

# **ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**SECTION 37L APPLICATION FOR A  
SAND AND GRAVEL PIT AT  
ROSCAT, TULLOW,  
CO. CARLOW**

**Prepared For:**



**Prepared By:**

**Earth Science Partnership Ire. Ltd  
Tonranny  
Westport  
Co. Mayo  
April 2019**

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## 1.0 INTRODUCTION

### 1.1 Project Background

This Environmental Impact Assessment Report (EIAR) has been prepared to accompany an application under Section 37L of the Planning and Development (Amendment) (No. 2) Regulations 2015 regarding the proposed development of a 14.7ha sand and gravel pit located at Roscat, Tullow, Co. Carlow.

Section 37L permits quarry operators who were required to submit applications to An Bord Pleanála for Substitute Consent in respect of their quarries pursuant to Section 261A, the opportunity to submit an application to the Board for further development of their quarry subject to compliance with Section 37L. The provision states that an operator can only apply for further development “of a quarry as a quarry”. As such, this application for proposed future works is submitted in tandem with a retrospective Substitute Consent application (remedial EIAR and remedial NIS) for a 4.7ha area which overlaps the south western section of the Section 37L application area. The geographical location of the application site is illustrated on Figure 1.1 and 1.2, which are presented at the end of this chapter.

The development consists of 14.7 hectares comprising of the following:

- Removal of overburden where present and the construction of screening berms.
- Extraction of sand and gravel material down to 63mOD which is the level of the existing sand and gravel pit.
- Processing of extracted material and stockpiling on site.
- Landscaping and restoration of the site.
- All associated ancillary facilities/works.
- The applicant is seeking a 25 year permission as part of the application.
- The application is accompanied by an Environmental Impact Assessment Report and a Natura Impact Statement.

The 14.7 hectare application area can be divided into the following areas:

- Approximately 8 hectares of a greenfield area which is currently subject to agricultural use and which the applicant proposes to extract the available resource from.
- Approximately 6.7 hectares consisting of an area which is the subject of a Substitute Consent application to An Bord Pleanála, an area which is authorised by planning permission (Planning Ref: CW7850), the existing haul road to the site and undisturbed areas.



## 1.2 Proposed Application Site

The site is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site.

Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm is located nearby.

The site is situated on the eastern side of a minor valley which is defined by a small north-south trending ridge that peaks at 94 mOD, 1 km northeast of the site at Ellengrove Crossroads, and a wider area of raised ground which reaches 93 mOD, 1.8 km southwest of the site. This valley flattens out to less than 70 mOD a short distance southwest of the site. OS Discovery maps indicate the site elevation to be in the range 68 – 74 mOD.

The area immediately around the site is sparsely populated, with individual farmsteads and scattered houses along the road network. A series of irregular third class roads run around the lands, serving a number of dwellings and farms.

The existing sand and gravel pit area was registered with Carlow County Council in accordance with the requirements of Section 261 of the Planning and Development Act, 2000 (Quarry Ref. No. QY12/28). An area of 6.02ha of the landholding was registered in this process. A Substitute Consent application was submitted to An Bord Pleanála and relates to an area of 4.7 hectares. An area of 1.3 hectares is authorised by a previous planning permission (Ref: CW7850).

The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel will result in the extension of the existing pit area into the greenfield area. The area will be extracted down to a maximum level of 63mOD which is the level of the existing pit area. The final extraction level will vary from 63mOD at the south western portion of the greenfield area to a level of 64.5mOD in the north eastern portion of greenfield area. This will ensure that there is a buffer in place between the finished extraction level and the groundwater level. The restoration plan involves placing a layer of approximately 0.5m of overburden on top of extracted areas and returning to agricultural land.

Material will be extracted by excavators and exported to a processing plant offsite or will be processed on site using mobile processing plant which will process the material into various grades of aggregate, as and when required. Material will be processed into various grades depending on market demand for aggregate and will be stockpiled close to the processing plant or at designated stockpiles. Processing when undertaken will consist of dry screening with no washing of aggregate.

Plant and machinery which will operate in the application area will consist of tracked excavators, wheel loaders, dump trucks and mobile processing plant. Ancillary plant such as a water bowser for dust suppression will be deployed where required.

### 1.3 The Applicant

Kilcarrig Quarries Ltd is a long established company which has been supplying materials to the civil engineering and construction industries for the past 30 years. Kilcarrig Quarries produce a wide range of quarry products, precast products, a complete selection of building blocks, building stone, crushed rock, drainage material and building sands. In addition, Kilcarrig supply manufacture and supply precast products such as concrete stairs, concrete flooring and also a full range of precast products for domestic and agricultural construction, as well as ready-mix concrete and mortar. They supply and deliver quarry materials to Carlow, Kilkenny, Laois, Waterford, Wexford, Wicklow, Kildare, also the Greater Leinster and Munster Area from their network of quarry and pit developments.

### 1.4 EIAR Methodology

#### 1.5.1 EIAR Preparation

The primary objective of the EIAR is to identify baseline environmental and socio-economic conditions in the vicinity of the developments, predict potential beneficial and/or adverse effects of the development and propose appropriate mitigating measures where necessary. The following guidelines were considered as part of the preparation of this EIAR:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department by the Department of Housing, Planning and Local Government (August, 2018).
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (EPA, August 2017).
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Union, 2017)
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA, September 2015).
- Guidance for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of the Environment, Community and Local Government, 2013)

Information on the project and the receiving environment was obtained through a number of means including:

- Satellite imagery (Bing Maps);
- Site visits and field surveys;
- Site investigations (geotechnical, environmental etc.);
- Review of existing data for the general area of the site;
- Review of previous studies carried out at the site and locality;
- Consultation with interested parties.

This EIAR is prepared by the developer and is submitted to the relevant Planning Authority as part of the process. The relevant Planning Authority uses the information provided to assess the potential beneficial and/or adverse effects and proposed mitigation measures to determine if permission should be granted. The EIA Directive (2014/52/EU) describes information which should be included as part of an EIAR:

1. *“Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:*
  - (a) *A description of the project comprising information on the site, design, size and other relevant features of the project.*
  - (b) *A description of the likely significant effects of the project on the environment.*
  - (c) *A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment.*
  - (d) *A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.*
  - (e) *A non-technical summary of the information referred to in points (a) to (d).*
  - (f) *Any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*
2. *Where requested by the developer, the competent authority, taking into account the information provided by the developer in particular on the specific characteristics of the project, including its location and technical capacity, and its likely impact on the environment, shall issue an opinion on the scope and level of detail of the information to be included by the developer in the environmental impact assessment report in accordance with paragraph 1 of this Article. The competent authority shall consult the authorities referred to in Article 6(1) before it gives its opinion. Member States may also require the competent authorities to give an opinion as referred to in the first subparagraph, irrespective of whether the developer so requests.*
3. *In order to ensure the completeness and quality of the environmental impact assessment report:*
  - (a) *the developer shall ensure that the environmental impact assessment report is prepared by competent experts;*

- (b) *the competent authority shall ensure that it has, or has access as necessary to, sufficient expertise to examine the environmental impact assessment report; and*
- (c) *where necessary, the competent authority shall seek from the developer supplementary information, in accordance with Annex IV, which is directly relevant to reaching the reasoned conclusion on the significant effects of the project on the environment.”*

Article 3 of the EIA Directive (2014/52/EU) states that the following environmental factors/topics should be described and assessed:

1. *“The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*
  - (a) *population and human health;*
  - (b) *biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
  - (c) *land, soil, water, air and climate;*
  - (d) *material assets, cultural heritage and the landscape;*
  - (e) *the interaction between the factors referred to in points (a) to (d).*
2. *The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.”*

### 1.5.2 EIAR Format

The EIAR is presented in the ‘Grouped Format Structure’ which gives an introduction and overall project description, then examines each topic within individual chapters. The coverage of each topic includes descriptions of the relevant characteristics of the proposed project, the existing environment, predicted impacts, mitigation measures and residual impacts.

The EIAR is structured under the following subject headings:

- 1.0 – Introduction
- 2.0 – Screening, Scoping and Alternatives
- 3.0 – Project Description
- 4.0 – Planning and Legislative Framework
- 5.0 – Population and Human Health
- 6.0 – Biodiversity
- 7.0 – Land, Soils & Geology
- 8.0 – Water

- 9.0 – Climate
- 10.0 – Air
- 11.0 – Noise and Vibration
- 12.0 – Traffic
- 13.0 – Landscape & Restoration
- 14.0 – Material Assets
- 15.0 – Cultural Heritage
- 16.0 – Interactions
- 17.0 – Mitigation & Monitoring Summary

**Chapter 1** provides an introduction to the development and gives details in relation to the project team and their relevant expertise and competencies, including external consultants retained to assess various environmental factors/topics.

**Chapter 2** provides details in relation to screening, scoping and consideration of alternative designs and processes.

**Chapter 3** provides details relating to the existing and proposed work methods within the development including day to day processes that are/will be undertaken at the existing and proposed development.

**Chapter 4** sets out the planning and development context relating to the proposed development. This chapter reviews the national, regional and local planning policy relevant to the development.

**Chapter 5 - 15** details information on all aspects of the existing environment including any impacts or potential impacts identified. Mitigation measures are reviewed and proposed where required in order to offset potential impacts identified.

**Chapter 16** addresses the cumulative impacts, indirect impacts and main interactions between different aspects of the environment likely to be significantly affected by the proposed activities at the application site. Only topics that could be logically linked to the development have been examined in detail. Accordingly, when a topic is not mentioned, it is concluded that no potential for conflict exists.

**Chapter 17** provides a summary of the mitigation and monitoring measures proposed in order to offset the potential impact. Residual impacts are also described.

### 1.5.3 Chapter Layout

In accordance with the EPA (2017) draft guidance document, Chapters 5 to 15 of the EIAR follow the same general layout, as follows:

1. **Introduction** – Describes the purpose of and rationale for inclusion of the particular environmental topic within the EIAR.
2. **Methodology** – Details the sources of baseline information and data and the methods employed to gather data.
3. **Existing Environment** – A description of baseline information/data relating to the aspects relevant to each particular environmental topic. The description of aspects of the environment provides sufficient data to facilitate the identification and evaluation of the likely significant effects of the topic. Systematic, accurate and comprehensive descriptions of the environment are presented under the following headings within each chapter:
  - Context – Description of the location, magnitude, spatial extent and trends of the environmental factor;
  - Character – An indication of the distinguishing aspects of the environment under consideration e.g. the types of habitats present or the current status of onsite water quality;
  - Significance – The quality, value and/or designation assigned to the aspect of the existing environment under consideration, and;
  - Sensitivity – An evaluation of the sensitivity of the aspect of the environment to change e.g. would any increase in nutrients cause eutrophication of local waterbodies or would disturbance cause nesting birds to disperse?
4. **Impact Assessment** – A clear and concise description of the *likely significant effects* of the proposed development on the environmental topic in terms of the following (Table 1.1):
  - Quality of effects - whether an effect is positive, negative or neutral;
  - Significance of effects - imperceptible, not significant, slight, moderate, significant, very significant, profound;
  - Extent and context of effects – size of the area/number of sites/proportion of population effected and whether this will conform or contrast with established baseline conditions;
  - Probability of effects – likely or unlikely;
  - Duration and frequency of effects – momentary, brief, temporary, short-term, medium-term, long-term, permanent, reversible, frequency.

**Table 1-1:** Definition of Effects (EPA, 2017)

Characteristic	Level	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects/effects which are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Magnitude	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect.
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions.
Probability	Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration and Frequency	Momentary	Effects lasting from seconds to minutes.
	Brief	Effects lasting less than a day.
	Temporary	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible	Effects that can be undone, for example through remediation or restoration.
Frequency	Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).	

Characteristic	Level	Description
Types of Effects	Indirect (Secondary)	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out.
	'Worst Case'	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described Irreversible When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.

**5. Mitigation Measures** – a description of the measures designed to avoid, prevent, reduce, remedy or offset any identified significant adverse effects on the environment, as follows:

- Avoidance – when no effect is caused (often through consideration of alternatives);
- Prevention – when a potential effect is prevented by a measure thus avoiding the possibility of the effect occurring;
- Reduction – when an effect is lessened;
- Remedy – when an effect is resolved by remedial action
- Offset – when an adverse effect is balanced by a positive effect.

The description also explains the extent to which significant adverse effects on the environment are avoided, prevented, reduced or remedied/offset. The proposals of any monitoring arrangements are also outlined in this chapter.

**6. Residual Impacts** – a description of the final or intended effects which remain after the proposed mitigation measures have been implemented. These are the remaining environmental “costs” of a project that could not be reasonably avoided and will be a key consideration in deciding whether the project will be permitted or not. For this reason, residual effects are clearly described in accordance with the system of effects description as set out above i.e. quality, significance, extent, etc.



## 1.5 Competency of Experts

Article 5(3) (a) of the amended Directive requires that *“the developer shall ensure that the environmental impact assessment report is prepared by competent experts...”* and Recital (33) of the Directive 2014/52/EU requires that *“sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality.”*

As such, Table 1-1 presents details of all competent experts involved in the preparation of this EIAR.

**Table 1-2:** The EIAR Study Team and their relevant competencies

Chapter	Company	Competent Expert	Area and Level of Expertise
1.0 Introduction	Earth Science Partnership (Ire.) Ltd.	Patrick O'Donnell C Eng. BSc. Eng. Dip Eng. MIEI Sarah Ingham MSc. BSc. (Hons) ACIEEM David Killeen BSc. Env	Principal Environmental Engineer Senior Ecologist/Env. Consultant Senior Environmental Consultant
2.0 Screening, Scoping & Alternatives			
3.0 Project Description			
4.0 Planning & Legislative Framework			
5.0 Population & Human Health			
6.0 Biodiversity	Earth Science Partnership (Ire.) Ltd.	Sarah Ingham MSc. BSc. (Hons) ACIEEM	Senior Ecologist/Env. Consultant
7.0 Land, Soils & Geology	Envirologic Hydrogeological & Hydrological Consulting	Colin O'Reilly PhD (Hydrology) Patrick Breheny MSc. (Hydrogeology)	Consultant Hydrogeologist Consultant Hydrogeologist
8.0 Water			
9.0 Climate	Earth Science Partnership (Ire.) Ltd.	Patrick O'Donnell C Eng. BSc. Eng. Dip Eng. MIEI Sarah Ingham MSc. BSc. (Hons) ACIEEM David Killeen BSc. Env	Principal Environmental Engineer Senior Ecologist/Env. Consultant Senior Environmental Consultant
10.0 Air			
11.0 Noise	Noise and Vibration Consultants Ltd.	Brendan O'Reilly MPhil (Noise and Vibration) ISEE SFA EAA	Noise and Vibration Consultant
12.0 Traffic	Alan Lipscombe Traffic and Transport Consultants	Alan Lipscombe B.Eng (hons) Transportation Engineering	Transportation Engineer
13.0 Landscape	Earth Science Partnership (Ire.) Ltd.	Patrick O'Donnell C Eng. BSc. Eng. Dip Eng. MIEI Sarah Ingham MSc. BSc. (Hons) ACIEEM David Killeen BSc. Env	Principal Environmental Engineer Senior Ecologist/Env. Consultant Senior Environmental Consultant
14.0 Material Assets			
15.0 Cultural Heritage	Charles Mount Archaeology	Charles Mount M.A., Ph.D., M.B.A., Dip. EIA & SEA Mgmt., M.I.A.I.	Consultant Archaeologist
16.0 Interactions	Earth Science Partnership (Ire.) Ltd.	Patrick O'Donnell C Eng. BSc. Eng. Dip Eng. MIEI Sarah Ingham MSc. BSc. (Hons) ACIEEM David Killeen BSc. Env	Principal Environmental Engineer Senior Ecologist/Env. Consultant Senior Environmental Consultant
17.0 Remedial Measures & Monitoring Summary			

## 1.6 Technical Limitations

Data limitations and technical difficulties associated with the compilation of the EIAR are detailed in relevant chapters of the EIAR.

## 1.7 References

Dept. of the Environment, Community and Local Government (2013) Guidance for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessments

Directive 2014/52/EU European Parliament and of the Council EIA Directive (April, 2014)  
Environmental Protection Agency (2006) Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non – Scheduled Minerals)

Environmental Protection Agency (2015) Advice Notes on Preparing Environmental Impact Statements (Draft) September 2015

Environmental Protection Agency (2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) August 2017

S.I. No. 600 of 2001: Local Government (Planning and Development) Regulations, 2001

S.I. No. 93 of 1999: European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999, Second Schedule

S.I. No. 93 of 1999: European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999, Third Schedule

S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999.

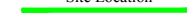
## Figures



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**Legend**

Site Location



ITM Coordinates: 683027 E, 670998 N

Rev	Description	Date

**EARTH SCIENCE PARTNERSHIP**

CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
 Tonranny Westport Co. Mayo  
 tel: +353(0)98 28999 fax: +353(0)98 24727  
 e-mail: earthsciencepartnership@gmail.com  
 Ordnance Survey Ireland Copyright Licence No: EN 0021419

Client: Kilocarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Site Location Map

