by the public.

### 8.4.4 Conclusion

Noise emissions from the continued operation of landfilling activities at Powerstown have been assessed. The existing noise environment on-site will not change as a result of the proposed continuation of the landfill. Additionally it is noted that no construction phase is required to continue operations.

The only identified potential impact would be an increase in the number of vehicle movements to the site to increase the waste landfilling activities. However, when the noise impact from this increase is compared to the existing baseline noise levels influenced by the local road network in the area, it is considered that the predicted increase in traffic levels will have an imperceptible impact on noise emissions.

# 9 CLIMATE & AIR QUALITY

## 9.1 Introduction

This section describes the existing air and climate environment of the Powerstown facility and surrounding area. The main areas examined with respect to the potential impacts from the proposed development on climate and air quality are:

- dust/particulate emissions
- vehicle emissions
- flare emissions

Mitigation measures are proposed where required.

## 9.2 Assessment Methodology

### 9.2.1 Assessment of Existing Environment

To describe the existing environment, a desk-top assessment was undertaken of existing data sources and published reference reports such as, available climatic data representative of the site from Met Eireann, air monitoring data undertaken by the EPA and air monitoring undertaken in accordance with the waste licence.

### 9.2.2 Assessment of Construction Impacts

The continued operation of Powerstown landfill does not require the construction of new landfill cells. Therefore, construction impacts are not assessed any further in this section.

### 9.2.3 Assessment of Operational Impacts

The proposed development will involve filling the remaining void space in Phase 3. These activities are considered landfill operation activities and their assessment is discussed below.



*Assessment of dust emissions*

During operational activities, dust particles may be emitted from the site. To assess the impacts of operation dust emissions, the NRA Assessment Criteria for the impact of dust emissions from construction activities with standard mitigation in place was used. This table is provided in Appendix 7 *of the National Roads Authority (NRA) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (NRA, 2006).

*Assessment of Vehicle Emission Impacts*

To assess the impact of vehicle emissions from the proposed development on the wider road network of Powerstown (M9 and R448), the NRA *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* was consulted. A basic air quality prediction screening model was undertaken.

This prediction tool is designed by *Design Manual for Roads and Bridges (DMRB)* (Volume 11, Section 3 Air Quality, May 2007) and published by the UK Highways Agency. The DMRB model predicts vehicle emissions for $NO_x$, $NO_2$ and $PM_{10.}$ carbon monoxide, benzene and 1,3-butadiene. This screening model was used to predict existing base case $NO_x$, $NO_2$ and $PM_{10}$ traffic emissions using 2010 traffic data and estimated proposed traffic flows in 2012 with the acceptance of 50,000 tpa of waste is proposed.

The DMRB model requires a number of inputs such as traffic flow, speed and vehicle mix and the annual background pollutant concentration at each route. In the assessment, modelled traffic speeds were taken as the speed limit on each of the roads. The traffic inputs used in the model are outlined in Table 1 Appendix 6. The average maximum annual rural location monitoring results from the fixed EPA Zone D rural air quality monitoring locations was included in the assessment.

The UK Local Air Quality Management (LAQM) year adjustment factor spreadsheet tool was used to adjust measured concentrations and assess the pollution impact for future years (V2.2 for $NO_2$ & $PM_{10}$ adjustment and V1.1 for CO adjustment). This spreadsheet is used based on the assumption that pollutant concentrations will decline in future years due to initiatives to reduce vehicle derived emissions. Pollutant concentrations were predicted for a sensitive receptor located 10 m from the modelled road. Predicted concentrations were then compared with the relevant air quality standards.

*Assessment of Landfill gas emissions*

To assess the impact of landfill gas emissions at the facility, a landfill gas prediction model for the site was examined. The existing flare monitoring records were also assessed and compared against EPA emission limit values.

## 9.3 Existing Climate and Air Quality

### 9.3.1 Climate in the Existing Environment

The long-term weather patterns at the Powerstown facility would indicate the meteorology of the area to be typical of the south eastern region of Ireland. The weather patterns reflect regional trends characterised by mild conditions with no extremes of temperature, consistent humidity, prevailing south to south-westerly winds and low relatively uniform rainfall distribution throughout the year.



The climate of the Powerstown site is characterised from meteorological measurements taken by the Irish Meteorological Service from a weather station at Kilkenny (1961-1990). The synoptic station at Kilkenny is located approximately 28 km south of the site. It is situated at an elevation of 66 mOD, which is slightly higher in elevation than the Powerstown site (50 - 60 mOD). The synoptic station records rainfall, temperature, relative humidity, sunshine, wind direction, potential evapotranspiration and general weather data. This data is most applicable to the Powerstown site.

Table 9.1 summarises the long-term weather patterns recorded at Kilkenny Met Station from 1961-1990. Data from the station indicates that the mean air temperature is 9.3 °C and the mean wind speed is 6.5 knots (3.3 m/s). The mean annual rainfall recorded is 822.9 mm.

The wind rose for Kilkenny met station for 1966-1995 is provided in Figure 9.1. This highlights that the prevailing wind direction at this station is predominantly south, south west and the dominant wind speed at 24.5% of the time period is between 1-3 knots (0.5-1.5 m/s).

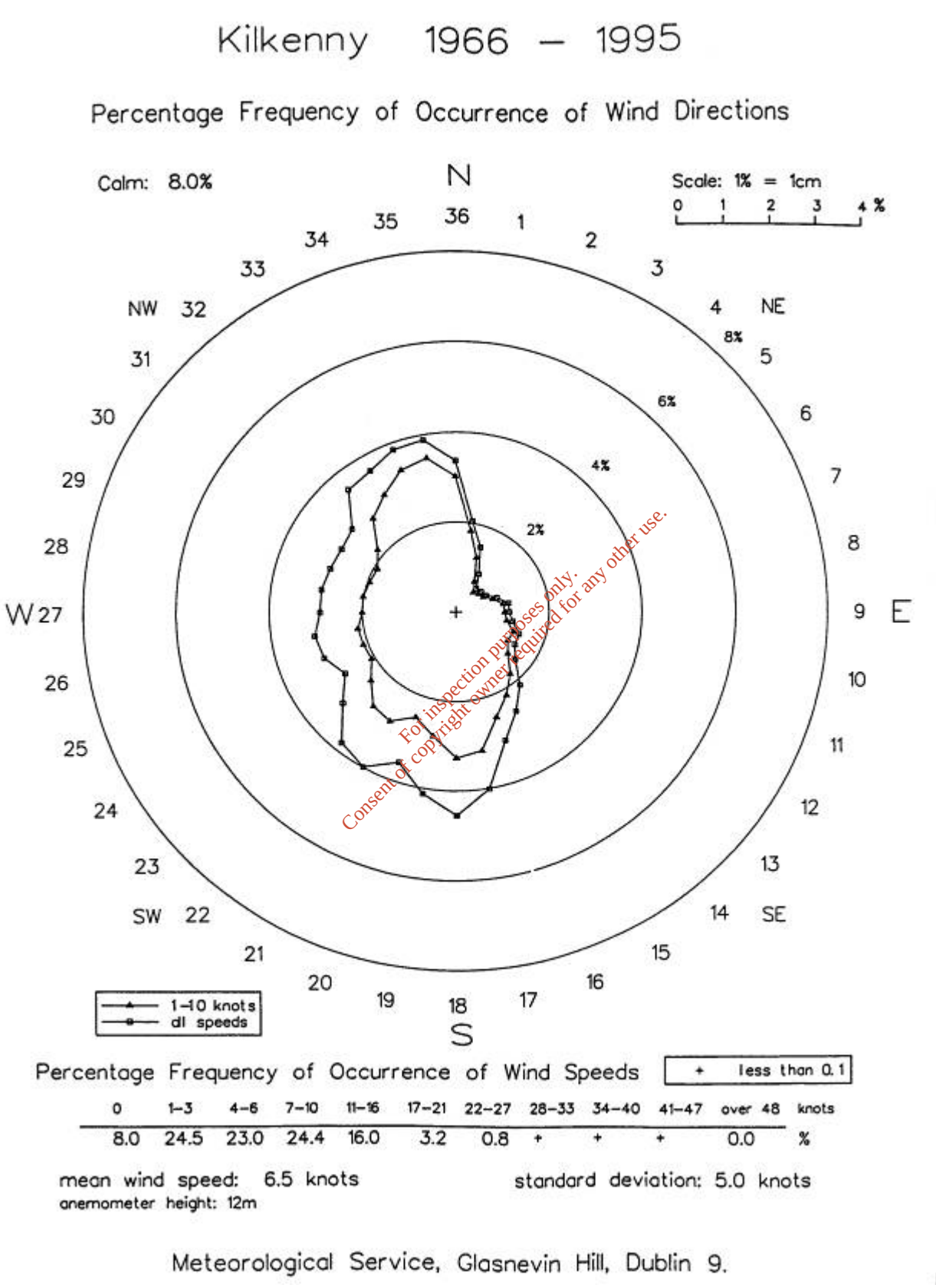
An on-site metrological weather station was installed at the Powerstown facility in 2011.

## Table 9.1: Kilkenny Met Station Monthly and Annual Mean and Extreme Values (1961-1990)

| Weather Conditions | jan | feb | mar | apr | may | jun | jul | aug | sep | oct | nov | dec | year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TEMPERATURE** (degrees Celsius) | | | | | | | | | | | | | |
| *mean daily max.* | 7.7 | 7.9 | 10 | 12.4 | 15.1 | 18.1 | 19.9 | 19.6 | 17.2 | 13.9 | 10.1 | 8.4 | **13.4** |
| *mean daily min.* | 1.4 | 1.6 | 2.3 | 3.4 | 5.6 | 8.4 | 10.4 | 9.9 | 7.9 | 6.1 | 2.8 | 2.1 | **5.2** |
| *mean* | 4.6 | 4.8 | 6.1 | 7.9 | 10.3 | 13.3 | 15.2 | 14.7 | 12.6 | 10 | 6.4 | 5.3 | **9.3** |
| *absolute max.* | 14.1 | 15.1 | 18.5 | 23.5 | 26 | 31.5 | 31.4 | 30.5 | 25.6 | 22.2 | 17.4 | 14.8 | **31.5** |
| *absolute min.* | -14.1 | -11.1 | -7.9 | -5.4 | -3.7 | 0.5 | 2.3 | 1.2 | -1.6 | -4.4 | -7 | -10.8 | **-14.1** |
| *mean no. of days with air frost* | 10.8 | 8.7 | 7.4 | 4.1 | 0.8 | 0 | 0 | 0 | 0.4 | 2 | 8.4 | 10.5 | **53** |
| *mean no. of days with ground frost* | 18.2 | 14.9 | 14.3 | 12.4 | 7.3 | 2 | 0.4 | 0.8 | 3.4 | 6.8 | 14.2 | 16.8 | **111.5** |
| **RELATIVE HUMIDITY** *(%)* | **jan** | **feb** | **mar** | **apr** | **may** | **jun** | **jul** | **aug** | **sep** | **oct** | **nov** | **dec** | **year** |
| *mean at 0900UTC* | 88 | 87 | 85 | 79 | 76 | 76 | 78 | 82 | 85 | 88 | 89 | 89 | **84** |
| *mean at 1500UTC* | 80 | 74 | 68 | 64 | 64 | 65 | 65 | 66 | 69 | 76 | 78 | 82 | **71** |
| **SUNSHINE** *(hours)* | **jan** | **feb** | **mar** | **apr** | **may** | **jun** | **jul** | **aug** | **sep** | **oct** | **nov** | **dec** | **year** |
| *mean daily duration* | 1.71 | 2.29 | 3.32 | 4.85 | 5.47 | 5.15 | 4.65 | 4.5 | 3.82 | 2.71 | 2.22 | 1.48 | **3.51** |
| *greatest daily duration* | 8.2 | 9.7 | 12.1 | 14 | 15.8 | 16.3 | 16 | 14.2 | 11.8 | 10.2 | 9 | 7.3 | **16.3** |
| *mean no. of days with no sun* | 11 | 8 | 6 | 3 | 2 | 2 | 2 | 2 | 3 | 6 | 9 | 12 | **65** |
| **RAINFALL** *(mm)* | **jan** | **feb** | **mar** | **apr** | **may** | **jun** | **jul** | **aug** | **sep** | **oct** | **nov** | **dec** | **year** |
| *mean monthly total* | 87 | 65.7 | 62.8 | 51.6 | 61.9 | 50.5 | 52.7 | 70.7 | 72.5 | 85.5 | 74 | 88 | **822.9** |
| *greatest daily total* | 31.5 | 32.3 | 29.9 | 24.5 | 23.9 | 30 | 66.4 | 49.8 | 30 | 34.6 | 29 | 45.8 | **66.4** |
| *mean no. of days with >= 0.2mm* | 19 | 15 | 17 | 15 | 17 | 14 | 13 | 15 | 15 | 18 | 17 | 18 | **192** |
| *mean no. of days with >= 1.0mm* | 15 | 11 | 12 | 10 | 12 | 10 | 9 | 11 | 11 | 13 | 12 | 13 | **137** |
| *mean no. of days with >= 5.0mm* | 7 | 5 | 5 | 4 | 5 | 4 | 3 | 4 | 5 | 6 | 5 | 6 | **58** |
| **WIND** *(knots)* | **jan** | **feb** | **mar** | **apr** | **may** | **jun** | **jul** | **aug** | **sep** | **oct** | **nov** | **dec** | **year** |
| *mean monthly speed* | 7.4 | 7.4 | 7.7 | 6.7 | 6.4 | 5.8 | 5.6 | 5.6 | 5.9 | 6.4 | 6.4 | 7.1 | **6.5** |
| *max. gust* | 77 | 72 | 60 | 53 | 54 | 45 | 46 | 56 | 65 | 74 | 56 | 65 | **77** |
| *max. mean 10-minute speed* | 44 | 39 | 36 | 33 | 32 | 28 | 27 | 29 | 40 | 45 | 35 | 40 | **45** |
| *mean no. of days with gales* | 0.5 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.3 | **1.4** |

Source (EIREANN, Met, 2011)

**Figure 9.1: Windrose for Kilkenny Met Station (1966-1995)**



## 9.3.2 Air Quality in the Existing Environment

### EPA Air Monitoring Data

Under the Air Quality Framework Directive (1996/62/EC), Ireland has been divided into four air management areas. Dublin is one zone – Zone A and Cork is defined as Zone B. Zone C consists of 16 towns with a population of greater than 15,000 while Zone D covers the remainder of the country (all towns with a population of less than 15,000 and all rural areas). The Powerstown facility is located in a rural area (Zone D).

The EPA operates a number of fixed and mobile air monitoring stations. As the site is located in a rural Zone D location –2008, 2009 and 2010 EPA air quality data monitored within Zone D, was reviewed and summarised in Table 9.3. An average of the maximum rural location monitoring results can be used as a conservative representation of the air quality in proximity to the existing and proposed facility.

### Onsite Air Monitoring Data

Under the existing waste licence for the facility, there is a requirement to monitor dust deposition, landfill gas and emissions from the landfill gas flare as well as odour. A monitoring location map illustrating the location of each of these monitoring points is provided on Figure 3.13. Each of these air monitoring parameters are discussed separately below.

### Dust Deposition

Dust deposition monitoring is undertaken three times a year (twice during May-September) at six monitoring locations (D2, D4, D5, D6, D7 and D8). A description of the location of these monitoring points is provided in Table 9.2 below.

**Table 9.2: Location of Dust monitoring points (ug / $m^3$)**

| Location | Description |
|---|---|
| D2 | Western site boundary near leachate lagoon |
| D4 | North-western site boundary near manifold 5 |
| D5 | Eastern site boundary near leachate tank |
| D6 | Northern site corner near surface water pond |
| D7 | Southern site boundary near main entrance |
| D8 | Adjacent to roadway entering civic amenity |



The monitoring method used is the Standard method VDI2119 (Measurement of Dustfall, Determination of Dustfall using Bergerhoff Instrument (Standard Method)) by the German Engineering Institute. The EPA has set a dust deposition limit value of 350 mg/$m^2$/day in Schedule C of the facility's licence.

Monitoring results indicate that dust deposition levels onsite have been within the EPA limit value of 350 mg/$m^2$/day for all locations since September 2008. There have been 4 events at 2 monitoring locations, 3 at D2 and 1 at D4 since August 2005 were dust levels exceeded the limit. The most recent event was in June 2008 wheredust levels at D2 exceeded the EPA limit value. In June 2008, elevated levels were attributed to capping works at the landfill and construction works at the adjacent N9 roadway during the monitoring period.

All monitoring conducted in 2009, 2010 and 2011 show results that are in compliance with the EPA limit value of 350 mg/$m^2$/day.

## Table 9.3: Summary of EPA Monitoring Results (ug/m$^3$)

| Pollutant | | Rural Areas Air Quality Zone D | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2008 | | | | | | 2009 | | | | 2010 | | | | | |
| | | Cork Harbour | Kilkitt, Co. Monaghan | Glashboy, Co. Cork | Carnsore Point, Co. Wexford | Shannon Estuary | Castlebar, Co. Mayo | Kilkitt, Co. Monaghan | Shannon Estuary | Glashboy, Co. Cork | Castlebar Co. Mayo | Glashboy, Co. Cork | Castlebar Co. Mayo | Kilkitt, Co. Monaghan | Longford | Shannon Estuary | Average |
| $NO_x$ | Hourly Max | 212 | 107 | 266 | - | - | - | 53 | - | 319 | 310 | 568 | 705 | 189 | - | - | 303 |
| | Annual Mean | 15 | 4 | 13 | - | - | - | 3 | - | 15 | 13 | 14 | 17 | 4 | - | - | 11 |
| $NO_2$ | Hourly Max | 63 | 80 | 75 | - | - | - | 50 | - | 87 | 87 | 101 | 129 | 32 | - | - | 78 |
| | Annual Mean | 10 | 3 | 9 | - | - | - | 3 | - | 11 | 8 | 10 | 10 | 3 | - | - | 7 |
| CO | 8 Hourly Max | 900 | - | - | - | - | - | | - | - | | - | - | - | - | - | 900 |
| | Annual Mean | 400 | - | - | - | - | - | | - | - | | - | - | - | - | - | 400 |
| $SO_2$ | Hourly Max | 33 | 42 | - | - | 54 | - | 16 | 27 | - | | - | - | 14 | - | 20 | 29 |
| | 24 -HR Max | 12 | 14 | - | - | 18 | - | 12 | 11 | | | - | - | 10 | - | 11 | 13 |
| | Annual Mean | 4 | 4 | - | - | 5 | - | 4 | 4 | - | | - | - | 2 | - | 3 | 4 |
| $PM_{10}$ | 24 -HR Max | - | 57 | - | 146 | - | 73 | 55 | - | - | 64 | - | 108 | 42 | 105 | - | 81 |
| | Annual Mean | - | 10 | - | 30 | - | 16 | 8 | - | - | 13 | - | 15 | 10 | 21 | - | 15 |

## Landfill Gas

In accordance with Schedule D of the waste licence, landfill gas monitoring is undertaken at perimeter boreholes surrounding the landfill footprint (G1 – G46, TP11, TP12, TP13, TP14, TP15, TP16, TP17) and at the site office & other buildings onsite.

Landfill gas monitoring is currently carried out at all of these locations with the exception of G9 which was damaged due to quarry works and G10 which was damaged during capping works. Following correspondence from the EPA in January 2011, G42 was removed from the monitoring schedule.

The waste licence has set landfill gas concentration limits for onsite buildings and perimeter boreholes. These limit values are:

- Methane ($CH_4$) - 20 % LEL (1% v/v)
- Carbon Dioxide ($CO_2$) - 1.5 % v/v

Perimeter boreholes are monitored monthly the results for during 2011 are provided in Table 3 of Appendix 6.

The following should be noted in relation to landfill gas perimeter monitoring:

- Wells TP11, TP12, TP13, TP16, G6, G7, G8, (G9), G27, G28, G30 - G35 & G37 - G39 are located outside the landfill facility.
- Wells G11-G21 are located in waste and as such are not landfill gas perimeter monitoring wells.
- The remainder of the wells are located on site (TP14, TP15, TP17, G1-G5, G10, G22-G29, G36, G41, G43 – G46).

Methane levels are within the EPA limit value for all perimeter boreholes outside the landfill facility and within the landfill facility. There were no incidents of methane levels greater than the limit of 1% v/v in the main or weighbridge offices.

Carbon dioxide levels are within the EPA limit value for most of the perimeter boreholes outside the landfill facility. Levels above the trigger level were recorded at locations TP13, G27, G28 and G31. Onsite carbon dioxide levels at TP15, G5 and G29 are regularly over the relevant limit value while G3, G22, G36 and G44 are intermittently elevated.



Carbon dioxide may be elevated naturally in soils as high concentrations can occur at shallow depths of up to 2 m due to microbiological activity associated with the roots of many types of vegetation. However, carbon dioxide also has the potential to migrate from an unlined landfill body through the subsoil. The locations of the majority of elevated concentrations are found to occur to the south and north of the old unlined landfill (Phase 1).

In addition, it is noted that the underlying bedrock at the site is predominantly limestone and it is possible that the reaction of limestone with slightly acidic groundwater, caused by the seepage of leachate from the uncontained site, will release carbon dioxide. So rather than gases migrating laterally from the site, carbon dioxide may be generated at the groundwater table beneath and downgradient of the site. Elevated carbon dioxide levels therefore may also be attributed to the unlined portion of the old landfill (Phase 1).

As outlined earlier in Section 6.5.4 additional abstraction wells have been installed at the site as part of the capping works of cells 6 - 13 as well as the installation of a new flare.

Boreholes G12, G13, G14, G15 and G17 have elevated methane concentrations however these boreholes are located within the waste mass. Boreholes G12, G13, G14, G15 and G17 have elevated carbon dioxide concentrations however these boreholes are also located within the waste mass.

## Flare

There is currently one operational enclosed flare onsite. Under Schedule D of the EPA waste licence, emissions from the enclosed flare is monitored annually. Monitoring data for the existing flare from 2006 to 2011 is provided in Table 9.4 below indicate emissions are within the emission limit values outlined in the EPA waste licence for flares.

## Table 9.4: Onsite Enclosed Flare Monitoring Results

| Parameters | Units | 2006 | 2008 | 2009 | 2010 | 2011 | EPA Emission Limit Value |
|---|---|---|---|---|---|---|---|
| Nitrogen Oxides ($NO_x$ as $NO_2$) | $mg/Nm^3$ | 24 | 64 | 71.6 | 69.6 | 43.3 | 150 |
| CO | $mg/Nm^3$ | 23 | 35 | 5.7 | 3.3 | 1.8 | 50 |
| Total Organic Carbon (TOC) | $mg/Nm^3$ | 0.9 | 9.96 | 6.3 | 2.2 | 3.2 | 10 |
| Hydrogen Chloride | $mg/Nm^3$ | 2 | 29.27 | 6.4 | 5.1 | 0.3 | <50 (at mass flow >0.3 kg/hr) |
| Hydrogen Flouride | $mg/Nm^3$ | 0.09 | 0.08 | 1.1 | 0.5 | 0.3 | <5 (at mass flow >0.05 kg/hr) |
| $SO_2$ | $mg/Nm^3$ | 26 | 85 | 21.7 | 115 | 132 | - |
| Flow Rate | $Nm^3/hr$ | | | 593 | 264 | 317* | 3000 |
| Temperature | °C | 1028 | 974 | 1023 | 1021 | 1027 | - |
| $O_2$ | % | 2.6 | 10.19 | 9.1 | 7.17 | 8.18 | - |

*uncertainty as to whether this is $Nm^3/hr$ or $m^3/hr$

### Ambient Odour and Surface VOCs

The Odour Management Plan (OMP) for the Powerstown facility sets out best practice for the acceptance of waste, management of the active cell including the filling sequence, active face management and odour management infrastructure operation and maintenance), management of the permanent gas extraction system, operation of the leachate management system, perimeter gas well monitoring, landfill gas auditing and record keeping and responsibilities.



The site manager keeps records on a continuous basis of observed odours on site by site personnel and off-site by nearby residents. These records are compared to climatic conditions and every effort is made to minimise odours at the site. At present, odours are monitored twice daily (morning and afternoon) at three residential sites.

There were three odour complaints received in 2010 and none in 2011. This is in contrast to some 19 odour complaints in 2009, 29 in 2008 and over 300 in 2006. There has been a significant reduction in the number of odour complaints over the last few years due to the completion of the final capping of cells 6-13, the installation of a new gas collection system and the operation of the new flare. This has helped to improve odour control and reduce odour emanating from the landfill.

In addition, since 2008 CCC has undertaken total volatile organic compounds (VOC's) surface emissions from the landfill site to detect areas of gas leakage from the landfill site. In 2008, local sources of gas migration were identified and recommendations were outlined to improve gas management onsite. During 2009, following the capping works, a new landfill gas abstraction system was installed as well as an LDPE gas flap liner on the flank of Cells 15 and 16 and additional cover material was placed along the side slopes and flanks of the active landfill area of the site.

In 2009, VOC monitoring was undertaken three times in July, August and November. In July, ten zones of surface emissions were identified. These were associated with inadequate landfill gas extraction from the active cells (Cells 15 and 16) and were located at flanked and open areas. Some of the emissions occurred as a result of insufficient sealing at wellheads.

In August 2009, ten zones of surface emissions were identified that exceeded recommended limits. These were associated with inadequate landfill gas extraction from the active cells (Cells 15 and 16). Comparison with the 2008 surveys demonstrated improvements in the control of fugitive landfill gas to atmosphere (as a result of capping works carried out in 2008).

In November 2009, nine zones of surface emissions were identified from flanked and open areas and a number of wellheads. VOC levels had reduced from the July survey. The report recommended an extension of the mitigation measures in place, which are as follows:

- Partial permanent capping on the northern and eastern flanks of Cells 15 and 16
- Extension of the temporary capping on some flanks
- Vertical extraction wells and pipework

In 2010, two monitoring surveys were undertaken in June and September. In June, seven zones of surface emissions were identified. Five of these areas were at sloped/flanked areas within the active area of the landfill. One area emission was due to insufficient sealing around a well head while another was a diffuse source in an open area.

In September 2010, eight zones of surface emissions were identified during this survey. Seven of these were as a result of landfill gas surface emissions from flanked areas within the landfill. One source was due to insufficient sealing around a vertical well head. Mitigation measures carried out as a result of these surveys included:

- Additional capping material as required
- Extension of the temporary capping on some flanks.
- Maintenance of vertical extraction wells and pipe-work.

In 2011, two monitoring surveys were carried out in May and October. In May, six zones of surface emissions were identified. Five locations were diffuse sources in flanked areas of the landfill and one location was a localised source from a gas well. In October, six zones of surface emissions were identified. Five locations were diffuse sources in flanked areas of the landfill and one location was a localised source from a gas well.

The diffuse emissions identified were from flanked areas and a gas well in Cell 15. Results show a reduction in emission levels from the May survey to the October survey. The levels measured in the vicinity of the gas well are just slightly above the recommended trigger level. Overall the 2011 surface emission levels are lower than the 2010 levels. Ongoing mitigation measures include:

- Increased abstraction from Cell 15
- Investigation of the gas well.



## 9.4 Summary of Key Possible Impacts

### 9.4.1 Construction Phase

The proposed development does not require the construction of new landfill cells or other infrastructure. Cells 15-18 are already constructed. Therefore, there will be no construction impacts associated with this development.

### 9.4.2 Operational Phase

The principal sources of air emissions during the operation of the proposed facility are:

- Dust/particulate emissions
- Vehicle emissions
- Flare emissions.

The impacts of these emissions are discussed in this section.

### 9.4.2.1 Impact Assessment

*Dust emissions*

During operation of the facility, dust emissions arise due to particulate matter becoming airborne. This airborne dust is then available to be carried downwind from the source. The amount of dust generated and emitted from a working site and the potential impact on surrounding areas varies according to the following:

- The type and quantity of material and working method
- Distance between site activities and sensitive receptors
- Climate/local meteorology and topography

Potential dust particles generated from vehicle movement, capping activities and waste deposition onsite are expected to primarily comprise of larger dust particulates (i.e. above 30 µm) which will deposit over short distances. Likely nuisance effects from this dust are soiling of buildings and vegetation surrounding the site.

Table 9.5 below provides a list of distances within which dust could be expected to be a nuisance from construction sites. Nuisance effects include soiling, $PM_{10}$ deposition and vegetation effects. This data is taken from *Appendix 7* of the *National Roads Authority (NRA) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*. As landfilling activities are similar to construction activities in open sites, this table is used to assess the potential impacts of dust emissions from the landfill.

**Table 9.5: NRA Assessment Criteria for the Impact of Dust Emissions from Construction Activities with Standard Mitigation in Place**



| Source | | Potential Distance for Significant Effects (Distance from source) | | |
|---|---|---|---|---|
| **Scale** | **Description** | **Soiling** | **$PM_{10}$** | **Vegetation Effects** |
| Major | Large construction sites, with high use of haul roads | 100 m | 25 m | 25 m |
| Moderate | Moderate construction sites, with moderate use of haul roads | 50 m | 15 m | 15 m |
| Minor | Minor construction sites, with limited use of haul roads | 25 m | 10 m | 10 m |

**Source:** National Roads Authority, 2006

Landfilling activities would be considered similar to a moderate construction site with moderate use of haul roads. Therefore, soiling effects will mostly likely occur at 50 m and $PM_{10}$ deposition and vegetation effects will occur at 15 m. The civic amenity activities would be considered similar to a minor construction site with limited use of haul roads. Therefore, soiling effects will most likely occur at 25 m and $PM_{10}$ deposition and vegetation effects will occur at 10 m. As the civic amenity and carpark facilities are located on in hardstanding (tarmac), this will further minimise dust impacts.

In accordance with the requirement of the waste licence, a 50 m wide 'buffer zone' has been developed at the eastern side of the landfill. The nearest sensitive receptor is located to the south east of the site. This dwelling is approximately 30 m from the administration office carpark, 40 m from the civic amenity and 250 m from landfill activities. Therefore, due to these separation distances, airbourne dust emissions will not significantly affect the surrounding environment.

It should be noted that increasing the rate of waste deposition from 40,000 tpa to 50,000 tpa will not necessitate either a larger open face or longer working hours therefore dust emissions associated with waste deposition will not increase significantly. It must be also noted that significant quarrying activity occurs within the vicinity of the Powerstown site and these activities have the potential to generate dust.

### *Vehicle emissions*

The pollutants of most concern in relation to emissions from road traffic are nitrogen dioxide and $PM_{10}$. Predicted traffic flows associated with the proposed development was examined using an air quality prediction screening model designed by Design Manual for Roads and Bridges (DMRB). The results of this prediction assessment are outlined in Table 2 and shown on Figures 1 -2 in Appendix 6.

Predicted traffic emissions in 2012 are within the relevant air quality guidelines and therefore will not impact on ambient air quality. Predicted emissions do not vary significantly across the chosen years however; a decrease in pollutant concentrations from 2010 to 2012 is evident despite the slight increase in development traffic. This is due to initiatives to reduce vehicle derived emissions in future years.

### *Flare emissions*

A landfill gas prediction model was prepared as part of the EIS using the modelling package LandGem Landfill Gas Emissions Model version 3.02. The model outputs are outlined in Section 3.4.5 of this EIS and presented in Appendix 5. In this landfill gas model, a number of scenarios were examined to assess what impacts the proposed development would have on landfill gas production.

The landfill gas model shows that peak landfill gas production has occurred onsite in 2009 at rate of at 4.3 million $m^3$/yr (c. 493 $m^3$/hr). The proposed acceptance of 50,000 tpa will cause a secondary peak in landfill gas in 2014, of 4.1 million $m^3$/yr (473 $m^3$/hr).

Flaring capacity of 473 $m^3$/hr is required to treat peak gas production. The existing capacity of the landfill flare onsite is 1,200 $m^3$/hr. Therefore, there is be sufficient landfill gas treatment capacity on site.

It should be noted that the facility's waste licence now restricts the quantity of biodegradable municipal waste (BMW) going to landfill. Condition 5.6 of its waste licence sets out limits and dates for the acceptance of BMW at the landfill. Compliance with these limit values will affect the quantities of landfill gas being produced onsite as a reduction in BMW accepted will reduce the volume of landfill gas produced.

The EPA has set emission flow rates and limit values for parameters from the flare onsite. Currently, the flare onsite is within these limit values. The existing flare on site has sufficient capacity to treat the predicted landfill gas volumes therefore as described in Section 3.4.5.



### *Climate Impacts*

Under the Kyoto Protocol, Ireland is obliged to reduce its greenhouse gas emissions to a level that is 13% above 1990 levels by 2012. The current practice of landfilling the majority of the country's waste results in the production of significant quantities of greenhouse gases, in particular methane. The National Climate Change Strategy 2007-2012 estimates that landfill gas flaring and utilisation, as well as the diversion of biodegradable waste from landfill will result in an annual average decrease of 1.2 Mt $CO_2$eq.

The landfill gas prediction model is outlined in Section 3.4.5 of this EIS and presented in Appendix 5. If the development was filled as originally planned to final restoration levels, the total quantity of landfill gas produced would be 110.2 million $m^3$. The proposed increase in waste acceptance from 40,000 tpa to 50,000 tpa will not alter the overall quantity of landfill gas produced at the site.

The same quantity of waste will come into the site albeit over a shorter period if waste quantities in the proposed intensification are reached or at a slower rate over a longer period if the currently declining waste tonnages entering the site continue.

Currently, landfill gas is flared onsite to avoid the emission of methane (and other constituents including odiferous trace gases) and convert it to carbon dioxide. This is important as methane has a global warming potential 21 times greater than that of carbon dioxide. Landfill gas will continue to be flared.

Therefore, the proposed development will not alter the permitted development impacts on local climate and climate change.

## 9.5 Mitigation Measures

### 9.5.1 Construction Phase

There will be no construction impacts associated with this development therefore no mitigation measures are required.

### 9.5.2 Operational Phase

*Dust Emissions*

A key mitigation measure to minimise dust nuisance for sensitive receptors is the distance between the activities onsite and the nearest sensitive receptor. In accordance with the requirement of the waste licence a 50 m wide 'buffer zone' has been developed at the eastern side of the landfill. The nearest sensitive receptor is located to the south east of the site. This dwelling is approximately 30 m from the administration office carpark, 40 m from the civic amenity and 250 m from landfill activities. Due to this distance any potential dust impacts will be minimised and predominantly remain within the site boundary.

A number of mitigation measures are currently in place which successfully control dust on site. These measures will be continued across the site and include the following:

- All vehicles will comply with onsite speed limit
- Surface dressing of roads to the landfill area to reduce the amount of dust generated
- The access roads and internal site roads will be sprayed during periods of dry weather in order to suppress dust migration from the site
- All loads leaving the site will be required to pass through the wheel wash
- A water bowser and road sweeper is used daily to control dust nuisance
- All waste disposed of in the landfill will be compacted and covered daily. During periods of dry weather the cover material is kept moist to prevent dust nuisance
- A monitoring programme at the site will continue to measure dust and $PM_{10}$ in accordance with the waste licence for the facility
- Any soil stockpiles stored for capping or engineering purposes will be sprayed using a water bowser, during periods of dry weather, in order to suppress dust migration from the site
- All capped areas will be vegetated as soon as possible to prevent windblown erosion.



*Landfill Gas Emissions*

An previously mentioned an OMP has been implemented at the site in 2010.

A number of mitigation measures are already in operation onsite to control landfill gas from both the old unlined landfill area and the newer lined landfill areas.

LFG is currently extracted from the waste using a combination of vertical and horizontal gas wells and flared in an enclosed flare. During the filling of the newly constructed cells, vertical wells will be constructed immediately following commencement of waste placement to enable early extraction of landfill gas from the active area. Horizontal slotted pipework will be placed at intervals in advance of the developing waste front for odour control. In the medium term, these pipes will also be used for landfill gas extraction providing increased coverage of the landfill gas extraction system.

As the old landfill area is unlined, lateral landfill gas migration is difficult to control however the site management will continue to manage and control the gas field extraction system to minimise this.

A portion of cells 15 and 16 have been temporary capped to minimise the landfill gas and odour emissions. Final capping of Phase 3 will most likely occur under one contract.

Landfill gas monitoring will continue and will also be extended as landfilling progresses. The number of boreholes to be installed and the borehole locations will be agreed in advance with the EPA.

Predicted emissions associated with the flaring of landfill gas onsite are within the relevant air quality guidelines and therefore will not impact on ambient air quality. No further mitigation measures are required.

*Vehicle Emissions*

Predicted vehicle emissions associated with the proposed development are within the relevant air quality guidelines and therefore will not impact on ambient air quality. No mitigation measures are required.

*Climate*

The proposed development will not alter the permitted development impacts on local climate and as the development will not alter the overall quantity of landfill gas produced at the site and landfill gas will continue to be flared in the proposed development. The mitigation measures outlined for landfill gas emissions above are also relevant in the control of climate impacts.

## 9.6 Predicted Impacts after Mitigation

Following the implementation of the above mitigation measures, it is predicted that the proposed development will not have a significant impact on ambient air quality or the local or national climate.

## 9.7 Monitoring

Air monitoring will continue to be undertaken at the frequencies and locations outlined in the existing waste licence for the facility W0025-03. Monitoring will be completed by a suitably qualified person and samples will be analysed at an accredited laboratory. Monitoring equipment will be calibrated when required and records maintained.

Additional monitoring points particularly for landfill gas may be installed as landfilling progresses. The number of monitoring points and locations will be agreed in advance with the EPA. Ongoing monitoring will measure the effectiveness of the existing and proposed mitigation measures in this development and if breaches of EPA licence limit values are recorded, facility operations and mitigation measures will be reviewed corrective action procedures put in place.

A continuous monitoring system under SCADA control will monitor the operation of the landfill gas extraction system and the flare onsite. Any deviations in key design and control parameters will be detected and appropriate preventative maintenance will be undertaken to minimise air emissions.



## 9.8 Conclusion and Summary

This section examined the potential impacts of the proposed development on climate and air quality in the surrounding environment.

Potential impacts associated with the proposed development on climate and air quality are dust emissions, vehicle emissions and landfill gas emissions. The proposed development does require the construction of new landfill cells or other infrastructure. Therefore, there will be no construction impacts associated with this development.

Operational emissions include dust, vehicle and flare emissions. Due to a separation distance between activities onsite and the nearest sensitive receptor, dust emissions will not significantly affect the surrounding environment and predominantly remain within the site boundary. Traffic pollutants of most concern were also examined using a basic air quality prediction screening model and predicted traffic emissions from existing and proposed traffic flows are within the relevant air quality guidelines and therefore will not impact on ambient air quality.

On examining the landfill gas prediction curves for the permitted and proposed development it is evident that the proposed development will not increase the total or peak quantity of landfill gas produced onsite. The proposed development will not modify the operational efficiency of the existing flare onsite.

# 10 TRAFFIC

## 10.1 Introduction

This chapter of the EIS describes the impact the development will have in terms of traffic. Existing conditions associated on the receiving roads environment are evaluated and assessed and traffic volumes associated with the proposed development are also estimated.

## 10.2 The Development

### 10.2.1 General

Chapter 3 of this EIS describes the proposed development in detail. The main purpose of this EIS is to obtain consent from An Bord Pleanála for the continued operation of the landfill until such time as the landfill cells on site (already built) are filled. No new infrastructure is proposed and the Council will in any case continue to operate the civic amenity in accordance with the conditions of the waste licence. However the Council is seeking to increase the allowable annual tonnage of waste for disposal at the landfill from 40,000 tonnes per annum (tpa) to 50,000 tpa.

### 10.2.2 Hours of Operation and Waste Acceptance Hours

In accordance with the conditions of the waste licence, the landfill and civic amenity is licensed to accept waste between 08:00 and 17:30 Monday to Friday inclusive (bank Holidays excepted) and 08:00 to 12:30 on Saturdays.

Further information in relation to the hours of operation and waste acceptance hours are described in detail in Section 3.2.2 of this EIS.

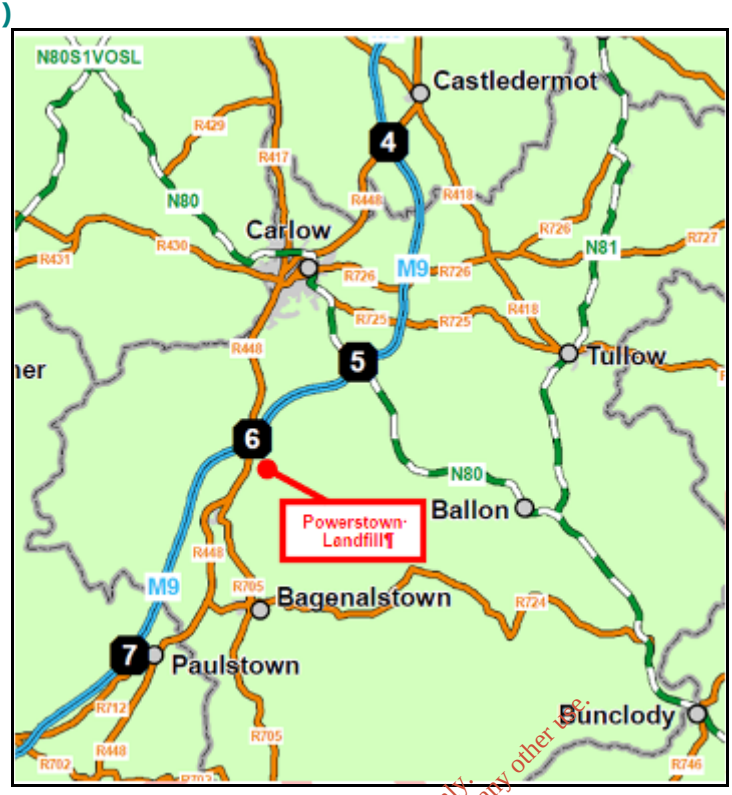


## 10.3 Existing Road Network and Site Access

### 10.3.1 General

Figure 10.1 below shows the location of the site in relation to nearby major road infrastructure (only motorway, national and regional roads shown).

**Figure 10.1: Road Infrastructure near the Powerstown Facility (M9 Junctions numbers shown)**






## 10.3.2 M9 Motorway

The Powerstown facility is located approximately 200 m (on plan) from the M9 Motorway, with the entrance to the site located approximately 1,400 m (by road) from Junction No 6 on the M9.

The M9 Motorway passing the facility runs from Waterford to Kilcullen in County Kildare and was developed under the National Development Plan and Transport 21. The motorway stretches for approximately 110 km and was developed in four discrete sections between July 2006 and September 2010[9]. The first section of the road to be completed was the 18 km long Carlow Bypass which was built between July 2006 and May 2008.

The new M9 (a motorway grade road) essentially replaced the 'old N9' which was a single carriageway roadway of varying standards which ran from Waterford through Carlow Town and on to Kilcullen in County Kildare. Phases 1 and 2 of the landfill are adjacent to the R448 (old N9).

## 10.3.3 R448 (old N9)

The R448 is a regional road which passes the western side of the Powerstown facility. The R448 was part of the 'old N9' which was then a National Primary Road. The road is a single 2-lane carriageway with 3.5 - 4 m wide lanes and a circa 2 m wide hardshoulder on either side. The road was redesignated and renumbered from the N9 to the R448 following the construction of the M9 Motorway. The section of the R448 near Powerstown Landfill has a speed limit of 100 km/hr.

The junction on the R448 with the L3045 leading to the Powerstown facility entrance includes a right turning lane and ghost island arrangement for traffic coming from the south (i.e. from the Leighlinbridge direction). A slip lane is present on the R448 for cars coming from the northern side (i.e. from the Carlow or M9 direction).

[9] Ref National Road Authority website www.nra.ie

The junction layout is generally in line with NRA Design Manual for Roads and Bridges (DMRB). Sightlines near the junction have been improved in recent years in part due to clearing/widening of verges in the vicinity of the junction.

**Figure 10.2: Photo showing Junction on R448 with L3045 leading to the Powerstown Facility (looking north)**



## 10.3.4 Local Road and Site Access

Access to the site is via the main site entrance only which is located off a local road – L3045 which connects the R448 (southwest of the facility) to the Garryhundon Cross Roads at an intersection with the Carlow - Bagnelstown Road (east of the facility). The L3045 is approximately 1.4 km long and has signs indicating an 80 km/hr speed limit.

Approximately 500 m of the L3045 from the site entrance to the R448 junction was upgraded in circa 2006 in line with the requirement of the An Bord Pleanala planning conditions relating to the landfill expansion (Planning Reg No 01.EL2020). The upgrading works included widening the road to a single 2-lane carriageway circa 7 m in width, road resurfacing, road markings and the construction of footpaths and site lighting. Figure 10.1, 10.2 and 10.3 below show photographs of the site access and L3045 near Powerstown Landfill.

The L3045 east of the facility entrance is narrower at approximately 4 - 5 m wide with no road markings.

**Figure 10.3: Facility Entrance at Powerstown Landfill and Civic Amenity**

**Figure 10.4: L3045 outside the Powerstown Facility (looking west)**



**Figure 10.5: L3045 outside the Powerstown Facility entrance (looking east)**

## 10.4 Existing Traffic on the R448 (the old N9)

The NRA maintains a series of permanent traffic counters throughout Ireland. One of the counters is located at on the R448 (old N9) north of Leighlinbridge which is approximately 2 km south of Powerstown. The traffic figures for Leighlinbridge can be used as a good indication of traffic volumes passing the Powerstown facility on the R448 as shown in Table 10.1.

### Table 10.1: Traffic Figures on the R448/old N9 (source NRA website)

| Year | Annual Average Daily Traffic Estimate (AADT) | % Heavy Goods Vehicles (NGV) |
|---|---|---|
| 2005 | 14,362 | 10.2 |
| 2006 | 15,322 | 9.7 |
| 2007 | 15,539 | 10 |
| 2008 | 15,550 | 9.5 |
| 2009 | 16,745 | 8.2 |
| 2010 | 13,980 | 7.6 |
| 2011 | 6,494 (based on Jan – July 11 figures) | 6.6 |

There is a marked reduction in traffic figures using the R448 in 2011. In reality the reduction in traffic figures was noticed first in October 2010 around the time the full length of the M9 Motorway opened. The 2011 Annual Average Daily Traffic (AADT) is estimated at 6,494 vehicles per day. This is approximately 41% of the AADT generated along the same road in 2007 before the M9 opening and when the Powerstown facility was busiest.



In addition to the overall reduction in traffic on the R448, there has been a reduction in the percentage of Heavy Goods Vehicles (HGVs) using this route. The 2011 estimate indicates that approximately 6.6% of vehicles are HGVs whereas in 2007 it was 10%.

The above figures are consistent with the predictions outlined in the EIS[10] prepared in 2005 for the N9/N10 Kilcullen to Waterford Scheme (now known as the M9 Motorway). This EIS cited an Annual Average Daily Traffic (AADT) for 1998 to be 10,808 vehicles per day for the N9 [R448] between Powerstown and Paulstown. A detailed traffic model was prepared which included predictions for traffic growth to 2010 and 2025 using various scenarios. The main impacts of the proposed road development on the existing network were identified to be:

> *"a significant reduction of trips along the existing N9, where flows between Powerstown and Paulstown decrease by approximately 54%, and transfer onto the proposed dual carriageway mainline".*

[10] Section 6 Traffic of EIS for the N9/N10 Kilcullen to Waterford Scheme: Waterford to Powerstown Feb 2005 prepared by Arup Consulting Engineer/Roughan O'Donovan/Faber Maunsell Alliance.

## 10.5 Existing Traffic on the Local Road

### 10.5.1 Traffic to the Civic Amenity

Carlow County Council operates a civic amenity on the same facility as the landfill. The civic amenity does generate traffic and the information below is provided to illustrate the amount of traffic associated with the facility before landfill traffic is considered.

In 2011, at total of 1,736 tonnes of material was received at the civic amenity from approximately 18,400 customers. Table 10.2 below provides information of the number of vehicle movements generated by these customers.

**Table 10.2: Number of vehicles using the Civic Amenity (2011)**

| Breakdown of Vehicles using Civic amenity | |
|---|---|
| No of customers per year | 18,400 |
| No of customers per week (mean) | 354 |
| No of customers per day (mean) | 89 (assuming 4 day week in 2010) |
| No of vehicles/customers per hour (mean) | 15 (assuming a 6 hour working day) |
| No of movements per hour (mean) | 30 (assuming 1 customer = 1 vehicle and each vehicle has an in and out movement). |

However, it is acknowledged that Saturday is the busiest day at the civic amenity with an estimated 50% of the weekly traffic occurring on Saturdays.



### 10.5.2 Existing Landfill Traffic

Traffic volumes related directly to the landfill are, in large part, a function of waste tonnages accepted at the facility. Section 3 of this EIS presents details of waste tonnages/types accepted at the facility from 2006 to 2010. While the waste tonnage accepted at the facility in 2010 was low (at 13,697 tonnes), the facility was busier in previous years i.e. 2006 - 2008 where circa 40,000 tpa was accepted.

Table 10.3 below provides the number of vehicles visiting the site in relation to the landfill alone and is based on information gathered at the weighbridge on site. Waste currently arrives at in a variety of vehicles including HGV's, skips, tractor and trailer, van, 4x4s and cars.

**Table 10.3: Number of vehicles directly related to the landfill by month/year**

| Month | Year and tonnage of waste landfilled | | | |
|---|---|---|---|---|
| | 2008 | 2009 | 2010 | 2011 |
| | 36,177 | 21,684 | 13,697 | 10,145 |
| | No of vehicles | | | |
| January | 2793 | 2455 | 1898 | 2007 |
| February | 2378 | 2024 | 1940 | 1708 |
| March | 2425 | 2178 | 1937 | 1908 |
| April | 2456 | 2149 | 2439 | 2193 |
| May | 2610 | 2408 | 2500 | 1727 |
| June | 2354 | 2564 | 2403 | 1901 |
| July | 2762 | 2558 | 2450 | 1975 |
| August | 2552 | 2227 | 1975 | 1689 |
| September | 2345 | 2127 | 2072 | 1563 |
| October | 2155 | 1962 | 1879 | 1671 |
| November | 2142 | 1511 | 1643 | 1477 |
| December | 2245 | 1842 | 1366 | 1508 |
| **Total** | 29,217 | 26,005 | 24,502 | 21,327 |
| No of open days per year (say 52 wks x 6 day/wk less 9 bank/public holidays) | 303 | 303 | 303 | 303 |
| Mean no of vehicles per day | 96 | 86 | 81 | 70 |
| Mean no of vehicles per hour (for 6 hr day) | 16 | 14 | 13 | 12 |
| Mean no of vehicle movements per hour (assuming each vehicles has an in and out movement) | 32 | 28 | 26 | 24 |



So, based on figures for 2008 - 2011 the number of movements per hour ranges from 24 to 32 the latter occurring on the busiest year 2008.

The worst case scenario to date involved 32 movements per hour relating the landfill (in 2008).

## 10.5.3 Use of the Weighbridge by An Garda Síochána

From time to time Carlow County Council have allowed the weighbridge to be used by members of An Garda Síochána to accurately weigh vehicles (including trucks, tractors and trailers etc) as part of their general traffic policing duties. This situation arises infrequently and generally no more than 25 times a year. Carlow County Council plan to continue to make the weighbridge available to An Garda Síochána into the future. Occasions when the facility has been used by An Garda Síochána are included in the above historic traffic volumes.

## 10.5.4 Other traffic on the Local Road (not related to landfill or civic amenity)

The local road (L3045) passing the site is a paved public road and is maintained by Carlow County Council. The types of traffic using the road can be classified in general terms as:

- Vehicles visiting Powerstown landfill and civic amenity area
- Vehicles relating to the neighbouring quarries (limited)
- Local access to residential properties and farm holdings

Most vehicles accessing the Powerstown facility travel from the R448 and travel east along the L3045 and turn left into the facility entrance. Anecdotally, the L3045 east of the facility entrance is not busy and very few vehicles arrive at the facility from the east along the L3045. Primarily, landfill/civic amenity traffic arrives at the site from the R448 end and along the upgraded section of the L3045.

As part of the 2003 EIS for the Extension to Powerstown Landfill some traffic monitoring was conducted by FTC on the 11th February 2003 at the Garyhundon Cross Road. The 2003 results indicated that the AADT using the L3045 was 98 vehicles +/- 23% at the 68% confidence interval when measured at the Garryhundon Cross Roads end of the L3045.

## 10.6 Existing Traffic Arrangements and Traffic Related Complaints

### 10.6.1 General

The facility currently has planning permission and a waste licence for 40,000 tonnes per annum. The road and entrance upgrades carried out pursuant to the 2004 An Bord Pleanála planning conditions meant that the facility has operated without traffic problems while accepting circa 40,000 tonnes of waste per year. Significantly, the 2006-2008 tonnages were realised before the development of the M9 motorway and while the 'old N9' which passes near the site was in use.

It is estimated that approximately 69 vehicles movements per hour relate to the existing facility (both landfill and civic amenity related). This estimate is summarised in **Error! Reference source not found.** below.



**Table 10.4: Summary of Existing Traffic Volumes relating to both landfill and Civic Amenity**

| Type | No of vehicle Movements per hours | Comment |
|---|---|---|
| Landfill Related | 32 | Using worst case for 2008 (refer to Table 10.3 above) |
| Civic Amenity Related | 30 | 2011 figures (refer to Table 10.2 above) |
| Leachate Tanker | 2 | Only 1 load of leachate is taken from site each day. Assume 'in' and 'out' trip occurs in same hour (worst case). |
| Staff Vehicles | 16 | Approx 8 staff on site. Assume each has a car and all arrive to site in same hour (worst case) |
| **Total** | **80** | |

### 10.6.2 Complaints relating to traffic at Powerstown landfill

The Annual Environmental Reports (AER) for 2008, 2009 and 2010 notes that 1 no complaint relating to traffic was received by Carlow County Council in 2008 relating to the haulage of clay/subsoil for the permanent capping works. No complaints were received in 2009, 2010 or 2011.

## 10.7 Proposed Development and Potential Impacts

### 10.7.1 Increased Tonnage and its effect on Traffic

As described elsewhere in this EIS, Carlow County Council is seeking permission to extend the operational lifetime of the landfill and also an increase in the allowable tonnage accepted at the facility. Specifically, permission is sought to increase the tonnage from 40,000 tpa to 50,000 tpa.

An increase in the waste intake by 10,000 tpa will lead to an increase in vehicle movements using the facility if this increased waste intake is realised. This potential increase in waste related traffic will only occur until the cells are filled.

An increase of 10,000 tpa is equivalent to approximately 33 tonnes per day (based on 303[11] open days per year) or 6 tonnes per hour based on a 6 hour working day. Should the increase in waste intake occur it will, almost certainly, arrive at the site from a private waste collector in a HGV with a 10 tonne mean payload. Accordingly, the increase in traffic will most likely take the form of 1 no additional HGV visiting the site per hour or 2 no additional vehicle movements per hour or 82 vehicles movements in total. Conservatively this represents a 3% maximum[12] increase in traffic volume on the L3045 (2 additional movements divided by 69 existing movements as set out in **Error! Reference source not found.** above).

### 10.7.2 Traffic Assessment

The National Road Authority (NRA) Traffic and Transport Assessment Guidelines (2007) set down best practice for the preparation of Traffic and Transport Assessments (TTAs). Section 2 of the guidelines considers the 'thresholds' at which the production of TTA's is recommended or in some cases automatically required. Sections 10.7.3 - 10.7.5 set out the implications of the NRA guidance notes on this development.



### 10.7.3 Thresholds for Traffic and Transport Assessment

Section 2.1 (Table 2.1) of the NRA guidelines indicates when a transport assessment is automatically required. Table 10.5 below presents the criteria outlined in the guidelines along with details of its relevance to the subject development.

**Table 10.5: Threshold for Automatic Requirement to carry out a Traffic & Transport Assessment (Adapted from NRA Guidelines Section 2.1 Table 2.1)**

| Criteria (as listed in Table 2.1 of the Guidelines) | Applicable to this development (Yes/No) | Comment |
|---|---|---|
| Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road. | No | Max 3% increase in traffic over existing traffic was estimated in Section 10.7.1 above. |
| Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive. | No | TTA not required. |
| Residential development in excess of 200 dwellings. | No | TTA not required. |
| Retail and leisure development in excess of 1000 $m^2$. | No | TTA not required. |
| Office, education and hospital development in excess of 2,500 $m^2$. | No | TTA not required. |

[11] 303 days = 52 weeks x 6 days/wk less 9 bank/public holidays

[12] This estimate assumes (very conservatively) that the only traffic on the L3045 is the 80 vehicles per hour associated with the existing facility and no other vehicles use the road. If other background traffic was considered the relative increase in traffic volumes would be far less than 3%.

| Criteria (as listed in Table 2.1 of the Guidelines) | Applicable to this development (Yes/No) | Comment |
|---|---|---|
| Industrial development in excess of 5,000 $m^2$. | No | TTA not required. |
| Distribution and warehousing in excess of 10,000 $m^2$. | No | TTA not required. |

As the proposed development does not meet any of the thresholds set out in Table 2.1 of Guidelines, a TTA is not automatically required.

### 10.7.4 Advisory Thresholds for Traffic and Transport Assessment (TTA) where National Roads are affected

The NRA Guidelines also describe 'advisory thresholds' which also lead to the requirement to carry out a TTA. These specifically relate to the impact of the development may have on National Roads. Table 10.5 below presents the criteria outlined in the guidelines along with details of its relevance to the subject development.

**Table 10.6: Advisory Thresholds for Traffic and Transport Assessment Where National Roads are Affected (Adapted from NRA Guidelines Table 2.2)**



| Criteria (as listed in Table 2.2 of the Guidelines) | | Applicable to this develop-ment (Yes/No) | Comment |
|---|---|---|---|
| **Vehicle Movements** | 100 trips in / out combined in the peak hours for the proposed development | No | Estimated Maximum no of movements (or trips) is 82/hour as set out in Section 10.7.1 above. |
| | Development traffic exceeds 10% of turning movements at junctions with and on National Roads. | No | TTA not required. |
| | Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive. | No | TTA not required. |

| Criteria (as listed in Table 2.2 of the Guidelines) | | | Applicable to this develop-ment (Yes/No) | Comment |
|---|---|---|---|---|
| Size | Retail | 1,000 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Leisure facilities including hotels, conference centres and cinemas. | 1,000 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Business | 2,500 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Industry | 5,000 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Distribution and warehousing | 10,000 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Hospitals and education facilities | 2,500 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Stadia | 1,500 person capacity. | No | TTA not required. |
| | Community Facilities including places of worship, community centres. | 1,000 $m^2$ Gross Floor Area. | No | TTA not required. |
| | Housing | 50 dwellings within urban areas with a population less than 30,000.<br>100 dwellings within urban areas with a population equal to or greater than 30,000. | No | TTA not required. |
| Parking Provided | 100 on-site parking spaces. | | No | TTA not required. |



As the proposed development does not meet any of the thresholds set out in Table 2.2 of Guidelines, a TTA is not required.

### 10.7.5 Sub Threshold Criteria for Traffic and Transport Assessment

In some cases the impact of traffic volumes may not be significant and the thresholds for a TTA may not be exceeded. However, the type and volume of generated traffic on National Roads may be of a nature to raise concerns about effects on road safety and road structure. In such cases, the planning authority should consult the evaluation criteria in Table 2.3. It is recommended that if the proposed development meets two or more of these criteria, then a TTA should be requested.

**Table 10.7: Sub-threshold Criteria for Traffic and Transport Assessment (Adapted from NRA Guidelines Table 2.3)**

| Criteria (as listed in Table 2.3 of the Guidelines) | | Applicable to this development (Yes/No) | Comment |
|---|---|---|---|
| **Vehicle Movements** | The character and total number of trips in/out combined per day are such that as to cause concern. | No | TTA not required. |
| **Location** | The site is not consistent with national guidance or local plan policy or accessibility criteria contained in the Development Plan. | No | TTA not required. |
| **Other Considerations** | The development is part of incremental development that will have significant transport implications | No | TTA not required. |
| | The development may generate traffic at peak times in a congested area or near a junction with a main traffic route. | No | TTA not required. |
| | The development may generate traffic, particularly heavy vehicles in a residential area. | No | TTA not required. |
| | There is significant concern over the development's effect on road safety. | No | TTA not required. |
| | The development is in tourist areas with potential for congestion. | No | TTA not required. |
| | Planning authority considers the proposal will result in a material change in trips or raises significant transport implications. | No | TTA not required. |



As the proposed development does not meet any of the thresholds set out in Table 2.3 of Guidelines, a TTA is not required.