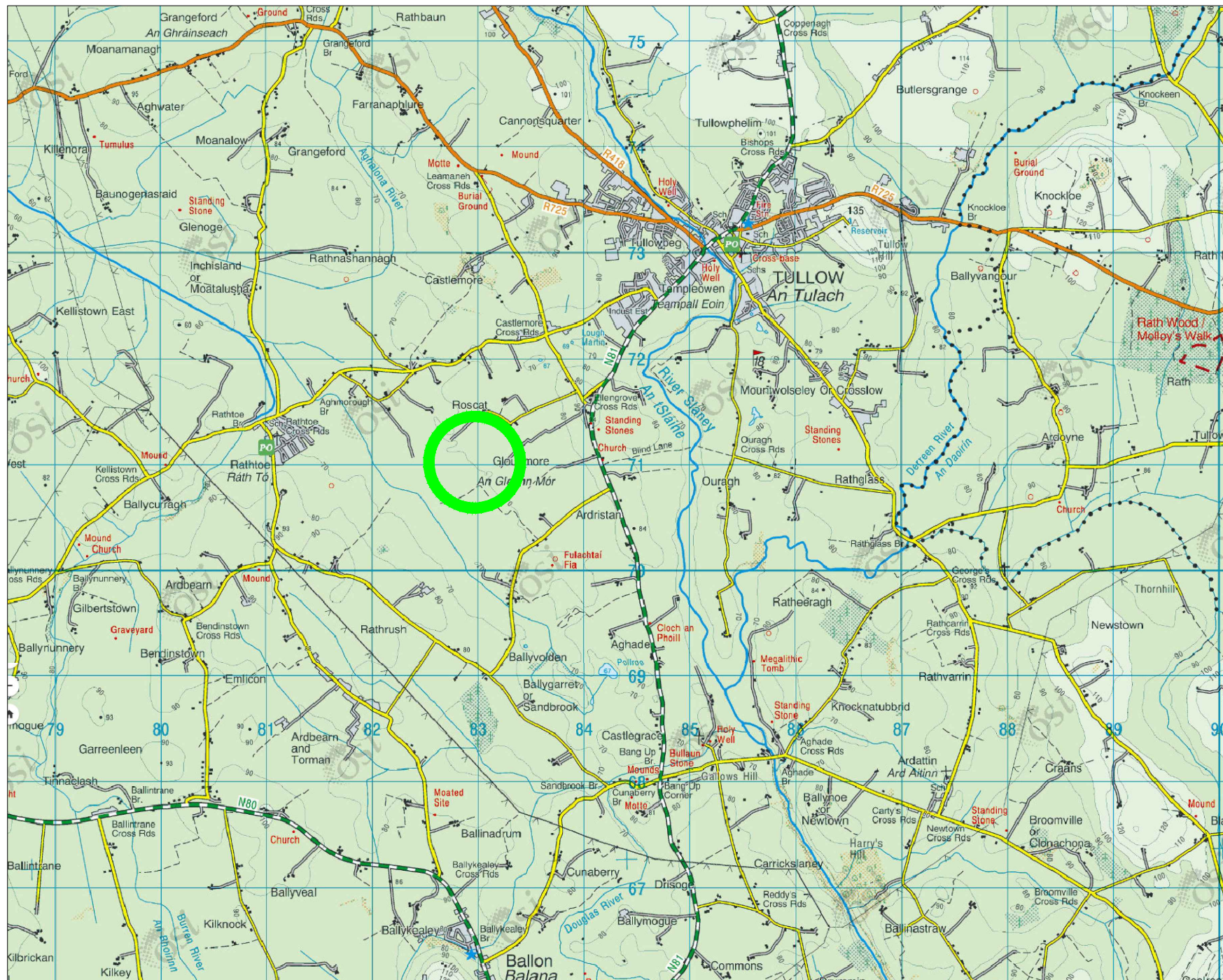
Drawn By: Sean O' Donnell

Checked By: Patrick O' Donnell

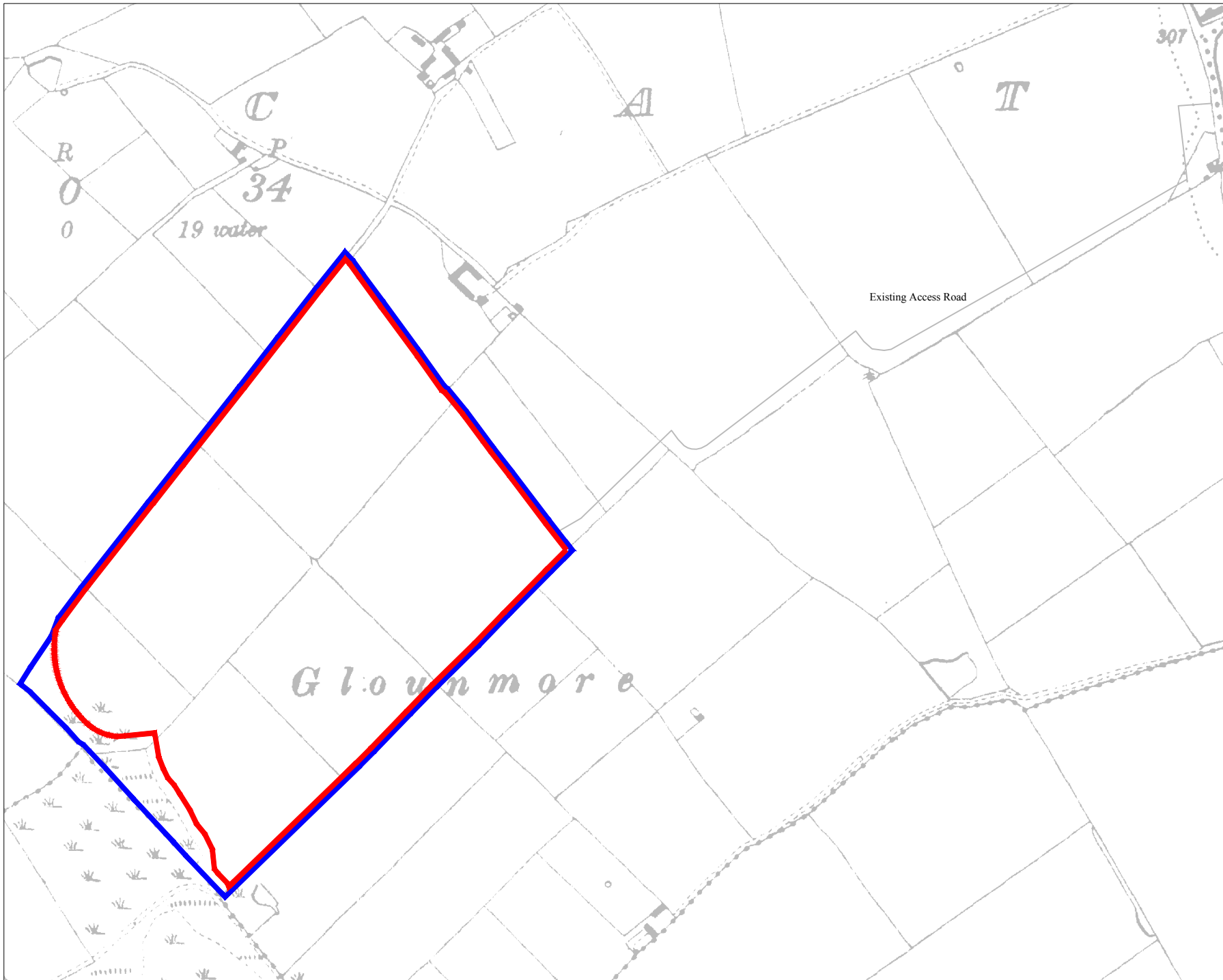
Scale: 1:50,000 @ A4 Date: Apr. 2019

Job No: EI 061 Rev: 0

Figure 1.1







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**Legend**

Ownership Boundary

Application Area  
Area = 14.7 Ha



O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

Rev	Description	Date

**EARTH SCIENCE PARTNERSHIP**

CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
 Tonranny Westport Co. Mayo  
 tel: +353(0)98 28999 fax: +353(0)98 24727  
 e-mail: earthsciencepartnership@gmail.com  
 Ordnance Survey Ireland Copyright Licence No.: EN 0021419

Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact  
 Assessment Report to  
 Accompany a Planning  
 Application for a Sand &  
 Gravel Pit Located at Roscat,  
 Tullow, Co. Carlow

Title: Site Location Map

Drawn By: Sean O' Donnell

Checked By: Patrick O' Donnell

Scale: 1:5,000 @ A4 Date: Apr. 2019

Job No: EI 061 Rev: 0

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## 2.0 SCREENING, SCOPING AND CONSIDERATION OF ALTERNATIVES

### 2.1 Introduction

This chapter of the EIAR details the screening and scoping exercise carried out in relation to the proposal and the alternative locations, layouts and designs considered as part of the process.

### 2.2 EIA Screening

The first step of the EIA process is screening which establishes whether an EIA is required or not. The project needs to be considered in its entirety for screening purposes. This means that off-site and secondary projects as well as indirect, secondary and cumulative effects need to be identified and evaluated at an appropriate level of detail. Plate 2-1 details the steps to be followed as part of the screening exercise.

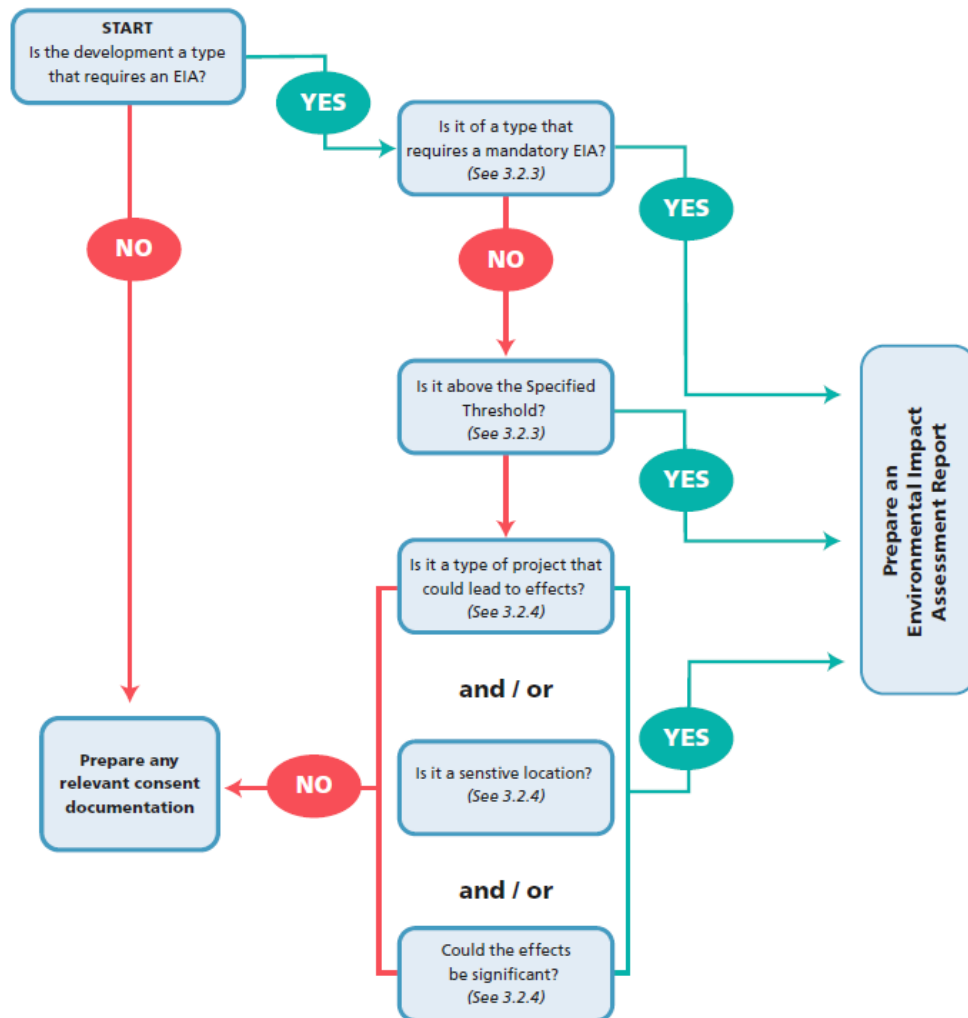


Plate 2-1: EIA Screening Process (EPA 2017)

The EIA Directive, “Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment” as amended by Council Directives 97/11/EC, 2003/35/EC, 2009/31/EC, 2011/92/EU and 2014/52/EU is designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

Screening involves an initial determination to establish whether the proposal is a project which is listed in one of the Annexes to the Directive 2011/92/EU (as amended by Directive 2014/52/EU). The EIA Directive lists projects for which EIA is mandatory (Annex I) and those projects for which EIA may be required (Annex II). With regard to Annex II projects, Member States can choose to apply thresholds or use case by case examination or a combination of both to assess whether these projects require EIA. These Annexes have been transposed in to Irish law and the prescribed classes of development which require EIA are outlined in Schedule 5 of the Planning and Development Regulations 2001 (S.I. 600 of 2001) as amended. The relevant thresholds for quarrying and extractive developments are details in Section 2.1.1.

### 2.2.1 Screening Criteria

The sections of the Schedule 5 which are applicable to the proposed development are detailed below and referenced A, B and C.

**A. Part 1, Class 19**

*Quarries and open-cast mining where the surface of the site exceeds 25 hectares.*

**B. Part 2, Class 2(b)**

*Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares.*

**C. Part 2, Class 13(a)**

*Changes, extensions, development and testing*

*(a) Any change or extension of development which would:*

*(i) result in the development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, and*

*(ii) result in an increase in size greater than-*

- 25 per cent, or*
- an amount equal to 50 per cent of the appropriate threshold, whichever is the greater.*

Where a project is of a specified type but does not meet or exceed the applicable threshold then the likelihood of the project having significant effects on the environment needs to be considered.

Both the adverse and beneficial effects are considered. This is undertaken by referencing the criteria specified in Annex III of the amended Directive, as follows:

### **1. Characteristics of projects**

*The characteristics of projects must be considered, with particular regard to:*

- (a) the size and design of the whole project;*
- (b) cumulation with other existing and/or approved projects;*
- (c) the use of natural resources, in particular land, soil, water and biodiversity;*
- (d) the production of waste;*
- (e) pollution and nuisances;*
- (f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;*
- (g) the risks to human health (for example due to water contamination or air pollution).*

### **2. Location of projects**

*The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to:*

- (a) the existing and approved land use;*
- (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;*
- (c) the absorption capacity of the natural environment, paying particular attention to the following areas:*
  - (i) wetlands, riparian areas, river mouths;*
  - (ii) coastal zones and the marine environment;*
  - (iii) mountain and forest areas;*
  - (iv) nature reserves and parks;*
  - (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;*
  - (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;*
  - (vii) densely populated areas;*
  - (viii) landscapes and sites of historical, cultural or archaeological significance.*

### **3. Type and characteristics of the potential impact**

*The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of this Annex, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:*

- (a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);*
- (b) the nature of the impact;*
- (c) the transboundary nature of the impact;*
- (d) the intensity and complexity of the impact;*
- (e) the probability of the impact;*
- (f) the expected onset, duration, frequency and reversibility of the impact;*
- (g) the cumulation of the impact with the impact of other existing and/or approved projects;*
- (h) the possibility of effectively reducing the impact.*

#### **2.2.2 Determination**

The proposed development is not greater than the 25-hectare threshold listed under Part 1, Class 19, as the application area is 14.7 hectares.

However, the proposed development is greater than the 5-hectare threshold listed under Part 2, Class 2(b) as the application area is 14.7 hectares.

As detailed under Part 2, Class 13(a), the proposed development consists of an extension to an existing development which would result in the development being of a Class listed under Part 2 of the Schedule therefore the proposed development shall be subject to EIA.

#### **2.2.3 Requirement for an Appropriate Assessment**

Appropriate Assessment is required to be carried out under the Habitats Directive and specifically Article 6(3) thereof for plans or project likely to have significant effects on Natura 2000 sites. It is most recently implemented under the European Communities (Birds and Natural Habitats) Regulations 2011. An Appropriate Assessment is required to be carried out for development on or adjacent to sites classified by the Minister pursuant to the Regulations as Special Areas of Conservation (SACs) or Special Protection Areas (SPAs).

Specifically Article 42(1) of the 2011 Regulations requires competent authorities to screen for Appropriate Assessment in relation to a plan or project, which is not directly connected with or necessary to the management of the site as a European site, in view of best scientific knowledge and the conservation objectives of the site and to assess the plan or project not only individually but also in combination with other plans or projects likely to have a significant effect on the European site.

There are 3 Natura 2000 sites located within a 15km radius of the development, all of which are Special Areas of Conservation (SACs). The designated sites and their proximity to the proposed development are tabulated in Table 2-1 below. The pathways for potential effects are assessed as part of the AA assessment process and outlined in a Natura Impact Statement (NIS) which accompanies the planning application as a separate document.

**Table 2-1: Natura 2000 Sites within 15km Radius of the Development**

Site Code	Site Name	Distance from Site
000781	Slaney River Valley SAC	1.9km to the east
002162	River Barrow and River Nore SAC	12.9km to the west
000770	Blackstairs Mountains SAC	14.1km to the south

### 2.3 Consultation and Scoping

A scoping exercise was conducted as part of the planning application process to establish the range and aspects of the environment to be considered as part of the planning application as well as all topics specified in the Environmental Impact Assessment Regulations and guidance documents. This exercise was conducted following consultation with the applicant and members of the design team. Consultation with statutory bodies and interest groups was also undertaken to provide an opportunity to:

- Identify concerns and measures about the project and use these to inform the preparation of the EIAR.
- Incorporate mitigating measures where required.
- Take into consideration the expertise and knowledge of experts and interest groups.

Consultation regarding the proposed project was undertaken at the Screening and Scoping Stages of the process via the dissemination of a Screening and Scoping Document to relevant consultees. This document provides consultees with an overview of the proposed project including an outline project description, location, and scale, in addition to a list of potential effects as a result of the proposed project which have been identified at this stage.

Although not a legislative requirement, provision of this level of detail to relevant consultees during the preparation of an EIAR is best practice and ensures that the EIAR addresses the relevant concerns of those consulted, that the necessary studies have been undertaken and that the EIAR is appropriate to particular local circumstances and the scale of the proposed scheme.

The following is a list of consultees to whom the Screening and Scoping Document was disseminated:

- Department of Culture, Heritage and the Gaeltacht serving the Development Applications Unit (DAU)
  - Document submitted to the DAU will be dispersed to:

- National Parks and Wildlife Service;
- National Monument Service;
- Archaeology Advisory Unit.
- Department of Communications, Climate Action and Environment (DCCA)
- Carlow County Council (CCC)
- An Taisce (AT)
- Environmental Protection Agency (EPA)
- Health Service Executive Ireland (HSE)
- Office of Public Works (OPW)
- Geological Survey Ireland (GSI)
- Heritage Council of Ireland (HCI)
- Health and Safety Authority (HSA)
- Inland Fisheries Ireland (IFI)
- Transport Infrastructure Ireland (TII)
- Irish Water (IW)
- Arts Council of Ireland (ACI)
- ESB Networks
- Irish Aviation Authority (IAA)

Responses received from parties are detailed in Appendix I. Based on discussion and comments from the design team and various third parties, assessment were undertaken in relation to the various elements of the environment to assess any potential impacts associated with the proposed development. These are discussed in the various chapters of the EIAR.

## 2.1 Alternatives Considered

EIA guidance and legislation requires that consideration should be given to alternatives which should include, where relevant; sites, routes, alignments/layouts, processes and strategies. A number of alternatives were considered as part of the application. In terms of environmental considerations and constraints, the proposed site was considered the preferred option given it fulfilled a number of advantages over other alternatives. The alternatives which were examined as part of this application are detailed below.

### 2.1.1 Alternative Locations & Layout

#### **Option A**

This proposal consists of the area which is the subject of the substitute consent application and planning area CW7850. There is no material available for extraction in these area, therefore this option was not assessed in any further detail.

#### **Option B**

This option consisted of applying for an area of 14.7 hectares which would include the existing pit area and a greenfield area to the north east. This would secure a reserve of approximately

610,000m<sup>3</sup> or 1.2 million tonnes. This would supply demand for approximately a 25 year period based on an extraction rate of 50,000 tonnes per annum.

#### Advantages

- The proposal would supply a long term reserve of material.
- No additional land would need to be purchased.
- The pit is an established land use in the area and the baseline environment has reflected this use for an extended period of time.
- Mitigation measures have been implemented in order to offset potential impacts associated with pit activity.
- Landscaping works have been undertaken at the pit to date to screen the site from the surrounding landscape.

#### Disadvantages

- A greenfield area subject to agricultural use would be lost to extraction of material.

### **Option C**

This option consisted of purchasing an area of approximately 5 hectares to the southeast or northwest of the existing pit and extracting the available resource. This would supply approximately 600,000 tonnes of material which would be extracted at 50,000 tonnes per annum supplying enough material for a 12 year period.

#### Advantages

- The area would be located adjacent to the existing pit.
- The pit is an established land use in the area and has been operational since the 1980s therefore the baseline environment has reflected this use for an extended period of time.
- Mitigation measures have been implemented in order to offset potential impacts associated with the existing pit activity.
- Landscaping works have been undertaken at the pit to date to screen the site from the surrounding landscape.

#### Disadvantages

- A greenfield area subject to agricultural use would be lost to quarrying.
- This proposal relies on the areas being offered for sale which is not the case.

### **Option D**

This option consisted of securing a site at an alternative location away from the existing area and applying for planning permission for operating a pit to include extraction and processing.

#### Advantages

- If a suitable area was secured, a planning permission for a long term reserve of material could be applied for.



- It could lead to an increase in revenue for local businesses and indirect employment.

#### Disadvantages

- It would involve introducing a different land use to the alternative area.
- Suitable sites are also difficult to identify and would lead to additional traffic on the public roads in the vicinity of the proposed area.
- It could potentially result in an increase in emissions to the environment at the proposed location.

#### 2.1.2 Preferred Option

Option B was the preferred option as it had a number of advantages over the alternative options which are listed. The area of land proposed would meet the demand for material and secure the viability of the pit and employment. No additional land would need to be purchased. Sand and gravel extraction and related activity is an established land use in the area and serves the demand for products locally and regionally.

#### 2.1.3 Alternative Processes

The method of extraction will continue to be the same with an excavator used to extract material. This is the standard method of extraction at sand and gravel pits. Material will be loaded onto dump trucks which will transport the material to market or the material will be processed on site into various grades of aggregate.

Material will be processed using mobile plant as processing will only be undertaken on a part time basis. The other alternative would be to erect a fixed crushing and screening plant. A fixed plant is more appropriate where processing is undertaken on a full time basis as in order for them to operate economically the throughput of material needs to be high. Therefore processing using mobile plant is the preferred option.

#### 2.4 Rationale for the Application

The sand and gravel pit is an established industry in the area and supplies a range of products to meet the demand for construction materials. The proposed development will not increase the total output per annum or increase the traffic associated with the existing development. The applicant is seeking a 25-year permission as part of the planning permission.

## 2.5 References

DoECLG (2013) Guidance for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

Directive 2014/52/EU European Parliament and of the Council EIA Directive (April, 2014)

European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999, Second Schedule, (S.I. No. 93 of 1999)

European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999, Third Schedule, (S.I. No. 93 of 1999)

European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999 (S.I. No. 349 of 1989)

EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements, Environmental Protection Agency

EPA (2003) Advice notes on current practice in the preparation of Environmental Impact Statements

EPA (2006) Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non – Scheduled Minerals)

EPA (2015) Draft Revised Guidelines on the Information to be contained In Environmental Impact Statements

EPA (2015) Draft Advice Notes for Preparing Environmental Impact Statements

EPA (2017) Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

Local Government (Planning and Development) Regulations, 2001 (S.I. No. 600 of 2001)

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Figure 3.1: Existing Site Layout

Figure 3.2: Site Sections

Figure 3.3: Phasing Sections

### 3.0 PROJECT DESCRIPTION

#### 3.1 Introduction

This chapter of the EIAR provides supporting information in relation to the activities that will be undertaken at the application site on a day to day basis.

#### 3.2 Existing Environment

The site is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site. Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm is located nearby. The application site consists of an area which currently comprises a greenfield area, currently subject to agricultural use, and the existing pit area.