## 10.8 Potential Impacts

The proposed development (i.e. the continued/extended operation of the landfill and an increase in tonnage) will lead to generation of traffic to and from the site. The type of traffic which will be generated will vary but will include HGVs, refuse collection vehicles (RCVs, trucks, vans, 4x4s, cars with and without trailers. For the most part this traffic will arrive at the site using the M8 and/or the R448 and the upgraded L3045 passing the site entrance. There is a possibility that some traffic may arrive from the east along the existing L3045 but no more so that at present.

The potential impacts of traffic from a development such as the one proposed without mitigation measures include:

- Traffic congestion
- Traffic queuing at the entrance
- Lack of capacity on the L3045
- Unsafe traffic manoeuvres
- Soiling of roads and litter
- Traffic related air pollution and noise

## 10.9 Mitigation Measures

The road infrastructure in the vicinity of Powerstown landfill has improved significantly over the last number of years. Principally, these improvements have included the construction of the M9 motorway as described in Section 10.3.2 above. This new road has reduced significantly the annual average daily traffic (AADT) using the R448 (old N9) from 15,539 AADT in 2007 to 6,494 AADT in 2011.

Road safety was a concern during the planning process for the landfill extension in 2003/2004. These concerns related in part to the R448/L3045 junction and the L3045 itself. The current layout of the R448/L3045 junction includes right and left turning lanes, hard shoulders and ghost islands as described in Section 10.3.3 above. This engineered junction layout coupled with the reduction in traffic on the R448 means that the junction is safer than before the motorway opened and is more than capable of accommodating the traffic associated with the site.

The upgrades to the L3045 as described in Section 10.3.4 means that traffic flows freely to and from the site on the L3045. The presence of footpaths and lighting means that pedestrians are catered for along the L3045.

The facility entrance is wide with a gate which is 'set back' to avoid vehicles queuing outside the gate and on the approach roads. Additionally the weighbridge is well within the site thereby providing space, during busy times, for vehicles to queue within the site and not on the public road.

Soiling of public roads is avoided using good landfilling techniques and avoiding circumstances when mud or debris is carried from the site on the tyres of vehicles. Generally unsealed roads within the site are kept clean using clean stone/hardcore material. A vehicle bath is available in the site to help remove mud from the tyres of HGVs. The facility management keep a close eye on the condition of roads leading to the facility and if required street sweepers will be deployed particularly at times when soil is being imported for capping works.

Litter on public roads and within the site is controlled by executing good landfilling and transportation practices. Nets are generally used to cover open trailers. The facility management monitor the condition of roads leading to the facility and if required litter patrols and litter picks are conducted by site staff.

Traffic-related air and noise emissions are discussed in Section 8 and 9 of this EIS.

# 11 FLORA AND FAUNA

## 11.1 Introduction

An ecological assessment of the existing landfill facility site at Powerstown, Co. Carlow was carried out by FTC in August 2011 using standard ecological survey techniques (*e.g.* Lawrence & Brown, 1973; Clark, 1988; Institute of Ecology and Environmental Management, 2006; Smal, 1995; Bibby *et al*. 2000; Sargent & Morris, 2003; Bang & Dahlstrom, 2004; JNCC, 2004; Smith *et al*, 2011; Sutherland, 2006). Surveys included habitat, botanical, bird, mammal, bat and other taxa.

The purpose of the ecological assessment was to:

- Undertake a desktop study of available ecological data for the site and surrounding area, including a review of designated sites within 10 km of the site
- Undertake ecological field surveys of the site and surrounding land
- Evaluate the ecological significance of the site
- Assess the potential impact(s) of the proposed extension of time of the landfill on the ecology of the site and surrounding areas
- Recommend mitigation measures to reduce any potential negative impact(s) of the proposed development on the ecology of the site and surrounding land.

Based on the results of the ecological assessment, FTC considered potential impacts of the proposed development on the existing ecology of the site and appropriate mitigation measures to minimise these potential impacts.



## 11.2 Methodology

The ecological assessment comprised of a number of dedicated surveys which are described below. The surveys were carried out by two ecologists on 22nd August 2011 during suitable weather conditions (*i.e.* light breeze, dry, good visibility). All scientific names for species mentioned in the text are available in the relevant tables in Section 11.3.

### 11.2.1 Designated Sites

A desktop study was carried out to identify designated sites such as Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) located within 10 km of the proposed development site. FTC holds an archive of GIS data that includes the location and extent of designated conservation areas. Designated sites identified by this aspect of the study are outlined in Section 11.3.1.

### 11.2.2 Habitats & Botanical

The site was surveyed using site walkover methodology, following Heritage Council's recent guidelines for carrying out habitat surveys (Smith *et al*, 2011). Habitats were identified and classified according to the Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). A botanical list was also produced, recording the main species present in each habitat type.

Habitats were assessed and evaluated according to their occurrence as protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened and endangered species. Botanical species were assessed in accordance with their occurrence on the Flora Protection Order (1999) and The Irish Red Data Book (Curtis & McGough, 1988).

A plant species list for the 10 km grid square S76 in which the site occurs was generated from Preston *et al*, 2002. A list from grid square S66 was also compiled as the site lies close to this grid square. This list was then used to determine what rare or protected plants (as listed on the Flora Protection Order (1999) and The Irish Red Data Book (Curtis & McGough, 1988) have been previously recorded in the wider area.

A desktop review was also undertaken of NPWS historical records of protected flora species occurring in the 10 km grid square.

Habitats were assessed and evaluated according to their occurrence as protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened and endangered species. The impacts assessment for habitats used in this study is based on Nairn and Fossitt (2004; see Appendix 7.1).

### 11.2.3 Fauna

#### *Bird Survey*

Four transects of approximately 200 m length were undertaken for a general bird study. One visit was made to each transect. The locations of the transects were chosen in order to cover a representative sample of the habitats present on site. All birds identified (either by direct observation or by song/call) during the transect surveys, were recorded. Any additional bird species encountered at the site but outside of the dedicated transect surveys were also noted on a casual basis.

Birds were recorded as occurring either 0 - 25 m (from the transect), 25 – 100 m or >100 m and/or flying over the transect. The total number of birds per species was derived by adding count data from all four transects allow a baseline relative comparison of abundance between species. Bird species recorded >100 m, flying over, or noted casually outside of the dedicated transect surveys were considered separately in the analysis as additional species.

The conservation status of bird species found was assessed using the most recent Birds of Conservation Concern in Ireland (BoCCI) List (Lynas *et al.* 2007). In addition, a review of the bird species listed on Annex I on the EU Birds Directive (2009/147/EC) was undertaken in assessing the conservation status of birds. Annex I species are afforded additional protection through the designation of Special Protection Areas (SPAs) throughout EU countries in addition to existing National legislation.



#### *Mammal & Bat Survey*

The mammal survey consisted of a site walkover, with features such as field boundaries and access tracks being closely searched for signs of mammals. Any direct sightings, tracks or signs (including droppings, resting places, burrows and setts) of mammals occurring within or in the vicinity of the site were recorded.

Signs such as dwellings, feeding traces, tracks or droppings indicate the presence of mammals on site, and occasional direct observations were made. The methods used to identify the presence of mammals in the survey area followed international best practice (Lawrence & Brown, 1973; Clark, 1988; Smal, 1995; Sargent & Morris, 2003; Bang & Dahlstrøm, 2004; JNCC, 2004).

A dedicated bat survey was also undertaken at dusk (21.15 hrs in this case) within and in close vicinity to the site. The purpose of the bat survey was to identify bat species feeding and/or roosting at or in the vicinity of the site (included taking digital recordings in the field to confirm species identification), and to assess the suitability of structures and vegetation on the site for bat roosting/foraging opportunities and carry out surveys of suspected roost sites.

A transect method was employed (both car-based & on-foot) to monitor bat activity along accessible tracks within and adjacent to the site (Catto *et al.*, 2004). Car-based transects were driven at a speed of approximately 15 miles per hour (24.1 km/hr) as recommended by the Bat Conservation Trust (Catto *et al.*, 2004). A time expansion bat detector (Pettersson D240X) was employed to assess bat activity on the site and recordings were made using a Roland Ederol EDIROL R-09 Digital WAV Recorder and subsequently analysed using BatSound (v. 3.31) software. The bat-detector was angled from the window (angle of 45° above horizontal and pointed slightly towards the back of the car) in order to minimise background noise and interference.

The conservation status of mammal and bat species within Ireland and Europe is indicated by inclusion in one or more of the following documents; Wildlife Acts (1976 - 2010), the Red List of Terrestrial Mammals (Marnell *et al.*, 2009) and the EU Habitats Directive.

#### *Other Taxa*

The presence of any other species (*e.g.* butterflies, reptiles or amphibians) encountered during the other ecological surveys was also recorded.

The conservation status of other taxa was assessed by checking if any are listed in one or more of the following; Wildlife Acts (1976 - 2010), the relevant Irish Red Data Lists (Regan *et al.* 2010 and Nelson *et al.* 2011) and the EU Habitats Directive.

### 11.2.4 Potential Impacts & Mitigation Measures

The overall assessment of the potential impacts associated with the proposed development on the existing ecology of the site and surrounding area, and the consideration of mitigation measures to minimise potential impacts, was undertaken using guidelines produced by the EPA (2002).

## 11.3 Existing Environment

### 11.3.1 Designated Sites within 10 km of the Site

Powerstown landfill is located within 10 km of five designated sites. Table 11.1 summarises the characteristics of each site and Figure 11.1 shows the location of these designated sites in relation to the development site boundary. The full site synopses for these designated sites are provided in Appendix 7.2. A total of three proposed Natural Heritage Areas (pNHAs), one designated NHA and one Special Area of Conservation (SAC) occur within 10 km of the site.

The pNHAs are as follows:

- Ballymoon Esker (site code 000797)
- Cloghristick Wood (000806)
- Whitehall Quarries (000855)

The NHA is:

- Coan Bogs (002382)

The SAC is:

- River Barrow and River Nore (002162)



The closest designated site is the River Barrow and River Nore SAC (see Table 11.1). This SAC is located 300 m from the outlet point of the on-site surface water attenuation pond. The site drains into three waterbody catchments, which in turn drain to the River Barrow and its associated SAC. Powerstown Stream, which is a tributary of the River Barrow, flows west along the northern boundary of the site.

Cloghristick Wood pNHA is 0.31 km to the northwest, which is upstream of any drainage from the site. All other designated sites are located over 5 km from the proposed development site and are upstream of site drainage.

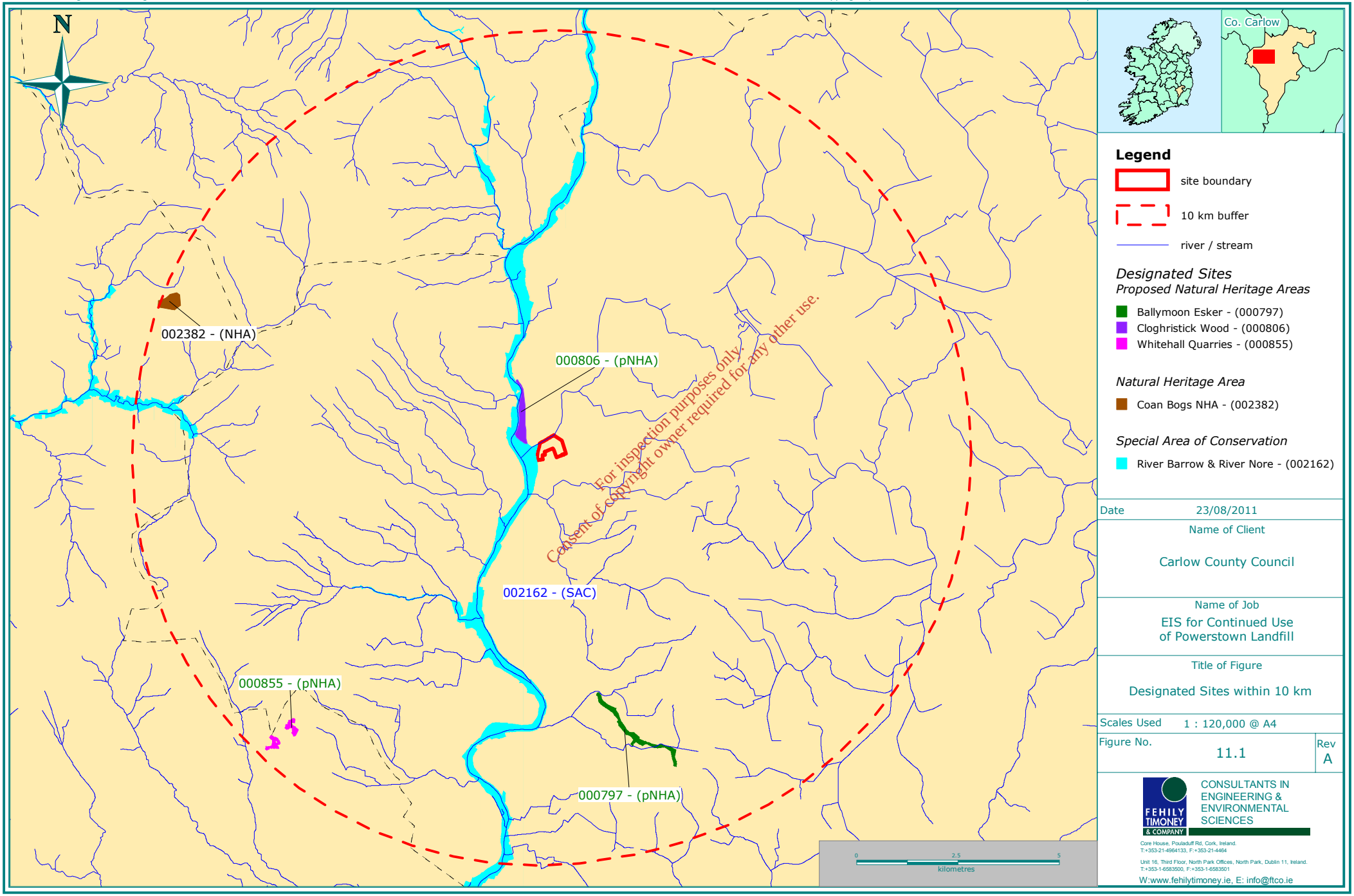
A Natura Impact Statement was also completed to examine potential impacts arising from the proposed development on Natura 2000 sites. This is available in the accompanying Appendix 7.3 and the outcome of this is summarised in Section 11.4.1 of this chapter.

## Table 11.1: Summary of Designated Sites within 10 km of the Proposed Development

| Designated Site | Site Code | Reason for designation | Distance from site (km) |
|---|---|---|---|
| River Barrow and River Nore SAC | 002162 | The site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore it is of high conservation value for the populations of bird species that use it. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows and the population of the hard water form of the Pearl Mussel which is limited to a 10 km stretch of the Nore, add further interest to this site. | 0.02 |
| Cloghristick Wood pNHA | 000806 | Oak (*Quercus* spp.), Beech (*Fagus sylvatica*) and Hazel (*Corylus avellana*) occur, although Willows (*Salix* spp.) are the dominant species. The ground flora comprises a range of wetland and woodland species. The wood is of value as it is typical and, by standards prevailing in County Carlow, quite large. | 0.31 |
| Ballymoon Esker pNHA | 000797 | Calcareous grassland covers much of the esker and at the southern end contains several rare plant species, two of which are legally protected (Flora Protection Order 1987), Green-winged Orchid (*Orchis morio*) and Basil Thyme (*Acinos arvensis*). In addition, the scarce Bee Orchid (*Ophrys apifera*) occurs. Other species included in the grassland are Yarrow (*Achillea millefolium*), Lady's Bedstraw (*Galium verum*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Smooth Meadow-grass (*Poa pratensis*), Quaking-grass (*Briza media*) and sedges (*Carex flacca* and *Carex caryophyllea*). | 5.89 |
| Whitehall Quarries pNHA | 000855 | Two disused shale/slate quarries 5km west of Bagnelstown. The quarry tips and the floors of the old working areas now provide a rich variety of dry acidic habitats, the substrate varying in stability and particle size etc. These have been colonised to a greater or lesser extent by a variety of plants typical of such dry habitats such as Bilberry (*Vaccinium myrtillus*). Although degraded by recent management, the vegetation has the potential to recover. | 8.74 |
| Coan Bogs NHA | 002382 | Coan Bogs NHA is a site of considerable conservation significance consisting of upland blanket bog. This site, although small, is undisturbed and shows good characteristics of blanket bog with some raised bog indicator species | 9.47 |

R:\Map Production\2011\LW11\120\03\Workspace\
LW11-120-03_Figure 11.1_Designated Sites within 10 km_Rev A









**Legend**

- site boundary
- 10 km buffer
- river / stream

*Designated Sites*

*Proposed Natural Heritage Areas*

- Ballymoon Esker - (000797)
- Cloghristick Wood - (000806)
- Whitehall Quarries - (000855)

*Natural Heritage Area*

- Coan Bogs NHA - (002382)

*Special Area of Conservation*

- River Barrow & River Nore - (002162)

| | |
|---|---|
| Date | 23/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Designated Sites within 10 km |
| Scales Used | 1 : 120,000 @ A4 |
| Figure No. | 11.1 |
| Rev | A |

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## 11.3.2 Habitats & Botanical in the Existing Environment

*Habitats*

A total of 10 habitat types were identified within the site. The habitat types and their habitat codes (after Fossitt, 2000) are given below. The extent of the habitats is shown in Figure 11.2 and described further below. The habitats recorded are:

- Other Artificial Lakes and Ponds (FL8)
- Amenity Grassland (GA2)
- Dry Meadows and Grassy Verges (GS2)
- Scrub (WS1)
- Hedgerows (WL1)
- Treelines (WL2)
- Spoil and Bare Ground (ED2)
- Recolonising Bare Ground (ED3)
- Arable Crops (BC1)
- Buildings and Artificial Surfaces (BL3)

One additional habitat type was recorded adjacent to the site:

- Depositing/lowland rivers (FW2)

The dominant habitat type within the site boundary is **Dry Meadows and Grassy Verges (GS2)**. This habitat type largely occurs on the older, capped section of the landfill. Red Fescue (*Festuca rubra*) together with Yorkshire Fog (*Holcus lanatus*) are the main grass species on the capped section of the site. This habitat type also occurs on the steep banks on the north and east of the active landfill area. These sections have more rank vegetation as indicated by the presence of Cock's-foot (*Dactylis glomerata*) and False Oat-grass (*Arrhenatherrum elatius*). Other species indicating the coarse nature of the habitat include Hogweed (*Heracleum sphondylium*), Common and Tufted Vetch (*Vicia sativa* and *V. cracca*). The south-western section of the capped landfill (Phase I) has been classed as **Recolonising Bare Ground (ED3)**. This section has a similar species composition as the Dry Meadows and Grassy Verges but contains bare ground within the sward. There are also patches that are totally dominated by Creeping Thistle (*Cirsium arvense*).



The built surfaces within the landfill, including all roads and tracks, the active and empty cells of the landfill and all of the administration buildings are considered to be **Buildings and Artificial Surfaces (BL3)** habitat. For the most part, this habitat contains no vegetation. The gravel tracks running around the eastern and northern area of the active landfill cells, grade into areas of **Spoil and Bare Ground (ED2)** habitat with typical colonising species such as Pineappleweed (*Matricaria discoidea*), Coltsfoot (*Tussilago farfara*), Annual Meadow-grass (*Poa annua*) and Creeping Buttercup (*Ranunculus repens*). The only areas of this habitat type that are large enough to map are found along the western edge of the active and empty cells, and also along the southern edge of the active cells together with an area south of the haul road to the south of the active cells. These areas contain species that are presumed to have come in from the neighbouring arable land. These species include Rape (*Brassica napus*), Common Poppy (*Papaver rhoeas*), Sun Spurge (*Euphorbia helioscopia*) and Fat Hen (*Chenopodium album*).

**Amenity Grassland (GA2)** areas are found around the entrance buildings and public facilities. These areas are kept closely mown but do contain a diversity of common plant species.

The two settlement ponds are classed as **Artificial Lakes and Ponds (FL8)**. Bulrush (*Typha latifolia*) and Hemp Agrimony (*Eupatorium cannabinum*) were recorded from the edge of the active settlement pond in the north of the landfill site. There are two small areas of **Scrub (WS1)** habitat located within the site. One of these is close to the active tip area. It is dominated by Common Nettle (*Urtica dioica*) and Hedge Bindweed (*Calystegia sepium*) with occasional; bushes of Elder (*Sambucus nigra*) and willow (*Salix sp.*) The second patch lies close to the former entrance into the landfill site. It comprises of non-native shrubs and trees that have now become overgrown, again with Hedge Bindweed as a dominant species.

The boundaries of the site contain sections of both **Hedgerow (WL1)** and **Treelines (WL2)** habitat. The Hedgerows comprise a mix of species with Hawthorn (Crataegus monogyna) being the main species found in the Hedgerows. The Hedgerow on the western side of the landfill, adjacent to the N9 road, is very gappy with Gorse (*Ulex europaeus*) and Bracken (*Pteridium aquilinum*) dominating. The other hedgerows, in general, do not have great structure in that they are relatively thin with a poor understorey.

The Treeline that is found on the northern edge of the site consists of non-native Poplar species (*Populus* sp) and was presumably planted as screening for the landfill site.

The other Treelines contain mostly native tree species. Treeline 2 (as shown on Figure 11.2) forms part of the boundary at the southern edge of the capped landfill area. It largely consists of English Elm (*Ulmus procera*), again with a relatively poor understorey. Treeline 1 however, contains a diversity of tree species, including English Elm, Ash (Fraxinus excelsior), Hawthorn and Blackthorn (Prunus spinosa). This treeline is tall, with some specimens at 15 m or more, and has good structure and diversity.

The buffer zone for the landfill, lying on the eastern side of the site. comprises **Arable Crops (BC1)** habitat. The crop has recently been harvested, with only stubble now evident in the field.

The Powerstown stream lies just to the north of the landfill site boundary. The stretch of the stream that is adjacent to the site is classified as **Depositing/lowland river (FW2)**. The flow of water in the stream at this point is slow and much of the water channel is choked with Fool's Water-cress (*Apium nodiflorum*). Elsewhere the surrounding habitats in the adjacent land comprises **of Active Quarries and Mines (ED4), Arable Crops (BC1)** and **Improved Agricultural Grassland (GA1)**.

All habitats present on site are evaluated as low ecological value (see Appendix 7.1). The only exceptions being the treeline (Treeline 2) on the eastern boundary and the Powerstown stream on the northern boundary. These two habitat areas are evaluated as moderate ecological value. The treeline contains a mix of several native species, whilst the river contains semi-natural habitats.

### *Botanical species*

A total of 104 plant species were recorded on the site. The plant species recorded in the main habitats on the site are outlined in Table 11.2 below. All the species found by this botanical survey are distributed in the general area (Blamey *et al*., 2003). In addition, no rare or protected species of high conservation concern were recorded (Curtis & McGough, 1988).



A Fleabane species (*Conyza bilbaona* or possibly *C. canadensis*) was found within the site. This is a non-native species that is slowly increasing and establishing itself on waste ground, roadsides and other bare habitats. It is not currently considered as a threat to native flora and is not listed on the 'most unwanted' list by the Invasive Species Ireland project (www.invasivespeciesireland.com). The only non-native invasive species recorded was Himalayan Balsam (*Impatiens glandulifera*). This species was found at the point where the Powerstown Stream meets the river Barrow, some 450 m downstream of the landfill site.

Twelve protected floral species, have previously been recorded the wider area (*i.e.* 10 km grid square S76 & S66):

- Shepherd's-needle *Scandix pecten-veneris*
- Blue Fleabane *Erigeron acer*
- Red Hemp-nettle *Galeopsis angustifolia*
- Weasel's-snout *Misopates orontium*
- Bog Orchid *Hammarbya paludosa*
- Green-winged Orchid *Orchis morio*
- Basil Thyme *Clinopodium acinos*
- Annual Knawel *Scleranthus annuus*
- Marsh Helleborine *Epipactis palustris*
- Bee Orchid *Ophrys apifera*
- Cowslip *Primula veris*
- Bog-rosemary *Andromeda polifolia*

It should be noted that four of these species; Marsh Helleborine, Bee Orchid, Cowslip, Bog-rosemary are not considered to be threatened in Ireland, but are protected in Northern Ireland. None of these species were recorded within the development site during the botanical survey. Shepherd's-needle, Weasel's-snout and Annual Knawel are all plants of arable ground, so it is possible that these three species may still occur within the vicinity of the site. Blue Fleabane is a plant of dry sandy or gravelly soils and so conditions may be suitable within the site for this species but given the highly disturbed nature of the habitats within the site, it seems highly unlikely that this plant is to be found here. The habitats available within the site boundary are not suitable for any of the remaining species.

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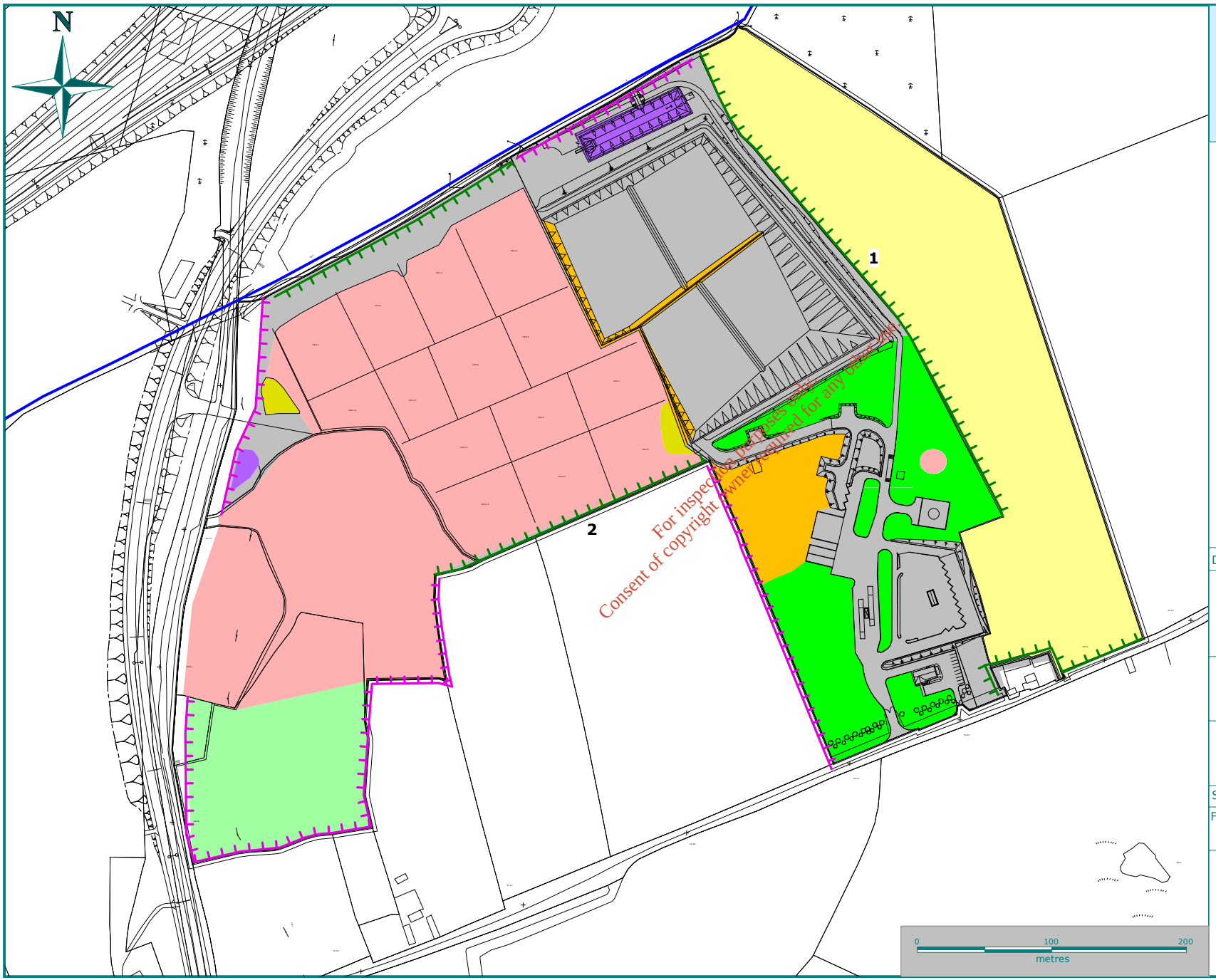
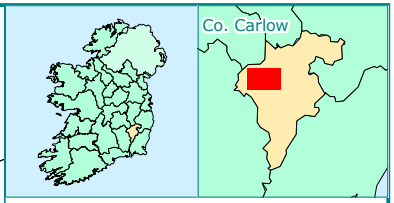
LW11-120-03_Figure 11.2_Habitats Map_Rev A






## Legend

*Habitat Classification*

- amenity grassland - GA2
- arable crop - BC1
- buildings and artificial surfaces - BL3
- dry meadows and grassy verges - GS2
- other artificial lakes and ponds - FL8
- recolonising bare ground - ED3
- scrub - WS1
- spoil and bare ground - ED2

- depositing lowland river - FW2
- hedgerow - WL1
- treeline - WL2

| | |
|---|---|
| Date | 25/08/2011 |
| Name of Client | Carlow County Council |
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| Title of Figure | Habitats Map |
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## Table 11.2: Botanical Species Recorded on the site and their Habitats of Occurrence

| Common Name | Scientific Name | Habitat of Occurrence |
|---|---|---|
| Alder | *Alnus glutinosa* | WL1 |
| American Willowherb | *Epilobium ciliatum* | GA2, ED2 |
| Annual Meadow-grass | *Poa annua* | ED2, ED3 |
| Ash | *Fraxinus exelsior* | WL2 |
| Autumn Hawkbit | *Leontodon autumnalis* | GA2, ED2 |
| Black Medick | *Medicago lupulina* | GA2, WL2, GS2 |
| Blackthorn | *Prunus spinosa* | WL1, WL2 |
| Bracken | *Pteridium aquilinum* | WL1 |
| Bramble | *Rubus fruticosus agg.* | WL1, WL2, WS1 |
| Broad Dock | *Rumex obtusifolius* | GA2, ED2 |
| Bulrush | *Typha latifolia* | FL8 |
| Burdock sp | *Arctium sp.* | ED2, WL2 |
| Bush Vetch | *Vicia sepium* | WL2 |
| Butterfly-bush | *Budleja davidii* | WS1, WL2 |
| Centaury | *Centaurium erythyraea* | GS2 |
| Changing Forget-me-not | *Myosotis discolor* | GA2 |
| Cock's-foot | *Dactylis glomerata* | GA2, GS2 |
| Coltsfoot | *Tussilago farfara* | ED2 |
| Common Field Speedwell | *Veronica persica* | GA2 |
| Common Knapweed | *Centaurea nigra* | GS2 |
| Common Nettle | *Urtica dioica* | GA2, ED3, WS1 |
| Common Poppy | *Papaver rhoeas* | ED2, ED3 |
| Common Vetch | *Vicia sativa* | GA2, GS2 |
| Cotoneaster | *Cotoneaster sp* | WL2 |
| Couch | *Elytrigia repens* | ED2, ED3 |
| Creeping Bent | *Agrostis stolonifera* | GA2 |
| Creeping Buttercup | *Ranunculus repens* | ED2 |
| Creeping Cinquefoil | *Potentilla reptans* | ED2 |
| Creeping Thistle | *Cirsium arvense* | GA2, GS2, ED3, WS1 |
| Curled Dock | *Rumex crispus* | GA2, GS2 |
| Daisy | *Bellis perennis* | GA2 |
| Dandelion | *Taraxacum officinale agg.* | GA2, GS2 |
| Dog Rose | *Rosa canina* | WL2 |
| Duckweed | *Lemna sp* | FW2 |
| Elder | *Sambucus nigra* | WL1, WL2, WS1 |
| English Elm | *Ulmus procera* | WL2 |
| False Oat-grass | *Arrhenatherum elatius* | GS2, ED3 |
| Fat Hen | *Chenopodium album* | ED2, ED3 |
| Field Madder | *Sherardia arvensis* | GA2 |
| Field Scabious | *Knautia arvensis* | WL1, WL2 |
| Fleabane | *Conyza sp* | ED2, ED3 |
| Fools water-cress | *Apium nodiflorum* | FW2 |
| Fumitory sp | *Fumaria sp.* | ED2 |
| Garden Lady's-Mantle | *Alchemilla mollis* | GS2 |
| Garden Privet | *Ligustrum ovalifolium* | WL1, WL2 |

| Common Name | Scientific Name | Habitat of Occurrence |
|---|---|---|
| Gorse | *Ulex europaeus* | GS2 |
| Great Mullein | *Verbascum thapsus* | GS2, ED3 |
| Great Willowherb | *Epilobium hirsutum* | GS2, ED3 |
| Greater Plantain | *Plantago major* | GA2, ED2, ED3 |
| Grey Willow | *Salix cinerea* | WL2 |
| Groundsel | *Senecio vulgaris* | GA2, ED2, ED3 |
| Hairy Tare | *Vicia hirsuta* | GS2 |
| Hawthorn | *Crataegus monogyna* | WL1, WL2 |
| Hedge Bindweed | *Calystegia sepium* | WL2, ED3, WS1 |
| Hemp Agrimony | *Eupatorium cannabinum* | FL8 |
| Hogweed | *Heracleum sphondylium* | GS2 |
| Imperforate St John's-wort | *Hypericum maculatum* | GS2 |
| Ivy | *Hedera helix* | WL1, WL2 |
| Knotgrass | *Polygonum aviculare* | ED2 |
| Lilac | *Syringa vulgaris* | WL1 |
| Lodgepole Pine | *Pinus contorta* | GA2 |
| Meadow Vetchling | *Lathyrus pratensis* | GS2 |
| Nipplewort | *Lapsana communis* | ED2 |
| Pedunculate Oak | *Quercus robur* | GS2 |
| Perennial Rye-grass | *Lolium perenne* | GA2 |
| Petty Spurge | *Euphorbia peplus* | GA2 |
| Pineappleweed | *Matricaria discoidea* | ED2 |
| Poplar | *Populus sp.* | WL2 |
| Prickly Sow-thistle | *Sonchus asper* | GA2 |
| Ragwort | *Senecio jacobaea* | GA2, GS2 |
| Rape | *Brassica napus* | ED2, ED3 |
| Red Clover | *Trifolium pratense* | GS2, ED3 |
| Red Dead-nettle | *Lamium purpuream* | ED2 |
| Red Fescue | *Festuca rubra* | GA2, GS2 |
| Red Valerian | *Centranthus ruber* | WL2 |
| Redshank | *Persicaria maculosa* | ED2 |
| Reed Canary-grass | *Phalaris arundinacea* | FW2 |
| Ribwort Plantain | *Plantago lanceolata* | GA2, ED3 |
| Rosebay Willowherb | *Chamerion angustifolium* | GA2, GS2, ED3 |
| Rowan | *Sorbus aucuparia* | WL2 |
| Salad Burnet | *Sanguisorba minor* | GS2 |
| Scarlet Pimpernel | *Anagallis arvensis* | ED2 |
| Scentless Mayweed | *Tripleurospernum inodorum* | ED3 |
| Shepherds Purse | *Capsella bursis-pastoris* | GA2 |
| Silver Birch | *Betula pendula* | WL2 |
| Smooth Hawksbeard | *Crepis capillaris* | GA2, ED3 |
| Smooth Sow-thistle | *Sonchus oleraceus* | GA2, GS2, ED3 |
| Spear Thistle | *Cirsium vulgare* | GS2, ED3 |
| Spindle | *Euonymus europaeus* | WL2 |
| Sun Spurge | *Euphorbia helioscopia* | ED3 |
| Sycamore | *Acer pseudoplatanus* | WL1, WL2 |
| Traveller's-joy | *Clematis vitalba* | WL2 |

| Common Name | Scientific Name | Habitat of Occurrence |
|---|---|---|
| Tufted Vetch | *Vicia cracca* | GS2 |
| Water-starwort | *Callitriche sp* | FW2 |
| Weld | *Reseda luteola* | ED2, ED3 |
| White Campion | *Silene latifolia* | GA2 |
| White Clover | *Trifolium repens* | GA2, GS2 |
| White Willow | *Salix alba* | GS2 |
| Wild Carrot | *Daucus carota* | ED3 |
| Wild Mignonette | *Reseda lutea* | GS2 |
| Wild Pansy | *Viola tricolor ssp tricolor* | ED2 |
| Willow | *Salix sp* | WS1 |
| Yarrow | *Achillea millefolium* | GS2 |
| Yorkshire Fog | *Holcus lanatus* | GS2, ED3 |

*Habitats code after Fossitt 2000;
Other Artificial Lakes and Ponds (FL8)
Amenity Grassland (GA2)
Dry Meadows and Grassy Verges (GS2)
Scrub (WS1)
Hedgerows (WL1)
Treelines (WL2)
Spoil and Bare Ground (ED2)
Recolonising Bare Ground (ED3)
Arable Crops (BC1)
Buildings and Artificial Surfaces (BL3)



### 11.3.3 Fauna in the Existing Environment

*Bird*

A total of 21 bird species were recorded on or in the vicinity of the site, eight of which were recorded >100 m, flying over, or noted casually outside of the dedicated transect surveys (see Tables 11.3 & 11.4).

On the day of the site visit there were large flocks (up to *c.* 150 birds) of mixed finch species in the area, which included Chaffinch, Greenfinch and Linnet specimens that were recorded. A corvid flock was also noted casually at the active cell which consisted of approximately 40 Hooded Crows, 30 Rooks and 15 – 20 Jackdaws at the active cell.

Six *Amber-listed* species of medium conservation concern were recorded on the site (Tables 11.3 & 11.4); Kestrel, Linnet, Sand Martin, Swallow, House Martin and Starling. No *Red-listed* species of high conservation concern and no Annex I species of the E.U. Birds Directive were recorded on the site.

Bird control is carried out at the landfill site using trained birds of prey as well as visual and acoustic deterrents such as an automated bird scarer, use of a hand pistol and the use of kites.

**Table 11.3: Birds Recorded at the Site.**

| Common Name | Scientific Name | Overall Count (0 - 100 m) | Conservation Status* |
|---|---|---|---|
| Blackbird | *Turdus merula* | 5 | Green |
| Blue Tit | *Cyanistes caerulea* | 1 | Green |
| Chaffinch | *Fringilla coelebs* | 10 | Green |
| Goldcrest | *Regulus regulus* | 5 | Green |
| Greenfinch | *Carduelis chloris* | 7 | Green |
| Kestrel | *Falco tinnunculus* | 1 | Amber |
| Linnet | *Carduelis cannabina* | 5 | Amber |
| Magpie | *Pica pica* | 1 | Green |
| Robin | *Erithacus rubecula* | 2 | Green |
| Sand Martin | *Riparia riparia* | 2 | Amber |
| Song Thrush | *Turdus philomelos* | 1 | Green |
| Swallow | *Hirundo rustica* | 6 | Amber |
| Woodpigeon | *Columba palumbus* | 5 | Green |
| Wren | *Troglodytes troglodytes* | 2 | Green |

**Table 11.4: Additional Birds Recorded at the Site.**

| Common Name | Scientific Name | Conservation Status* |
|---|---|---|
| Collared Dove | *Streptopelia decaocto* | Green |
| Hooded Crow | *Corvus cornix* | Green |
| House Martin | *Delichon urbica* | Amber |
| Jackdaw | *Corvus monedula* | Green |
| Pied Wagtail | *Motacilla alba* | Green |
| Rook | *Corvus frugilegus* | Green |
| Starling | *Sturnus vulgaris* | Amber |



*Mammal & Bat*

Two terrestrial mammal species were noted, Rabbit *Oryctolagus cuniculus* and Brown Rat *Rattus norvegicus*, as well as three bat species, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle, *Pipistrellus pygmaeus* and Leisler's Bat *Nyctalus leisleri*.

Rabbit burrows, droppings and digging were noted throughout the site within grassland, treeline and hedgerow habitats. Two Brown Rats were seen near the active cell. Neither of these species are protected, and the Rabbit is regarded as a species of Least Concern in the Irish Red Data Book (Marnell *et al.*, 2009).

No evidence of Otter, (*Lutra lutra*), was found within the site or along the section of river adjoining the northern boundary of the site.

Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat were noted foraging within and in the vicinity of the site. Feeding activity was noted along treelines and hedgerows in particular. Leisler's Bat activity was particularly high in the area around the administration building, probably as a result of the lights in the area attracting in suitable insect prey for Leisler's Bat. No roost sites were noted on the site where there is limited roosting potential within the on-site structures and buildings in general. All bat species are protected under the Wildlife Act (1976 and Amendment 2000). Both Pipistrelle species are considered to be of Least Concern in the Irish Red Data Book, while Leisler's Bat is considered as Near Threatened (Marnell *et al.*, 2009).

### *Other Taxa*

A total of eight other species were recorded on the site, six butterfly species and two odonata species (Table 11.5).

In general butterflies were noted at grassland, hedgerow and treeline habitats throughout the site. All of the butterfly species noted are of Least Concern in the Irish Red Data Book (Regan *et al.*, 2010).

Both odonata species were recorded close to or at the river that flows west of the northern boundary. Both of these species are regarded as a species of Least Concern in the Irish Red Data Book (Nelson *et al.*, 2011).

**Table 11.5: Other Taxa Recorded on the Site**

| Common name | Scientific name |
|---|---|
| **Butterflies** | |
| Common Blue | *Polyommatus icarus* |
| Green-veined white | *Pieris napi* |
| Meadow Brown | *Maniola jurtina* |
| Red Admiral | *Vanessa atalanta* |
| Small Tortoiseshell | *Aglais urticae* |
| Speckled Wood | *Pararge aegeria* |
| **Odonata** | |
| Banded Demoiselle | *Calopteryx splendens* |
| Common Darter | *Sympetrum striolatum* |



## 11.4 Potential Impacts

### 11.4.1 Potential Impacts on Designated Areas

The Powerstown facility is located within 10 km of five designated sites; Ballymoon Esker pNHA, Cloghristick Wood pNHA, Whitehall Quarries pNHA, Coan Bogs NHA and the River Barrow and River Nore SAC.

The River Barrow and River Nore SAC is the closest site (at 0.02 km distance) and also receives drainage from the Powerstown facility via Powerstown Stream. A Natura Impact Statement (NIS) has been prepared and is included as an appendix (Appendix 7.3). In summary, the NIS concludes that the existing landfill site is not negatively impacting on the integrity of the SAC nor on any of its qualifying interests. The NIS details the results of biological and chemical water quality monitoring undertaken in the Powerstown stream and in the River Barrow. These results show that water quality within the Powerstown stream is not being significantly impacted as a result of the existing discharge into the stream and that the existing controls are maintaining water quality.

Furthermore, it concludes that there are no impacts on the SAC through cumulative impacts in conjunction with other similar developments in the area and that no mitigation measures, additional to those already in place, are required.

Due to distance and lack of drainage, no potential impacts are predicted on all the other designated sites.

### 11.4.2 Potential Impacts on Habitats & Botanical

Continued operation of the landfill will not lead to any change to the distribution of habitats within the site. The proposed restoration of the landfill site on completion is to create grassland for sheep grazing. This will replace the Buildings and Artificial Surfaces (BL3) within the active landfill area with a grassland habitat, both of which are of low ecological value. It is noted that some structures such as gas and leachate management infrastructure, the civic amenity and office buildings will remain in situ long after the landfill is closed.

Some of the ruderal plant species occurring within the active cell area will be lost as the landfill cells become operational and the cells are filled in with refuse material. The species concerned are common and are of low ecological value.

The potential impacts on habitats and botanical species are considered to be insignificant.

### 11.4.3 Potential Impacts on Fauna

*Birds*

The continued operation of the landfill will not lead to the loss of any habitat that is of value to birds. Bird control operations will continue but this will only lead to disturbance to the targeted species, *i.e*. corvids. There are no predicted impacts on the local avian population as a result of the proposed development.



*Mammals & Bats*

The diversity and abundance of mammals on the site appears to be relatively low. The mammal community on the site is dominated by Rats and probably Fox. These species are common and widespread in the wider countryside.

Only three bat species were recorded on site but high levels of Leisler's Bat activity were recorded, particularly around the administration building. The continued operation of the landfill will not lead to the loss of any habitat that is suitable as feeding or roosting for bats and there are no predicted impacts on local bat populations.

There will be no long term impacts on the mammal communities occurring at the site arising from the proposed development.

## 11.5 Mitigation Measures

No additional mitigation measures are required other than those that are already in place.

The existing mitigation measures at the onsite surface water attenuation pond include an outlet control device. This device incorporates a monitoring probe linked to an automatic valve on the outlet pipe from the pond. If the monitoring probe detects contaminants in the water above the allowable emission limits in the waste licence, the valve automatically closes, preventing contaminants being released from the site. If this occurs, contaminated surface water is taken offsite by tanker for further treatment.

The attenuation pond also acts as a settling pond to remove any suspended solids and as an oil interceptor with a floating arm control device. Therefore, any oil or petrochemicals are removed periodically from the surface of the pond.

It is imperative that the operation and maintenance of the existing surface water drainage is continued in order to avoid accidental discharge to the Powerstown stream and the River Barrow and River Nore SAC that lies downstream of the landfill site.

No other mitigation measures are required.

## 11.6 Residual Impacts

With the continued operation of the existing surface water drainage system, there will be no impacts arising as a result of the proposed continued operation of the landfill facility.

## 11.7 Conclusion and Summary

The area of the proposed development is not of conservation concern. The habitats and flora found on the site are of low ecological value. The River Barrow and River Nore SAC lies close to the site. Surface water discharge from the site into the adjacent Powerstown Stream could potentially impact on the SAC. A NIS has been prepared to determine whether the proposed continued operation of the landfill would impact on the SAC. This concludes that there are no impacts arising on the SAC and that the existing mitigation measures are maintaining water quality and no additional mitigation measures are required.

Leisler's bat activity was found to be high around the administration building but no bat roosts were identified within the site.

The continued operation of landfilling activities does not require any additional habitat loss and is therefore considered not to lead to any impacts of the existing flora and fauna of the site or the surrounding area.

# 12 SURFACE WATER

This section addresses hydrology, water quality and surface water runoff in the existing environment, identifies potential impacts of the proposed development and outlines measures to avoid, reduce and mitigate potential impacts. Residual impacts that cannot be avoided are also identified and discussed.

## 12.1 Introduction

Powerstown landfill and civic amenity is within the catchment of the River Barrow. The hydrological assessment conducted as part of this EIS assesses the potential cumulative effect on the receiving waters in the vicinity of the facility at Powerstown together with the M9 motorway to the north. The method of drainage of the M9 motorway was examined, to determine the extent to which the drainage discharge from this new road contributes to the River Barrow catchment.

The hydrological assessment undertaken as part of the EIS involved a review of the design submitted for the Phase 3 extensions (refer to Figure 3.2) which was designed to mitigate any potential risk of pollution or flooding from the phase 3 extension as well as the landfill site as a whole.

There is no physical development proposed as part of this application. This application is for the extension of the life of the landfill only until the remaining constructed cells are filled. Therefore, In support of this application, the previous hydrological assessment was reviewed. As part of this review, the surface water management system was stress tested to current standards i.e. post 2005. This included checking the suitability of the existing drainage design and the locations of the infrastructure provided for the settlement of suspended solids and the attenuation of surface water run-off from the development.

Consultation letters were sent to the National Parks and Wildlife Service (NPWS), the Office of Public Works, South Eastern River Basin District (SERBD) and Inland Fisheries Ireland (IFI) as part of the EIA consultation process.



## 12.2 Methodology

The following guidelines and documents were considered in this assessment:

- Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies, March 2005
- CIRIA Environmental Good Practice On site
- BPGCS005,Oil Storage Guidelines
- CIRIA Control of Water Pollution from Linear Construction Sites. Technical Guidance (C648)
- CIRIA Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532)
- CIRIA Sustainable Construction Procurement. A Guide to Delivering Environmentally Responsible Projects (C571)
- CIRIA The SUDS Manual (C697)
- County Carlow Development Plan 2009 – 2015 and the Strategic Environmental Assessment Report
- The Planning System and Flood Risk Management Guidelines for Planning Authorities, OPW, DoEHLG, November 2009
- NRA Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan
- UK Pollution Prevention Guidelines (PPG):
    - PPG1: General guide to the prevention of water pollution
    - PPG2: Above ground oil storage tanks
    - PPG4: The disposal of sewage where no mains drainage is available
    - PPG5: Works in, near or liable to affect watercourses
    - PPG8: Safe storage and disposal of used oil
    - PPG21: Pollution incident response planning
    - PPG26: Dealing with spillages on highways

A site walkover took place on 13th July 2011.

With regards to water quality, an outline of the background behind the Water Framework Directive (WFD) is presented. This is followed by a summary of the physico-chemical water quality data, and a description of the biological water quality data submitted under the requirements of the licence for the facility.

## 12.3 Existing Environment

### 12.3.1 Existing Drainage

Powerstown Stream, which is a tributary of the River Barrow runs along the northern boundary of the site. The ground is marshy along this section of the perimeter of the site. The average annual rainfall over a 30 year period is 785 mm as provided by Met Eireann for Oakpark in County Carlow.

The existing surface water management system is designed to minimise the possibility of accidental spillage to surface water. The four lined cells are fully contained and are drained down by automated pumping systems. Each cell is considered to be clean until waste is placed in it. While clean, water is pumped to the surface water drainage system. When dirty water (leachate) is then diverted by pumping to the on-site leachate holding tank, from where it is transported by tanker to a municipal wastewater treatment plant. At time of writing, two cells are dirty and two cells are clean. In addition, the closed and capped cells of Phases 1 and 2 are equipped with leachate pumps that discharge to a covered lagoon from which leachate is extracted on a daily basis.

Other drained areas on the operational site include the civic amenity, reception areas and roads and hardstands. All dirty areas are drained to the leachate holding tank. These include the lower level of the civic amenity, green waste holding area, waste inspection/quarantine area and domestic waste disposal area. All other surfaced areas drain to the surface water drainage system.

The surface water drainage system drains to the surface water attenuation pond which has an outlet control device, which outfalls to the Powerstown stream at a rate of 15.9 L/sec. This surface water attenuation pond is located at the north eastern corner of the site, as shown in Figure 12.1.

It also acts as a settling pond to remove any suspended solids. There is a monitoring probe linked to an automatic valve on the outlet pipe from the pond. If the monitoring probe detects contaminants in the water above the allowable emission limits in the waste licence, the valve automatically closes.

The pond is also designed to act as an oil interceptor. The floating arm control device consists of a float with the outlet pipe opening hung approximately 200 mm below. Thus water drains down not from the surface but from a plane approximately 200 mm below the surface. Any petrochemicals entering the pond will float on the surface; consequently they cannot escape via the outlet discharge pipe. The outlet pipe is designed with a backfall to ensure that, even during extended dry periods, surface contaminants cannot escape through the outlet pipe. The design also includes for a floating oil boom at the inlet to the pond, which will give added protection by containing petrochemicals within a restricted area. Any surface contaminants can then be removed periodically as required.

## Figure 12.1: Existing Surface Water Attenuation Pond

The site drains into three waterbody catchments, which in turn drain to the River Barrow, as indicated in the Water Framework Directive mapping on their website www.wfdireland.ie. The River Barrow is in Hydrometric Area HA14, which is situated in the South Eastern River Basin District (SERBD). These waterbodies are identified as follows:

- SE_BarrowMain_Clonmelsh_IE_SE_14_1391
- SE_BarrowMain_Barrow_2_IE_SE_14_196
- SE_BarrowMain_Garryhundon_IE_SE_14_1102

The Clonmelsh waterbody (Powerstown Stream) has a catchment area of 12.42 km$^2$ (refer to Figure 12.2) and flows in a south westerly direction along the northern boundary of the site, joining the River Barrow approximately 500 m to the west of the site. The River Barrow flows southwards through Leighlinbridge, Bagnelstown and continuing south to New Ross, where it is joined by the River Nore. It then joins the River Suir at Cheekpoint, flowing out into Waterford Harbour. There is no development proposed within the confines of the other two waterbodies listed above, nor are these waterbodies impacted by adjacent development within the site. Surface water run-off in these areas drains as per the existing hydrological regime.



An environmentally protected site lies immediately to the west of the site. This protected site is known as the River Barrow and River Nore SAC, site code 002162. This designation is discussed in greater detail in Section 11 of this EIS.

The original unlined landfill (Phase 1) to the west of the site is capped and the surface water run-off drains to soakaways. Clean surface water from Phase 2 of the landfill which is lined with an engineered cap, drains to the Powerstown Stream at the northern end and to soakaways at the southern end. A buffer zone of farmland lies to the east of the site and this drains in accordance with the existing hydrological regime. The surface water run-off from Phase 3 of the landfill (current phase) drains to an attenuation pond. Phase 3 of the landfill is double lined and consists of two partially filled cells with a temporary cap and two empty cells.

The surface water run-off from the empty cells is directed to the attenuation pond. There are no drainage ditches running through the site. Elevations at the site are of the order of approximately 50 - 60 m OD, laid out with a mixture of compacted hard surfaces, concrete hard-standing areas, temporary outbuildings, site offices and a partly capped landfill (two empty cells remaining).

The existing site drainage for hard surfaces consists of kerb and gulley drainage, draining the hard surfaces, with filter drains draining the access roads, where these are in cut. Swales collect the surface water run-off from the capped landfill. All surface water drainage leads to the on-site attenuation pond, as shown in Figure 12.3.

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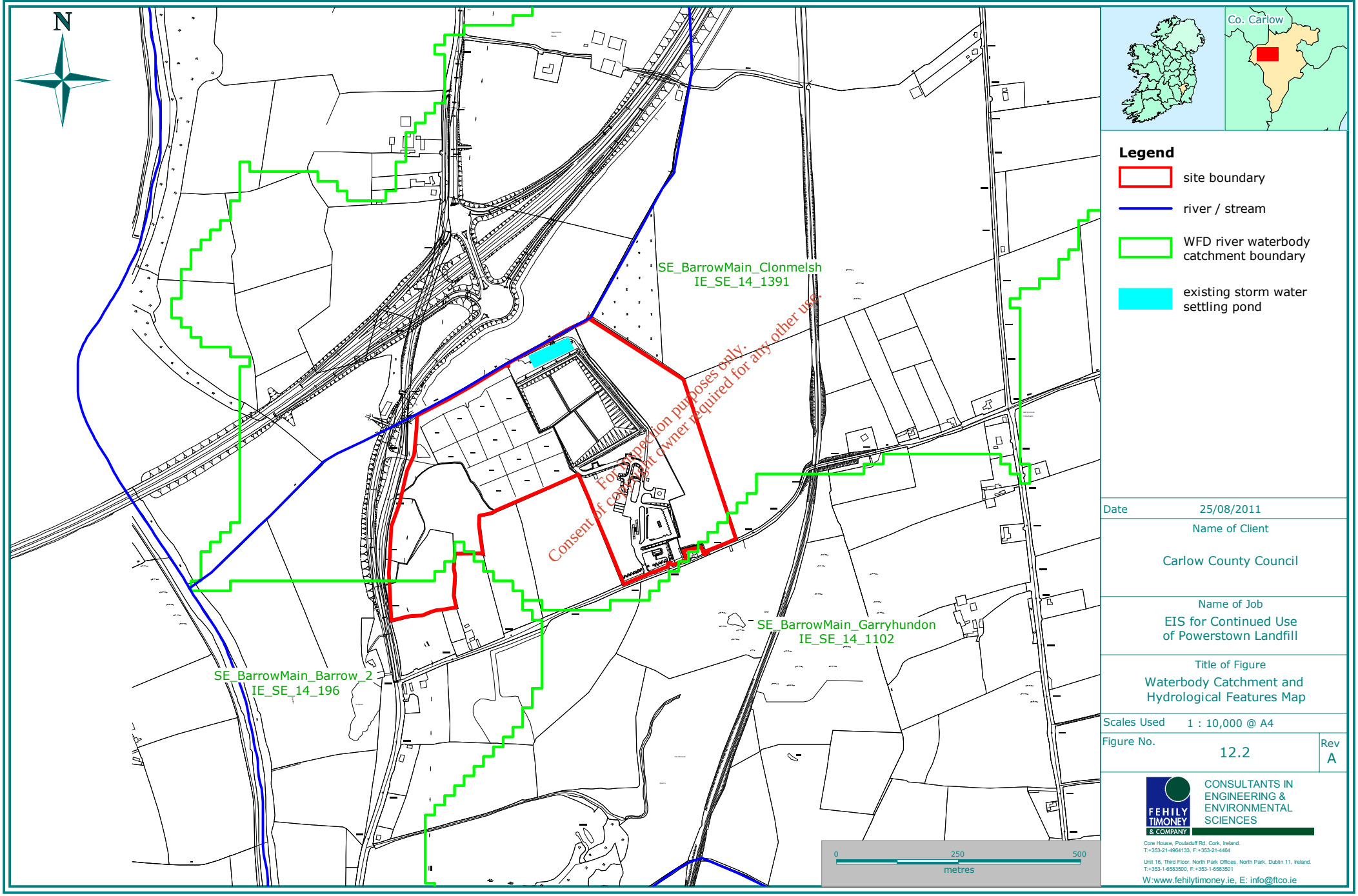
LW11-120-03_Figure 12.2_Waterbody Catchment and Hydrological Features Map_Rev A









**Legend**

- site boundary
- river / stream
- WFD river waterbody catchment boundary
- existing storm water settling pond

| | |
|---|---|
| Date | 25/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Waterbody Catchment and Hydrological Features Map |
| Scales Used | 1 : 10,000 @ A4 |
| Figure No. | 12.2 |
| Rev | A |

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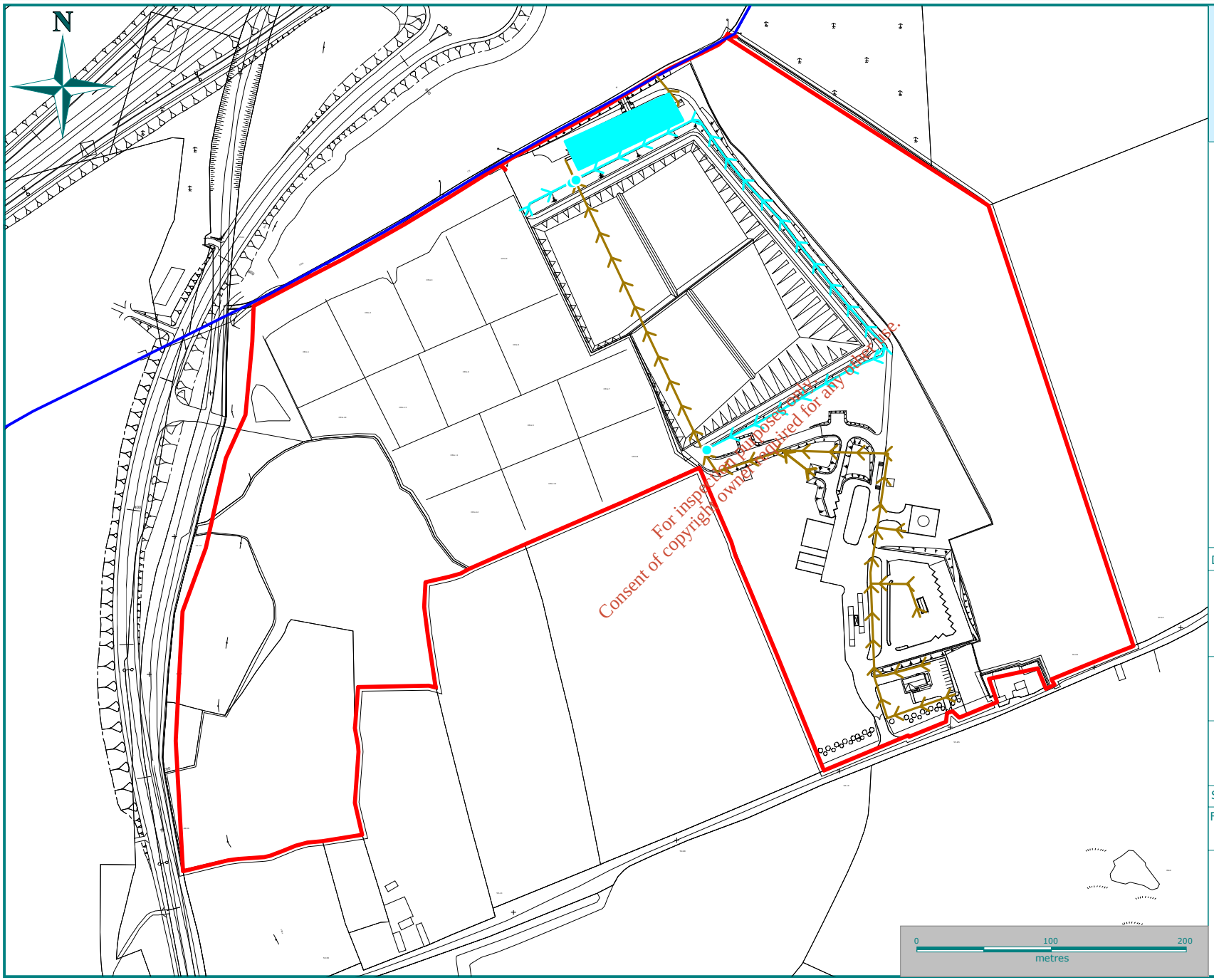
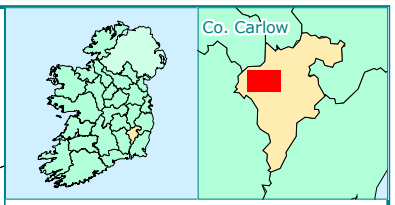
R:\Map Production\2011\LW11\120\03\Workspace\
LW11-120-03_Figure 12.3_Proposed Drainage of Powerstown Landfill & Recycling Centre_Rev A