The site is situated on the eastern side of a minor valley which is defined by a small north-south trending ridge that peaks at 94 mOD, 1 km northeast of the site at Ellengrove Crossroads, and a wider area of raised ground which reaches 93 mOD, 1.8 km southwest of the site. This valley flattens out to less than 70 mOD a short distance southwest of the site. OS Discovery maps indicate the site elevation to be in the range 68 – 74 mOD.

The area immediately around the site is sparsely populated, with individual farmsteads and scattered houses along the road network. A series of irregular third class roads run around the lands, serving a number of dwellings and farms.

#### 3.3 Characteristics of the Project

##### 3.3.1 Existing Development

The application site consists of an existing sand and gravel pit and access road which was subject to extraction and processing of sand and gravel. Material was extracted by excavators, loaded on trucks and transported off-site or was passed through mobile processing plant which processed the material into various grades of aggregate. The material was then stockpiled on site and sold as aggregate.

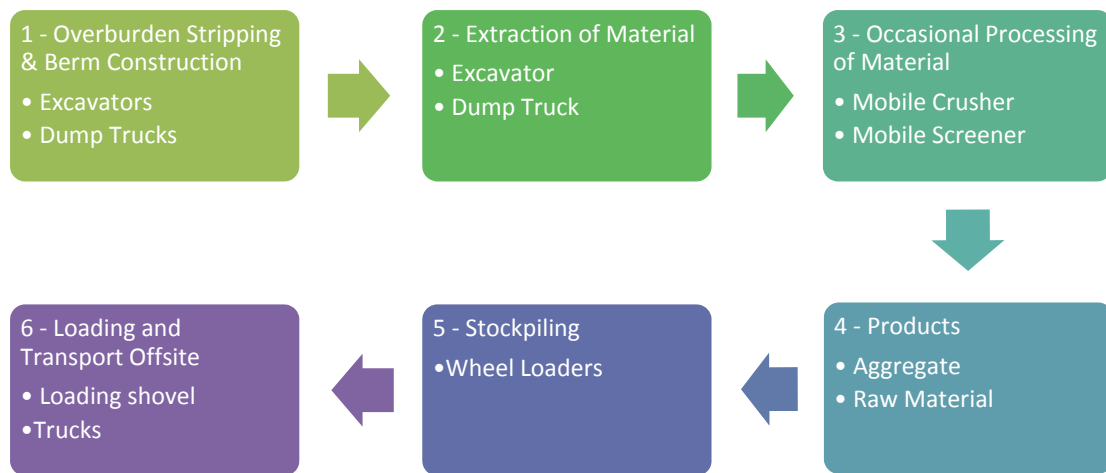
##### 3.3.2 Proposed Development

The application area consists of an area of 14.7 Ha. which consists an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares currently subject to agricultural use

The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel from the greenfield area, will result in the extension of the existing sand and gravel pit into the greenfield area. Material will be extracted by excavators and loaded onto trucks

which will transport the material to market or will be passed through mobile processing plant which will process the material into various grades of aggregate. This material will be stockpiled close to the processing plant or at designated stockpiles. The existing sand and gravel pit area which is the subject of a substitute consent application is exhausted of sand and gravel and no further extraction of materials is proposed in the area. This area will be used for stockpiling of materials pending restoration.

Landscaping of the pit will be undertaken during the operational phase and restoration of the pit on completion of extraction. All associated ancillary facilities/works are also included in this application. The applicant is seeking a 25-year permission as part of the application. Day to day activities associated with the proposed development are detailed on Plate 3-1 below and are described under each subsection.



**Plate 3-1:** Summary of day to day to day activities that will be undertaken at the proposed development.

### 3.3.3 Activities Relating to the Proposed Development

The activities undertaken at the site as part of the extraction process include the following:

1. Overburden Stripping & Berm Construction
2. Extraction of Material
3. Processing of material
4. Products
5. Loading and Transporting offsite

#### 3.3.3.1 *Overburden Stripping & Berm Construction*

Approximately 0.4 meters of overburden will be removed from the greenfield area in order to excavate the underlying sand and gravel material. This material will be removed using an excavator and trucks and used for berm construction around the north western and north eastern

boundaries. Overburden will also be stored on site for restoration of the pit on completion of the removal of the available resource.

#### *3.3.3.2 Extraction of Material*

Once the overburden has been removed, the sand and gravel material in the greenfield area will be extracted using excavators. The material will be passed through mobile processing plant or loaded directly into trucks for exportation offsite to market or to an external processing plant. The final extraction level will vary from 63mOD at the south western portion of the greenfield area to a level of 64.5mOD in the north eastern portion of greenfield area. This will ensure that there is a buffer in place between the finished extraction level and the groundwater level. The restoration plan involves placing a layer of approximately 0.5m of overburden on top of extracted areas and returning to agricultural land.

#### *3.3.3.3 Occasional Processing of Material*

Processing will be undertaken using mobile plant set up close to the excavation area with material screened into a number of grades depending on the market requirements. Occasionally material will be crushed onsite where required.

#### *3.3.3.4 Products*

Extracted material will be transported by trucks off-site to market or for processing at an off-site location. Processed aggregate will be sold to the client's requirements. Once processed, the aggregate will be stockpiled within the existing pit area awaiting transport to market.

#### *3.3.3.5 Stockpiling*

Processed material will be stored on extracted areas awaiting transport off-site to market.

#### *3.3.3.6 Loading & Transport Offsite*

Material will be loaded onto trucks using wheel loaders and transported off-site.

#### *3.3.3.7 Description of On-Site Plant*

The following plant and equipment will be used for future activities at the pit:

- Excavators
- Mobile crusher & screeners
- Trucks
- Wheel loaders
- Tractor and bowser

#### *3.3.3.8 Fuel and Chemical Storage*

For security reasons, no fuel will be stored at the pit. Fuel will be delivered to the pit by competent oil companies and dispensed into plant and machinery.

#### *3.3.3.9 Surface and Groundwater Management*

All surface water generated as a result of precipitation at the existing and proposed application site follow a number of routes. The majority of the existing site has been stripped of overburden and is primarily underlain by sand and gravel. Precipitation falling on the site the follows one of the following routes:

- Percolate through the underlying sand and gravel layers to ground.
- Flow towards shallow depressions where evaporates off during over time dry periods.
- Directed to the settlement lagoons located in the south eastern corner of the pit where water will be retained and used for dust suppression. Excess water will discharge off-site.

Procedures will be in place for dispensing fuels and dealing with accidental spillages to ensure that no contaminants enter the ground or surface water environment.

#### *3.3.3.10 Working Hours and Employment*

Operating hours for the development will be between 0700 hours and 1900 hours Monday to Friday and 0730 to 1700 hour on Saturdays as per Section 261 conditions. The pit will not operate outside these hours or on Sundays or Public Holidays. The pit will provide employment for approximately 1 person on a part-time basis.

#### *3.3.3.11 Utilities and Services*

There is no ESB and telecommunications connection to the pit. Water for dust suppression purposes is sourced from the settlement lagoons on-site.

#### *3.3.3.12 Transport and Access*

Access to the pit is gained from the N81 national road which connects Tullow with the N80 at Ballon. Access to the pit is via a haul road which is approximately 1.1km in length which links the pit to the N81. This access road consists of a paved road which is constructed of a wearing surface course of Macadam.

#### *3.3.3.13 Offices and Facilities*

A porta-cabin facility will be located within the application site for staff usage. Due to the low level of extraction and traffic movements, no wheel-wash or weighbridge facilities were required at the existing site. However, it is proposed that a wheel bath will be installed within the proposed development at a location before entering onto the paved 1km surface on exit from pit. The wheel bath will remove any excess material from the wheels of vehicles before transit along 1km paved access road prior to entering on the public road system. Given that all materials will be dry, it is envisaged that excess materials gathering on wheels of vehicles will be minimal.

#### *3.3.3.14 Waste Management*

##### Overburden and Soil Screenings

All overburden material arising from the pit will be stockpiled on site for restoration purposes once activities at the pit have ceased. Soil screened from processing of material will also be stored on-site for restoration of the pit.

##### Waste Metal

Waste metal from parts replaced on plant and vehicles and end of life vehicles will be sent to a registered waste facility for recycling.

#### *3.3.3.15 Safety and Security*

Stock proof post and wire fencing is in place around the boundary of the landholding. The gate located at the entrance to the site is locked outside working hours. Warning signs are in place around the pit. This will remain as is for the future development also.

#### *3.3.3.16 Resource*

Within the Section 37L area, it is estimated that the extraction of material will result in the removal of 24,000 m<sup>3</sup> of overburden material which will also be stockpiled on the pit floor for restoration of the pit on completion of works. Approximately 610,000 m<sup>3</sup> of sand and gravel material will be extracted from the pit. Using a conversion factor of 2-tonnes/m<sup>3</sup>, the annual average extraction rate is estimated to be 50,000 tonnes per annum (25,000m<sup>3</sup> per annum). Therefore, it is estimated that there is a 25-year resource of sand and gravel within this site.

#### *3.3.3.17 Dust Generation and Control*

The extraction and processing of material and vehicle movement has the potential to create wind-blown dust if not managed effectively. Dust generation and control is dealt with under Section 10.0 of the EIAR.

#### *3.3.3.18 Noise Generation and Control*

Sources of noise as a result of day to day activities being undertaken at the application site are associated with extraction and processing of material and vehicle movement.

All necessary precautions will be put in place to ensure that the operations at the pit will not impact significantly on the local environment. Noise and Vibration is dealt with under Section 11.0 of the EIAR.

#### *3.3.3.19 Landscape, Restoration, Decommissioning and Aftercare*

As the excavation of material will result in the creation of a void, it is important that the area is restored on completion of extraction and other activities. A Landscape and Restoration Plan for the site is included in Section 13.0. Restoration works will consist of, but are not limited to, the following:



1. All plant and machinery where present will be removed off the site.
2. Landscaping works will be undertaken where required.
3. All site boundaries will be secured.
4. Overburden will be spread on the floor of the pit, seeded and restored to agricultural land.
5. Additional planting of trees and shrubs may be necessary in some areas.

#### *3.3.3.20 Environmental Monitoring*

Environmental monitoring will be undertaken on a regular basis which will include noise, dust and water monitoring. Environmental monitoring is dealt with in relevant sections of the EIAR.



## Figures



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Legend

Ownership Boundary

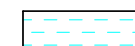
Application Area

Area = 14.7 Ha

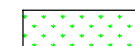
Aggregate Stockpile



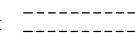
Water



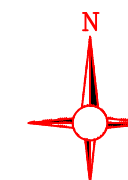
Vegetation



Access Road/Track



Tree Cover



Vegetation/Access:

Due to the density of the vegetation situated throughout the site, the sub-canopy contouring cannot be guaranteed. ESP will not take responsibility for errors in the sub-vegetation contouring as ESP cannot confirm or deny the presence of surface anomalies that may alter the present contouring. It is strongly advised that any wooded areas that are assigned for future development, are cleared and re-surveyed to ensure accurate elevation data.

All Levels Relative to Ordnance Datum

O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

**EARTH SCIENCE PARTNERSHIP**

CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

Tonranny Westport Co. Mayo

tel.:- +353(0)98 28999 fax:- +353(0)98 24727

e-mail: earthsciencepartnership@gmail.com

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Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Existing Site Layout Map

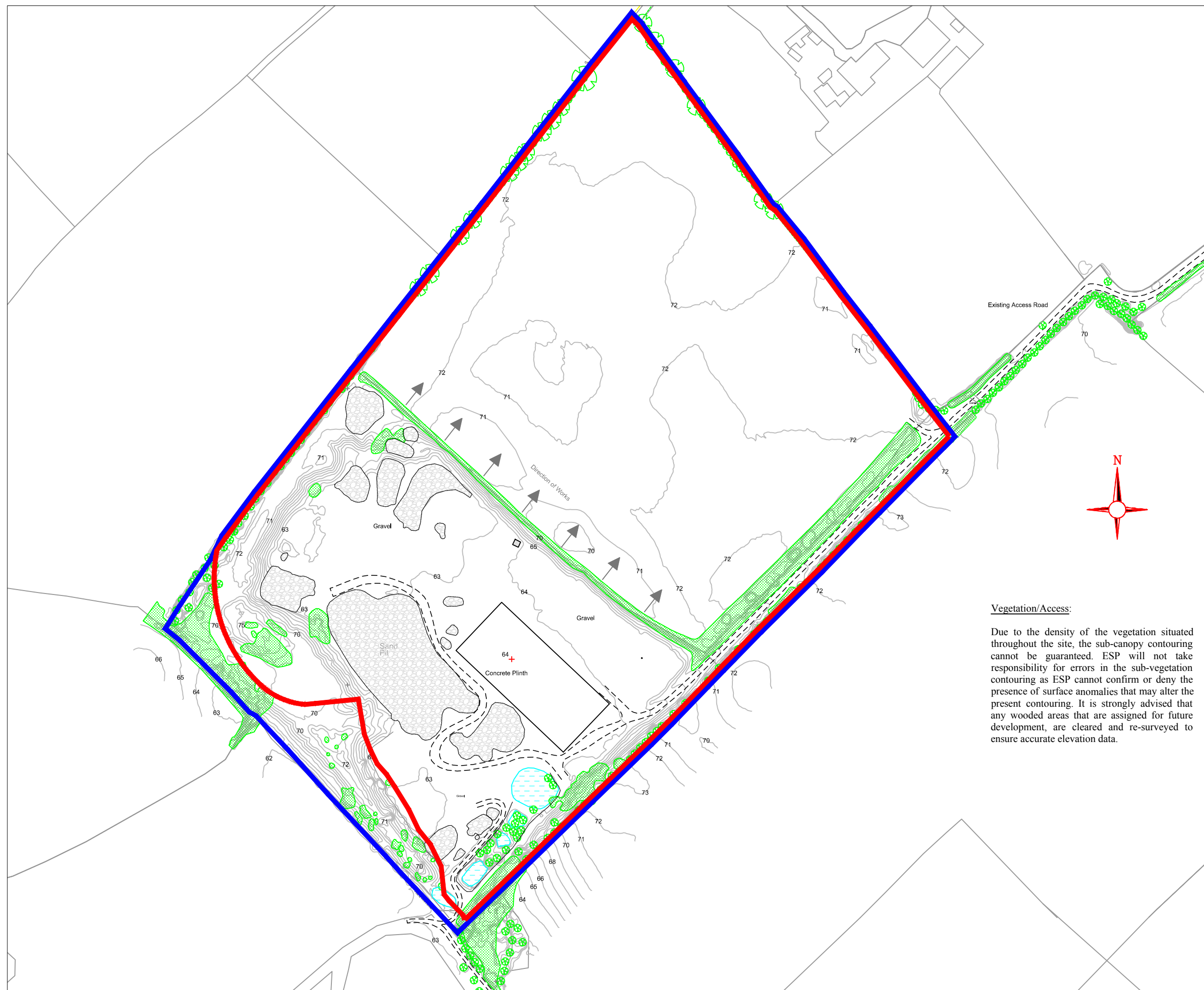
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Checked By: Patrick O' Donnell

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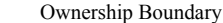

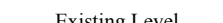


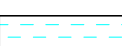
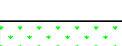
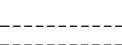

Job No: EI061 Rev: 0

Figure 3.1



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**Legend**

-  Ownership Boundary
-  Application Area  
Area = 14.7 Ha
-  Existing Level
-  Proposed Level
-  Aggregate Stockpile
-  Water
-  Vegetation
-  Access Road/Track
-  Tree Cover

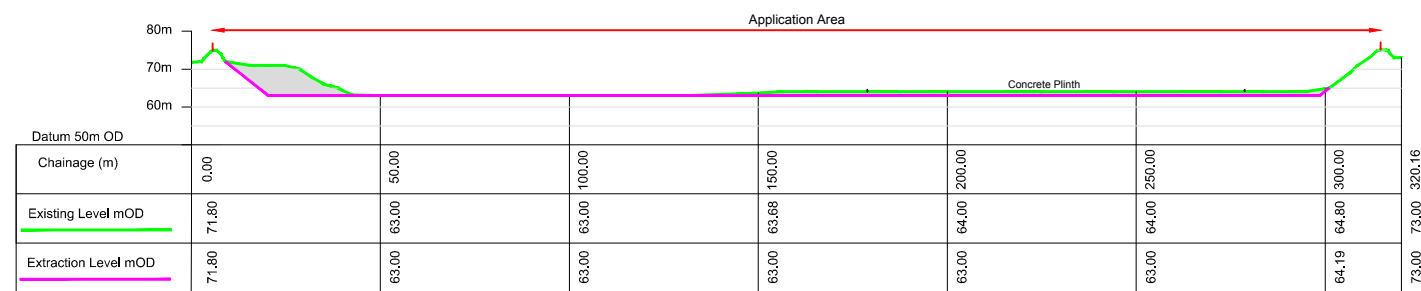
All Levels Relative to Ordnance Datum  
O.S. Map Ref No. 4475 - B  
ITM Coordinates: 683027 E, 670998 N

**EARTH SCIENCE PARTNERSHIP**  
CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
Tonranny Westport Co. Mayo  
tel.: +353(0)98 28999 fax: +353(0)98 24727  
e-mail: earthsciencepartnership@gmail.com  
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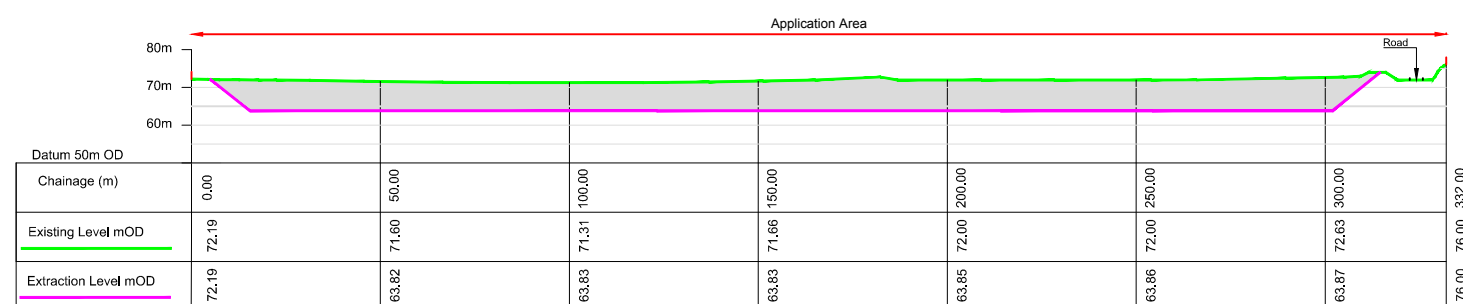
Client: Kilcarrig Quarries Ltd.  
Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscart, Tullow, Co. Carlow

Title: Site Sections  
Drawn By: Sean O' Donnell  
Checked By: Patrick O' Donnell  
Scale: 1 : 2,000 @ A3 Date: Apr. 2019  
Job No: EI061 Rev: 0

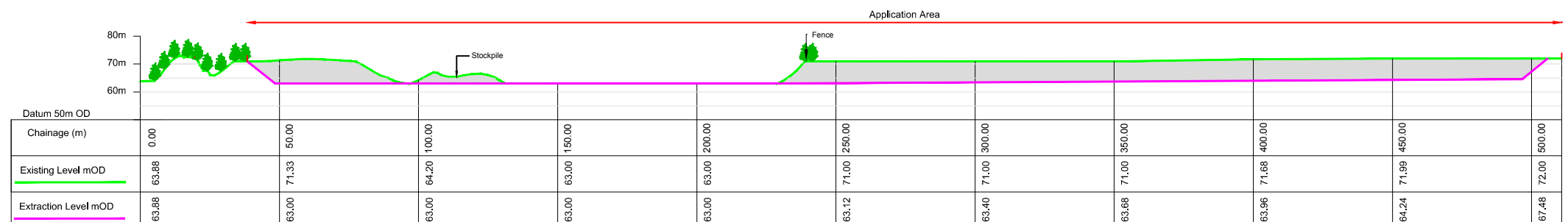
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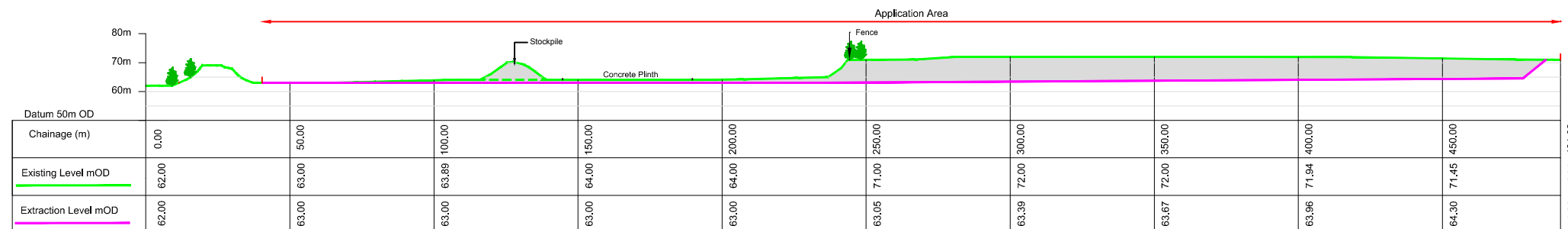
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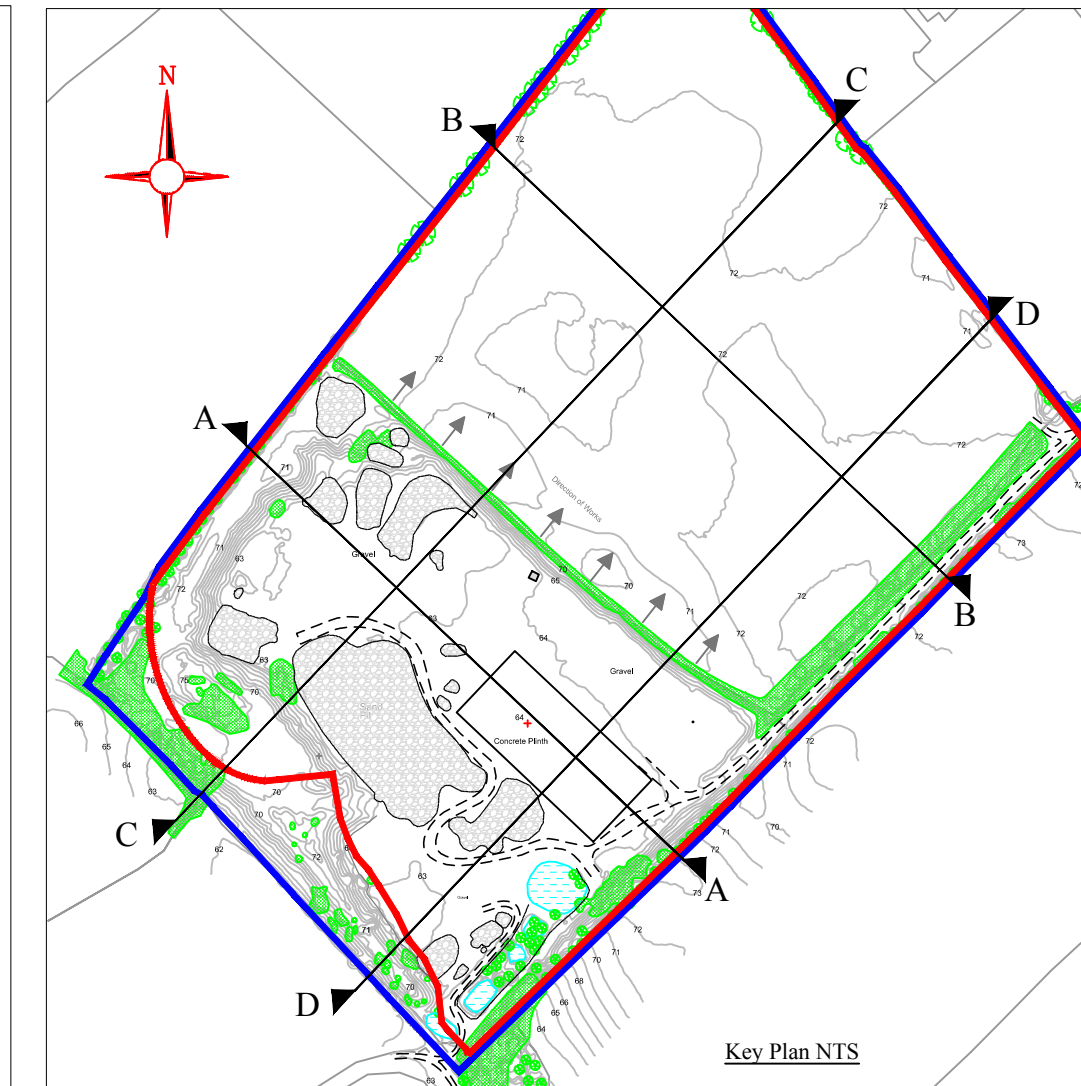
Section B - B Scale 1:2,000



Section C - C Scale 1:2,000



Section D - D Scale 1:2,000



Key Plan NTS

**Vegetation/Access:**

Due to the density of the vegetation situated throughout the site, the sub-canopy contouring cannot be guaranteed. ESP will not take responsibility for errors in the sub-vegetation contouring as ESP cannot confirm or deny the presence of surface anomalies that may alter the present contouring. It is strongly advised that any wooded areas that are assigned for future development, are cleared and re-surveyed to ensure accurate elevation data.

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**Legend**

Ownership Boundary

Application Area  
Area = 14.7 Ha

Existing Level

Proposed Level

Aggregate Stockpile

Water

Vegetation

Access Road/Track

Tree Cover

All Levels Relative to Ordnance Datum

O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

**EARTH SCIENCE PARTNERSHIP**  
CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
Tonranny Westport Co. Mayo  
tel.: +353(098) 28999 fax: +353(098) 24727  
e-mail: earthsciencepartnership@gmail.com  
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Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscart, Tullow, Co. Carlow

Title: Phasing Sections

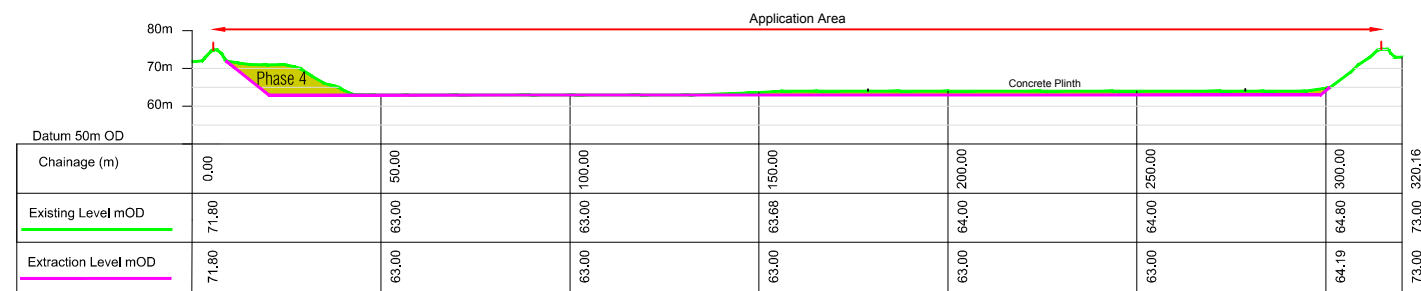
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Checked By: Patrick O' Donnell

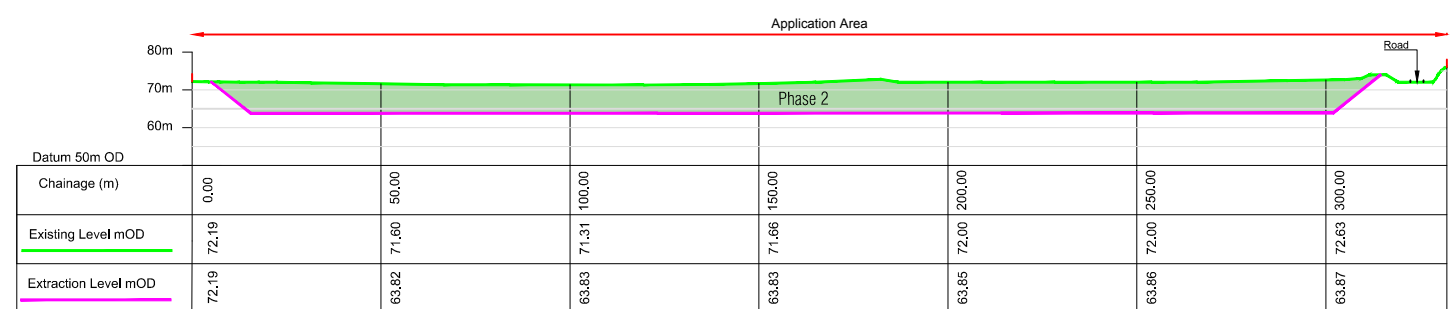
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Job No: EI061 Rev: 0

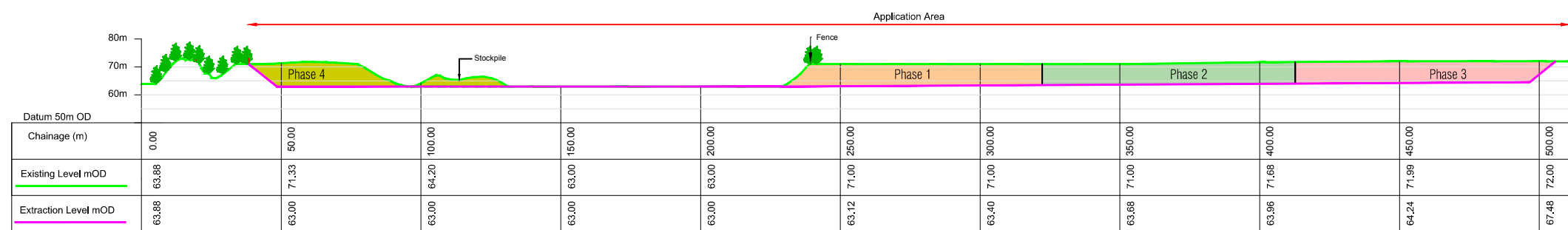
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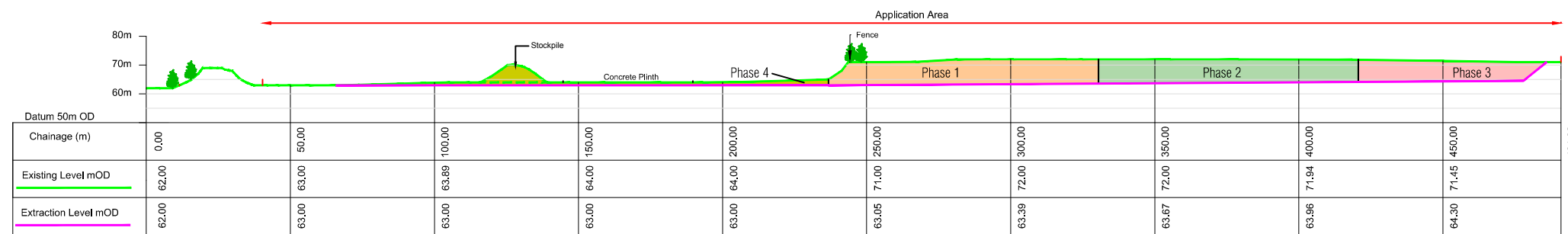
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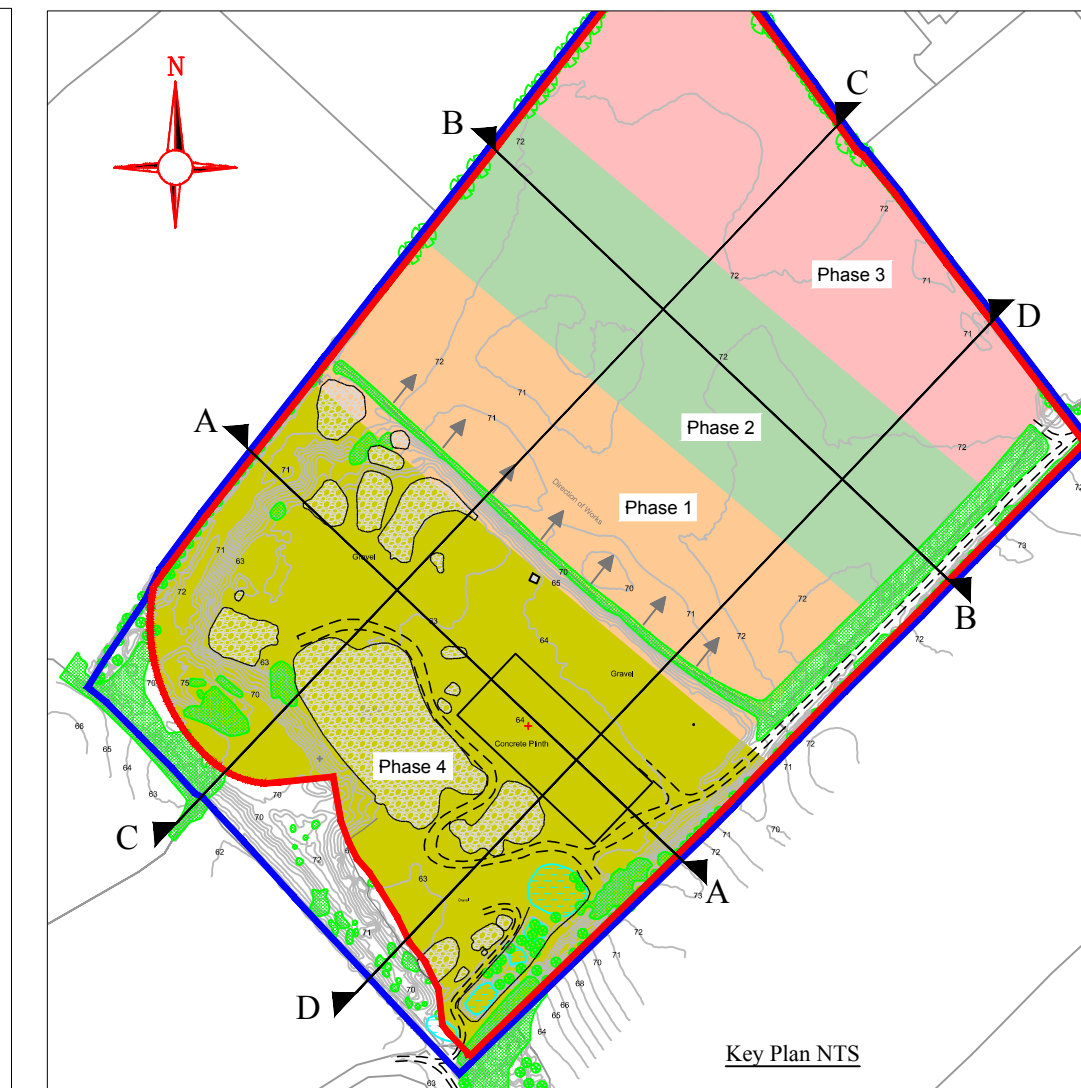
Section B - B Scale 1:2,000



Section C - C Scale 1:2,000



Section D - D Scale 1:2,000



Key Plan NTS

Phase	Color
1	Orange
2	Green
3	Pink
4	Yellow

**Vegetation/Access:**

Due to the density of the vegetation situated throughout the site, the sub-canopy contouring cannot be guaranteed. ESP will not take responsibility for errors in the sub-vegetation contouring as ESP cannot confirm or deny the presence of surface anomalies that may alter the present contouring. It is strongly advised that any wooded areas that are assigned for future development, are cleared and re-surveyed to ensure accurate elevation data.

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## 4.0 PLANNING AND LEGISLATIVE FRAMEWORK

### 4.1 Introduction

This chapter of the EIAR sets out the planning and development context relating to the sand and gravel pit development. The national, regional and local planning policy relevant to the development is also reviewed in this chapter.

### 4.2 Government Policy

In recent years, there has been a conscious move in Ireland towards strategic planning with various policy documents and plans introduced over the years to support strategic planning and development. Policies and objectives of the Government are contained in documents such as *“Sustainable Development: A Strategy for Ireland (1997)”*, *“National Spatial Strategy 2002 – 2020”* and more recently, *“Ireland 2040 - Our Plan”*. These, in turn, have derived their authority from higher order World and European Union (EU) agreed agendas and directives. Policy support filters down from national and regional levels through to specific County Development Plans and Local Area Plans (LAPs). The following planning documents are relevant to the assessment of the development:

- National Spatial Strategy 2002 – 2020
- Project Ireland 2040
- Regional Planning Guidelines for the Southern Region
- Carlow County Development Plan 2015-2021
- Carlow Local Economic and Community Plan 2016-2021
- Planning permissions relative to the site

#### 4.2.1 The National Spatial Strategy 2002 – 2020

In early 2000, work began on the National Spatial Strategy which ended with its publication in November 2002. The National Spatial Strategy (NSS) was a 20-year strategy designed to enable every place in the country to reach its potential, no matter what its size or location. It recognised that the various regions of the country have different roles and it sought to organise and co-ordinate these roles to benefit the regions. It aimed to achieve a better balance of social, economic, physical development and population growth between regions and focused on people, places and on building communities.

In order to drive development in the regions, the NSS required that areas of sufficient scale and critical mass be built up through a network of gateways and hubs. While the National Development Plan 2000-2006 identified Dublin, Cork, Limerick/Shannon, Galway and Waterford as existing gateways, the NSS designated four new national level gateways - the towns of Dundalk and Sligo and the linked gateways of Letterkenny/(Derry) and the Midland towns of Athlone/Tullamore/Mullingar.

This Strategy proposed to address the contrast between rapid development in the east of the Country and slower rates of development in other regions. To redress this imbalance, the Strategy identifies gateways and hubs that would have the capacity to support the stronger urban-rural structure needed to drive the development of these other regions. A review of the NSS was announced by Government on 2<sup>nd</sup> February 2017 which resulted in the new government strategy '*Project Ireland 2040*'.

#### 4.2.2 Project Ireland 2040

Project Ireland 2040 is the Government's policy initiative which aims to provide balanced regional development and to improve the State's infrastructure. It consists of two plans. The National Planning Framework (NPF) which aims to achieve balanced regional development. This plan prioritises growth in the major cities of Dublin, Cork, Galway, Limerick and Waterford.

The second strand is the National Development Plan (NDP) 2018 – 2027. The ten year plan demonstrates the Government's commitment to meeting Ireland's infrastructure and investment needs. The NDP sets out the significant level of investment, almost €116 billion, which will underpin the National Planning Framework and drive its implementation over the ten year period.

The Government is committed to the delivery of the NPF as a blueprint for spatial planning in Ireland to 2040. In setting out a strategic framework for public capital investment, the National Development Plan will support its delivery over the next ten years. Ten National Strategic Outcomes (NSOs) are outlined in the NPF and these are illustrated on Plate 4.1 along with corresponding Strategic Investment Priorities.

A new initiative in the National Development Plan and the NPF, intended to assist with urban and rural renewal, is the establishment of a proposed new public body, the National Regeneration and Development Agency.



**Plate 4-1:** NPF and its NSO Outcomes and Priorities of the NDP (from: Project Ireland 2040 – National Planning Framework, 2018)

#### 4.2.2.1 Regional Planning Guidelines

The Planning and Development Act, 2000 called for the drawing up of Regional Planning Guidelines (RPGs) which were first adopted in March 2004 as a key implementation mechanism of the Government's overall framework for achieving more balanced regional development and more strategic physical and spatial planning. The principal function for RPGs was to link national strategic spatial planning policies to the planning process at City and County Council level by co-ordinating the Development Plans of the local authorities through the Regional Planning Guidelines.

Following on from the enactment of the Local Government Reform Act 2014 a number of changes were made to the regional structures in Ireland where the eight regional authorities were dissolved. Three new Regional Assemblies came into effect on 1<sup>st</sup> January 2015, namely the Southern Regional Assembly, the Eastern and Midland Regional Assembly and the Northern and Western Regional Assembly.

#### 4.2.2.2 Southern Regional Assembly

From 1<sup>st</sup> January 2015, there are 33 councillors appointed to the Assembly in the Southern region, 27 from constituent local authorities and 6 by virtue of their membership of the Committee of the Regions. They are not directly elected but nominated by their respective local authorities from within the Region (Table 4-1).

**Table 4-1: Southern Regional Assembly Local Authorities**

Region	Local Authority
South-East Region	Carlow, Kilkenny, South Tipperary, Waterford and Wexford
South-West Region	Cork City and County, Kerry
Mid-West Region	Clare, Limerick City and County, Tipperary

The main roles of the Southern Regional Assembly are to:

- Manage and monitor EU programmes of Assistance;
- To co-ordinate, promote and support strategic planning and sustainable development of the region;
- To promote effective local government and public services in the region, in conjunction with the National Oversight and Audit Commission;
- To prepare and oversee the implementation of Regional Spatial and Economic Strategies (RSES).

Carlow is part of the South East Region, which consists of counties Carlow, Kilkenny, South Tipperary, Waterford and Wexford. The South East Region is identified as a region which requires

“reinforcing” and “strengthening” in the National Spatial Strategy. Carlow has significant potential for growth and development and can play an important role in regional growth and achieving balanced development. The proximate location of Carlow to the greater Dublin Area highlights Carlow’s accessible location within the South East Region.