**Legend**

- site boundary
- river / stream
- existing storm water settling pond
- swale
- catch pit
- storm sewer

| | |
|---|---|
| Date | 30/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Existing Drainage of Powerstown Landfill & Recycling Centre |
| Scales Used | 1 : 4,000 @ A4 |
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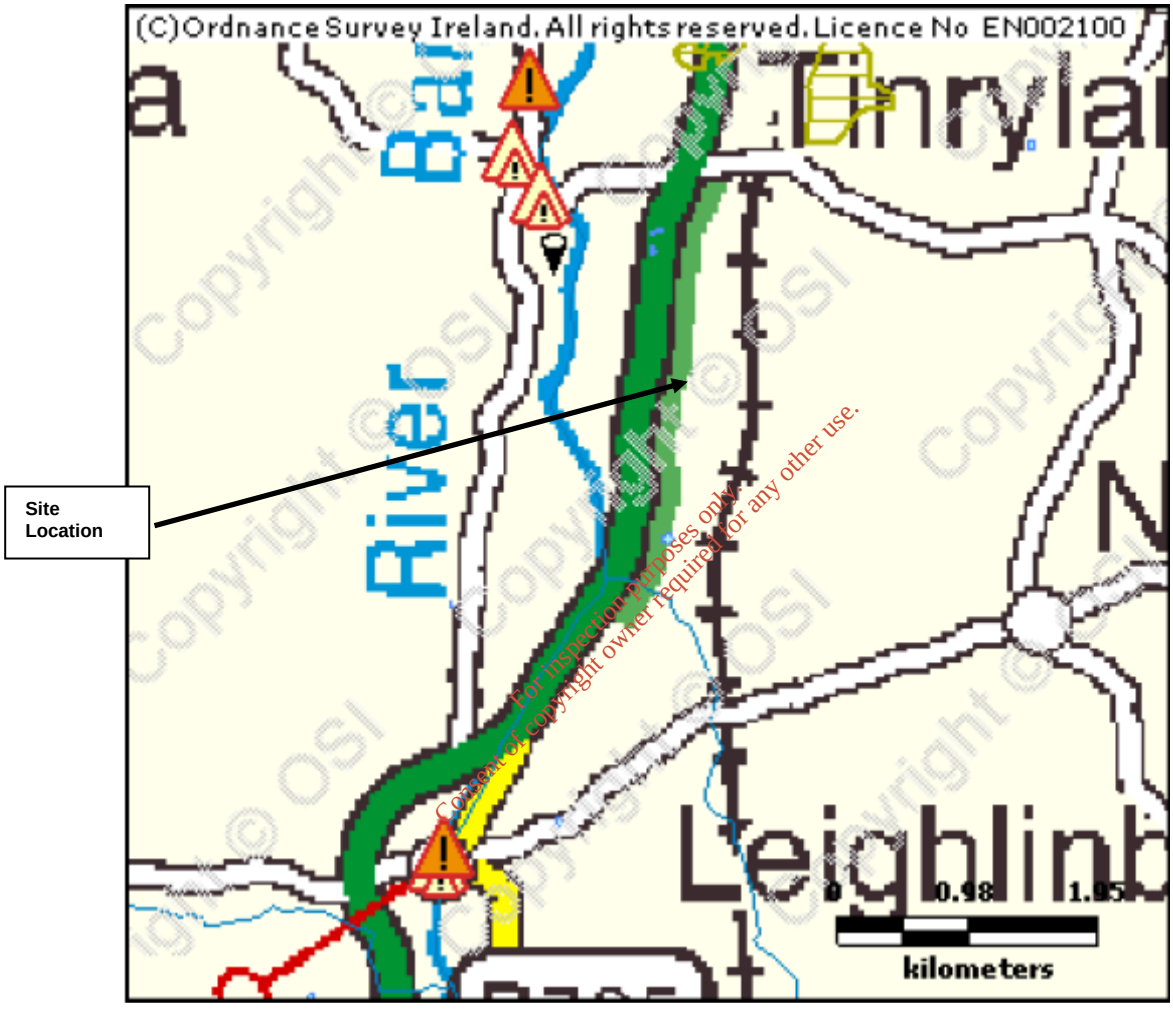
### 12.3.2 Flooding in the Existing Environment

The national flood hazard mapping website (www.floodhazardmapping.ie) does not indicate any history of flooding downstream within 2.5 km of the proposed site as illustrated in Figure 12.4 below. The lands in the vicinity of the site boundary are not identified by the OPW as benefitting lands i.e. lands that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage. There are no incidents of flooding recorded in the vicinity of the site.

**Figure 12.4: OPW Flood Map Report with 2.5 km of the site**




The nearest incident of flooding recorded is downstream at Leighlinbridge. Flood incidents are recorded to have occurred in January 1995 and November 2000. Remedial works were carried out in 1999 in Leighlinbridge and these proved successful at the onset of the 2000 flood, however they were later inundated as the flooding continued. High water levels were recorded in the River Barrow during these events.

The incidents of flooding recorded at Leighlinbridge are at such a distance from the proposed site that it is not considered that the development would be impacted by this flooding. As attenuation of surface water discharges has been provided at the site, it is not considered that the development would contribute to any increase in flooding at this location.

There is currently no catchment flood risk management plan (CFRMP) available for the River Barrow and therefore flood risk mapping is currently not available for the River.

The County Carlow Development Plan 2009 – 2015 states its design requirements in relation to new development and flooding as follows:

*"Development that is sensitive to the effects of flooding will generally not be permitted in flood prone or marginal areas. Appropriately designed development, which is not sensitive to the effects of flooding may be permissible in flood plains provided it does not reduce the flood plain area or otherwise restrict flow across floodplains. (Examples of such development might include park areas, sports pitches, certain types of industry, warehousing, etc. designed to be flood resistant and/or insensitive). Such development should only be permitted provided it incorporates adequate measures to cope with the ever-existent flood risk, e.g. adequate drainage systems, safety measures, emergency response facilities and/or warning and response systems and where it is considered that flooding would not result in significant hardship/financial loss or cost. Development must so far as is reasonably practicable incorporate the maximum provision to reduce the rate and quantity of runoff. e.g.:-*

- *Hard surface areas (car parks, etc.), should be constructed in permeable or semipermeable materials,*
- *On site storm water ponds to store and/or attenuate additional runoff from the development should be provided,*
- *Soak-aways or french drains should be provided to increase infiltration and minimise additional runoff.*

*For developments adjacent to watercourses of a significant conveyance capacity any structures (including hard landscaping) must be set back from the edge of the watercourse to allow access for channel clearing/maintenance. A setback of 5m-10m is required depending on the width of the watercourse. Development consisting of construction of embankments, wide bridge piers, or similar structures will not normally be permitted in or across flood plains or river channels. All new development must be designed and constructed to meet the following minimum flood design standards:-*

- *For Urban areas or where developments (existing, proposed or anticipated) are involved – the 100 year flood*
- *For Rural areas or where further developments (existing, proposed or anticipated) are involved - the 25 year flood*
- *Along Estuaries - the 200 year tide level*
- *Where streams open drains or other watercourses are being culverted - the minimum permissible culvert diameter is 900mm. (Access should be provided for maintenance as appropriate.)*



*All significant developments impacting on flood risk areas will be required to provide a Flood Impact Assessment to accompany the planning application to identify potential loss of floodplain storage and proposals for the storage or attenuation of run/off discharges (including foul drains) to ensure the development does not increase the flood risk in the relevant catchment. The precautionary principle (an absence of existing information on flooding in a given location should not be taken to assume an absence of flood risk) and the principle of proportionality (assessments undertaken should be appropriate in nature and scale to the development proposed) shall apply".*

The desk study of the proposed site concluded that the site does not impact on a flood risk area. However the above design requirements in relation to flooding were examined in Section 12.5 to determine if all the criteria set out by Carlow County Development Plan have been met in the existing surface water management system. These considerations are academic in nature given that there is no proposal for the development of additional infrastructure.

The County Carlow Development Plan 2009 – 2015 has also set down policies in relation to surface water drainage as follows:

***"Surface Water Drainage -** Individual developments facilitated under the guidance of this development plan shall be obliged, in all cases where surface water drainage measures are required, to provide a surface water drainage system separated from the foul drainage system.*

*For all other green-field developments it shall, in general, be the policy of Carlow County Council, to require the limitation of surface water run-off to pre-development levels. Where a developer can clearly demonstrate that capacity exists to accommodate run-off levels in excess of green-field levels then the planning authority shall give consideration to such proposals on a case by case basis.*

*In the case of brown-field development, while existing surface water drainage measures will be taken into account, some attenuation measures for surface water may be required at the discretion of the planning authority in the interests of balanced and sustainable development. In line with the above Carlow County Council will consider all drainage proposals consistent with SuDS (Sustainable Drainage Systems). To give adequate allowance for climate change in designing surface water proposals a multiplication factor of 1.2 shall be applied to all river return periods up to 100 years except in circumstances where the OPW have provided advice specifying the particular multiplication factor for return periods up to 100 years. In the case of rainfall a multiplication factor of 1.1 shall be applied to rainfall intensities to make allowance for climate change requirements. In the design of surface water systems, regard shall be had to the Greater Dublin Regional Code of Practice for Drainage Works and associated GDSDS technical documents. Design criteria will include technical assessment of surface water disposal arrangements including capacity protection of existing drainage systems and ability of the development to adequately cater for disposal".*

### 12.3.3 Existing Water Quality

An outline of the background behind the Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy or the Water Framework Directive (WFD) is presented below together with an assessment of the implications for the proposed development.

#### *Water Framework Directive*

The WFD was established by the European Community in 2000. This Directive was transposed into Irish legislation in December 2003 as the European Communities (Water Policy) Regulations 2003, (S.I. No 722 of 2003). The overriding purpose of the WFD is to achieve at least "good status" in all European waters by 2015 and ensure that no further deterioration occurs in these waters.

European waters are classified as groundwaters, rivers, lakes, transitional and coastal waters. The WFD has been implemented in Ireland by dividing the island of Ireland into eight river basin districts. As discussed, the development is located in the SERBD.



#### *Water Framework Directive Waterbody Status*

The Surface Water Regulations S.I. 272 of 2009 gives effect to the criteria and standards to be used for classifying surface waters in accordance with the WFD. In accordance with the Regulations, waters classified as 'High' or 'Good' must not be allowed to deteriorate. Waters classified as less than good must be restored to at least good status within a prescribed timeframe.

A water body must achieve both good ecological status and good chemical status before it can be considered to be of good status. The chemical status of a water body is assessed based on certain chemical pollutants.

The regulations also state that, for the purpose of classification, a status of less than good is assigned in the case of a body of surface water where the environmental objectives for an associated protected area are not met.

#### *Water Framework Directive Risk Assessments*

A baseline risk assessment was completed of the water bodies within each River Basin District in 2005. This assessment involved using information on water pollution indicators, point and diffuse pollution sources, water abstraction and existing commercial activities. The risk assessment indicated whether the water body would meet the criteria for "good status" or would be considered "at risk" of not meeting the standards by 2015. This assessment was presented in a characterisation report submitted to the EU in March 2005. This assessment provided the baseline information to prepare the River Basin Management Plan and Programme of Measures necessary to comply with the WFD standards.

### 12.3.4 WFD Status of Surface Waterbodies

The status of the river waterbody Clonmelsh is currently poor as shown on Figure 12.5 and is classified as probably at risk of failing to achieve good status by 2015. The status of the river waterbody Barrow is currently good as shown on Figure 12.5 and is classified as at risk of failing to achieve good status by 2015.

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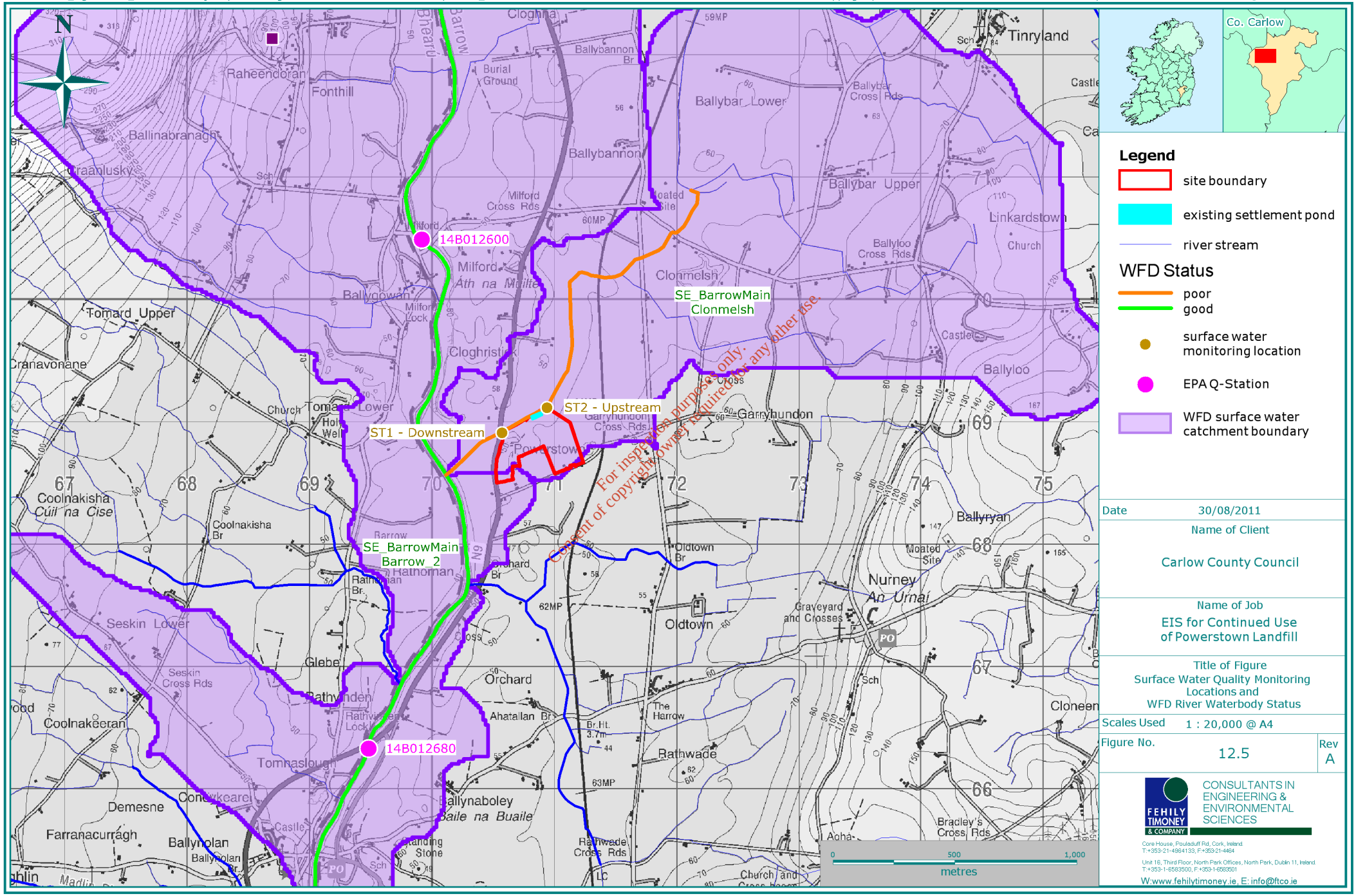
LW11-120-03_Figure 12.5._Surface Water Quality Monitoring Locations and WFD River Waterbody Status_Rev A



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| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Surface Water Quality Monitoring Locations and WFD River Waterbody Status |
| Scales Used | 1 : 20,000 @ A4 |
| Figure No. | 12.5 |
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### 12.3.5 Biological Water Quality

Below are summaries of the EPA's Q ratings for the River Barrow and biological samples analysed as part of the facility's waste licence.

*EPA's Q-Rating data for the River Barrow*

The location of the EPA's Q-values stations upstream and downstream of the confluence between the Powerstown Stream and River Barrow are shown on Figure 12.5 and the details outlined in Table 12.1 below. Q ratings range between Q3 to Q4 between 1994 and 2009. There is no obvious general trend in the data.

**Table 12.1: EPA Biological River Water Quality Ratings**

| Station ID | Location | 1994 | 1997 | 2000 | 2003 | 2006 | 2009 |
|---|---|---|---|---|---|---|---|
| 14B012600 | main River Barrow channel upstream from confluence | 3-4 | 3 | 3 | 3-4 | 4 | 3-4 |
| 14B080700 | main River Barrow channel downstream from confluence | - | 3-4 | 3-4 | 4 | 4 | 4 |

*Biological Water Quality along the Powerstown Stream*

The biological monitoring locations are shown on Figure 12.5 and the details outlined in Table 12.2 below. Q ratings range between Q3 to Q3-4 between 2007 and 2012.

**Table 12.2: Biological Q Rating along Powerstown Stream**

| Station ID | Location | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| ST1 | downstream of pond outlet | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 |
| ST2 | upstream of pond outlet | 3-4 | 3-4 | 3-4 | 3-4 | 4 | 3-4 |



The results for both the upstream and downstream locations were identical in the years 2007 -2010 and also in line with the River Barrow results. The results for ST2 in 2011, showed a slight improvement in the quality.

CCC retained Conservation Services, Ecological & Environmental Consultants in August 2011 to determine the quality rating at ST1 and ST2. A summary of these results are presented in Table 12.2.

Further supplementary morning was carried about again by Conservation Services in January 2012. The results from this report indicated:

> *"A minor difference in upstream/downstream biological water quality in the Powerstown Stream was indicated at Powerstown landfill in the annual biological monitoring in August 2011. In order to determine whether this trend is short-term or sustained, Conservation Services, Ecological & Environmental Consultants has carried out additional biological water quality assessment of the Powerstown Stream on 26th January 2012. This monitoring is to supplement the August 2011 data and is additional to the annual monitoring program.*

The results of the morning indicated:

*"The invertebrate community at ST1, upstream of the site merits a Q rating of 3-4. The invertebrate community at ST2, downstream of the site merits a Q rating of 3-4. (Conservation Services Ltd., 2012)".*

### 12.3.6 Physico-Chemical Water Quality Data

In compliance with the facility's waste licence, surface water monitoring is carried out on a quarterly basis upstream and downstream of the landfill along Powerstown Stream and also at the inlet and outlet of the surface water attenuation pond. There is no significant difference between the BOD levels in the stream upstream and downstream of the facility, nor between the inlet and the outlet to the surface water pond.

Trigger levels were agreed for ammonia, conductivity and chloride with the Environmental Protection Agency which are used in conjunction with the control rule:

> "*breach of a trigger level will have occurred when two exceedances of the relevant concentrations occur within four successive measurements*"

This control rule was not broken during 2010 or 2011 monitoring period.

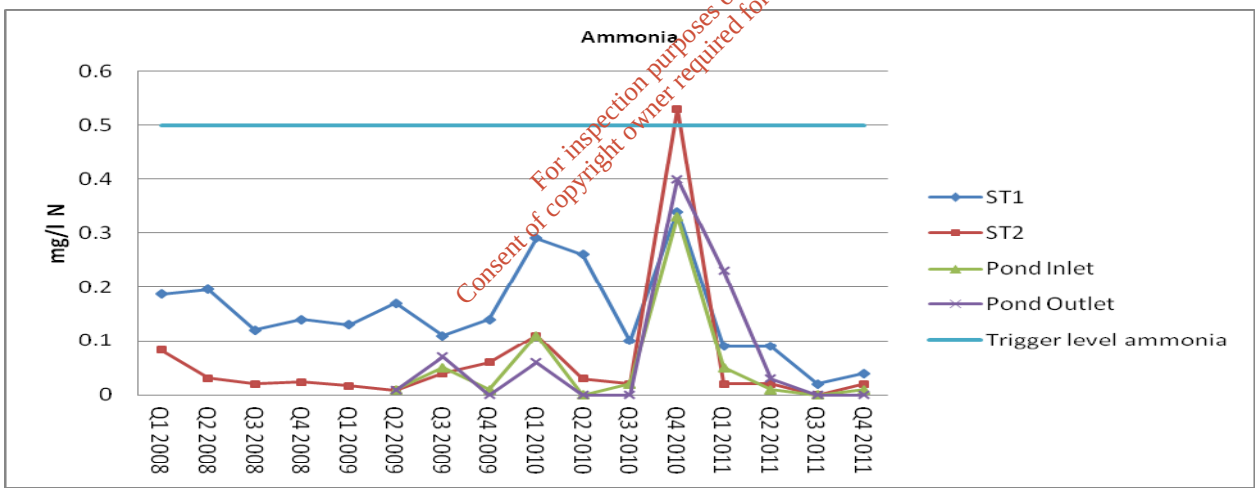
Additionally, the EPA has set a suspended solids emission limit from the outlet of the retention pond of 35 mg/l in Schedule C of the facilities licence.

The results presented below are collated from between 2009 and 2011 quarterly surface water quality results.

#### *Ammonia*

Figure 12.6 shows the ammonia concentration at each of the four monitoring locations and also the trigger value set by the EPA. There was no breach of the trigger level in the period 2008-2011 (in accordance with the control rule).

**Figure 12.6: Ammonia Concentrations at Monitoring Locations between 2009 and 2011**

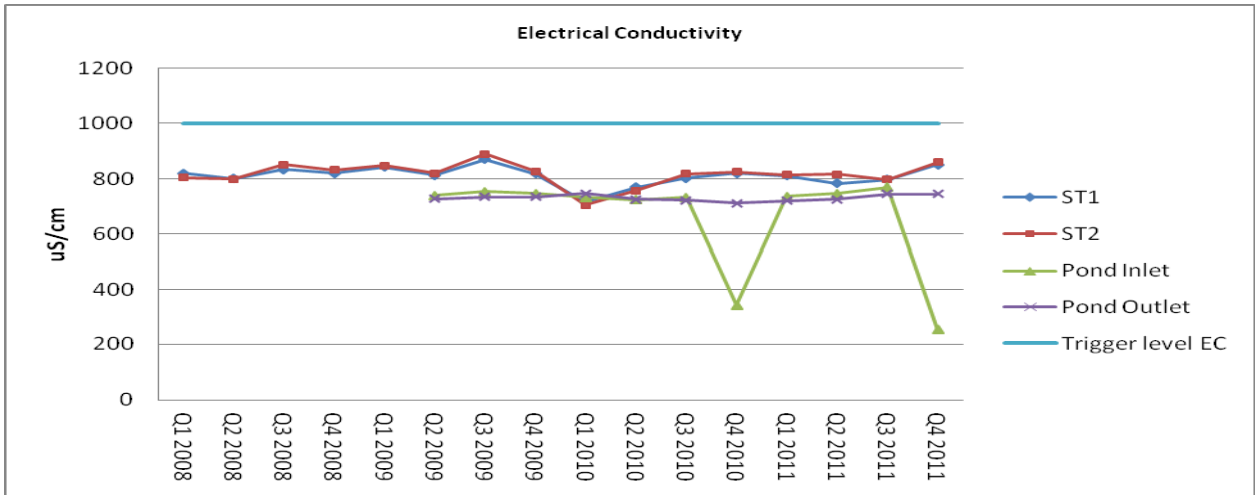





#### *Conductivity*

Figure 12.7 shows the electrical conductivity at each of the four monitoring locations and also the trigger value set by the EPA. No exceedances were recorded.

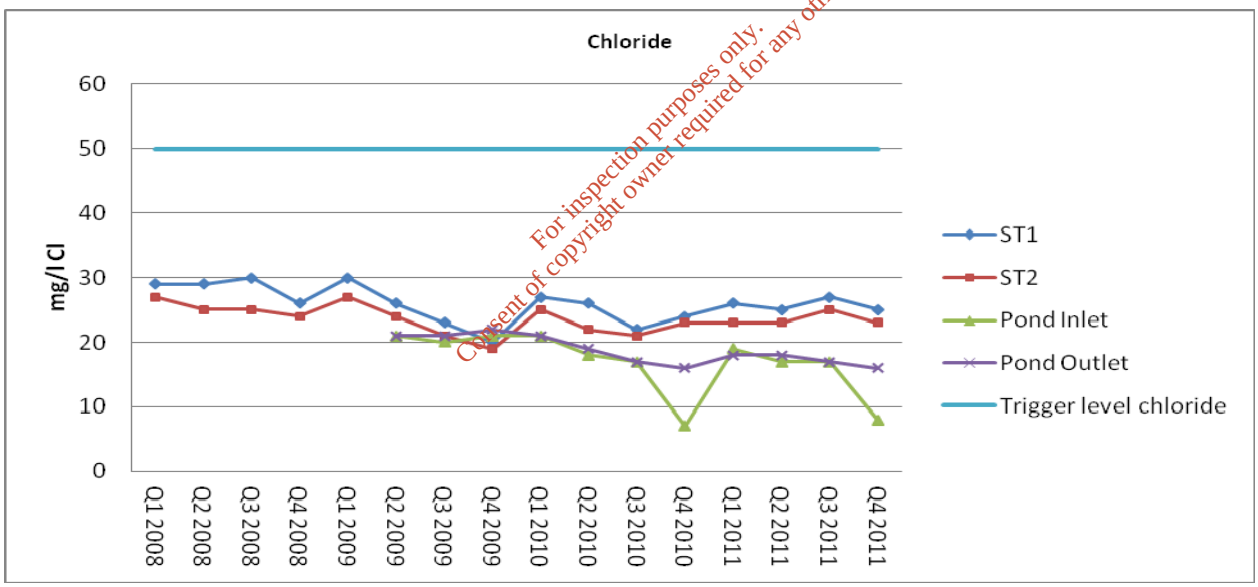
**Figure 12.7: Electrical Conductivity at Monitoring Locations between 2009 and 2011**




*Chloride*

Figure 12.8 shows the chloride concentration at each of the four monitoring locations and also the trigger value set by the EPA. No exceedances were recorded.

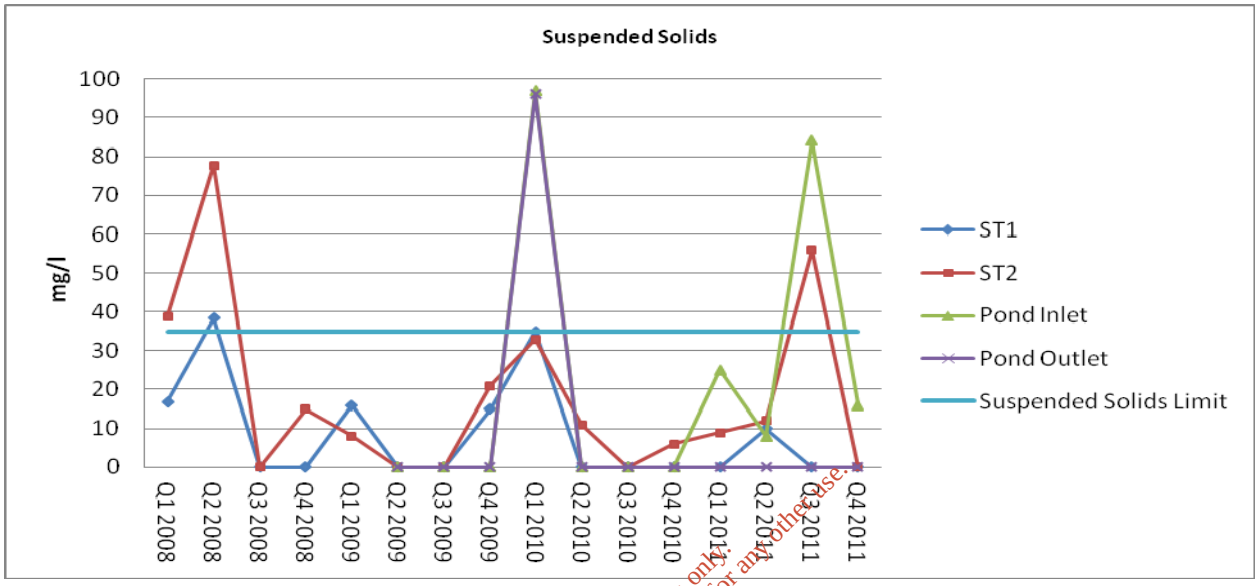
**Figure 12.8: Chloride Concentrations at Monitoring Locations between 2009 and 2011**



*Suspended Solids*

Figure 12.9 shows the suspended solids concentration at each of the four monitoring locations and also emission limit for the outlet of the settlement pond. There was one exceedance of the limit at the outlet to the pond in Q1 2010 (98 mg/l).

**Figure 12.9: Suspended Solids Concentrations at Monitoring Locations between 2009 and 2011**






## 12.4 Summary of Key Possible Impacts

### 12.4.1 Potential Hydrological Impact from the proposed development

There are no hydrological impacts from the proposed development in terms of either an increase in run-off or an increase in suspended solids in the surface water run-off from this site as a result of the proposed continued landfilling activities. The increase in waste acceptance from 40,000 tpa to 50,000 tpa will not require the construction of an additional cells or associated ancillary infrastructure.

The attenuation requirements for the site were tested for current standards with the rainfall increased by 10% in the pond calculations to allow for climate change. The impervious area estimated in the original calculation was deemed to be conservative with a factor of 0.5 being applied to the capped landfill. This factor was adjusted to 0.3 in the revised calculation, with a factor of 1.0 being applied to all paved surfaces contributing to the pond. It was found that the 'As Built' pond remains adequate to attenuate the surface water run-off from the site in accordance with current standards. The revised design calculations for the attenuation pond are included in Appendix 8.

The area of Powerstown landfill contributing to the pond (Phase 3 only) is 4.4 ha, of which 0.9 ha is made up of paved surfaces, with the remaining contribution of 3.5 ha from the landfill which is at various stages of capping (including the two cells yet to be filled and capped). There will be no net increase in the hard surface area on this site and no further attenuation of surface water flows is deemed necessary as there is no calculable increase in the risk of flooding downstream in the River Barrow as a result of the continued operation of the landfill.

In addition, there will be no decrease in water quality in the receiving waters of the River Barrow catchment as a result of the proposed development.

The current drainage system at the site is designed in accordance with the requirements of Carlow County Development Plan outlined in Section 12.3.2.

### 12.4.2 Potential Cumulative Hydrological Impacts from other developments in the area

The cumulative hydrological impacts on the Barrow catchment as a result of the footprint of the M9 Motorway to the north of the Powerstown landfill were examined.

The surface water management employed for the motorway and specifically at the interchange at Junction 6 on the M9 motorway, immediately north of the site, provides for the attenuation of all discharges of surface water from the motorway including the interchange.

As the run-off from the M9 is attenuated and adequate attenuation is provided for the Powerstown landfill, the cumulative impact due to the drainage of the two developments is considered to be of very low significance.

### 12.4.3 Potential Impacts on Water Quality

The proposed increase in waste acceptance from 40,000 tpa to 50,000 tpa and the extended operational life of the landfill beyond the 2012 deadline will not result in any new construction. Therefore there will be no construction-related impacts on water quality.

Operational impacts include leachate generation, storage and transportation and storm water run-off from hardstanding areas.

The increase in waste acceptance from 40,000 tpa to 50,000 tpa will have a slight net decrease in leachate generation.

## 12.5 Mitigation Measures

### 12.5.1 Mitigation Measures during construction

As the necessary site infrastructure for the continued operation of Powerstown landfill is already constructed mitigation measures for construction activities are not required.



### 12.5.2 Mitigation Measures during operation and maintenance

The continued maintenance of the drainage system will include for the activities associated with keeping the system operating effectively. The Landfill Manager is responsible for maintaining the drainage system which includes:

- Inspecting manholes for any blockages
- Emptying of catchpits
- Inspecting outfalls to watercourses
- Inspecting the pond and testing the water quality at the outfalls as per licence requirements

Maintenance is in accordance with CIRIA C697 SuDS and Maintenance Manual and the WWTP maintenance manual.

## 12.6 Predicted Impacts after Mitigation

There are no residual impacts as a result of continued landfilling activities.

## 12.7 Conclusion on Hydrology & Water Quality

The Powerstown Stream is a tributary of the River Barrow and runs along the northern boundary of the site. The existing surface water management system is designed to minimise the possibility of accidental spillage by the diversion of leachate to a leachate holding tank and leachate lagoon. Clean surface water from capped areas is currently drained to soakaways and to the Powerstown Stream.

Surface water run-off from Phase 3 is collected in a drainage system which drains into the surface water attenuation pond.

Biological monitoring of the River Barrow and the Powerstown steam illustrate similar results with biological water quality status of slightly polluted (Q rating of 3-4). Physico -chemical monitoring illustrates that in general, concentrations of ammonia and chloride in the Powerstown Stream are slightly elevated relative to the upstream site, however the levels are below the discharge trigger levels.

The desk study of flooding in the existing environment concluded that the proposed site does not impact on a flood risk area. The current drainage system at the site is designed in accordance with the requirements of Carlow County Development Plan and is adequate to attenuate the surface water run-off from the site in accordance with current standards

There are no hydrological impacts from the proposed development in terms of either an increase in run-off or an increase in suspended solids in the surface water run-off from this site. There will be no construction-related impacts on water quality and there will be no decrease in water quality in the receiving waters of the River Barrow catchment as a result of the continued operation of landfilling activites if current management practices are continued.

# 13 GEOLOGY & HYDROGEOLOGY

This section assesses the geology, hydrogeology and groundwater quality of the existing environment and identifies potential impacts that may arise from the continued operation of the landfill at 50,000 tpa. Where required, it outlines measures to avoid, reduce and mitigate potential impacts. Residual impacts that cannot be avoided are also identified and discussed.

## 13.1 Introduction

The existing geology is described in terms of the bedrock geology, overburden geology and hydrogeology. It was prepared using available published literature for the site area which included:

1. Groundwater Protection Scheme for County Carlow (on Geological Survey Ireland (GSI) website)
2. Geology of Carlow - Wexford Sheet 19 (on GSI website)
3. General Soil Map of Ireland - Second Edition 1980 (GARDINER, M.J and Radford, T, 1980)

## 13.2 Assessment Methodology

This section was prepared having regard to 'Geology in Environmental Impact Statements – A Guide' (IRELAND, Institute of Geologists, 2002).

## 13.3 Existing Environment

### 13.3.1 Overburden Geology

The soils association of the area is described from the *General Soil Map of Ireland*. There is one soil association at the site. This soil is classified as a grey-brown podzolic soil and an association of the Athy Complex. The parent material of this soil consists of calcareous, fluvio-glacial coarse gravels and sands of Weichsel Age, composed mainly of limestone, with a small proportion of sandstone, schist, shale and occasional conglomerate. Alluvial deposits also occur along Powerstown Stream and the River Barrow as indicated on Figure 13.1



Grey brown podzolics comprise 70% of the Athy Complex association and brown earths occupy 20% of the association. Both have a wide use-range, from farm, fruit and vegetable crops to pasture land. Due to their coarse texture and very friable consistency, they are easily tilled.

The quaternary geology of the landfill area comprises unconsolidated deposits, most of which were laid down during and immediately following the last glaciation. During the various investigations carried out over the years at the Powerstown Facility, 5 m to 15 m of sands and gravel overlie the thin layer of lodgement till over the area of the landfill.

### 13.3.2 Bedrock Geology

Figure 13.2 shows a summary of the bedrock geology of the site and surrounding area. The GSI database for the area shows that the site is underlain by the Milford and Ballysteen Formations. These are Dinantian dolomitised limestones. Both formations dip to the east at approximately $10^{o}$, the Milford Formation resting on top of the Ballysteen Formation.

The lower part of the Ballysteen Formation consists of well-bedded, relatively clean calcarenitic limestones, which pass gradationally up into finer-grained and more muddy limestones. Dolomitisation has taken place.

The Milford Formation is classified by the GSI from a sequence encountered in a 275 m-deep borehole drilled at Milford (1.5 km north-northwest of Powerstown landfill). Descriptions from this borehole indicate that the bedrock is a uniform, shale-free poorly bedded, medium-grey dolomite with scattered crinoid debris and that the boundary with the underlying Ballysteen Formation is gradational.

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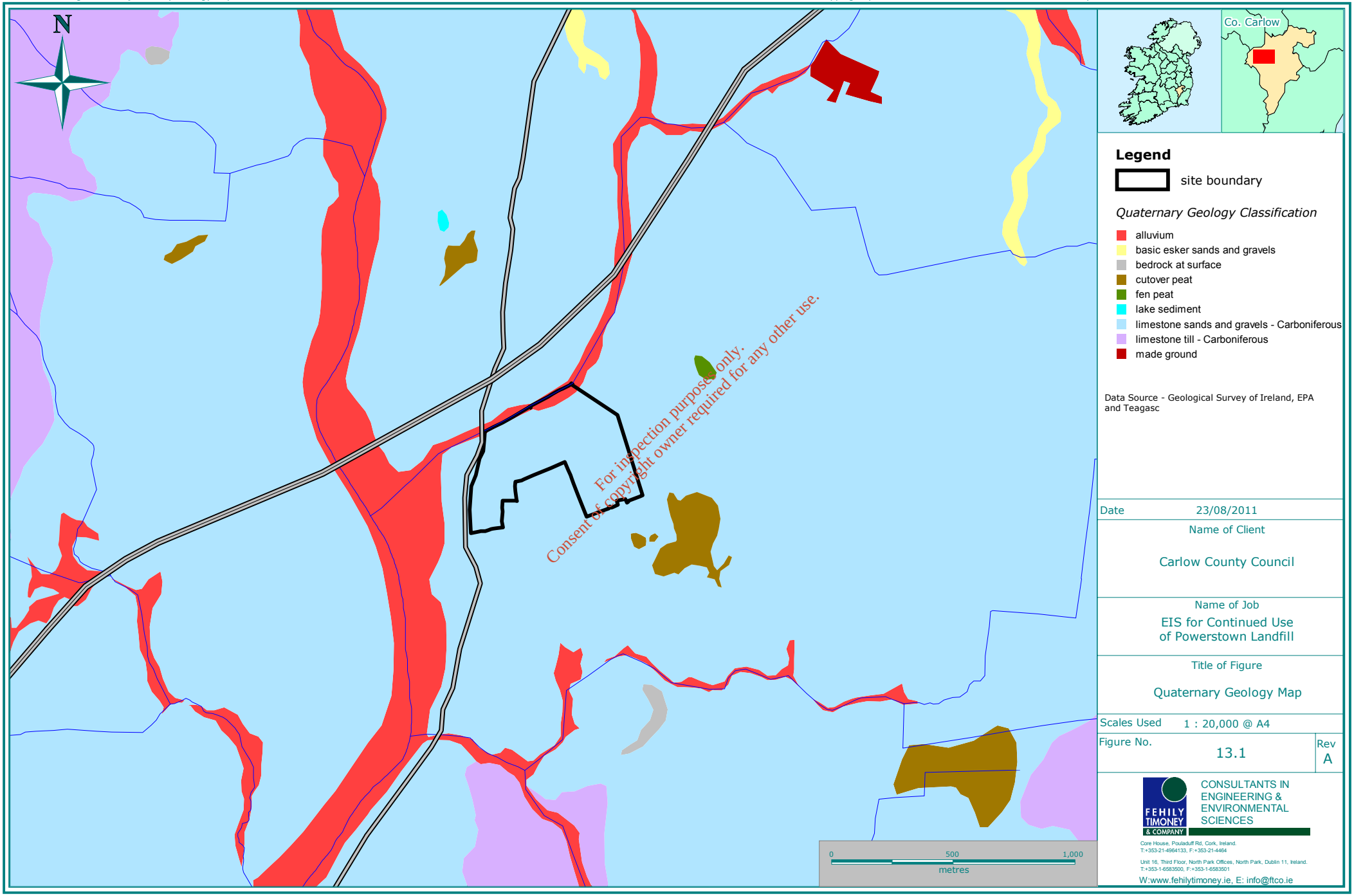


Date 23/08/2011

Name of Client

Carlow County Council

Name of Job

EIS for Continued Use of Powerstown Landfill

Title of Figure

Quaternary Geology Map

Scales Used 1 : 20,000 @ A4

Figure No. 13.1

Rev A

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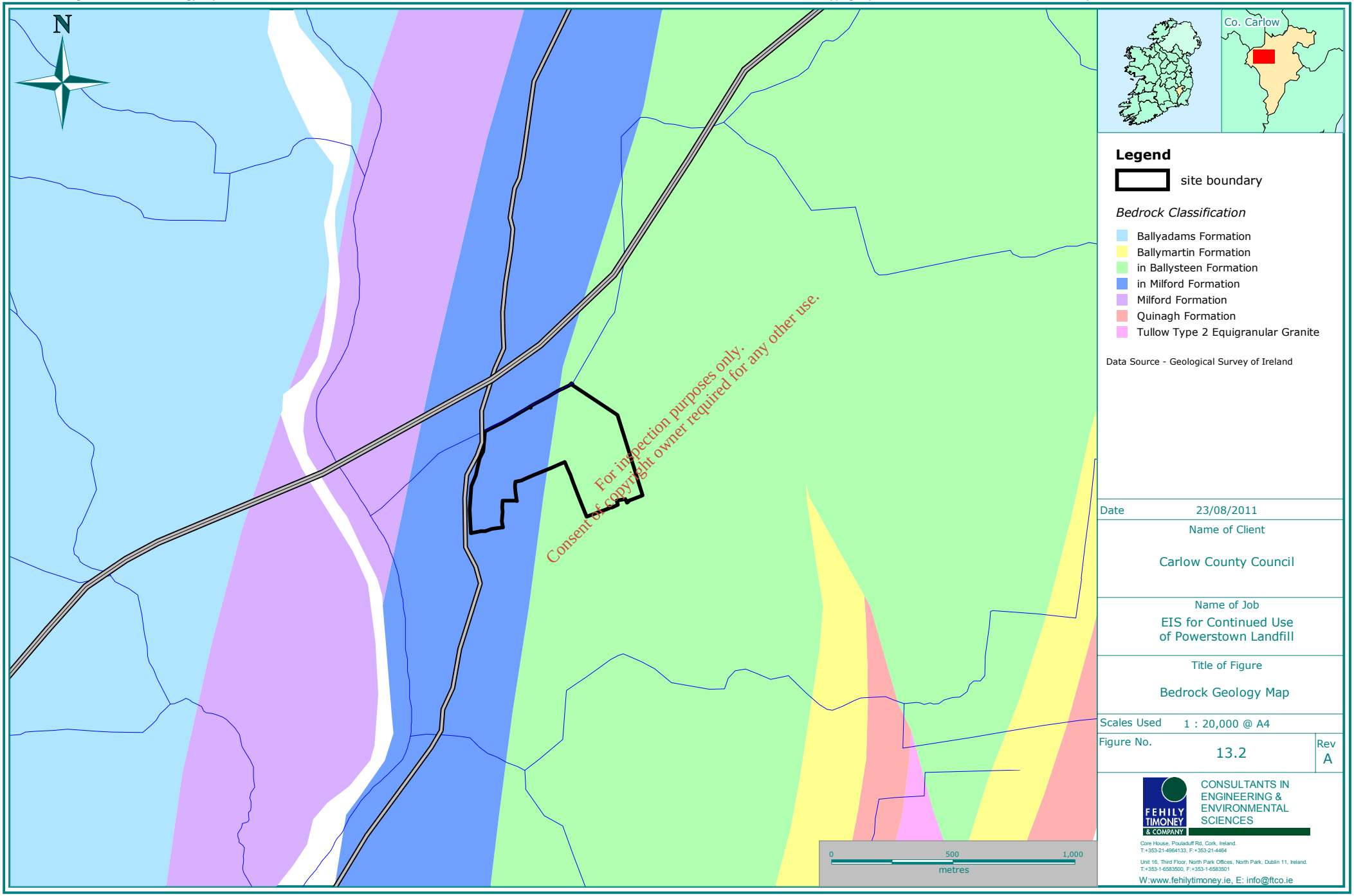




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Bedrock Geology Map

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Figure No. 13.2

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### 13.3.3 Structural Geology and Topography

The GSI database indicates that there is a fault trending North West/South East approximately 1 km to the east of Powerstown landfill.

### 13.3.4 Hydrogeology

The major aquifer in the Lower Carboniferous strata of the Barrow Lowlands is dolomitised limestone and it is classified as a Regionally Important Aquifer (Rkd) by the GSI. Groundwater enters Powerstown landfill via fissure flow in the bedrock and through the permeable fluvio-glacial gravel overburden. An aquifer classification map is presented on Figure 13.3. Flow direction is generally to the west towards the River Barrow, but with a northern component discharging to the Powerstown Stream. A groundwater flow map is presented on Figure 13.4.

The horizontal gradients of the water tables underlying the site are as follows (as recorded by the FTC site investigation of Phase 3):

- For the three bedrock boreholes (RCA1, RCB1 and RCC1), the horizontal gradient is approximately 0.015
- For the two overburden wells (RCA2 and RCB2), the gradient is approximately 0.25.

The location of these boreholes is indicated on Figure 13.4.

The overburden encountered at the site consisted of sand and gravel with cobbles. Thickness encountered in boreholes varied from 3.6 to 15 m. The underlying bedrock consisted of dolomitised limestone. A layer of discontinuous boulder clay overlying the bedrock confines the bedrock aquifer locally to the south of Phase 3.



Two pump tests were also conducted at the site as part of previous applications – one in the sand and gravels and the other in the bedrock. A sand and gravel pump test conducted from the 21st to 26th January 1991, confirmed that the sands and gravels are highly permeable. Two of the four observation wells in the gravels were affected by pumping. The hydraulic conductivity (K) of the gravels was found to be 96 m/day. The hydraulic gradient (dh/dl) from the southern end of the site to the northern end was 1 m/50 m. Assuming an average porosity (n) of 0.25 for the sand and gravel layer, then the effective velocity of groundwater through the aquifer can be calculated as follows:

$$V = \frac{K}{n}\frac{dh}{dl} = \frac{96}{0.25}\frac{1}{50} = 7.68 \text{ m/day}$$

The bedrock pump test conducted on 16th and the 20th April 2002 indicated the following:

**Table 13.1: Summary of Hydrogeological Properties of the Limestone Aquifer**

| Parameter | Range of Values |
|---|---|
| T (Transmissivity) | 850 – 1450 $m^2$/day |
| S (Storage Coefficient) | 0.0001 – 0.0007 |
| Specific Capacity | 95 $m^3$/day/m |
| K (Hydraulic conductivity) | 2.8 x $10^{-5}$ $ms^{-1}$ |

The GSI database has records of a number of groundwater wells in the Powerstown area. The majority of these are located within the landfill and are used as groundwater monitoring wells. The database also makes reference to three private wells in the vicinity of the site, details of which are provided in Table 13.2.

## Table 13.2: GSI Well Database

| | | | |
|---|---|---|---|
| **GSI Code:** | 2615NWW178 | 2615NWW270 | 2615NWW172 |
| **Well Type:** | Dug well | Borehole | Borehole |
| **Original Name:** | Carlow Drift Survey, 1962 | - | Carlow Drift Survey, 1962 |
| **Depth (meters):** | 10.7 | 30.5 | 4 |
| **Depth to Rock Confidence:** | DTB Unknown | - | DTB Unknown |
| **Drill Date:** | 30-Dec-1899 | 30-Dec-1899 | 30-Dec-1899 |
| **Easting:** | 270490 | 270490 | 270970 |
| **Northing:** | 167850 | 169080 | 169650 |
| **Locational Accuracy (meters):** | to 20m | to 20m | to 20m |
| **Townland:** | Powerstown | Powerstown | CLOGHRISTICK (Cloghristick House) |
| **County:** | Carlow | Carlow | Carlow |
| **Six Inch Sheet No.:** | 12 | | 12 |
| **Well Use:** | Agri & domestic use | | Domestic use only |
| **Yield m3d** | | 43.6 | |
| **Casing Comments:** | Goes dry | | Good Domestic yield |
| **Distance from Powerstown site** | Approximately 600 m south | Approximately 200m north-west | Approximately 800m north |

## Figure 13.3: Aquifer Classification Map

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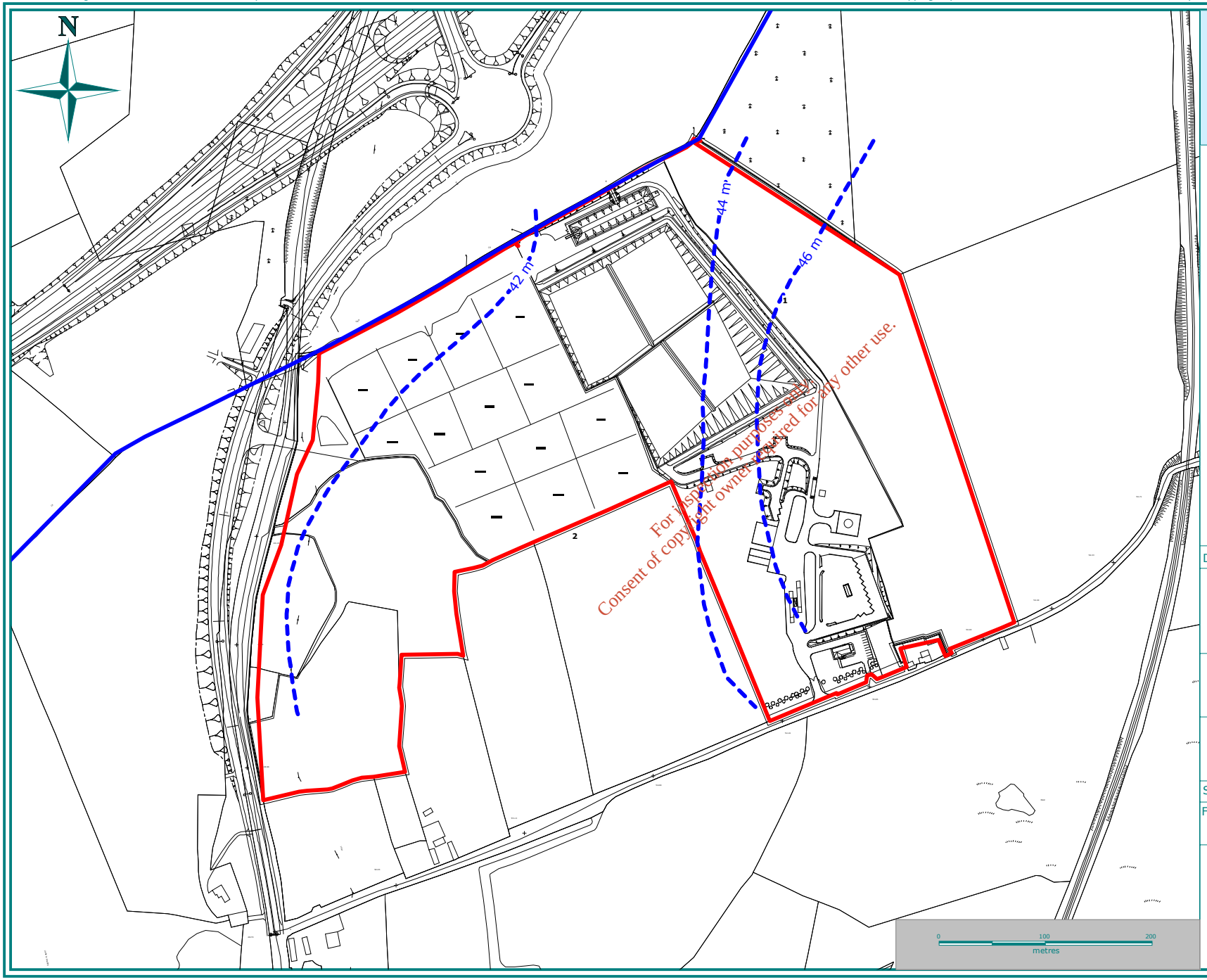
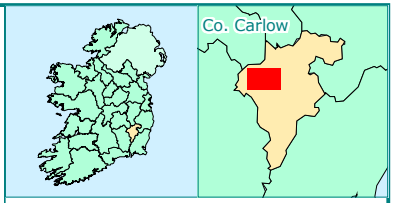
LW11-120-03_Figure 13.4_Groundwater Contour Map_Rev A






**Legend**

- site boundary
- line of equal groundwater elevation (m OD)
- stream

| | |
|---|---|
| Date | 23/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Groundwater Contour Map |
| Scales Used | 1 : 5,000 @ A4 |
| Figure No. | 13.4 |
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### 13.3.5 Groundwater Vulnerability

Groundwater vulnerability, as defined by the GSI, is the term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The factors used in assessing groundwater vulnerability include subsoil type and thickness, and recharge type. The GSI procedure whereby groundwater protection is assessed is outlined in the EPA-GSI publication 'Groundwater Protection Schemes' (DELG/EPA/GSI, 1999). The procedure proposes a matrix, which relates vulnerability, source and resource such that a particular site is given a Response (R) to specific activities. The GSI classifies the site as having a "High Vulnerability" as shown in Figure 13.5. However, in the construction of phase 3 of the landfill, the sand/gravel was removed to the water table, therefore increasing the vulnerability of the site to 'Extreme' (see Table 13.3).

**Table 13.3: GSI Guidelines – Aquifer Vulnerability Mapping**

| Vulnerability rating | Hydrogeological Conditions | | |
|---|---|---|---|
| | *Subsoil Permeability (Type) and Thickness* | | |
| | High Permeability (Sand/gravel) | Moderate Permeability (e.g. Sandy soil) | Low Permeability (e.g. Clayey subsoil, clay, peat) |
| Extreme (E) | 0 - 3.0 m | 0 - 3.0 m | 0 - 3.0 m |
| High (H) | >3.0 m | 3.0 -10.0 m | 3.0 - 5.0 m |
| Moderate (M) | N/A | >10.0 m | 5.0 - 10.0 m |
| Low (L) | N/A | N/A | >10 m |

**Notes:**
N/A = Not Applicable
Precise permeability values cannot be given at present.
Release point of contaminants is assumed to be 1-2m below ground surface.



The GSI's Response Matrix for Landfills combines the aquifer vulnerability (H), and the classification of the aquifer (Rkd), to give a response for site suitability for landfills. Table 13.4 below details the response matrix for landfills under the GSI guidelines.

**Table 13.4: GSI Guidelines – Response Matrix for Landfills**

| Vulnerability Rating | Resource Protection Aquifer Category | | | | | |
|---|---|---|---|---|---|---|
| | Regionally Important (R) | | Locally Important (L) | | Poor Aquifers (P) | |
| | Rk | Rf / Rg | Lm / Lg | Ll | Pl | Pu |
| Extreme (E) | R4 | R4 | R3[2] | R2[2] | R2[2] | R2[1] |
| High (H) | R4 | R4 | R3[1] | R2[1] | R2[1] | R1 |
| Moderate (M) | R4 | R3[1] | R2[2] | R2[1] | R2[1] | R1 |
| Low (L) | R3[1] | R3[1] | R1 | R1 | R1 | R1 |

In this case, the matrix response for the site is R4, i.e. not acceptable. However, the guidelines also include additional notes on the siting of landfills on regionally important aquifers, which state that they can be considered: "*Where the waste types are restricted and the waste acceptance procedures are in accordance with the criteria specified by the EPA*."

Extensive consultation took place with the EPA during the statutory consent process for Phase 3 and it was agreed with the Agency that a double lining system be installed in Phase 3 of Powerstown landfill. This lining system provides protection to the aquifer five times above that required by the Landfill Directive for non-hazardous landfills.

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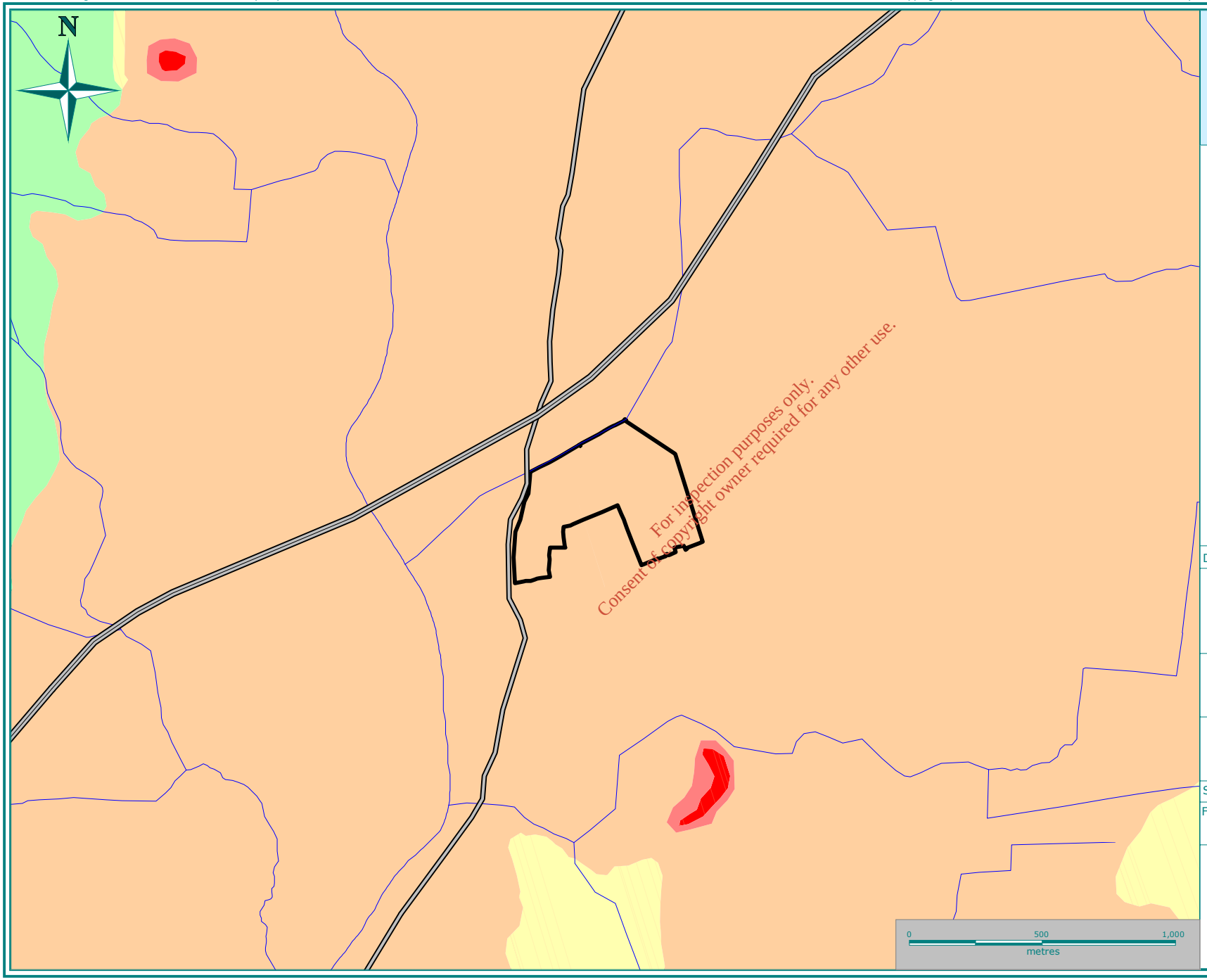




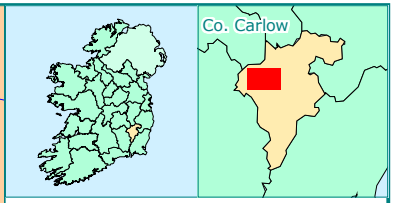


**Legend**

site boundary

river / stream

*Groundwater Vulnerability*

- rock near surface or karst
- extreme
- high
- moderate
- lLow
- high to low (interim study only)

Data Source - Geological Survey of Ireland, 2011

| | |
|---|---|
| Date | 23/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Groundwater Vulnerability Map |
| Scales Used | 1 : 20,000 @ A4 |
| Figure No. | 13.5 |
| Rev | A |

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## 13.3.6 Groundwater Quality

Groundwater quality monitoring is conducted in accordance with Schedule D.4 (Table D.5.1) of the waste licence and results for 2009, 2010 and 2011 are included in Appendix 9. The sampling and analysis of groundwater at Powerstown is carried out by the EPA. The groundwater monitoring locations tested are presented in Table 13.5. Groundwater monitoring locations have been revised on consultation with the EPA. GW1, GW2, GW8, RCA1 and RCA2 are existing wells and have monitoring data for 2008-2011. GW3, GW6 and GW7 have been monitored since 2010. The location of the groundwater monitoring wells is shown on Figure 3.13.