#### 4.2.3 Carlow County Development Plan 2015 – 2021

##### 4.2.3.1 Background

The County Development Plan (CDP) sets out a strategic spatial framework for the proper planning and sustainable development of County Carlow for the period between 2015 and 2021 and for the term beyond 2021. Carlow CDP 2015 – 2021 will provide the following:

- A sustainable spatial development strategy to guide the location of development;
- Clear guidance on the future use of land and the pattern of development over the next six years;
- A framework for the future investment in physical and social infrastructure;
- A framework for developing the county’s economy;
- Management and control by indicating standards to be achieved in new developments;
- Ways to conserve and enhance the urban and rural environment and to protect the diversity of the natural and cultural landscape;
- Guidance for public and private investors in relation to land use and development;
- A framework for developing tourism in the County Carlow.

The Development Strategy of the CDP focuses on key Strategic Development Opportunities (SDOs) for the County to be supported by the policies contained within the Plan. SDO 8 of the CDP relates to the extractive industries within the county as follows:

##### ***“SDO 8 Extractive Industries***

*The County has a rich base of mineral resources which are of strategic importance to the local and regional economy. The Lime Quarry at Clogrennane is one of about only 4 limestone quarries in the country that has a sufficient calcium content in its limestone rock to make high grade Chemical Lime and is of national strategic importance. The County Development Plan contains a specific policy to support and protect this resource.”*

Furthermore, the CDP states that Carlow County Council recognises the importance of sand and gravel extractions in the economic life of the county and its importance as a valuable source of employment in parts of the county. However, it is also recognized that exploitation of deposits or mining (open cast or underground) can have significant environmental impacts on the amenities of surrounding areas. The Planning Authority will have regard to the provisions of the DoEHLG’s “Quarries and Ancillary Activities; Guidelines for Planning Authorities” in the assessment and determination of development proposals.

Whether it is a new quarry or an extension to an existing, Carlow County Council must determine the need for the development in terms of national importance and the impact of the development on the local economy whilst maintaining a satisfactory balance between the needs of the building industry and the need to protect the environment. The suitability of any extraction enterprise shall be assessed on the basis of the sensitivity of the local environment to such impacts, the scale of the development proposed and the capacity of the road network in the area to accommodate associated traffic.

Moreover, it is the policy of Carlow County Council to:

- Provide for quarry and extractive development where it can be demonstrated that the development would not result in a reduction of the visual amenity of designated scenic area, to residential amenities or give rise to potential damage to areas of scientific, geological, botanical, zoological and other natural significance including all designated European Sites;
- Ensure compliance with the overall objectives of the Water Framework Directive in the context of quarries, mining and extractive development.

The Carlow CDP also states that in assessing an application for development (whether for a new or extension to an existing quarry or mine), the need for the development, the extent of existing authorised quarry or mining supplies available and the impact of the development on the local environment shall also be taken into consideration, together with the following:

- Developments, including associated processes, which would have a negative impact on existing / established rights of ways, walking routes or tourist, natural or recreational amenities will not be looked upon favourably;
- Nature and quantity of aggregate(s) to be extracted, including total and annual tonnage of excavated aggregate(s);
- Location – relative to dwellings or other developments, aquifers and groundwater;
- Environmentally sensitive areas, protected structures, special amenity areas and areas of archaeological potential;
- Impact on the environment, agriculture, tourism, recreational activities in the area, landscape and residential amenities;
- Noise generation and control;
- Dust generation and control;
- Impact on water table: minimisation of disturbance to the existing surface and subsurface hydrological regime shall be ensured on site and in proximity to the quarry;
- Ecology; due consideration shall also be given to sites of ecological value and designated species which lie outside designated sites;
- Transportation arrangements for products and road network in the area;
- Effects on amenity of the area and in particular residential, visual amenity;
- Natural and proposed screening of site;

- Restoration and aftercare with particular emphasis on protecting and facilitating biodiversity.

#### 4.2.3.2 *Compliance with County Development Plan*

The location of any quarry is dictated by the availability of resources at a particular location. Similarly the extent of operations on any site is dictated by the extent of those resources. In this case, the existing sand and gravel pit is located in this particular area due to the presence of available materials, and the proposed development is directly influenced by the availability of further resources on the site.

The proposal consists of an extension to an existing sand and gravel pit registered under Section 261 (QY12/28). The County Development Plan supports and facilitates the exploitation of aggregate resources in the County provided that they do not impact on environmental elements and residential amenity. The reopening of the currently disused sand and gravel pit will provide direct and indirect local and regional employment associated with the production of construction materials and transport of these to customers.

The pit utilises the existing road infrastructure in the area to transport the material to market. No increase in the level of traffic or production at the pit is proposed. Therefore, there will be no increase in quarry related traffic on road infrastructure in the vicinity of the pit. A Traffic and Transport Assessment has been compiled and included as part of the EIAR. There are no built and natural heritage features and areas located within the near vicinity of the pit which could be impacted on by the existing and continued development.

#### 4.2.4 **Carlow Local Economic and Community Plan 2016 – 2021**

##### 4.2.4.1 *Background*

The Local Economic and Community Plan (LECP) is a 6 year plan prepared to harness the county's many unique physical, natural and human resources, in order to improve the quality of life for all who live, work and visit the county, as the county moves into the future with confidence.

The Plan aims to improve the well-being of the people and economy of Carlow through enhanced strategic planning, better targeting of resources and more meaningful impacts for local communities. It provides the strategic framework for all publicly funded economic, local and community development programmes in the County with the objective of maximizing the social, cultural, sporting and economic development of Carlow at a regional level. The Plan includes measures to tackle poverty and exclusion and to develop opportunities for enterprise and employment, training and education, community wellbeing, rural and community development, local infrastructure and services, tourism, cultural services, innovation/R&D, natural resources, agriculture and the promotion of Carlow. The LECP is based on the following guiding principles:

- The creation of a framework for an economic and community strategy for County Carlow;

- Promotion and main-streaming of equality;
- Sustainability – promoting a more resource efficient, green and more inclusive economy;
- Maximising returns – avoiding unnecessary overlap and duplication and achieving synergies through co-operation;
- Participative planning – meaningful participation and consultation in the planning process;
- Community consultation and engagement – participation, empowerment and collective decision making to achieve change at local level;
- Community development principles – equality, participation, empowerment, collective decision making;
- Accessibility and ownership – the plan is written in a style that is open, straightforward and as accessible as possible.

These guiding principles have been developed taking into account the strategic vision of the Carlow County Development Plan 2015-2021.

#### 4.2.4.2 Compliance with Carlow Local Economic and Community Plan

The operation of the development will lead to direct and indirect employment at the sand and gravel pit which will lead to indirect economic development associated with employees contributing to the local businesses and economy. The development will provide aggregate products to both local and regional developments.

### 4.3 Planning Permissions Relative to the Site

A number of planning permissions relate to the proposed site and these are listed below in chronological order.

1. **Reg. Ref. 6889:** Permission granted for development of gravel pit.
2. **Reg. Ref. CW7850:** Permission granted in 1987 by ABP for development comprising development of gravel pit (including machinery for screening, batching, mixing), an office, and septic tank at Roscat, Tullow, County Carlow subject to 12 conditions.
  - Condition no.4 restricted operations to the area indicated on the location plan submitted to the PA on 27/03/86 (c.1.3ha).
3. **Reg. Ref. PL.99.545:** Permission granted in 1999 for a new entrance to existing sand and gravel pit subject to 11 conditions.
4. **Section 261 Registration:** QY12/28 – The pit was registered in 2007 under S.261 of the Planning and Development Act, 2000 and conditions were attached.
  - Condition no.1 (b) required compliance with the conditions attached to the three previous grants of planning permission.



#### 4.4 References

Carlow County Council (2015) Carlow County Development Plan 2015 – 2021

Available at: <http://www.carlow.ie/wp-content/documents/uploads/carlow-county-dev-plan-2015-2021.pdf>

Carlow County Council (2016) County Carlow 2021 Local Economic and Community Plan 2016-2021

Available at: <https://www.localenterprise.ie/Carlow/Enterprise-Development/Local-Economic-and-Community-Plan-LECP-/LECP.pdf>

Department of Environment, Heritage and Local Government (2002) National Spatial Strategy for Ireland 2002 – 2020

Department of Environment, Community and Local Government (2015) Circular Letter PL 3/15

Department of Housing, Planning and Local Government (2001) Local Government (Planning and Development) Regulations, 2001 (S.I. No. 600 of 2001)

Department of Housing, Planning and Local Government (2015) Local Government Planning and Development (Amendment) No. 2 Regulations 2015 (S.I. No. 310 of 2015)

Department of Housing Planning and Local Government (2018) National Planning Framework under Project Ireland 2040. Available at: [www.npf.ie](http://www.npf.ie)

Environmental Protection Agency (2006) Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non – Scheduled Minerals)

European Union (Environmental Impact Assessment and Habitats) Regulations 2015, S.I. No 301 of 2015

Irish Concrete Federation - <http://www.irishconcrete.ie>

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## 5.0 POPULATION AND HUMAN HEALTH

### 5.1 Introduction

This chapter assesses the existing environment, in addition to the potential effects on population and human health arising from the proposed development.

Section 5.2 focuses on population including potential direct and indirect effects of the development with regard to principal socio-economic indicators, including population, land use, employment, tourism and residential amenity. Section 5.3 assesses the potential effects on human health associated with the proposed development.

A human health risk assessment is the process of assessing the nature and probability of adverse health effects on human beings as a result of a development. This focuses on potential human health effects related to potential emissions associated with the development. Mitigation measures are proposed where required to mitigate any potential effects arising from the proposed development.

Other aspects of potential direct and indirect effects on human beings are also considered in the other chapters of this EIAR which include the following:

- 8.0 - Water
- 9.0 - Air
- 10.0 - Noise and Vibration
- 12.0 - Traffic
- 13.0 - Landscape and Restoration

#### 5.1.1 Characteristics of the Proposed Development

The Section 37L application area comprises of the existing pit area, undisturbed areas, haul road and a greenfield area currently subject to agricultural use. The site is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathtoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site.

Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm yard is located nearby.

The area immediately around the site is sparsely populated, with individual farmsteads and scattered houses along the road network. A series of irregular third class roads run around the lands, serving a number of dwellings and farms.

The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel, will result in the extension of the previously disturbed area associated with the existing pit area into the application area.

Material will be extracted by excavators and passed through mobile processing plant which will process the material into various grades of aggregate. Material will also be extracted, loaded directly onto trucks and transported off site to market or to an off-site location for processing. Landscaping of the sand and gravel pit will be undertaken during the operational phase and restoration of the pit on completion of extraction. The applicant is seeking a 25 year permission as part of the application.

The existing sand and gravel pit area part of which is also subject to Substitute Consent has been registered with Carlow County Council in accordance with the requirements of Section 261 of the Planning and Development Act, 2000 (Quarry Ref. No. QY12/28). An area of 6.02ha of the landholding was registered in this process.

Plant and machinery which will operate in the application area will consist of tracked excavators, wheel loaders, dump trucks and mobile processing plant. Ancillary plant such as a water bowser will be deployed where required.

## 5.2 Population

### 5.2.1 Introduction

This assessment on population includes potential direct and indirect effects of the existing development with regard to principal socio-economic indicators, including population, land use, employment, tourism and residential amenity.

### 5.2.2 Methodology

The assessment of impacts on human beings entails the identification of key populations which were most likely to be impacted on by day to day activities undertaken at the pit. Key populations that had the potential to be impacted upon by the development have been identified as persons residing and engaging in activities in close proximity to the existing pit, persons with a stake in the general economy of the local and regional area and persons enjoying the recreational and cultural amenities of the area. The principal sources of information are sourced from the Central Statistics Office (CSO). A number of other sources of information and guidance documents were referred to as part of the compilation of this chapter which are listed in Section 5.7 – References.

### 5.2.3 Existing Environment

The application site is located in the townland of Roscat, Tullow, Co. Carlow. The application area is situated within the Electoral Division (ED) of Tullowbeg. The nearest urban centre is the village of Tullow, Co. Carlow, which is located approximately 3km to the northeast of the sand and gravel

pit. Carlow town, the nearest large urban centre, is located approximately 16km to the northwest of the site.

In describing the receiving environment in relation to human beings, this section provides an overview of the local area, including settlement patterns, age structure, population change, social indicators including employment, education, and social class, and economic activity. Figure 5.1 at the end of this chapter illustrates the dwellings within 1km of the proposed application site.

#### 5.2.3.1 Population and Age Profile

Based on the latest census data (CSO, 2016), a total of 622 persons resided in the Tullowbeg ED on Census Night in 2016. The majority of the populations of the ED live in one off houses and farmsteads, which are sparsely populated throughout the ED.

The 25-44 (33.3%) age group constitutes the highest proportion of the demographic in the Tullowbeg ED (Table 5-1). Overall, the age profile of the ED is relatively comparable across with the board when equated to the County and State. However, the ED holds a slightly, but not significantly, lower proportion of the population aged 65 and over (9.6%) when compared with the County (12.9%) and State (13.4%). As such, this result gives rise to a lower dependency ratio (31%) within the ED than the County (31.5%) and State (34.5%).

**Table 5-1:** Proportional age profile of the Electoral Divisions of Tullowbeg ED compared with Co. Carlow and the State.

Area	0-14	15-24	25-44	45-64	65+	Dependency Ratio
<b>Tullowbeg ED</b>	21.4%	12.1%	33.3%	23.6%	9.6%	31.0%
<b>Co. Carlow</b>	22.2%	12.3%	28.7%	23.9%	12.9%	35.1%
<b>Ireland</b>	21.1%	12.1%	29.5%	23.8%	13.4%	34.5%

#### 5.2.3.2 Principal Economic status

The 2016 Census results show that the Tullowbeg ED has a labour participation rate of 54.8%, which is a moderately higher proportion of the population than that of the County (45.5%) but in line with the State (53.4%).

Conversely, the Tullowbeg ED has an unemployment rate of 15.1%, which almost twice that of the County and over twice that of the State. However, these proportional results are slightly skewed relative to the County and State results due to the low population of the ED aged 15 years and over (n = 489) divided by the number of unemployed inhabitants of the ED (n=74). Labour force results (CSO, 2016) for the ED compared with the County and State results are presented in Table 5-2.

**Table 5-2:** Proportion of the labour force (aged 15 years and over) by principal economic status in the Electoral Divisions of Tullowbeg compared with Co. Carlow and the State.

Economic Status	Area	Tullowbeg ED	Co. Carlow	Ireland
	At work	54.8%	45.5%	53.4%
	Looking for first regular job	1%	0.9%	0.8%
	Unemployed	15.1%	8.4%	7.1%
	Student	10%	10.5%	11.4%
	Looking after home/family	5.7%	8.5%	8.1%
	Retired	9.6%	8.5%	14.5%
	Unable to work	3.7%	12.5%	4.2%
	Other	0%	5.1%	0.4%

### 5.2.3.3 Socio- Economic Groups

The CSO establishes several principal socio-economic groups within the population. These are classified as follows:

- A Employers and Managers
- B Higher Professional
- C Lower Professional
- D Non-Manual
- E Manual Skilled
- F Semi-Skilled
- G Unskilled
- H Own Account Worker
- I Farmers
- J Agricultural Workers
- Z All Others Gainfully Employed

Table 5.3 below indicates that the main 'known' socio-economic group in the Tullowbeg ED is 'Non-manual' (18.5%), which is slightly higher than the County (16.8%) and roughly on par with the State (18%) (Table 5-3). Results also show that the proportions of 'Higher' and 'Lower professionals' in the ED (2.8% and 8.8% respectively) are significantly lower than those of the County (4.3% and 9.4% respectively) and State (7.1% and 11.7% respectively).

**Table 5-3:** Percentage Distribution of Socio-Economic Groups in Tullowbeg ED

Area	A	B	C	D	E	F	G	H	I	J	Z
<b>Tullowbeg ED</b>	13.7	2.8	8.8	18.5	12.4	11.4	3.0	4.3	4.5	1.0	19.7
<b>Co. Carlow</b>	12.8	4.3	9.4	16.8	11.6	9.2	4.3	4.7	6.1	1.3	19.6
<b>Ireland</b>	15.5	7.1	11.7	18.0	9.3	8.6	3.6	5.2	4.9	0.5	15.6

#### 5.2.3.4 Employment Sources and Travel Patterns

Just over three-quarters of the population of Tullowbeg ED travelled to work, school or college by car (75.3%), as either the principal driver (50.9%) or passenger (24.4) (Table 5-4). This is moderately higher than that of the County (66.4%) and State (57.9%). Given the semi-rural location of the Tullowbeg ED, this result can be expected.

Similarly, owing to the semi-rural location, the proportions of the ED population who travel on foot (9.1%), by bicycle (0.3%) and by public transport (0.8%) are significantly lower relative to the proportions of the County and State populations (Table 5-4).

- A. On foot
- B. Bicycle
- C. Bus, minibus or coach
- D. Train, DART or LUAS
- E. Motorcycle or scooter
- F. Motor car: Driver
- G. Motor car: Passenger
- H. Van
- I. Other
- J. Not stated

**Table 5-4:** Means of travel to work, school or college by the proportion of the population (5 years +)

Area	A	B	C	D	E	F	G	H	I	J
<b>Tullowbeg ED</b>	9.1	0.3	1.3	0.8	0.0	50.9	24.4	7.0	0.8	5.5
<b>Co. Carlow</b>	14.4	1.1	5.8	1.0	0.1	42.6	23.8	5.6	0.6	5.0
<b>Ireland</b>	14.4	2.8	10.6	2.8	0.3	40.6	19.2	4.3	0.4	4.6

The figures relating to journey times to work, school or college by the proportion of the population (5 years +) within the ED are comparable across the board with the County and State. Given that the proximity of the of the ED to the town of Tullow is within 3 km, it is likely that the majority of the population of the ED either work or attend schools in Tullow as 40.3% of journey times are reported as being less than 15 minutes.

The second most common journey timeframe is 15 – 30 minutes, with 27.3% of the ED residents commuting this distance. With Carlow town located approximately 16km to the northwest, it is likely that the majority of the demographic within this journey-time category commute to the Carlow for employment and studies at the Carlow Institute of Technology.

**Table 5-5:** Journey time to work, school or college by the proportion of the population (5 years +)

Area	< 15 mins	15 – 30 mins	31 – 45 mins	46 – 60 mins	61 – 90 mins	90 + mins	Not stated
Tullowbeg ED	40.3%	27.3%	9.1%	3.4%	7.5%	4.4%	8.1%
Co. Carlow	40.3%	25.7%	12.5%	4.0%	6.0%	3.4%	8.0%
Ireland	32.3%	28.8%	17.3%	5.9%	6.0%	2.3%	7.4%

#### 5.2.3.5 Land-Use and Housing

Table 5-6 contains CSO (2016) data on the number of private households in the ED and the number of persons in these households, compared with the County and the State. Results show that the average household size in the ED is slightly higher than the county and national average. Figure 5.1 at the end of this chapter illustrates the dwellings within 1km of the proposed application site. CSO (2016) data shows that there has been consistent building of new private houses within the ED during the past 40 years.

**Table 5-6:** Household formation and size

Area	No. of Households	No. of Persons in Households	Avg. Household Size
Tullowbeg ED	196	605	3.1
Co. Carlow	20,537	56,609	2.8
Ireland	1,702,289	4,676,648	2.7

The sand and gravel pit is situated in a semi-rural area with one off housing developments and farmsteads located along local roads in the vicinity of the pit. The main land use of the study area is agricultural with livestock grazing being the predominant sector practiced.

The town of Tullow is located approximately 3km to the north of the pit. The town consists of public houses, schools, a post office and a church.

#### 5.2.3.6 Tourism, Recreation and Amenity

Tourism is regarded as one of the greatest sources of potential employment nationally and also has potential to benefit the community in an environmentally sustainable way. The following is a summary of key statistics from Failte Irelands report for the year ended 31<sup>st</sup> December 2017:

- 8.7m overseas tourists came to Ireland, representing a growth of 9%
- Overseas tourism expenditure grew by an estimated 9% to €4.6bn
- Volume of holiday trips taken by domestic residents was estimated at 4.8 million



- Spending by Irish people on holiday trips in Ireland rose by 5% to 1.1bn
- Almost 150k people were employed in the accommodation and food service sectors alone.

The Tourism – Objective 1 of the Carlow CDP 2015-2021 states the following:

*“Carlow County Council will promote, encourage and facilitate the development of sustainable tourism through the conservation, protection and enhancement of the built and natural heritage, the protection of sensitive landscapes and cultural and community environments in order to maximise upon the economic benefits arising from the industry.”*

#### 5.2.3.6.1 Local Tourism Amenities

As a primarily rural area, 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. The local cultural and social landscape, which includes interpretation of local traditions and customs, can contribute to and enhance the visitor’s enjoyment of their holiday, while also being sustainable for local people in the long term.

Carlow also benefits hugely from its strategic location on the east coast of Ireland within close proximity to Dublin, the country’s main urban area and a major source of tourism business for the county. The completion of the M9 motorway provides easy access to Dublin, Belfast and the entire South East region. Additionally, the Carlow – Dublin and Waterford route is well serviced by bus and train operators. Carlow is also approximately 90km from the ferry and airports of Dublin, Rosslare and Waterford. Its central location offers the perfect base to explore the surrounding counties of Wexford, Kilkenny, Wicklow, Kildare and Laois.

Home to three of Ireland’s key national walking routes – the South Leinster, the Barrow and the Wicklow Ways – Carlow is blessed with hundreds of miles of excellent and varied walking. The golfing visitor will find an impressive variety of golfing facilities to suit all levels while the Rivers Barrow and Slaney and their many tributaries provide exciting activities for the passive and active water enthusiast.

County Carlow is steeped in historical and archaeological artefacts from pagan sites such as the Brownshill Dolmen to ecclesiastical settlements, many of which are of national significance. The Carlow Garden Trail is another gem for visitors to enjoy featuring a collection of eighteen gardening attractions including great old gardens such as those at Altamont and smaller gardens which are maturing beautifully with time.

#### 5.2.3.7 Social Infrastructure

There are a number of national schools located within a 10km radius of the proposed application site, the nearest of these being Scoil Naisiunta Muire Lourdes, Mill St and St Columbas National School, Tullowphelim, Tullow, both of which are located 2.9km to the north east of the application

area. Ballon National School is located approximately 7.6km to the south of the application site in the village of Ballon.

Tullow Community School is the closest secondary school to the application area, located 3km to the north east in the town of Tullow. The nearest third level institute is Carlow Institute of Technology, approximately 16.5km to the north-west in Carlow town.

There is no local Garda Station in the immediate vicinity of the application area, with the closest station being Tullow Garda Station located 2.9km to the north east of the pit. The closest Fire station is Tullow City Fire Station, located approximately 3.1km to the north east of the pit.

#### 5.2.4 Population Impact Assessment

The development, as with similar developments of this nature, was brought about by the continued demand for construction materials. Sand and gravel extraction activities have created a long established land use in the area. The proposed development is assessed under the following headings:

##### 5.2.4.1 *'Do Nothing' Scenario*

All components of the baseline are constantly changing due to a combination of natural and human processes. When predicting likely direct and indirect effects, it is important to remember that there are two available for comparison: the existing baseline environment and the future baseline environment without the implementation of the proposed development but considering natural changes only.

In socio-economic terms, if the development did not go ahead, there would be no further land-take to extraction activity and there would no potential for increased employment in the area as a result of the operation of the sand and gravel pit.

##### 5.2.4.2 *Population*

The sand and gravel pit is located in an area which consists of one off dwellings and farm houses situated along local and minor roads in the vicinity. As seen from the statistical analysis of the population numbers, the average household size is slightly higher in the vicinity of the existing pit than that of the County and National average. Activities associated with sand and gravel sites can deter people from living within proximity to such developments. However, there have been a number of houses built in the vicinity of the pit in recent years.

The applicant will implement measures to reduce noise and dust emissions from the pit. Noise and Dust Deposition monitoring will be undertaken when the pit is operating to measure the levels associated with this activity. Dust and noise emissions are discussed in more detail in Chapters 10.0 and 11.0 respectively.

#### 5.2.4.3 *Economic Activity*

Kilcarrig Quarries Ltd. is a significant employer in Co. Carlow. Their quarry development at Bagnelstown, Co. Carlow provides employment for approximately 15 people directly with a further 5 people employed indirectly. Additional personnel such as contract hauliers, maintenance contractors, material suppliers, etc. also give an additional indirect source of employment.

The proposed development will provide additional employment to the Roscat/Tullow area, therefore, the pit is deemed to have had a positive impact on the local community in terms of employment levels.

#### 5.2.4.4 *Land-Use and Housing*

Prior to extraction activity commencing the land was used for agricultural purposes. The majority of land in the proximity of the application site is used for agricultural purposes with livestock grazing being the predominant activity practiced. Therefore, extraction activity has not led to a significant loss of an existing land-use in the area. A consistent number of houses have been constructed in the vicinity of the pit over the past 30-40 years, which demonstrates that extraction activity to date has not deterred people from living in the area.

#### 5.2.4.5 *Tourism, Recreation and Amenity*

The pit is not located within proximity of any identified tourist attractions in the area. According to the landscape appraisal of County Carlow, the sand and gravel pit is located within the Landscape Character Area (LCA) which has been characterised as Central Lowlands (CAAS, 2015). The following Landscape Types are in the Character Area:

- broad and narrow river valleys;
- farmed lowlands and;
- farmed ridges.

The flat lowland topography of the surrounding lands aids in screening the pit from the surrounding landscape.

The construction of screening berms will further aid in screening the pit. Quarrying activity is a long established land use of the area and has not impacted on the tourist amenity of the study area. The application area is not located on or near a Natura 2000 site or near any protected structure.

#### 5.2.4.6 *Social Infrastructure*

It is unlikely that sand and gravel extraction activity will significantly affect the social infrastructure of the area and may have a positive impact as materials extracted from the pit will be used to develop social infrastructure in the study area.

#### 5.2.4.7 *Site Safety*

Security fencing, screening and other landscaping around the perimeter have secured the site from unauthorised access. It is proposed to further improve perimeter fencing and safety notices in order to make the site more secure. Berms will also be placed around excavated areas and will be in line with “Safe Quarry - Guidelines to the Safety, Health and Welfare at Work (Quarry) Regulations 2008”.

#### 5.2.4.8 *Traffic*

The traffic generated as a result of the operational pit during peak production was in the region of 20 loads per day. This proposed development does not propose to increase the level of traffic above that experienced in the past when operational.

#### 5.2.4.9 *Unplanned Events*

Should an unplanned event occur, emergency response plans and procedures in place will be implemented. Unplanned events are discussed further in various chapters of the EIAR.

#### 5.2.4.10 *Mitigation Measures*

The proposed development will be developed in a manner such that the effect on human beings is minimised. The proposed development will ensure that a reserve of material will be available for future extraction which will secure employment and supply of building materials for the construction industry. This effect is positive, therefore no mitigation measures are proposed in relation to employment.

Employment at the proposed development may also lead to persons moving into the locality or indeed allowing them to continue to reside in the locality rather than emigrating. Again, this is a positive effect for which no mitigation measures are proposed.

There are no potential negative effects on tourism and amenities in the area and therefore no further mitigation measures are required. Mitigation measures for Air, Noise, Water, Landscape and Visual and Material Assets included in the representative chapters of the EIAR will ensure that the proposed development’s effect on the receiving environment is minimised.

### 5.3 Human Health

#### 5.3.1 Introduction

A human health risk assessment is the process to estimate the nature and probability of adverse health effects in humans as a result of a development. The assessment has had regard to the findings of other chapters of this EIA Report, in particular to:

- 5.2 Population
- 8.0 Water
- 10.0 Air

- 11.0 Noise and Vibration
- 12.0 Traffic
- 13.0 Landscape and Restoration

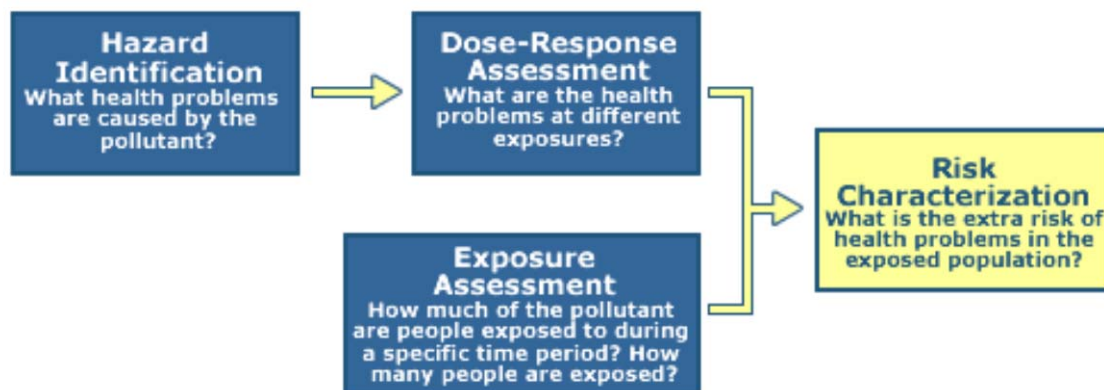
This assessment is focused on potential human health effects associated with potential emissions related to day today activities undertaken at the pit.

### 5.3.2 Methodology

The methodology used in the assessment has regard to that provided by the US Environmental Protection Agency (US EPA) in their Human Health Risk Assessment process. The assessment also has regard to the Draft Guidelines for Preparing Environmental Impact Assessment Reports (EPA, August 2017).

The Irish EPA has general guidelines on Human Health Risk Assessment, however the US guidelines benefit from being more specific and as a result more user-friendly. Nevertheless, they are entirely in keeping with those recommended by the Irish EPA. The assessment methodology advised by the US EPA follows a 4-step process which is detailed in Plate 5.1 and described thereafter.

**Plate 5.1:** Risk Assessment Process (United States Environmental Protection Agency)



#### 5.3.2.1 Steps in the Risk Assessment Process

##### **Step 1 - Hazard Identification**

- Examines whether a stressor has the potential to cause harm to humans and/or ecological systems, and if so, under what circumstances.

##### **Step 2 - Dose-Response Assessment**

- Examines the relationship between exposure and effects.

**Step 3 - Exposure Assessment**

- Examines what is known about the frequency, timing, and levels of contact with a stressor.

**Step 4 - Risk Characterisation**

- Examines how well the data support conclusions about the nature and extent of the risk from exposure to environmental stressors.

**5.3.2.2 Definition of Terms**

The following terms are used in the assessment:

- *Agent* - A chemicals or factors in the environment to which humans are exposed that may cause adverse health effects.
- *Vulnerable / Vulnerable Groups* - An individual or group of individuals who, by nature of their age, health status or other factor is more prone to developing adverse health effects.
- *Robust* - Strong and Healthy
- *Health based Standard* - The dosage of an agent scientifically determined to protect against human health effects.
- *Threshold* - The dosage of an agent below which there is no adverse health effect.
- *PM10* - Particulate matter of diameter less than 10 µm.
- *PM2.5* - Particulate matter of diameter less than 2.5 µm.

**5.3.2.3 Health Based Standards**

Health based standards by their nature are set to protect against human health effects. The level at which the standard is set is chosen to protect the vulnerable, not the robust. In determining the most appropriate methodology a number of Guidance Notes were reviewed. The Irish EPA Guidance favours the Health Based Standards approach. In its publication, “*EPA Revised Draft Guidelines on the Information to be contained in Environmental Impact Statements*” (August 2017) it states:

*‘The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment.’*

These Health Based Standards will be discussed further but it is appropriate to understand the principal behind the setting of such standards. In this, it is useful to consider Guidance by the US EPA in performing a Human Risk assessment.

Baseline information gathered to date and predictions of future emissions associated with the day to day operations of the proposed development have been used as part of the assessment. These can be compared to various thresholds for air, noise, vibration etc. No detrimental health effects are expected below these thresholds.

#### *5.3.2.4 Significance of Health Effects*

There is a difficulty in assigning levels of significance to human health effects. In medicine, as in all science, we use the concept of statistical significance. That is putting a value, often in terms of percentage levels of our confidence, on the data. We would often use confidence measures of 95% or even 99% to measure our levels of certainty that any changes are not due to chance alone.

This is a valid approach for the study of the effects on a population or in large studies but is not possible in the assessment of a significant effect on human health in smaller scale projects. It does not, for example, absolutely exclude a response in an individual. This may be best explained with an example. Low levels of noise emissions from a process undertaken at the proposed development may be such that the vast majority of the population do not notice it. However, an individual located within proximity may find them aggravating even when other people in exactly the same location do not.

The significance criteria used in the assessment as adapted from the Irish EPA Guidelines, are set out in Table 5-7.

**Table 5-7:** Criteria Used in the Assessment of Human Health Effects

Effect Level	Significance Criteria
Imperceptible	No significant human health impacts are apparent. An example is no measurable effect attributable to the proposed development.
Slight	A small impact on individual reported symptoms but no change in health status can be attributed to the proposed development. An example is a temporary increase in symptoms in an individual but no change in the severity of the underlying condition or treatment required.
Moderate	A small impact on health status of individuals but no change in morbidity or mortality can be attributed to the proposed development. An example is an individual increasing their use of a treatment attributable to the development but no change in underlying condition.
Significant	A proposed development has the potential to impact on individual health status. An example is an individual's condition becoming measurably more severe as a result of the proposed development.
Very Significant	A proposed development has the potential to impact on the health status of groups. An example is a group of individuals' conditions becoming measurably more severe as a result of the proposed development.
Profound	A proposed development has the potential to impact on the health status of communities. An example is a measurable increase in the incidence or severity of a condition in a community.

### 5.3.3 Human Health Impact Assessment

#### 5.3.3.1 Hazard Identification

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares. It is proposed to extract the available sand and gravel material from the greenfield area. The following chapters of the EIAR provide detailed information on the existing and predicted emissions relating to their respective chapter:

- 8.0 - Water
- 10.0 - Air
- 11.0 - Noise and Vibration
- 12.0 - Traffic
- 13.0 - Landscape and Restoration

Of relevance to the human health are air emissions, noise emissions, emissions to water and traffic associated with day to day activities and therefore, these are assessed as part of this chapter.



#### 5.3.3.2 *Dose-Response Assessment*

Emissions to air including noise emissions, emissions to water and traffic associated with the development are identified as the main areas which could impact on human health. The concept of dose-response suggests that the greater the dose to which an individual is exposed, the greater either the likelihood of a health response and/or the greater the severity of that response. Inbuilt to this concept is the principle of a threshold. The threshold is the level of an agent below which one would expect no adverse response. This is a concept on which many health based standards are based.

Thresholds are set in relation to emissions to various elements of the environment such as stack emissions to air, dust-deposition, noise associated with day to day operations and discharge of water to surface water or ground water. These are set by way of standards and recommended guideline values which are attached as conditions to a grant of a planning permission or by way of an air emissions licence or discharge licence. In order to ensure compliance routine monitoring of the emissions is undertaken.

Emission levels which are below the threshold are taken to have no significant health effects. If however, the levels increase above the threshold it is anticipated that an increasing number of people will be affected and the severity of that effect increases with increase in level.

#### 5.3.3.3 *Exposure Assessment*

This is the process of measuring or estimating the magnitude, frequency and duration of human exposure to an agent in the environment, or estimating future exposures for an agent that has not yet been released. An exposure assessment includes some discussion of the size, nature, and types of human populations exposed to the agent, as well as discussion of the uncertainties in the above information.

Health based standards therefore rely on the dose response concept and try to identify by scientific means the threshold below which no significant health effects would occur. When standards are scientifically set by reliable and recognised or statutory agencies, they are a useful method in assessing the impact of any proposed change.

Health standards are not established based on the threshold to protect the robust members of the population, who may be more resilient, but are primarily there to protect the vulnerable. They are to protect the elderly, the very young, and the ill and by extension thereby, the robust are not affected.

#### 5.3.3.4 *Risk Characterisation*

Risk characterisation is the fourth step of the risk assessment process, integrating information from the exposure assessment and the hazard characterisation to produce the judgment as to the nature and presence or absence of risks. In practice, each component of the risk assessment (e.g.

hazard assessment, dose-response assessment, exposure assessment) has an individual risk characterization written to carry forward the key findings, assumptions, limitations and uncertainties.

It involves comparing the predicted impacts of the change in the environment associated with the development and comparing those predicted changes with the relevant health based standards. It can be assumed that provided the predicted changes do not result in exceedances of the health based standards that there will be no significant risk.

#### *5.3.3.4.1 Assessment of Impacts Associated with Emissions to Water*

The potential impacts of the proposed development on the water environment have been assessed in Chapter 8.0 of the EIA Report and mitigation measures are proposed in order to safeguard the water environment.

#### Assessment of Effect

Given that there will be no effect on water quality standards, the effects on human health from water are assessed as Imperceptible.

#### *5.3.3.4.2 Assessment of Impacts Associated with Noise*

As detailed in Chapter 11.0 of this EIAR, a noise assessment undertaken at the application area shows that the pit will be compliant with the limits of 55dB(A)  $L_{Aeg}$  (60 minutes) daytime and 45dB(A)  $L_{Aeg}$  (60 minutes) night-time. It is likely that these will be the limits imposed as part of a grant of permission.

The assessments concluded that given the mitigation proposed in relation to noise there will be no significant noise impact as a result of the proposed development.

#### Assessment of Effect

The human health effect for all receptors arising from noise are assessed as being Imperceptible.

#### *5.3.3.4.3 Assessment of Impacts Associated with Emissions to Air*

The main potential sources of emissions to air in relation to the development will be associated with plant and machinery undertaking day to day activities such as extraction, processing and transportation of material and dust blow generated during dry windy conditions.

The most commonly applied guideline is the German (TA Luft) guideline of 350mg/m<sup>2</sup>/day as measured using Bergerhoff type dust deposit gauges as per the German Standard Method for determination of dust deposition rate (VDI 2119). This is commonly applied to ensure that no nuisance effects will result from specified industrial activities. Below these thresholds dust problems are considered less likely. Dust Deposition is normally measured by gravimetrically determining the mass of particulates and dust deposited over a specified surface area over a period of one month (30 days +/- 2 days).

The EPA Document Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006) recommends that the following TA Luft dust deposition limit value be adopted at site boundaries associated with quarry developments – total dust deposition (soluble and insoluble): 350 mg/m<sup>2</sup>/day (when averaged over a 30-day period).

#### Assessment of Effect

Modelled emissions associated with the pit when operational lead to ambient concentrations which are within the relevant ambient air quality standards for dust, PM10 and PM2.5. Thus, the impact on air quality associated with day to day activity is assessed as being imperceptible.

It is anticipated that the results of dust monitoring will be consistently below the recommended threshold going forward. As such, the potential impacts on human health associated with these activities are assessed as being imperceptible.

#### *5.3.3.4.4 Assessment of Impacts Associated with Traffic*

The existing sand and gravel pit development generates a number of traffic movements associated with the transport of material to and from the pit to market. The proposed development will not result in an increase in traffic on the public road as the proposed development seeks to authorise a reserve of material to extract into the future. The historical traffic movements associated with the proposed development are approximately 20 per day and this will be the level going forward.

#### *5.3.3.5 Unplanned Events*

Should an unplanned event occur, emergency response plans and procedures in place will be implemented. Unplanned events are discussed further in various chapters of the EIAR.

## **5.4 Mitigation Measures**

No mitigation measures other than those detailed in the following chapters of this EIA Report are required:

8.0 – Water

9.0 – Climate

10.0 – Air

11.0 – Noise and Vibration

12.0 – Traffic

13.0 – Landscape and Restoration

## **5.5 Residual Effects**

The assessment concludes that the proposed development will not give rise to effects on human health.

## 5.6 Monitoring

Environmental monitoring will be carried out in accordance with the recommendations of the various sections of the EIAR or in line with conditions attached to the grant of planning permission.