### Table 13.5: Groundwater Monitoring Locations

| Location | Comment |
|---|---|
| GW1 | Down gradient |
| GW2 | Down gradient |
| GW3 | Background |
| GW6 | Background |
| GW7 | Down gradient |
| GW8 | Down gradient |
| RCA1 | Up gradient |
| RCA2 | Up gradient |

Condition 8.7 of the waste licence stipulated a requirement *to include private wells (e.g. domestic, agriculture etc) within 500 m of the facility in the monitoring programme, subject to agreement with the owner*. Two private wells were sampled during 2010 and 2011. The analytical results for each well are included in Appendix 9.



Water quality limits are not stipulated in the licence, however specific Groundwater Trigger Levels (GTLs) have been set for individual monitoring wells for indicator parameters such as electrical conductivity (EC), chloride and ammoniacal nitrogen. These are summarised in Table 13.6 below:

### Table 13.6: Groundwater Trigger Levels

| Parameter | GW1 | GW2 | GW3 | GW6 | GW7 | GW8 |
|---|---|---|---|---|---|---|
| Conductivity uS/cm | 1,000 | 1,300 | 1,000 | 900 | 1,000 | 1,000 |
| Chloride mg/l | 50 | 60 | 40 | 30 | 50 | 50 |
| Ammonia mg/l N | 2.0 | 1 | 0.15 | 0.15 | 0.8 | 2.0 |

No trigger levels have been set for borehole RCA1 and RCA2.

In addition groundwater monitoring data for monitoring wells at the facility are assessed relative to European Communities Environmental Objectives (Groundwater) Regulations 2010 (SI No. 9 of 2010), while groundwater monitoring data from private wells was also compared with the European Communities (Drinking Water) (No 2) Regulations 2007 (S.I. No. 278 of 2007).

#### *Comparison with Groundwater Trigger Levels*

Monitoring results for 2009, 2010 and 2011 indicate that samples collected from down gradient monitoring wells GW1 and GW2, exceed the groundwater trigger levels for conductivity and chloride indicator parameters. Ammonia levels in GW1 have exceeded the trigger levels in the period 2008-2011. Ammonia levels in GW2 have been decreasing since 2007 and have not breeched the trigger level since quarter 2 of 2008 with the exception of quarter 4 2011 where the level recorded was equal to the trigger value.

The ammonia, conductivity and chloride levels in GW8 have been decreasing since 2008 and have been below the trigger level since quarter 2 of 2010.

*Comparison with Overall Threshold Values*

Ammonia levels in groundwater wells GW1 and GW8 (down gradient) are elevated above the Overall Threshold Value (OTV) set out in SI. No. 9 of 2010. Ammonia levels in GW2 (down gradient) have exceeded the OPV three times in the last 2 years (2010-2011). Ammonia values in GW7 (down gradient) are lower than the OPV values.

Background and up-gradient levels of conductivity, ammonia and chloride are within trigger and OTV set out in SI. No. 9 of 2010.

With regards to metal concentrations, aluminium levels are elevated above OTV set out in SI. No. 9 of 2010 in GW2 and GW7 (down gradient), GW6 (background), RAC 1 and RAC2 (up-gradient).

Two private wells to the north and north-west of the site are monitored on an annual basis. The results obtained for samples taken from these wells in 2010 and 2011 indicate that all results reported are below their respective parametric values as set out in S.I No 278 of 2007 with the exception of an elevated concentration of 2/100 ml for Total Coliforms. Total Coliforms occur naturally in soil.

*Conclusions*

Groundwater monitoring data indicates that the quality of groundwater downgradient of the facility has been impacted by the landfill. It is considered that leachate percolating from the unlined landfill (phase 1) may be contributing to the deterioration of groundwater quality.

Historical data compiled to date displays elevated levels of conductivity and chloride in GW1 and GW2 downstream. Ammonia levels in groundwater are elevated down gradient of the landfill at GW1, GW2 and GW8.

The EPA audit of the site on 27th July 2011 noted the elevated levels of conductivity, ammonia and chloride in GW1 as well as the elevated levels of in GW2 as recorded in Q1 of 2011 and asked that an investigation is conducted so as to define the nature, source and cause of the elevated levels. This investigation is due for completion during 2012, with three new groundwater wells having being installed to the west of Phase 1.



## 13.4 Summary of Key Possible Impacts

There will be no impact on the soils and geology of the site as no further construction will be conducted as part of this proposal. The two cells which require filling have already been constructed as part of the previous consent issued by An Bord Pleanála.

The main impact for the continued landfilling in Phase 3 is the production of leachate. If not appropriately managed, it has the potential to pollute the underlying aquifer.

The water balance calculation conducted in Section 3 of the EIS indicates that the proposed increase in waste acceptance from 40,000 tpa to 50,000 tpa will result in a slight reduction in annual leachate generation quantities as the additional waste input will increase absorption values of the placed waste.

## 13.5 Mitigation Measures

Current measures employed at the site to control leachate impact include leachate minimisation and leachate containment using the in-situ composite landfill liner system in Phases 2 and 3 of the landfill. The effects of possible leachate impact from Phase 3 are further mitigated by a dual liner, affording a further impermeable barrier beneath the upper liner along with the added thickness of enhanced clay liner (of permeability $10^{-10}$ m/sec). The protection afforded by this liner is five times greater than that given by a Landfill Directive liner system. Therefore, the risk of leachate reaching the bedrock is considered negligible from this portion of the site.

'The old unlined landfill area was capped in 2006 (to c. 90% completion) with the remaining 10% capped in 2008. The capping make-up, as prescribed in the licence, is to the unusually high specification of 1 m of soils (topsoil and subsoil) on drainage layer on geosynthetic clay layer on fully welded 1mm LLDPE layer on gas equalisation layer. Thus there are two environmental barrier layers, reducing significantly the potential for rainfall percolation through the capping system. The potential for future leachate generation is thus reduced below the standard level for engineered capped landfills.'

## 13.6 Residual Impacts after Mitigation

With regards to the proposed development, there is no residual impact on the soils and geology as no further construction is required onsite.

It is evident that the landfill is impacting on groundwater quality downstream of the site. The source of this pollution is most likely from the unlined portion of the landfill (Phase 1) and this will most likely continue for some time, regardless of whether the site remains closed or not.

Private wells sampled to the north & north west of the site in 2010 and 2011 did not indicate any contamination from the landfill.

With regards to hydrogeology and groundwater quality, the existing unlined landfill is impacting on the groundwater quality downstream of the site. The proposed development involves the filling of already constructed cells which have a clay liner to restrain leachate migration. This liner is five times greater than that required by Landfill Directive liner system. Therefore, the risk of leachate reaching the bedrock is considered negligible from Phase 3 of the site. The proposed development will not increase the risk of groundwater contamination.



## 13.7 Monitoring

The groundwater monitoring programme, as set out in the waste licence, will continue to assess groundwater quality at the site.

## 13.8 Conclusion and Summary

A desk-top study was undertaken to review the existing geology and hydrogeology of the site and surrounding area and assess the impacts of the proposed development on this environment. It is evident from data collected upstream and downstream of the landfill, that groundwater quality is being impacted on. The source of this is mostly likely leachate from the unlined portion of the site. Private wells sampled to the north & north west of the site in 2010 and 2011 did not indicate any contamination from the landfill.

The proposed development will not impact on the soils and geology of the site as no further construction works will be required. There is a potential for groundwater contamination as a result of leachate leakage, however the remaining cells of Phase 3 have been constructed with a clay liner five times greater than that required by Landfill Directive liner system. The risk of leachate reaching the bedrock is considered negligible from Phase 3 of the site and therefore the proposed development will not increase the risk of groundwater contamination.

# 14 LANDSCAPE

This section describes the existing landscape, the visual character of the existing facility and the potential visual impact of the proposed continued landfilling activities at Powerstown

## 14.1 Introduction

The term 'landscape' refers primarily to the visual appearance of the area, including its shape, form and colour, and the interaction of these elements to create specific patterns that are distinctive to particular localities. However, the landscape is not purely a visual phenomenon. Its character relies closely on the local physical geography and environmental history. Besides any scenic and/or visual dimension, there are also a whole range of other constituents of significance. These include:

- Topography
- Ecology
- Landscape history
- Land use
- Buildings and settlement
- Architecture

This section deals with these factors only in so far as they impinge on the landscape and visual characteristics of the locality, setting out how the proposed development(s) interact with them and specifying any significant environmental effects.



## 14.2 Methodology

The landscape character of the area in and around the Powerstown facility was assessed by means of a desk-based study to assess the available information in relation to the sensitive landscapes in the area of the proposed development, the presence of sensitive visual receptors and the presence of sites of cultural significance in the vicinity of the Powerstown Facility.

Once this was completed, an assessment of both the positive and negative impacts of the proposed continued use of Powerstown landfill on the surrounding area in terms of the visual impact was undertaken. These impacts are presented in this section, as well as the mitigation measures proposed, if appropriate, to mitigate the negative impacts.

The data and publications used to compile the baseline assessment were as follows:

- County Carlow Development Plan 2009 - 2015
- South East Regional Authority, Regional Planning Guidelines, 2010 – 2022
- Carlow Heritage Plan 2007.

The Powerstown facility was visited by personnel from FTC on a number of occasions in 2011. A site walkover and survey of the surrounding area was undertaken. The purpose of theses was to assist in the characterisation of the landscape in the local and broader context, identify sensitive receptors and assess how the character of the landscape had changed since submission of the previous application in 2004.

## 14.3 Existing Landscape

A landscape character assessment of County Carlow was completed as part of the County Carlow Development Plan 2009 – 2015.

The assessment identified four landscape character areas within the County:

- Central Lowlands
- River Slaney - East Rolling Farmland
- Blackstairs and Mount Leinster Uplands
- Killeshin Hills

Powerstown landfill lies with the Central Lowlands area which occupies a substantial portion of the County and includes the County's major settlements including Carlow Town.

This assessment also divides the County into generic landscape types which include:

- Uplands
- Rolling farmland
- Rolling Farmland with Plantations/ Woods
- Farmed Lowland Ridge
- Fertile Plain
- Narrow River Valley
- Broad River Valley
- Hilly Farmland with Rough Grazing
- Built Up

The Powerstown facility falls within the farmed lowland landscape type.

The Development plan describes this landscape as "..*primarily rural, with medium to quite large fields defined by well maintained and generally low hedges and occasional to frequent hedgerow trees…….. Its historically determined land uses derive from the high fertility of the soil and the gentle topography. A dense network of local roads traverses the area in addition to the N80 and the N9…….There are isolated gravel and quarry workings in the area. Extraction of sand and aggregate has been taking place for some time in the area*".

The existing landfill is located in the townland of Powerstown, approximately 8 km south of Carlow town and 7 km north of Bagenalstown. The site is defined by a local road (L3045) to the south and west, the M9 motorway to the west & north, Powerstown Stream to the north and agricultural landscape to the east and north. The landfill occupies a total area of approximately 24 ha (including buffer zone) and lies approximately 50-60 mOD. Figure 14.1 shows the view from the top of landfill towards the new M9 motorway.



**Figure 14.1: View from Phase 2 looking north west along the M9**

Two quarries exist along the L3045 which runs along the south of Powerstown landfill. One of these quarries abuts the boundary of Phase 1 of the facility as indicated on Figure 14.2. This view was taken from the top of the cap on Phase 1 looking into the quarry. A second quarry is located further east on this road.

The wider area includes a number of other quarries to the south and east as well as improved grassland used for grazing and silage making. Hedgerows typically form the field boundaries and consist of linear strips of shrubs with occasional trees.

**Figure 14.2: Sand and gravel Quarry located on the south eastern boundary of the landfill**



Topographically, the Powerstown facility lies almost equidistant between Gallows Hill (approximately 300 mOD) 6 km to the west and a peak to the east (195 mOD) in the townland of Graiguralug. The landscape to the south and north is similar to that of the Powerstown facility. The construction of the M9 motorway along with Junction 6 in the immediate vicinity of the site has significantly altered the local landscape.

The greater landscape is characterised by fertile gently undulating pasturelands with a dense hedgerow grid defining field boundaries, copses of mature trees and small rural roads. Forestry plantations are located along Gallows Hill adding to the man made nature of the landscape.

The surrounding landscape is dotted with farmsteads, individual dwellings and a number of archaeological sites and monuments of interest. These are discussed further in Section 7 – Human Environment and Section 15 Archaeology, Architecture and Cultural Heritage. The River Barrow is the predominant surface water feature in the landscape meandering in a north south direction to the west of the site. This river is a European designated site. A number of tributaries flow to the river from the areas of high ground to the east and west of the site including Powerstown Stream, to which the Powerstown facility drains to.

As described in earlier chapters, the landfill has been in operation since 1978. As part of the 2004 application for the development of Phase 3 of the landfill, a number of viewpoints were assessed from various locations around the site. To illustrate how the landscape has changed in the intervening periods, photos were taken at the same locations (where accessible) in July 2011, the results of which are described below. Figure 14.3 shows the locations of these points.

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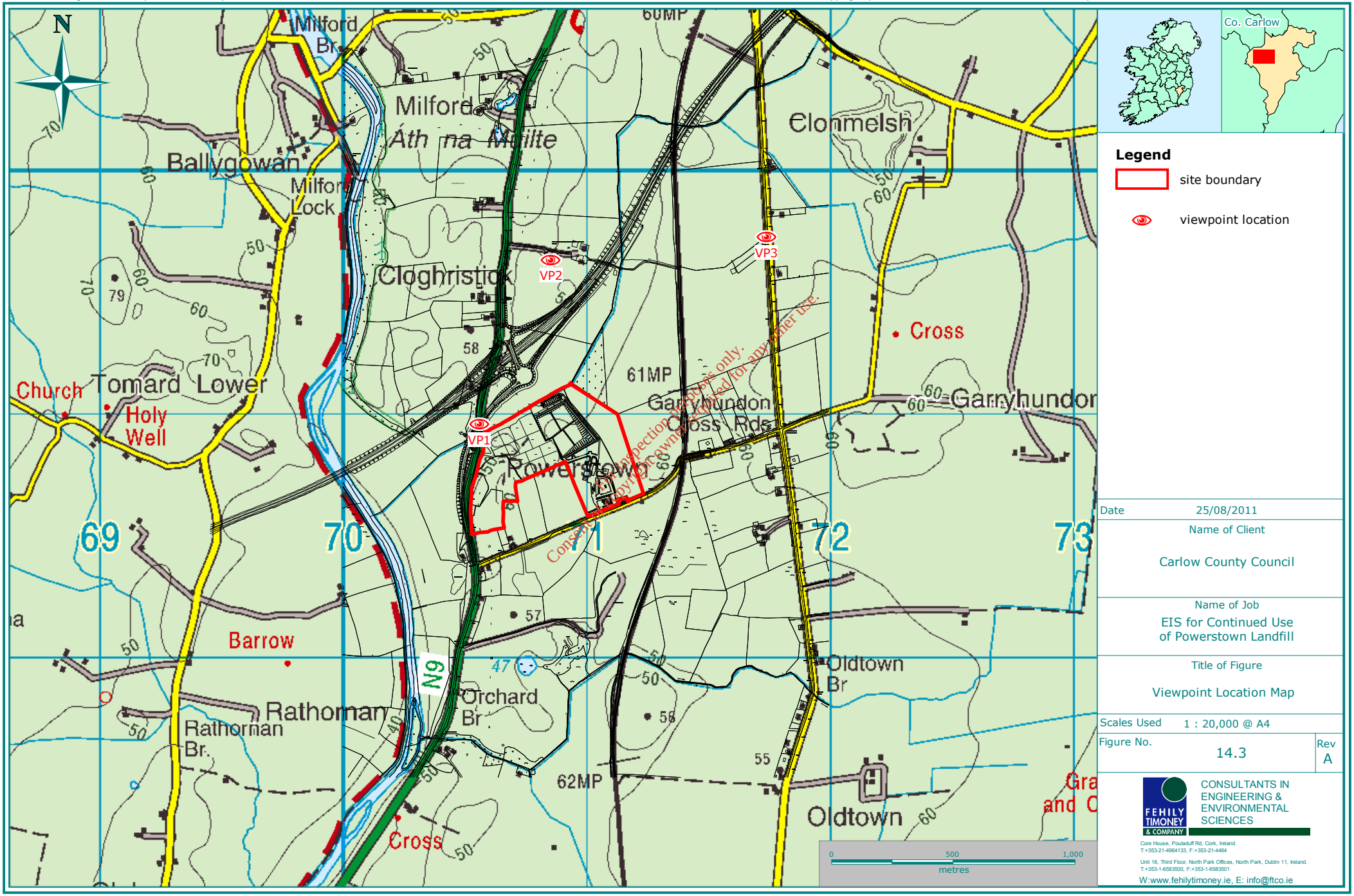
LW11-120-03_Figure 14.3_Viewpoint Location Map_Rev A





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| Date | 25/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Viewpoint Location Map |
| Scales Used | 1 : 20,000 @ A4 |
| Figure No. | 14.3 |
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## Viewpoint 1 along the N9 near a residence to the west

Viewpoint 1 was originally taken adjacent to a dwelling which was located on the old N9 looking east into Phase 2 of Powerstown landfill (Figure 14.4). Views from this locations were largely screened by semi-mature trees and vegetation planted along the boundary of the landfill site.

### Figure 14.4: Viewpoint 1 in 2002 looking west onto the site



This dwelling has since been demolished as part of the construction for the M9 motorway and the old N9 (now the R448) has also been realigned to accommodate the construction of Junction 6. These works have resulted in some of the screening vegetation being removed which allow intermittent views of the landfill by road users. What is clearly noticeable is that the semi-mature vegetation in Figure 14.4 has grown significantly providing ample screening of large portions of the site (Figure 14.5).

### Figure 14.5: Viewpoint 1 in 2011 looking west onto the site

### Viewpoint 2: Viewpoint off a laneway along the N9

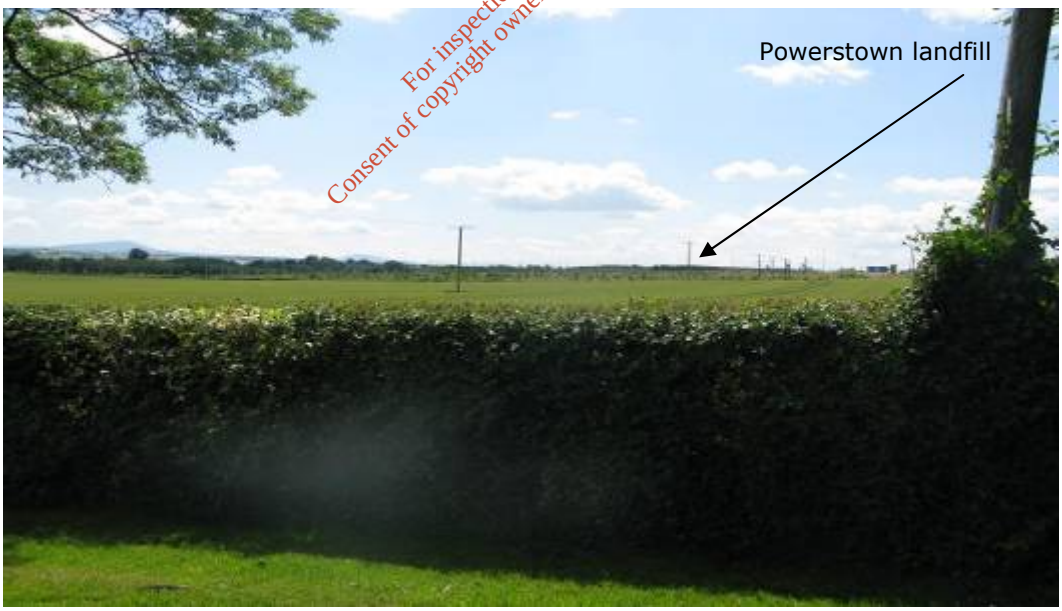
This viewpoint was taken from a laneway off the old N9 less than 1 km north of the landfill. In 2002 the landfill, in particular phases 1 and 2 were clearly visible in the background as shown in Figure 14.6.

### Figure 14.6: Looking South towards the landfill in 2002


The site is still visible from this location in 2011 as shown in Figure 14.7. It must be noted that the 2011 view was taken further away than the 2002 photo which results in the landfill been less intrusive on the skyline in the Figure 14.7, which in fact is not the case.



### Figure 14.7: Looking South towards the landfill in 2011




#### Other Views

The site is generally not visible from the local road north of Garryhundon Cross Roads. However, vehicles and pedestrians travelling on the local access road to the south of the site have a clear view of the entrance, site office and associated ancillary infrastructure as shown on Figures 14.8 and 14.9.

**Figure 14.8: View of site entrance & site office from L3045**

**Figure 14.9: Views of capped areas of the landfill from L3045**



## 14.3.1 Landscape Amenity

The principal amenities in the greater area surrounding the site are based largely in the towns of Carlow, Leighlinbridge and Bagenalstown. The County Carlow Development Plan 2009 - 2015 identifies various scenic routes, amenity areas, public walkways, designated sites, and areas of local natural, archaeological and historical interest. Only the closest features of interest are discussed below.

*Amenity Areas*

The following amenity areas are located in the vicinity of the landfill:

- River Barrow and Valley – This is the closest amenity to the site located approximately 1 km to the west of the landfill. The development plan describes it as a one of Carlow's principal *tourist asset* as well as being designated a cSAC.
- Castlecomer Plateau – This Plateau is an upland area extending between Carlow, Laois and Kilkenny. The Carlow section is at northwestern end of the County: the Rossmore Plateau, which is the highest point of the range (334 m), located some 5 km from Carlow Town. There are extensive views of the entire County from positions on the Plateau.

Appendix 7 – *Views, Prospects and Scenic Routes* of the Carlow County Development Plan identifies scenic views and route across the county. These have been assigned a value from 1- 4 with 1 being described as a 'unique landscape' while 4 is described as a "*view/vista which is potentially of value but has been degraded by the intrusion of inappropriate elements*".

With respect to the Powerstown facility the following views and routes are located within the vicinity of the site:

**Table 14.1: Scenic Routes in the vicinity of the site**

| ID | Location | Route | Feature | Quality |
|---|---|---|---|---|
| 5 | Ballyryan | L3052-42 | Panorama to west of route | 4 |

**Table 14.2: Scenic Views in the vicinity of the site**

| ID | Location | Orientation | Route | Type | Features | Quality |
|---|---|---|---|---|---|---|
| 26 | Killyballyhue | southeast | L30504 | Vista | Panorama of Central Plain to Blackstairs | 4 |
| 27 | South of Nurney | 280 -340º | L7146 | view | Hill with forest at Newtown/Bradleys Cross | 3 |
| 29 | Leighlinbridge | south | R705-24 | view | River Barrow | 2 |
| 30 | Leighlinbridge | north | R705-24 | view | River Barrow & Black church | 2 |
| 33 | Milford | East & north | L3039 - 14 | view | River Barrow | 2 |



The location of these in relation Powerstown landfill is illustrated on Figure 14.10.

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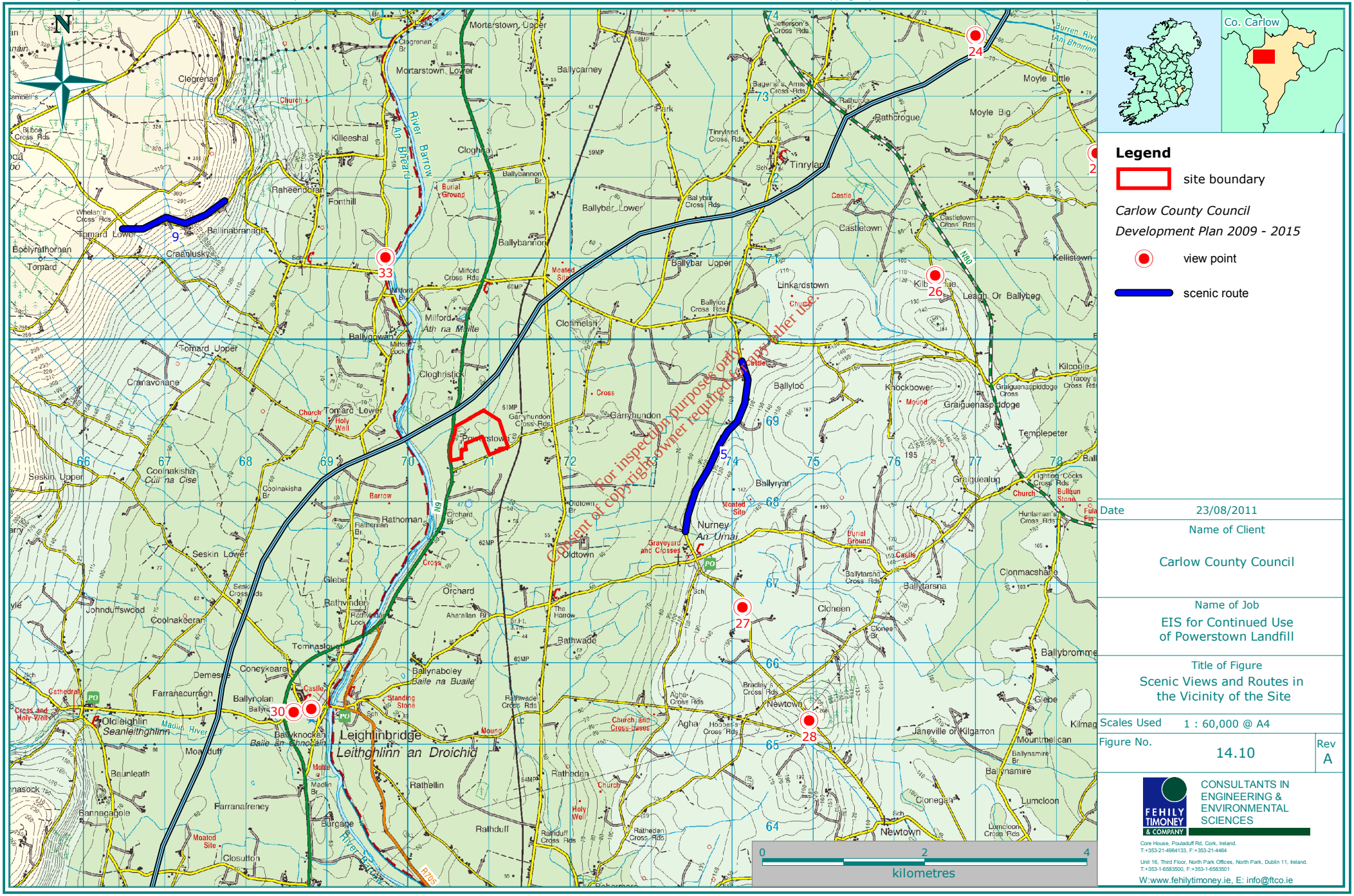
LW11-120-03_Figure 14.10_Scenic Views and Routes in the Vicinity of Site_Rev A



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| Date | 23/08/2011 |
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| Name of Job | EIS for Continued Use of Powerstown Landfill |
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| Figure No. | 14.10 |
| Rev | A |

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*Public Walkways*

There are a number of major walking routes/Bealach Siúlóide and Slí na Slainte through Carlow, such as at the South Leinster Way and the River Barrow walking route. *It is the intention of the Council to identify, promote and maintain a series of walking routes and to link these to a strategic network of trails into the county.* The Barrow walking route passes within 2 km of Powerstown landfill.

*Designated sites*

A total of three proposed Natural Heritage Areas (pNHAs), one NHA and one Special Area of Conservation (SAC) occur within 10 km of the site. These are discussed in further detail in Section 11 - Flora and Fauna but in summary include:

- Ballymoon Esker pNHA (site code 000797)
- Cloghristick Wood pNHA (000806)
- Whitehall Quarries pNHA (000855)
- Coan Bogs NHA (002382)
- River Barrow and River Nore SAC (002162)

*Sites and Features of Archaeological and Historical Interest*

These are discussed in greater detail in Section 15 – Archaeology, Architecture and Cultural Heritage.

## 14.4 Assessment Methodology

This landscape and visual impact assessment has been undertaken in accordance with the following guidelines:

- Department of Environment and Local Government - *Landscape and Landscape Assessment, Consultation Draft of Guidelines for Planning Authorities, June, 2000*
- The Landscape Institute - Institute of Environmental Assessment – *Guidelines for Landscape and Visual Impact Assessment, 2nd Edition, 2002.*



### 14.4.1 Visual Impact Assessment

The landscape impact assessment describes the nature and scale of changes to the landscape elements and character and outlines the effect of the proposed development on the landscape character of the area. Landscape impacts may be viewed as positive, neutral or negative.

The magnitude of the effects from the proposed pipeline on landscape is rated as follows:

- No change – very minor loss or alteration to one or more key elements/features/characteristics of the baseline i.e. the introduction of elements that are not uncharacteristic with the surrounding landscape
- Low – minor loss or alteration to one or more key elements/features/characteristics of the baseline i.e. the introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape
- Moderate – partial loss or alteration to one or more key elements/features/characteristics of the baseline i.e. the introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape
- High – total loss or major alteration to one or more key elements/features/characteristics of the baseline i.e. the introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape

*Significance of Change*

The visual impact assessment describes the visual effects or changes due to the proposed. Visual impact may occur by means of intrusion and/or obstruction. These terms can be defined as:

- **Visual Intrusion**: An impact on a view without blocking
- **Visual Obstruction**: An impact on a view involving blocking thereof.

Visual impacts on a particular view may be viewed as positive, neutral or negative. The significance of these effects will be rated as follows:

- *Little/None* - arises where the proposal is adequately screened by existing landforms, vegetation or the general built environment and there is no discernible deterioration within the existing view.
- *Low* - arises where views affected by the proposal form only a small element in the overall panorama and there is a perceptible deterioration within the existing view
- *Moderate* - arises where an appreciable segment of the panorama is affected and where may be readily noticeable to the receptor or where there is an intrusion into the foreground and there would be a noticeable deterioration within the existing view
- *High* - arises where the view is significantly affected, obstructed or so dominated by the proposal as to form the focus of attention and there is a significant deterioration of the existing view.