## 5.7 References

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Fáilte Ireland (2016) - Domestic Tourism 2015 An overview of Irish residents' travel within the Republic of Ireland

United States Environmental Protection Agency - Conducting a Human Health Risk Assessment - <https://www.epa.gov/>

## Figures



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**Legend**

Application Area  
Area = 14.7 Ha

Dwelling Location

1Km off Application Boundary



All Levels Relative to Ordnance Datum

O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

**EARTH SCIENCE PARTNERSHIP**  
CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
Tonranny Westport Co. Mayo  
tel: +353(0)98 28999 fax: +353(0)98 24727  
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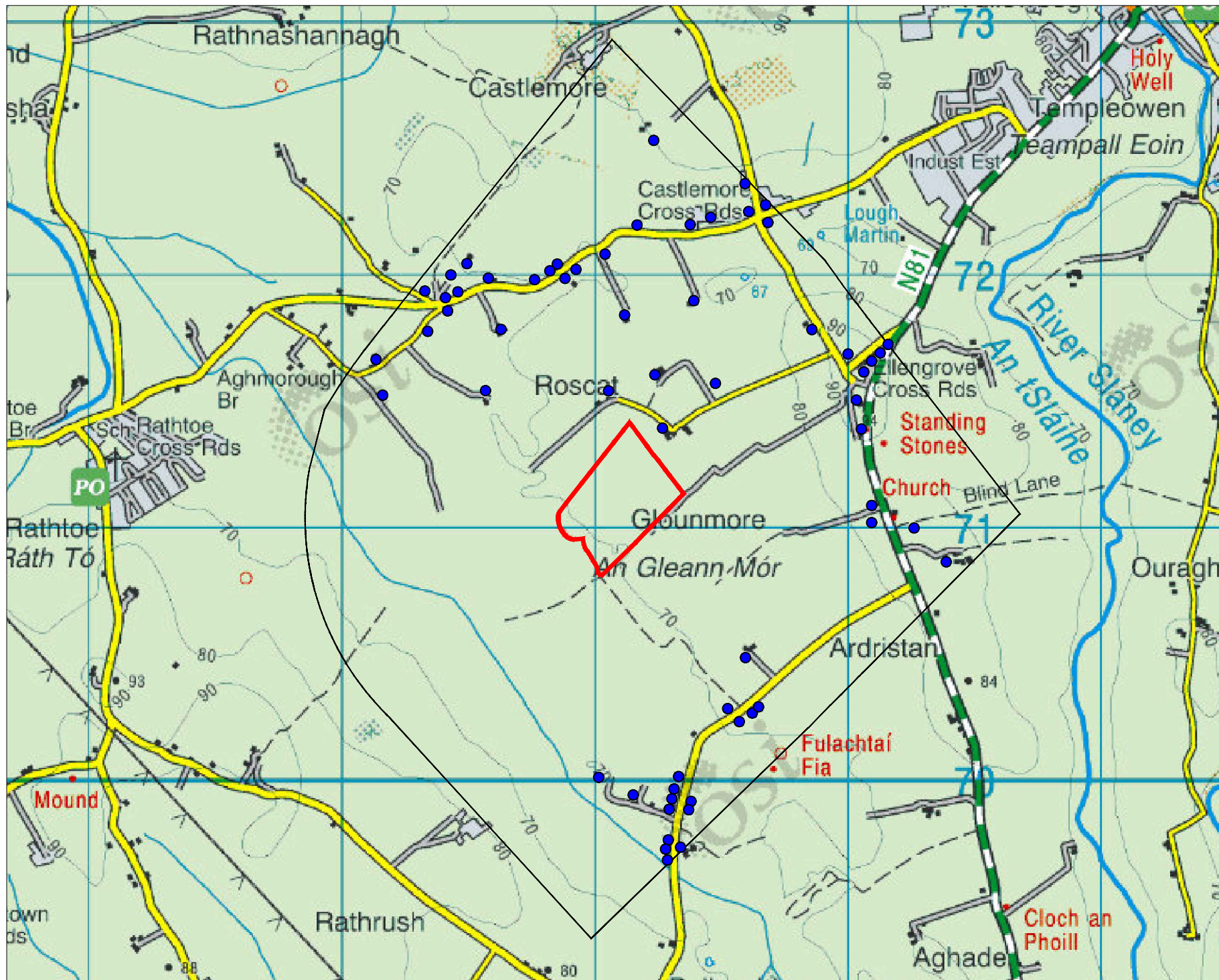
Client: Kilcarrig Quarries Ltd.  
Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Project: Dwellings within 1km of Application Site

Drawn By: Sean O' Donnell  
Checked By: Patrick O' Donnell

Scale: 1 : 20,000 @ A4 Date: Apr. 2019  
Job No: EI061 Rev: 0

Figure 5.1





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## 6.0 BIODIVERSITY

### 6.1 Introduction

This chapter appraises the likely significant effects of the proposed sand and gravel pit extension on the receiving environment. Where likely significant effects are identified, appropriate mitigation measures to reduce / avoid these effects are outlined.

A separate Natura Impact Statement has been produced which evaluates the potential for significant effects on the Natura 2000 sites within 15 km of the proposed development and is included in the planning application.

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares currently subject to agricultural use. The site is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathtoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site.

Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm yard is located nearby.

The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel, will result in the extension of the previously disturbed area associated with the existing pit area into the application area.

Material will be extracted by excavators and passed through mobile processing plant which will process the material into various grades of aggregate. Material will also be extracted, loaded directly onto trucks and transported off site to market or to an off-site location for processing. Landscaping of the sand and gravel pit will be undertaken during the operational phase and restoration of the pit on completion of extraction. The applicant is seeking a 25 year permission as part of the application.

Please refer to Chapter 3.0 Project Description for a comprehensive overview of the site location and characteristics of the proposed project.

#### 6.1.1 Statement of Competency

Ms Sarah Ingham MSc BSc (Hons.) ACIEEM

Ms Sarah Ingham worked as an Ecologist and Project Manager with an environmental consultancy in the west of Ireland from early 2014 prior to taking up her current post of Senior Ecologist with Earth Science Partnership Ireland in November 2017. Ms Ingham is primarily a bird expert with robust professional experience in surveying and studying bird ecology both within and outside Special Protection Areas throughout Ireland.

Most notably Ms Ingham has a great deal of applied knowledge and experience of conducting protected species breeding surveys of hen harrier, merlin, golden plover, red grouse and snipe, as well as wintering swans and geese. Survey techniques included vantage point surveys, breeding bird transects, prey density point counts, nest finding and habitat mapping. Ms Ingham also worked as a habitat specialist on numerous projects, most notably the National Irish Uplands Habitat Survey.

Since taking up her position as a full-time ecological consultant in 2014, Ms Ingham has project managed all elements of several large scale and complex wind farm ecology projects such as Knockacummer Wind Farm and Glentane Wind Farm Phases I and II in Co. Cork. She was responsible for overseeing implementing the Hen Harrier Species and Habitat Management Plan for these three wind farm projects from the pre-construction to operational phase.

She has written over 100 Appropriate Assessment Screening Reports, Natura Impact Statements and Ecological Impact Assessments for various infrastructural developments throughout Ireland and managed a team of up to 5 ecologists to assist in this work.

She has also taken the role of on-site Ecological Clerk of Works at numerous wind farms under construction, such as Slieve Callan Wind Farm, Co. Clare and Ballyhoura Wind Farm, Co. Cork.

In her current role with Earth Science Partnership, Ms Ingham has sole responsibility for the management and output of all ecological elements of engineering projects which come through the office, as well as sourcing new clients and tendering for environmental work.

Ms Ingham is an Associate Member of the Chartered Institute of Ecology and Environmental Management (ACIEEM) and sits on the Irish Section Committee of CIEEM.

## 6.2 Materials and Methods

### 6.2.1 Desktop Review

A desktop review was carried out to identify features of ecological importance within the receiving environment of the proposed extension of the existing sand and gravel pit.

A review of the extent of sites designated for nature conservation was carried out by examining the most recent updates of GIS shapefiles downloaded from the NPWS website and exploring these within QGIS 2.18.15. These included European sites i.e. Special Areas of Conservation and Special Protection Areas, as well as nationally designated Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) within a 15km radius of the existing pit, as per published guidance on the Department of the Environment and Local Government (2009).

A review of the published literature was undertaken in order to collate data on the receiving environment, including species and habitats of conservation importance in the study area. Publicly

available documents from the following agencies and bodies were accessed as part of the desktop review:

- Environmental Protection Agency (EPA);
- Carlow County Council (CCC);
- Inland Fisheries Ireland (IFI);
- Inland Waterways Association of Ireland (IWA);
- National Parks and Wildlife Service (NPWS);
- Water Framework Directive (WFD);
- National Biodiversity Data Centre (NBDC);
- BirdWatch Ireland (BWI);
- Bat Conservation Ireland (BCI).

### 6.2.2 Consultation

A Screening and Scoping document in relation to the full EIAR, outlining the complete project description and potential effects of the project, was forwarded to the Development Applications Unit (DAU) 26<sup>th</sup> October 2018, which in turn disseminated the information to the National Parks and Wildlife Service (NPWS). At the time of writing formal written response has not yet been received from the DAU/NPWS.

### 6.2.3 Site Survey

The existing pit was visited by Senior Ecologist, Ms Sarah Ingham MSc. ACIEEM of Earth Science Partnership Ireland, on 25<sup>th</sup> May 2018 (see Figure 6.1 at the end of this chapter for geographical context of the site). In order to evaluate likely significant effects on ecological receptors in the receiving environment, a number of survey area extents were required. These comprised the proposed application area (see Figure 6.2 at the end of this chapter) plus, if applicable, a wider survey area extent as recommended by specific published Best Practice guidance for specific ecological receptors. Where specific published Best Practice recommendations were not available, professional judgement and a review of peer reviewed literature were the primary drivers in calculating survey area extents. Ecological receptors and justification for their respective survey area extents are presented in Table 6-1. The weather on the day of the survey was dry allowing for good visibility and an above average temperature of 25/28 °C.

**Table 6.1:** Study area extents in relation to individual ecological receptors and justification for same.

Ecological Receptor	Geographical Boundary of the Study Area	Justification for the Study Area Extents
Designated Sites including European Sites, NHAs, pNHAs	Appraised in the Appropriate Assessment reporting document.	A distance of 15km is currently recommended in the case of projects (DoEHLG, 2009). A zone of 15km is considered sufficient in this instance given the magnitude of works and distance downstream to other European sites.
Habitats	The proposed application area only.	Professional judgement and as per Best Practice (CIEEM, 2016).
Birds	The proposed application area only.	Professional judgement and as per Best Practice (CIEEM, 2016).
Non-volant Mammals	The proposed application area only.	Badgers, as per Best Practice guidelines published by the NRA (2005). Other mammal species, professional judgement and as per Best Practice (CIEEM, 2016).
Bats	Desk study only of hectad S87 within which proposed application area is located.	Professional judgement and as per: " <i>Bat Surveys for Professional Ecologists: Good Practice Guidelines</i> , Collins, (2016)".
Amphibians / Reptiles	The proposed application area only.	Professional judgement and as per Best Practice (CIEEM, 2016).
Invertebrates	The proposed application area only.	Professional judgement and as per Best Practice (CIEEM, 2016).

#### 6.2.4 Habitat Survey and Evaluation

A Phase I habitat survey was undertaken to inform an ecological evaluation of the habitats present within the proposed development site in accordance with methods outlined in the Heritage Council publication, "*Guidance for Habitat Survey and Mapping*" (Smith *et al.*, 2011). Habitats were recorded using the habitat classification scheme published by the Heritage Council in *A Guide to Habitats in Ireland* (Fossitt, 2000) and evaluated using the geographical frame of reference scheme as per "*Guidelines for Assessment of Ecological Impacts of National Road Schemes*" (NRA, 2009; please see Table 6-2 below for an outline of this evaluation scheme).

## 6.2.5 Fauna Survey and Evaluation

### 6.2.5.1 Birds

A list of avifauna, mainly passerine species both seen and heard within the study area, was recorded.

### 6.2.5.2 Non-Volant Mammals

November – April is the most optimum survey period for identifying signs of non-volant mammal presence (NRA, 2005). However, given the late climatic spring of 2018 and the consequential delayed growth in vegetation, professional judgement deemed that mammal surveys undertaken in May would suffice. As such, a badger survey was undertaken within the boundaries of the proposed extension area to check for the presence of active or disused badger setts.

An otter survey was conducted along 300m of the Roscat Stream which is located approximately 520m to the south west of the proposed application area. Any tracks and signs encountered along the stream transect was recorded. Records of tracks or signs of other mammals such as red fox (*Vulpes vulpes*), pine marten (*Martes martes*), Irish hare (*Lepus timidus*), European rabbit (*Oryctolagus cuniculus*), red squirrel (*Sciurus vulgaris*), bank vole (*Clethrionomys glareolus*) and wood mouse (*Apodemus sylvaticus*) were also noted.

### 6.2.5.3 Bats

As there are no sites designated for the protection of Lesser Horseshoe Bats within a 15km radius of the proposed application area, it was not deemed necessary to undertake bat surveys within the site. However, a desktop review of bat species records within hectad S87 (NBDC, 2018) was undertaken within which proposed application area is located. There were no buildings within 150m of the application area boundary, as such, a preliminary bat roost potential survey of was not required.

### 6.2.5.4 Amphibians and Reptiles

Any sightings and suitable habitat of amphibians and reptiles were noted during the site ecology walkover survey.

### 6.2.5.5 Invertebrates

A survey of suitable habitat of invertebrate species was undertaken during the site ecology walkover survey.

### 6.2.5.6 Water Quality and Aquatic Ecology

A hydrology report to accompany this application was prepared by hydrogeologist, Dr Colin O'Reilly PhD. (see Chapter 8.0 Water). Effects of water quality on the aquatic ecology within the local environment were extracted from the hydrology report.



A desk-top review on the distribution of freshwater aquatic species within the local hydrological environment was also undertaken by accessing the online data resources of the National Biodiversity Data Centre and the National Parks and Wildlife Service, the findings of which are presented in Section 6.4.1.

#### 6.2.6 Criteria for Evaluating Likely Significant Effects

The significance of a likely effect is a combined function of the value of the affected feature (its ecological importance), the type of effect and the magnitude of the effect. It is necessary to identify the value of ecological features within the study area in order to evaluate the significance and magnitude of possible effects.

The proposed pit extension has been appraised in terms of habitat types present and mapped accordingly. Each habitat type within the study area is evaluated and given an overall significance rating on the basis of the criteria outlined in the National Roads Authority (2009) *Guidelines for the Ecological Assessment of Road Schemes*. This system, presented in Table 6-2 in Section 6.2.6.1 below, outlines criteria for evaluating the significance of effects on at various geographical scales.

##### 6.2.6.1 Geographical Context for Determining Ecological Value

Ecological features are evaluated on the following geographical frame of reference when determining value:

- International importance
- National importance
- County importance (or vice-county in the case of plant or insect species)
- Local importance (higher value)
- Local importance (lower value)

The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest. This system is presented in Table 6-2 below and is taken from the NRA publication "*Guidelines for the Assessment of the Ecological Impacts of National Road Schemes*" (NRA, 2009).

**Table 6.2:** Criteria used to determine the value of the ecological resources (adapted from NRA, 2009).

Ecological Valuation	Criteria
<b>International Importance</b>	<ul style="list-style-type: none"> <li>• ‘European Site’ including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.</li> <li>• Proposed Special Protection Area (pSPA).</li> <li>• Site that fulfills the criteria for designation as a ‘European Site’ (see Annex III of the Habitats Directive, as amended).</li> <li>• Features essential to maintaining the coherence of the Natura 2000 Network.</li> <li>• Site containing ‘best examples’ of the habitat types listed in Annex I of the Habitats Directive.</li> <li>• Resident or regularly occurring populations (assessed to be important at the national level) of the following: <ul style="list-style-type: none"> <li>○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> </ul> </li> </ul> <p style="text-align: center;">and/or</p> <ul style="list-style-type: none"> <li>○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.</li> </ul> <ul style="list-style-type: none"> <li>• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).</li> <li>• World Heritage Site (Convention for the Protection of World Cultural &amp; Natural Heritage, 1972).</li> <li>• Biosphere Reserve (UNESCO Man and the Biosphere Programme).</li> <li>• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).</li> <li>• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).</li> <li>• Biogenetic Reserve under the Council of Europe.</li> <li>• European Diploma Site under the Council of Europe.</li> <li>• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).</li> </ul>
<b>National Importance</b>	<ul style="list-style-type: none"> <li>• Site designated or proposed as a Natural Heritage Area (NHA).</li> </ul>

Ecological Valuation	Criteria
	<ul style="list-style-type: none"> <li>• Statutory Nature Reserve.</li> <li>• Refuge for Fauna and Flora protected under the Wildlife Acts.</li> <li>• National Park.</li> <li>• Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.</li> <li>• Resident or regularly occurring populations (assessed to be important at the national level) of the following: <ul style="list-style-type: none"> <li>○ Species protected under the Wildlife Acts; and/or</li> <li>○ Species listed on the relevant Red Data list.</li> </ul> </li> <li>• Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.</li> </ul>
<b>County Importance</b>	<ul style="list-style-type: none"> <li>• Area of Special Amenity.</li> <li>• Area subject to a Tree Preservation Order.</li> <li>• Area of High Amenity, or equivalent, designated under the County Development Plan.</li> <li>• Resident or regularly occurring populations (assessed to be important at the County level) of the following: <ul style="list-style-type: none"> <li>○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> <li>○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;</li> <li>○ Species protected under the Wildlife Acts; and/or</li> <li>○ Species listed on the relevant Red Data list.</li> </ul> </li> <li>• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.</li> <li>• County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared.</li> <li>• Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.</li> <li>• Sites containing habitats and species that are rare or are</li> </ul>

Ecological Valuation	Criteria
	undergoing a decline in quality or extent at a national level.
<b>Local Importance (Higher Value)</b>	<ul style="list-style-type: none"> <li>• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;</li> <li>• Resident or regularly occurring populations (assessed to be important at the Local level) of the following: <ul style="list-style-type: none"> <li>○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> <li>○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;</li> <li>○ Species protected under the Wildlife Acts; and/or</li> <li>○ Species listed on the relevant Red Data list.</li> </ul> </li> <li>• Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;</li> <li>• Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential.</li> </ul>
<b>Local Importance (Lower Value)</b>	<ul style="list-style-type: none"> <li>• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;</li> <li>• Sites or features containing non-native species that are of some importance in maintaining habitat links.</li> </ul>

#### 6.2.6.2 Definitions of Effects

The description of effects needs to be precise and concise. Each effect usually needs to be qualified to provide a comprehensive description of the predicted effect on receptors. Definitions of the quality, significance, duration, probability and magnitude of effects as outlined in the EPA (2017) “Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements” are presented in Tables 6-3 – 6-7 below.

**Table 6.3:** Quality of Effects (adapted from EPA, 2017)

Quality of Effect	Description
<b>Positive Effect</b>	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities).
<b>Neutral Effect</b>	A change which does not affect the quality of the environment.
<b>Negative/Adverse Effect</b>	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

**Table 6.4:** Significance of Effects (adapted from EPA, 2017)

Significance of Effect	Description
<b>Imperceptible</b>	An effect capable of measurement but without notice changes in the character of the environment.
<b>Not Significant</b>	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.
<b>Slight</b>	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
<b>Moderate</b>	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
<b>Significant</b>	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
<b>Very Significant</b>	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
<b>Profound</b>	An effect which obliterates sensitive characteristics.

**Table 6.5:** Duration of Effects (adapted from EPA, 2017)

Duration of Effect	Description
<b>Momentary Effects</b>	Effects lasting from seconds to minutes.
<b>Brief Effects</b>	Effects lasting less than a day.
<b>Temporary Effects</b>	Effects lasting less than a year.
<b>Short-term Effects</b>	Effects lasting one to seven years.
<b>Medium-term Effects</b>	Effects lasting seven to fifteen years.
<b>Long-term Effects</b>	Effects lasting fifteen to sixty years.
<b>Permanent Effects</b>	Effects lasting over sixty years.

**Table 6.6:** Probability of Effects (adapted from EPA, 2017)

Probability of Effect	Description
<b>Likely Effects</b>	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
<b>Indeterminable Effects</b>	When the full consequences of a change in the environment cannot be described.
<b>'Worst case' Effects</b>	The effects arising from a project in the case where mitigation measures substantially fail.

**Table 6.7:** Magnitude of Effects (adapted from EPA, 2017)

Magnitude of Effect	Description
<b>Extent</b>	The size of the area, the number of sites, and the proportion of a population affected by an effect.
<b>Duration</b>	The period of time over which the effect will occur (see further detail above in Table 6-5).
<b>Frequency</b>	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)?
<b>Context</b>	Will the extent, duration, or frequency conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever)?

## 6.3 Receiving Environment

### 6.3.1 Designated Sites

#### 6.3.1.1 Natura 2000 Sites

There are 3 EU designated sites located within a 15km radius of the proposed application area (Tables 6-8). Figure 6.3 at the end of this chapter shows the locations of these sites relative to the proposed application area.

**Table 6.8:** EU designated SACs located within a 15km radius of the proposed application area at Roscat, Tullow, Co. Carlow.

EU Designated SACs and Site Code	Distance and direction from the proposed application area
Slaney River Valley SAC (Site Code: 000781)	1.8km east
River Barrow And River Nore SAC (Site Code: 002162)	12.7km west
Blackstairs Mountains SAC (Site Code: 000770)	14.2km south

A hydrological connection exists between the River Barrow and River Nore SAC and the proposed application area via the Roscat Stream which is located approximately 520m to the west of the proposed application area. The Roscat Stream flows in a north-westerly direction towards its

confluence with the Burren River, which flows into the River Barrow in Carlow town. The total hydrological distance between the application area and the SAC is 15.5km, which provides a potential, albeit weak, source-pathway-receptor link between the two.

There are no further hydrological connections between the proposed application area and the identified Natura 2000 sites.

A Natura Impact Statement (NIS) which evaluates the likely significant effects of the proposed development on the above listed European sites, is included in the planning application.

**Evaluation:** EU designated sites are of International Importance.

#### 6.3.1.2 Nationally Designated Sites

There are 8 proposed Natural Heritage Areas (pNHAs) (Table 6-9) located within a 15km radius of the proposed application area. Figure 6.4 at the end of this chapter shows the locations of these designated sites relative to the proposed application area.

**Table 6.9:** Proposed Natural Heritage Areas (pNHA) located within a 15km radius of the proposed application area at Roscat, Tullow, Co. Carlow.