## 14.5 Potential Visual and Landscape Impacts

The existing site gives rise to high visual impacts for road users along the R448 and the M9 motorway as well as to a number of dwellings to the south, east and north of the site. The impacts are permanent due to height of the landfill body itself.

The operation of the landfill beyond 2012 would result in additional impacts mainly from the traffic delivering waste as well as the placement of waste. The continued operation of the landfill at a higher tonnage will allow faster filling of the remaining void space thus reducing the duration of this element of the visual impact.



It must be noted however, that the visual impacts that will arise from the final capping of cells 15 and 16 will occur regardless of whether the site remains closed as these capping works are required under the existing waste licence for the facility (W0025-03).

Currently, Phase 1 and 2 of Powerstown landfill have been permanently capped and restored, while cells 15 and 16 have been filled with waste and areas of these cells have a temporary cap. If the landfill remains closed, Phase 3 of the site would not be restored in accordance with the profiles set out in the waste licence for the facility (refer to Figure 3.7) as cells 17 and 18 would not be filled to the required height.

## 14.6 Mitigation Measures

A closure, restoration and aftercare management plan (CRAMP) has been prepared and was submitted to the EPA for approval in July 2011 and includes for the restoration of all of Phase 3 so that the most appropriate profile for the landfill body can be achieved thus mitigating some of the visual impact. A copy of this is included in Appendix 10. This plan sets out the intended after use for the facility for sheep grazing with the landfill body being planted with species of grasses for meadows and pastures and wildflowers that could be sown either as a pure wildflower stand, or in a mix with grasses to establish a wildflower meadow. It is also intended that the settling pond will be planted with species appropriate to a wetland location.

## 14.7 Predicted Impacts after Mitigation

Even after the restoration and re-vegetation of the site, the Powerstown facility will continue to permanently impact on the landscape post mitigation, in particular for road users along the R448 and M9 motorway and a number of local residences. This is due to the nature and scale of the landfill body.

The permanent visual impact of the Powerstown facility cannot be completed mitigated due to its scale and elevation above surrounding lands. CCC have however minimised some of the low level visual impact through boundary planting which will continue to be maintained.

## 14.8 Conclusion and Summary

The visual appearance of the Powerstown facility has significantly changed since the 2002 application. These changes include the permanent capping and seeding of Phase 2 of the landfill, the construction and operation of Phase 3 of the landfill and the construction and operation of a new site entrance, administration office and civic amenity. The local landscape has also been significantly impacted by the construction of the M9 motorway to the west of Powerstown landfill.

The existing site gives rise to permanent landscape impacts for road users along the R448 and the M9 motorway as well as to a number of dwellings to the south, east and north of the site. The operation of the landfill beyond 2012 would result in continuing impacts mainly from the traffic associated with the delivery of waste and the placement of waste. It must be noted however, that the visual impacts that will arise from the final capping of cells 15 and 16 will occur regardless of whether the site ceases activity in 2012 or not as these capping works are required under the existing waste licence for the facility (W0025-03).

# 15 ARCHAEOLOGY, ARCHITECTURE & CULTURAL HERITAGE

## 15.1 Introduction

This section examines the importance and sensitivity of the known and the potential archaeological, architectural, industrial archaeological and cultural heritage environment of the Powerstown Facility and the surrounding area. It aims to identify the impact of the proposed development on this environment and to propose mitigation measures to reduce any impacts.

## 15.2 Assessment Methodology

The impact assessment methodology undertaken included:

- A desktop study of previous assessment carried out by Headland Archaeology (2003), Irish Archaeology Consultant Limited (Phase 3 development 2005) and the EIS for M9 Motorway
- The files of the Archaeological Survey of Ireland were consulted to ensure all archaeological monuments in the area are included
- Review of the Carlow County Development Plan which contains catalogues of protected sites and structures within its respective administrative area. This was consulted to obtain information on sites within close proximity to the Powerstown facility to identify architectural features & protected structures in the vicinity of the site
- National Inventory of Architectural Heritage (NIAH) - This is a section within the Department of Environment, Community and Local Government (DoECLG) (formerly known as DoEHLG). The work of NIAH involves identifying and recording the architectural heritage of Ireland from 1700 to the present day.
- National Monument Service register –http://webgis.archaeology.ie/NationalMonuments/FlexViewer/

The proposed development was examined to assess if potential areas of archaeological, architectural and cultural heritage significance are likely to be impacted. Impacts are defined as:

  - Direct Impact - where a cultural heritage site is physically located within the footprint of the proposed development
  - Indirect Impact - where a cultural heritage site is located in close proximity to the footprint of a proposed development
  - No Predicted Impact - where the potential development does not adversely or positively affect a cultural heritage site



Mitigation measures are outlined for areas where potential impacts are highlighted in order to avoid, reduce or offset adverse impacts.

## 15.3 Existing Environment

Carlow has a rich archaeological heritage which ranges from megalithic tombs, to early ecclesiastical enclosures, medieval earthworks and buildings and industrial archaeology. The Archaeological Inventory of the Country lists 807 sites dating from the Neolithic period to the end of the 17th Century.

Some of the most interesting sites are Rath Gall Hill Fort (on the Wicklow Carlow border near Tullow), Brownshill Dolmen near Carlow town, and Haroldstown Dolmen. The most important ecclesiastical site is the church of Saint Lazerian in Old Leighlin and the monastic settlements at St. Mullins, Clonmore and Killeshin. Interesting castles and castle ruins include Carlow Castle, Clonmore Castle, Ballymoon Castle and Ballyloughin Castle.

Other sites and structures of historic importance include the Barrow Navigation which includes weirs, mills, malt houses, bridges and lock keepers houses. The River Barrow historically allowed goods to be transported to the coast for export to other markets.

Other industrial archaeological sites within the county include sites and machinery relating to extractive industries, manufacturing, service industries, power and transport and communications. These sites would include for example bridges, water pumps, mills, railway bridges, lime kilns and structures associated with coal mining. This heritage relates to the last 250 years, during which Ireland became industrialised.

The geology of the county has influenced the landscapes, soils, habitats, economic activities such as quarrying and features of local cultural interest such as stonewalls and limekilns. The Carlow County Development Plan recognises the need to identify sites of geological and geomorphological interest within the county and to protect these sites. There are two sites of geological interest in the vicinity of Powerstown landfill and they are Morrissey's quarry at Clonmelsh 1 km north east of the landfill site and Clogrenan Quarry 3 km north west of the landfill site.

From the review of the Record of Protected structures there are no protected structures with 1 km of the Powerstown facility.

There are however 9 recorded monuments within 1 km of the site as summarised in Table 15.1. Three of these records are now redundant due to the construction of the M9 motorway.

### Table 15.1: Recorded Sites and Monuments within 1 km of the site

| SMR | Class | Townland |
|---|---|---|
| CW012-089---- | Fulacht fia | CLOGHRISTICK |
| CW012-094---- | Ring-ditch | CLOGHRISTICK |
| CW012-119---- | Burial | CLOGHRISTICK |
| CW012-120---- | Excavation | CLOGHRISTICK |
| CW012-121---- | Redundant record | CLOGHRISTICK |
| CW012-122---- | Metalworking site | CLOGHRISTICK |
| CW012-129---- | Redundant record | CLOGHRISTICK |
| CW012-134---- | Redundant record | CLOGHRISTICK |
| CW012-132---- | Water mill | CLOGHRISTICK |
| CW012-043---- | Barrow ring-barrow | RATHORNAN |



Four of the recorded sites are located in the townland of Powerstown and are classified as National monuments. A summary of these is provided in Table 15.2. None of these are within the boundary of the Powerstown facility.

### Table 15.2: National Monuments within 1 km of the site

| National Monument Ref | Class | Townland |
|---|---|---|
| CW012-023---- | Moated site | Powerstown |
| CW012-128---- | Excavation | Powerstown |
| CW012-093---- | Enclosure | Powerstown |
| CW012-104 | Castle – unclassified | Powerstown |

Excavation undertaken in advance of the construction of the M9 motorway to the east of the Powerstown facility uncovered a moated site *c*. 500 m to the north east of the site, which is a rectangular or square earthwork with a moat used to enclose houses and outbuildings.

It also identified an enclosure generally described an enclosed area, with a rectilinear or circular morphology c 900m north east of the landfill site.

The majority of the remaining sites and monuments are located to the north of the site in close proximity to the new M9 motorway. In the townland of Cloghristick derived from Cloch Risteard meaning "*Richards Stone*", there is a mill complex and mill race. As you move south west through the townland of Cloghristick, there are a number of redundant archaeological records. There is also a *fulacht fia* just north of the landfill site. This was used by the ancient Irish tribe, the Fianna, to cook deer.

The location of these recorded sites and monuments are shown on Figure 15.1.

Within the footprint of the Powerstown facility, Headland Archaeology Ltd conducted an archaeology assessment for inclusion in the EIS for the Powerstown landfill extension (Phase 3) in 2003. This work included a detailed desk based study of relevant cartographic and documentary sources and a walkover survey of the site was undertaken.

During the desk based study, 1st and 2nd editions of the Ordnance Survey were inspected. No archaeological sites were noted on the OS maps but the 1st edition (surveyed 1839) does show a lime kiln adjacent to the natural mound in the northern part of the site. This was clearly one of a number of ephemeral kilns in the area at that time. By the time of the Second Edition OS map, this kiln seems to have been moved. No surviving traces of either structure were seen during the site walk over walkover. The desk based study concluded that there was no known archaeological sites or finds within the boundary of the development site. Three known monuments were identified within a 1 km radius of the site; a *fulacht fiadh* (burnt mound CW012-89), a rectangular enclosure (CW012-94) and an enclosure (CW012-23) as shown on Figure 15.1.

The subsequent site walkover undertaken by Headland Archaeology Ltd did not identify any new sites however it was noted that a natural mound close to the northern perimeter of the site, was an obvious local landmark and could potentially have been a focus for human activity. There was, however, no direct evidence to support this.



On grant of planning permission of the Phase 3 extension, a planning condition required that a suitably qualified archaeologist be employed to monitor all topsoil stripping and earthmoving associated with the construction phase, in order to conserve the archaeological heritage of the site and to secure preservation of any archaeology which may exist within it.

Irish Archaeology Consultancy Limited was appointed as archaeologists for the development. A continuous archaeological presence was maintained throughout all sub-surface works associated with construction of the landfill extension. Excavation of the extension area took place with a bulldozer under archaeological supervision on the 7th & 10th November 2005.

No features or finds of archaeological significance was uncovered during monitoring of the proposed development. A copy of their report is included in Appendix 11.

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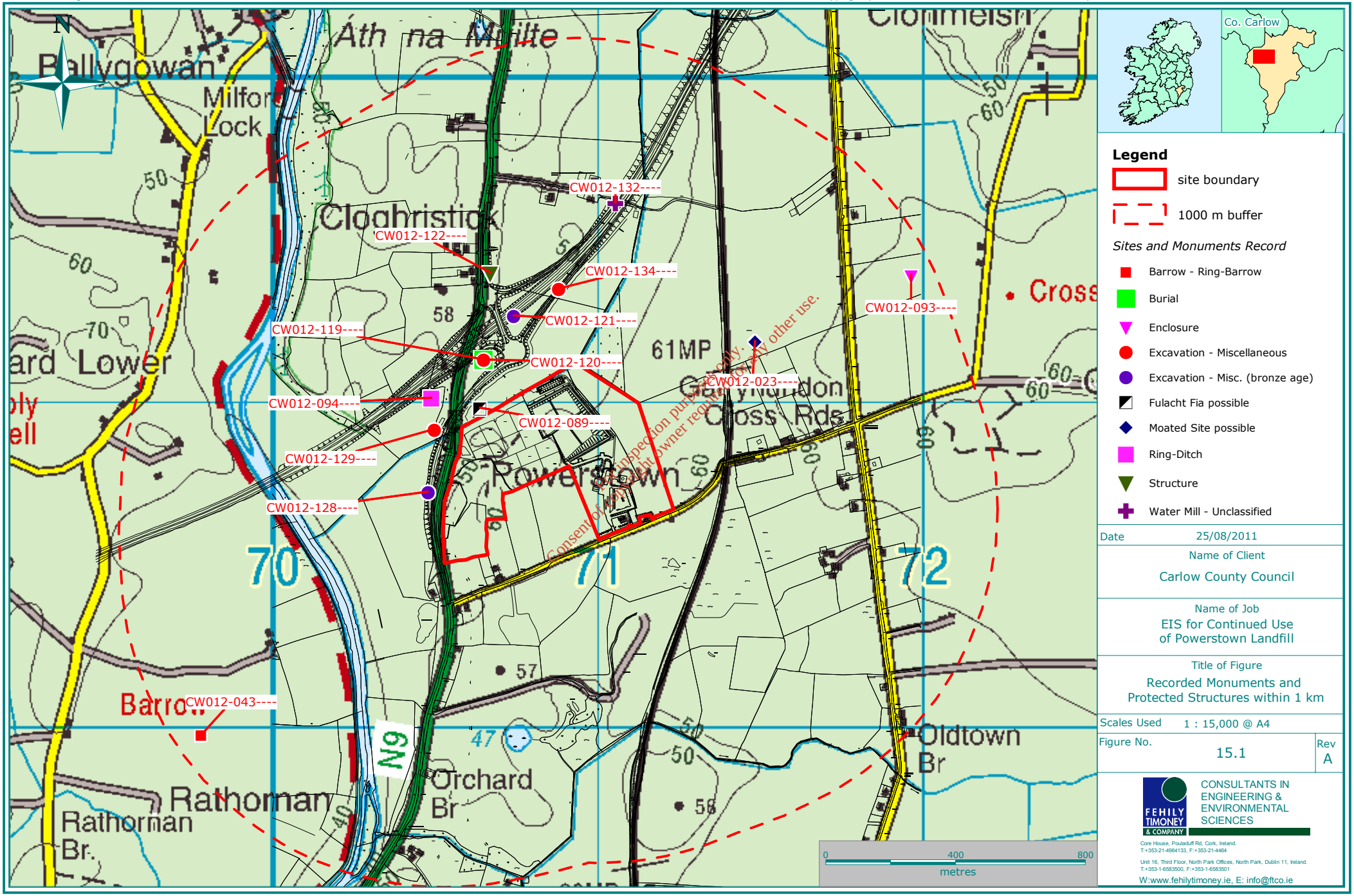
LW11-120-03_Figure 15.1_Recorded Monuments and Protected Structures within 1 km_Rev A











**Legend**

- site boundary
- 1000 m buffer

*Sites and Monuments Record*

- Barrow - Ring-Barrow
- Burial
- Enclosure
- Excavation - Miscellaneous
- Excavation - Misc. (bronze age)
- Fulacht Fia possible
- Moated Site possible
- Ring-Ditch
- Structure
- Water Mill - Unclassified

| | |
|---|---|
| Date | 25/08/2011 |
| Name of Client | Carlow County Council |
| Name of Job | EIS for Continued Use of Powerstown Landfill |
| Title of Figure | Recorded Monuments and Protected Structures within 1 km |
| Scales Used | 1 : 15,000 @ A4 |
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## 15.4 Summary of Key Possible Impacts

### 15.4.1 Construction Impacts

As there will be no construction activities required for the continued operation of the Powerstown landfill i.e. all necessary infrastructure is in place, there will be no direct or indirect operational impact on the archaeological, architectural or cultural heritage resource.

### 15.4.2 Operational Impacts

With regards to the recorded site and monuments in close proximity to the landfill, there are potential indirect visible impacts from the existing landfill and the existing motorway development. The proposed development will not alter the visibility from these sites and therefore there will be no further impact on these sites due to the continued landfill activities.

## 15.5 Mitigation Measures

As there will be no construction activities required for the continued operation of the Powerstown landfill i.e. all necessary infrastructure is in place, no mitigation measures are required.

## 15.6 Residual Impacts after Mitigation

The Powerstown facility will continue to visually impact on nearby recorded sites and monuments once the site is closed and restored.



## 15.7 Monitoring

There is no additional monitoring required for archaeology onsite.

## 15.8 Conclusion and Summary

Carlow has a rich archaeological, architectural and cultural heritage. While there are some 13 recorded sites and monuments within 1 km of the Powerstown facility, none of these are recorded within the footprint of the facility. Three of these records are now redundant due to the construction of the M9 motorway. Archaeological monitoring undertaken during the construction of Phase 3 of the landfill did not identify any archaeological sites.

# 16 MATERIAL ASSETS

## 16.1 Introduction

This section examines existing material assets in the area of the Powerstown Facility. It predicts the impacts that may occur on these assets and the measures proposed to mitigate these effects. Consideration is given to both the construction and operational phases of the development.

## 16.2 Assessment Methodology

A desk-top study was undertaken to outline the material assets in the existing environment. In order to assess the impacts of the proposed development on material assets, a review of the proposed development to identify potential impacts on material assets was undertaken and the significance of these impacts assessed.

Impacts on transportation infrastructure, archaeology, architecture and cultural heritage and local settlements have been discussed in their relevant sections, and should be read in conjunction with this Section.

## 16.3 Existing Environment

Material assets are outlined by the EPA in their *Advice Notes on Current Practice for the Preparation of Environmental Impact Statements* (2003) as '*resources that are valued to specific places*'. They may be of human or natural origin and can be important for either economic or cultural reasons. This section focuses on economic material assets. The main areas examined with respect material assets are:

- Transportation infrastructure (roads, railways, airports etc)
- Major utilities (water supplies, sewage, power systems etc)
- Ownership and access
- Non-renewable resources (e.g. minerals, soils)
- Renewable resources (hydraulic head, wind exposure)
- Cities, towns, villages and settlements



Existing transportation infrastructure, archaeological, architecture and cultural assets and local settlements has been discussed in previous sections above.

### 16.3.1 Utilities Infrastructure

Utilities infrastructure is necessary to ensure that power (electricity/gas), water and amenity services, such as telecommunications and sewer collection, are provided to communities in a reliable consistent manner. Due to a community's dependency on such sources, any disruption to a utility supply can have a negative impact.

An overhead three phase medium voltage 10 kV ESB line runs north south across the western section of the site (Phase 1). A single phase medium voltage 10 kV ESB line connects off the previous line to the south west of the site and runs to the facility entrance. A further line connects off this and runs in a northerly direction along the boundary of the facility. This line provides electricity to the existing site.

Telecommunications run north - south along the R448 and serves the local community and also service the main administration buildings onsite. A source of potable water for use in canteen, welfare facilities and for general site cleaning is sourced from the Local Authority mains supply.

There is no gas pipeline in the vicinity of the site and there is no foul sewer service in the area. All foul effluent generated from administration welfare facilities is collected and treated in a proprietary wastewater treatment system onsite.

### 16.3.2 Ownership and Access

CCC has full ownership of the site area in which the existing and proposed development is located. They have significantly invested in the upgrading of the local access road to the site to ensure appropriate and safe access (as discussed in Section 10 Traffic).

### 16.3.3 Non-Renewable Resources

There are a number of quarries and pits in the wider surrounding area. The existing site itself is underlain with a soil parent material of fluvio-glacial coarse gravels and sands and gravelly sandy loams.

### 16.3.4 Renewable Resources

There are no wind energy facilities in proximity to the site. There is a hydropower facility in Milford operated by Strongstream Limited with a capacity of 240 kW.

There are two private wells monitoring as part of the waste licence for the facility. One of these wells is used for drinking water purposes. These are assessed in more detail in Section 13.

## 16.4 Summary of Key Possible Impacts

### 16.4.1 Property Values

There is a perception that property values will be depressed by the proximity of a landfill. The potential impact on residential properties arises principally from a combination of visual, noise, air and traffic effects. These have been identified and their mitigation discussed in the preceding sections of this document.

As the proposed development is a continuation of the operation of the existing site, impacts on property values will not change.



### 16.4.2 Utilities Infrastructure

The road network servicing the site is good. The increases in traffic volumes associated with the increase in waste intake from 40,000 tpa to 50,000 tpa will results in approximately 2 additional movements per hour. Although current waste inputs are significantly lower than 40,000 tpa, the site has operated at this maximum tonnage from 2006 -2008 without any traffic issues. These factors coupled with the fact that the opening of the M9 motorway has now led to a significant reduction in traffic volumes along the Old N9 (16% from 2009 to 2010) and therefore there will be no significant impact on the local road infrastructure.

Potential impacts on other utilities mainly occur during construction activities where severance or disruption of services occurs. As there will be no construction activities required for the continued operation of the landfill, there will be no impact on utility infrastructure.

### 16.4.3 Ownership and Access

There will be no impacts on ownership and access to lands from the continued operation as the Powerstown Facility is owned by CCC. The adjacent buffer zone is retained in agreement with the landowner.

### 16.4.4 Non-Renewable Resources

There will be no additional requirements for non-renewable resources for the continued operation of the landfill over and above those required for the final capping of Phase 3 of the landfill which will happen regardless of whether this application is given approval or not.

### 16.4.5 Renewable Resources

The proposed development will not impact existing renewable resources or potential future renewable resources surrounding the site.

## 16.5 Mitigation Measures

There is no requirement for mitigation measures in relation to material assets as it is considered that the proposed development will not impact existing materials in the surrounding environment.

## 16.6 Residual Impacts after Mitigation

Residual impacts on materials assets due to the proposed development are considered to be minimal.

## 16.7 Monitoring

There is no additional monitoring required for material assets onsite.

## 16.8 Conclusion and Summary

Continued operation of landfilling activities at Powerstown will take place within the existing constructed cells, therefore impacts on property values, utilities and renewable and non-renewable resources are not predicted to change as a result of the proposed development.

# 17 THE DEVELOPMENT AND ITS IMPACTS IN CONTEXT

## 17.1 Introduction

The previous chapters have described the potential impact of the development under a variety of different topic headings. The purpose of this chapter is to take a more holistic view. This ensures that there is adequate coverage in this EIS of the potential for the development to cause overall effects and cumulative impacts. This process also examines whether interactions between the different effects themselves may cause impacts that are greater than those alluded to when the relevant topics were discussed individually. As such, this chapter responds to the requirement of the legislation governing the EIA process for the cumulative effects and the inter-relationship or interaction between the various topics to be fully considered and described.

## 17.2 Impact Summary

The scale and nature of the impacts identified from the proposed development over and above the existing development is illustrated by Table 17.1. Here all of the more significant impacts referred to in the earlier chapters of this EIS are summarised. The definitions relating to the scale of the relevant impacts used in this table are based on those in Chapter 5 of the EPA's *Guidelines on the Information to be contained in Environmental Impact Statements*. For the purposes of this analysis, it is assumed that the proposed landfilling activities have a medium term life of fifteen years.

As the proposed development at Powerstown landfill is a continuation of the operation of the existing landfill post January 2012 and at a higher tonnage of 50,000 tpa, the majority of the environmental aspects examined for potential impacts with regards to the proposed development are neutral. That is, the proposed development will not increase the impacts on the receiving environment over that already of the existing development.



The proposed continued operation of landfilling activities may also cause some positive and negative impacts on the receiving environment. Examples of the negative impacts are increased traffic volumes associated with the increase in waste acceptance and a corresponding increase in noise emissions. However when these negative impacts are examined they are not significant. For example the proposed increase in traffic levels (2 movements per hour) can be accommodated within the existing road network and the environmental impacts are considered imperceptible with regards to noise emissions especially considering the large traffic volumes currently using the M9 motorway.

Also in the short term, if the landfill life is extended due to the decline in the amount of waste received at the facility, the visual impacts of everyday operation at the landfill will be extended. This will be adverse in the medium term however; impacts on visibility will not be greater than that experienced from the existing development. In the longer term, this proposed development will ensure that the constructed landfill cells are filled and restored in conjunction with the rest of the landfill.

Positive impacts from the proposed development include the continuance of the payment of the community fund to support community facilities in the area. Also in the case where the waste quantity accepted onsite is at the maximum rate of 50,000 tpa there will be a decrease in leachate generation onsite which will positively reduce the potential for groundwater contamination.

Table 17.1 confirms that the proposed development as a neutral impact for 17 of the 24 impacts summarised. Any adverse impacts are localised in their extent and that their significance can be described as slight and the table also outlines a number of positive impacts from the proposed development.

## Table 17.1: Summary of Relative Significance of Impacts with and without Mitigation

| Topic Area | Description of Impact | Geographical Scale | | | | | Impact | Duration | Significance Without Mitigation | Significance With Mitigation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | I | N | R | D | L | | | | |
| **Human Beings** | Local settlements, community facilities, industry, commerce | | | | | + | Neutral | Mt | - | - |
| | Community levy contribution towards community facilities | | | | | + | Neutral/ Positive | Mt | Moderate | - |
| | Employment generation | | | | + | + | Neutral | Mt | - | |
| | Amenity and Tourism – Visual impacts | | | | | + | Positive | Mt | Moderate | Slight |
| **Transportation** | Additional Traffic | | | | | + | Adverse | Mt | Slight | Slight |
| **Noise** | Construction Noise | | | | | + | Neutral | Mt | - | - |
| | Operational Noise | | | | | + | Adverse | Mt | Slight | Slight |
| **Ecological** | Impacts on designated areas | | | | | + | Neutral | Lt | - | - |
| | Impacts on flora and fauna onsite | | | | | + | Neutral | Mt | - | - |
| **Geology / Hydrogeology** | Soil and geology impacts | | | | | + | Neutral | Mt | - | - |
| | Groundwater contamination – decrease in leachate generation | | | | | + | Neutral/ Positive | Mt | Slight | Slight |
| **Hydrology / Surface water** | Surface water quality impacts | | | | | + | Neutral | Mt | - | - |
| | Hydrological impacts | | | | | + | Neutral | Mt | - | - |
| **Air & climate** | Dust during operation | | | | | + | Neutral | Mt | - | - |
| | Air emissions from operation | | | | | + | Neutral | Mt | - | - |
| | Vehicle emissions from operation | | | | + | + | Neutral | Mt | - | - |
| | Climate impacts | | + | + | + | + | Neutral | Mt | - | - |
| **Landscape / Visual** | Visual Impact of proposed development in medium term | | | | | + | Adverse | Mt | Slight | Slight |
| | Visual Impact of proposed development in long term | | | | | + | Positive | Lt | Slight | Slight |
| **Cultural Heritage** | Construction/operational impacts | | | | | + | Neutral | Mt | - | - |
| **Material Assets** | Impacts on property values | | | | | + | Neutral | Mt | - | - |
| | Impact on utilities | | | | | + | Neutral | Mt | - | - |
| | Use of non-renewable resources for landfill capping | | | | + | + | Neutral | Mt | - | - |
| | Impacts on renewable resources | | | | | + | Neutral | Mt | - | - |



**Key**

| Scale | | Duration | | Significance |
|---|---|---|---|---|
| I - | International | Tp - | Temporary (<1 yr) | Imperceptible |
| N - | National | St - | Short term (1-7 yrs) | Slight |
| R - | Regional | Mt - | Medium term (7-15 yrs) | Moderate |
| D - | County | Lt - | Long Term (15-60 yrs) | Significant |
| L - | Local | Pe - | Permanent (60+ yrs) | Profound |

## 17.3 Interactions, inter-relationships and cumulative effects

### 17.3.1 Cumulative Effects

In the context of an EIS, cumulative effects can relate to two different aspects of a development. Firstly, the various impacts of a particular project can interact in a manner which causes additional effects, which when taken together are greater than they appear when documented under separate topic headings. Secondly, a project may magnify impacts already associated with other built development. This may mean that, when a development is proposed at a greenfield location which is devoid of other significant built development, its impact is acceptable; by contrast, where it is proposed in conjunction with other development, the cumulative effect may be much greater. In some cases, the impacts of these multiple developments collectively may exceed that which is tolerable.

In relation to the issue of cumulative effects between this proposed development and other projects, the most obvious is the effect of a combination of the proposed development and the existing landfill development. The cumulative impacts of the M9 motorway development, especially as junction 6 is just north of the landfill, was also examined where relevant.

An analysis of the relevant cumulative effects is set out in the Table 17.2 where it can be seen that the main significant cumulative impacts are imperceptible or slight.

## 17.4 Conclusions on the Development & its Impacts in Context

The proposed development at Powerstown is for the filling of the remaining void space in Phase 3 of the landfill which facilitates the complete restoration of the landfill to previously agreed restoration contours. This void space has not been filled due to the economic downturn and in part due to market forces within the Irish waste industry.

The previous chapters of the EIS deal with any potential impacts that may occur as a result of the proposed development. The majority of the environmental aspects examined with regards to the proposed development have a neutral environmental impact. That is, the proposed development will not increase the impacts on the receiving environment over that already permitted under the existing development.

## Table 17.2: Summary of Cumulative Impacts of the Proposed Development

| | Cumulative Impact with Existing Landfill and M9 Motorway | Significance of Cumulative Impact | Scale of Cumulative Impact | Comment |
|---|---|---|---|---|
| **Human Beings** | Local settlements, community facilities, industry, commerce, employment | Imperceptible | Localised | No increased impacts above existing developments in the area |
| **Traffic** | Additional traffic from proposed development | Slight | Localised | Proposed development will create a modest increase in traffic levels |
| **Noise** | Additional noise from proposed development | Slight | Localised | Noise chapter indicates additional noise not significant |
| **Flora and Fauna** | Impacts on designated areas | Imperceptible | Localised | No impacts on the River Barrow and River Nore SAC and no additional mitigation measures required, above those already in place. |
| **Soil, Geology and Hydrogeology** | Additional removal of overburden | Imperceptible | Localised within development | There will be no impact on the soils and geology of the area as no further construction will be conducted |
| | Leachate generation | Slight | Localised | The proposed increase in waste acceptance will result in a positive reduction in annual leachate generation |
| **Hydrology / Surface Water** | Surface water run-off impacts | Imperceptible | Localised | Both developments are adequately attenuated |
| **Air and Climate** | Air emissions with regards to traffic increases | Imperceptible | Localised | Vehicle emissions will actually decrease due to initiatives to reduce vehicle derived emissions in future years. |
| **Landscape and Visual** | Cumulative visual effect on landscape, visual amenity and tourism | Slight | Localised | The proposed development will not alter the current visible impact of the landfill on the landscape. This visual impact may be extended over a longer period; to ensure full capping and restoration of the site. |
| **Cultural Heritage** | Ground disturbance during soil excavation/soil preparation | Imperceptible | Localised within development | There will be no additional ground disturbance for the proposed development or the M9 motorway. |
| **Material Assets** | Property, utilities, non-renewable resources, renewable resources | Imperceptible | Localised | No increased impacts above existing developments on material |

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