Proposed Natural Heritage Areas and Site Code	Distance and direction from the proposed application area
Ardristan Fen pNHA (Site Code: 000788)	15m south west
Slaney River Valley pNHA (Site Code: 000781)	4 km south east
Oakpark pNHA (Site Code: 000810)	12.8 km northwest
Cloghrystick Wood pNHA (Site Code: 000806)	12.9 km west
Ballymoon Esker pNHA (Site Code: 000797)	13.6 km southwest
John's Hill pNHA (Site Code: 000808)	13.6 km south east
Blackstairs Mountains pNHA (Site Code: 000770)	14.2 km south
Baggot's Wood pNHA (Site Code: 000792)	14.7 km northeast

Ardristan Fen pNHA is due south of the application site, with the western portion of the fen extending from the Roscat Stream to the southern boundary of the application area with a 15m work exclusion buffer zone between the pNHA and the application area (Figure 6.5).

A fen is a peat-substrate wetland fed by mineral-rich, basic groundwater. It typically occurs on undulating lowlands, predominantly Carboniferous limestone glacial drifts. Within this geological landscape fens tend to form in river valleys and poorly drained hollows, as well as adjacent to raised bogs, and have an average depth of 1-2m (Hammond, 1981). Sphagnum peat is not found on fen peats because of the continued flushing with groundwater.

Local hydrology is an important element in peat formation as the wetland conditions are maintained by groundwater levels being close to, or above, ground surface. Ardristan Fen is fed by a series of springs around its periphery, predominantly on the northern side. During winter

conditions the higher groundwater table means that water table intersects the surface around the periphery of the fen, being clearly visible as a number of small springs from the sands and gravels. The site survey of Ardristan Fen carried out as part of this study was undertaken in summer 2018 during what has been recognised as an extensive drought period and the lower water table was likely the reason for these springs not being observed at this time.

Historical mapping (OSI 6" and 25" maps) suggests that Ardristan Fen was formerly a more extensive area of seasonally saturated fen and marshland that developed in a topographical depression. The historical marsh extents correspond with the peat-based NPWS extents outlined in Figure 8.3 in Chapter 8.0 – Water.

It is important to note that in relatively recent times the area has undergone significant arterial drainage, presumably by local landowners. Reclamation of drained lands has been ongoing since 1975 and aerial photography (Figure 8.3) shows the result of this is prevalence of improved grassland. The arterial drains shown in Figure 8.3 intercept water table and transmit these waters in a general southwest direction toward the Roscat Stream. This is fairly typical in Ireland where undisturbed fens are very rare, with most having been drained and cultivated. There is no hydrological surface or groundwater connectivity between the proposed application area and any of the other identified pNHAs within a 15km radius.

**Evaluation:** NHAs and proposed NHAs are of National Importance.

### 6.3.2 Habitats in the Receiving Environment

The habitats recorded within the proposed application area are presented and evaluated in Table 6-9 as per "*Guidelines for Assessment of Ecological Impacts of National Road Schemes*" (NRA, 2009; please see Table 6-2 for an outline of the geographic frame of reference valuation scheme). Habitats have been categorized as per Fossitt (2000) and are illustrated in Figure 6.5 at the end of this chapter. Each habitat is then described individually in Sections 6.3.2.1 – 6.3.2.8.



**Table 6.10:** Summary of habitat recorded within and adjacent to the proposed application area classified as per Fossitt (2000), their respective evaluations as per NRA (2009) and their respective correspondence, if any, to EU Annex I Habitats.

Fossitt Code	Habitat Type	Habitat Evaluation	Correspondence to EU Annex I Habitats
BC1	Arable crops	Local Importance (Lower Value)	N/A
BL3	Buildings and artificial surfaces	Local Importance (Lower Value)	N/A
ED1	Exposed sand, gravel or till	Local Importance (Higher Value)	N/A
ED3	Recolonising bare ground	Local Importance (Lower Value)	N/A
ED4	Active quarries and mines	Local Importance (Lower Value)	N/A
FL8	Artificial lakes and ponds (settlement lagoons)	Local Importance (Higher Value)	N/A
WL1	Hedgerows	Local Importance (Higher Value)	N/A
WS1	Scrub	Local Importance (Higher Value)	Although a higher value semi-natural habitat, given the absence of heath and calcareous grassland, there is no potential correspondence with the EU Annex I habitat <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130].

#### 6.3.2.1 Arable crops (BC1)

The dominant habitat (c. 8ha) within the entire proposed application area (c. 15ha) is comprised of an arable crop field (Plate 6-1) in the north-eastern half of the site. The area is a monoculture of maize crop which is surrounded along its perimeter by a hedgerow/treeline with an understory of a number of weed species such as wild carrot (*Daucus carota*) and common nettle (*Urtica dioica*).



**Plate 6-1:** Area of arable crops (BC1) in the north-eastern half of the application site.

**Evaluation:** Given the agriculturally managed and mono-cultural nature of this habitat, it is considered to be of low ecological value and as such is evaluated as being of Local Importance (Lower Value).

#### 6.3.2.2 *Buildings and artificial surfaces (BL3)*

The paved access track (BL3) runs from the main entrance to the site coming from the N81 road and along the south-eastern boundary of the application area (Plate 6-2). As with the adjacent arable field, the track is bordered on both sides by mature hedgerows and treelines.



**Plate 6-2:** The access track (BL3) to the application area.

**Evaluation:** The access track, which is categorized as BL3 is considered to be of low ecological value and as such is evaluated as being of Local Importance (Lower Value).

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

This category includes natural or artificial exposures of unconsolidated coarse or mixed sediment. Sand and gravel are mostly made up of sediment particles that are less than 16mm in diameter. Till, or boulder clay, is an unsorted mixture of pebbles, cobbles or boulders in a matrix of finer material such as sand, silt or clay. Most exposures of these sediments are associated with sand and gravel pits (Fossitt, 2000).

There are a number of stockpiles of exposed sand and gravel within the worked area of the application site (Plate 6-3). Some of these stockpiles have become sparsely vegetated with various recolonising species such as Colt's Foot (*Tussilago farfara*), Scutch Grass (*Elymus repens*), Common Poppy (*Papaver rhoeas*) and Creeping Buttercup (*Ranunculus repens*).

A breeding Sand Martin (*Riparia riparia*) colony exists in the largest stockpile, which is located in the southwest of the worked area (Plate 6-4). There were approximately 50 nest entrances recorded within the colony.



**Plate 6-4** One of a number of sand/gravel stockpiles within the worked area of the application site.



**Plate 6-3:** Sparsely vegetated sand stockpile containing a breeding Sand Martin colony.

**Evaluation:** Given that presence of a breeding colony of Sand Martin within this habitat, onsite exposed sand, gravel and till is considered to be of Local Importance (Higher Value).

#### 6.3.2.4 Recolonising bare ground (ED3)

This category is used for any areas where bare or disturbed ground, derelict sites or artificial surfaces of tarmac, concrete or hard core have been invaded by herbaceous plants. Vegetation cover should be greater than 50% for inclusion in this category.

There are a number of areas of recolonising bare ground throughout the worked section of the application area. These mainly occur along the boundaries of the worked area where sand and gravel have been extracted and the exposed faces have been left to recolonise. The largest area of this habitat is located in the south-eastern section of the worked section where overburden from the original pit was placed and levelled (Plate 6-5). The recolonization is patchy and the sward is low suggesting that the sandy substrate is not particularly fertile. Typical colonising species occur such as Greater Plantain (*Plantago major*), Knotgrass (*Polygonum aviculare*), Pineappleweed (*Matricaria discoidea*) and Shepherd's-purse (*Capsella bursa-pastoris*). Grasses are usually also present but should not dominate.



**Plate 6-5:** Recolonising bare ground in the south-western section of the worked area of the application site.

**Evaluation:** Given its low species diversity and tight sward, re-colonising bare ground is considered to be of Local Importance (Lower Value).

#### 6.3.2.5 Active quarries and mines (ED4)

This category is used for all active rock or sediment quarries (including gravel pits) and mines, or parts of these, where levels of disturbance are so high that colonisation by plants and animals is almost entirely prevented.

This habitat is the second most dominant habitat within the application area (Plate 6-6). Sand and gravel were extracted from this area in the past; however, the area has not been worked on an ongoing basis since approximately 2008. Nonetheless, the substrate of compacted gravel has only been colonised very sparsely by typical colonisers and weed plants such as Greater Plantain (*Plantago major*), Knotgrass (*Polygonum aviculare*), Pineappleweed (*Matricaria discoidea*) and Shepherd's-purse (*Capsella bursa-pastoris*).



**Plate 6-6:** The central area of the worked sand and gravel pit within the south-western half of the application area which can be categorised as ED4 owing to the lack of colonisation of plants.

**Evaluation:** Given its lack of recolonization this area of the sand and gravel pit is considered to be of Local Importance (Lower Value).

#### 6.3.2.6 Artificial lakes and ponds (settlement lagoons) (FL8)

There are five settlement lagoons located in the south-eastern corner of the site (Plate 6-7). These settlement lagoons were previously installed at the site to remove suspended solids from water that can then be recycled for dust suppression and wheel-bath use on site or allowed to flow across the site boundary in line with undisturbed flow gradient.

The lagoons are nutrient and species poor with some Broad-leaved Pondweed (*Potamogeton natans*) and Unbranched Bur-reed (*Sparganium emersum*) occurring frequently within all four ponds. Each pond is surrounded by occasional scrub species such as Willow (*Salix spp.*) and Bramble (*Rubus fruticosus*).

Although none were recorded during the site survey, this habitat is potentially suitable for larval stage Odonata (damselflies and dragonflies) and other similar invertebrates.





**Plate 6-7:** The northernmost settlement lagoon within the worked area of the application site.

**Evaluation:** Given its potential suitability for Odonata and other similar invertebrates, these settlement lagoons are considered to be of Local Importance (Higher Value).

#### 6.3.2.7 Hedgerows (WL1)

Hedgerows are defined as linear strips of shrubs, often with occasional trees, that typically form field or property boundaries (Fossitt, 2000). Most hedgerows originate from planting and many occur on raised banks of earth that are derived from the excavation of associated drainage ditches. Dimensions of hedgerows vary considerably, depending largely on management and composition, and are taken here as being mainly less than 5 m high and 4 m wide.

All field boundaries within the application area are bordered by mature hedgerows (Plate 6-8). The main species composition of the hedgerows onsite is Holly (*Ilex aquifolium*), Dog-rose (*Rosa canina*) and Bramble (*Rubus fruticosus*); in addition there are a number of mature deciduous trees dispersed occasionally to frequently within the hedgerows.

These mature hedgerows act as valuable habitats for foraging and breeding birds and mammals such as wood mice (*Apodemus sylvaticus*) and pygmy shrews (*Sorex minutus*). Intact hedgerows also act as commuting corridors for bat species.



**Plate 6-8:** Hedgerow/treelines occur on all boundaries of the application area and are visible in the background of this image.

**Evaluation:** Owing to their intact and mature nature, the hedgerows surrounding the application area are considered to be of Local Importance (Higher Value).

#### 6.3.2.8 Scrub (WS1)

This broad category includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. The canopy height is generally less than 5 m, or 4 m in the case of wetland areas. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland.

Pockets of scrub habitat occur at various locations within the worked area of the application site primarily in the southwest of the site along the boundary and on an area of overburden also in that area. The species composition of the scrub habitat is primarily willow (*Salix spp.*) and gorse (*Ulex europaeus*). This habitat is of benefit to breeding birds for nesting and foraging purposes.

**Evaluation:** Although a higher value semi-natural habitat, given the absence of heath and calcareous grassland, there is no potential correspondence with the EU Annex I habitat *Juniperus communis* formations on heaths or calcareous grasslands [5130]. Given its foraging and nesting potential for general breeding bird species, scrub habitat is considered to be of Local Importance (Higher Value).



**Plate 6-9:** Patches of scrub occur primarily in the southern section of the worked area of the site.

#### 6.3.2.9 Protected Flora

No rare or protected plant species were found during the Phase I habitat survey. There are no Flora Protection Order records within hectad S87 within which the proposed application area is situated (NDBC, 2018).

#### 6.3.2.10 Invasive Plant Species

No invasive plant species were found during the Phase I habitat survey. Records of the high impact invasive species, Japanese Knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron ponticum*), were registered in 2010 and 2007 within hectad S87.

### 6.3.2 Fauna in the Receiving Environment

#### 6.3.2.1 Birds

The site survey recorded the presence of a number of bird species. All were common countryside species. The presence of pockets of scrub and hedgerows makes for suitable nesting and roosting sites for a range of these species. A total of 13 species were recorded in the proposed application area (Table 6-11). No species cited as Red-listed under the Birds of Conservation Concern in Ireland (Colhoun and Cummins, 2014) were recorded during the walk-over survey. A colony breeding Sand Martin (*Riparia riparia*) was also recorded nesting in an onsite stockpile of sand (Plate 6-10). There were approximately 50 nest entrances recorded within the colony. This is an Amber-listed species (Colhoun and Cummins, 2014).





**Plate 6-10:** Breeding Sand Martins nesting in a stockpile of sand onsite.

Bird species diversity and abundance recorded during the site visit within the proposed application area are shown in Table 6-10.

**Table 6.11:** Bird species and maximum abundance recorded during the ecology walk-over survey within the proposed application area.

Common and Scientific Name	Total no. birds observed	Conservation Status	
		BoCCI	Annex I
Sand Martin ( <i>Riparia riparia</i> )	~50	Amber	No
Blackbird ( <i>Turdus merula</i> )	2	Green	No
Pheasant ( <i>Phasianus colchicus</i> )	1	N/A	No
Coal Tit ( <i>Periparus ater</i> )	3	Green	No
Chaffinch ( <i>Fringilla coelebs</i> )	5	Green	No
Great Tit ( <i>Parus major</i> )	1	Green	No
Goldcrest ( <i>Regulus regulus</i> )	2	Amber	No
Robin ( <i>Erithacus rubecula</i> )	3	Amber	No
Dunnock ( <i>Prunella modularis</i> )	2	Green	No
Rook ( <i>Corvus frugilegus</i> )	8	Green	No
Hooded Crow ( <i>Corvus cornix</i> )	8	Green	No
Wood Pigeon ( <i>Columba palumbus</i> )	3	Green	No
Wren ( <i>Troglodytes troglodytes</i> )	3	Green	No

**Evaluation:** The scrub habitat which is used by general passerine species and stockpiles of sand used by breeding Sand Martins within the proposed application area, the site is considered to be of Local Importance (Higher Value) in respect of bird species.

#### 6.3.2.2 *Non-Volant Mammals*

The site survey revealed evidence of Rabbit (*Oryctolagus cuniculus*) activity onsite by virtue of the presence of a number burrow entrances within the large sand stockpile (Plate 6-11). A number of rabbits were also observed during the site survey. This is the only evidence of non-volant mammal activity recorded onsite during the survey.

An otter survey was conducted along 300m of the Roscat Stream which is located approximately 520m to the south west of the proposed application area. There were no tracks or signs of Otter were encountered along the stream transect.

Hedgerows and field boundaries were surveyed and there was no evidence of Badger activity onsite. This low level of mammal observance was on a par with what could be expected without night monitoring. The fact that few mammals were seen during the survey is not significant, as most mammals in Ireland, with the exception of shrews, are more active at night. Badgers possibly utilize part of the site for foraging however, due to the open nature of the site, it is unlikely that there are any sets present within the application area.

Table 6-12 lists the non-volant mammal species records presented in the hectad S87 (NBDC, 2018). Also listed is an indication of whether suitable habitat for this species is found within, or near to the development site (within 1 km).

**Table 6.12:** Non-volant mammal records for hectad S87, within which the application area is located. The table also presents the level of protection afforded to each species and whether suitable habitat is available on or near the application area.

Species	Suitable Habitat	Protected Status
Eurasian Otter	Near to site	Habitats Directive Annex II and Wildlife Act
Pine Marten	Onsite	Habitats Directive Annex II and Wildlife Act
Mountain (Irish) Hare	Near to site	Habitats Directive Annex V and Wildlife Act
Hedgehog	Onsite	Wildlife Act
Badger	Near to site	Wildlife Act
Fallow Deer	Near to site - confirmed	Wildlife Act
Irish Stoat	Near to site	Wildlife Act
Red Fox	Near to site	None
Pygmy Shrew	Near to site	None
Rabbit	Near to site	None
Bank Vole	Near to site	None
Wood Mouse	Onsite	None
House Mouse	Onsite	None
Brown Rat	Near to site	None
Feral Goat	Near to site	None
American Mink	Near to site	None

**Source:** National Biodiversity Data Centre (2018) accessed 21/11/2018)

**Evaluation:** The proposed application area is considered to be of Local Importance (Lower Value) in relation to non-volant mammals.

### 6.3.2.3 Bats

There will be no hedgerow or treeline removal undertaken onsite as part of these proposed works. As such, it was deemed that a bat activity survey was not necessary. Furthermore, the site survey yielded no observations of mature or veteran trees with cracks and crevices or access points suitable to accommodate roosting bats.

Bat Conservation Ireland ([www.batconservationireland.org](http://www.batconservationireland.org)) maintains a database of bat activity and roosts in Ireland. The National Biodiversity Data Centre shows records in the vicinity of the site (hectad S87; NBDC, 2018 – accessed 22/11/2018) for Brown Long-eared Bat (*Plecotus auritus*), Lesser Noctule (*Nyctalus leisleri*), Daubenton's Bat (*Myotis daubentonii*) and Common and Soprano pipistrelles (*Pipistrellus pipistrellus* and *pygmaeus*).

The presence of the Annex II Lesser horse-shoe bat is deemed to be very unlikely within the proposed application area, as there is no suitable roosting habitat present.

**Evaluation:** The proposed application area is considered to be of Local Importance (Lower Value) in relation to bats.

#### 6.3.2.4 Amphibians and Reptiles

The Common Frog (*Rana temporaria*) and the Smooth Newt (*Lissotriton vulgaris*) are afforded protection under the Wildlife Act (1976) and Wildlife (Amendment) Act, 2000. Frog has been recorded in hectad S87 (NBDC, 2018 – accessed 22/11/2018) and there are no records of newt within this database.

The Viviparous lizard (*Zootoca vivipara*) is also afforded protection under the Wildlife Act (1976) and Wildlife (Amendment) Act, 2000. No existing records of Viviparous lizard are known from within the study area (NBDC, 2018; accessed 22/11/2018) and no Viviparous lizards were recorded on site during the habitat survey, as expected, given the habitats present.

**Evaluation:** The proposed application area is considered to be of Local Importance (Lower Value) in relation to amphibian and reptile species.

#### 6.3.2.5 Invertebrates

A total of three species of Odonata (damselflies and dragonflies) were recorded during the site ecological survey. These species were using the settlement pond system, namely Common Bluet (Common Blue Damselfly) (*Enallagma cyathigerum*) (n = 2) and Common Spreadwing (Emerald Damselfly) (*Lestes sponsa*) (n = 3) and Ruddy Darter (dragonfly) (*Sympetrum sanguineum*) (n = 1). All of these hold a status of *Least Concern* under the International Union for the Conservation of Nature (IUCN) Red List for Irish dragonfly and damselfly species (Nelson *et al.*, 2011).

Orange Tip (*Anthocharis cardamines*) (n = 1), Green-veined White (*Pieris napi*) (n = 1) and Peacock (*Inachis io*) (n = 2) were the only three butterfly species observed onsite during the site survey. All three of these species are common throughout the Irish landscape and are listed as being of Least Concern on the (IUCN) Red List for Irish Butterflies (Regan *et al.*, 2010).

Table 6-13 lists the invertebrates that have been recorded in hectad S87 within which the site is situated (NBDC, 2018 – accessed 22/11/2018). There are no records from the 1km square of the development site. Considering the limited extent and quality of semi-natural scrub habitat within the site, it is unlikely any rare or threatened invertebrate fauna occur.

**Table 6.13:** Invertebrate species recorded in 10km square (S87) within which the site is situated

Species Name (Latin)	Faunal Group	Common Name
<i>Aglais urticae</i> (Linnaeus, 1758)	Insect – butterfly	Small Tortoiseshell
<i>Cicindela campestris</i> Linnaeus, 1758	Insect – beetle	Common Tiger Beetle
<i>Aphantopus hyperantus</i> (Linnaeus, 1758)	Insect – butterfly	Ringlet
<i>Boloria euphrosyne</i> (Linnaeus, 1758)	Insect – butterfly	Pearl Bordered Fritillary
<i>Inachis io</i> (Linnaeus, 1758)	Insect – butterfly	Peacock
<i>Maniola jurtina</i> (Linnaeus, 1758)	Insect – butterfly	Meadow Brown
<i>Pararge aegeria</i> (Linnaeus, 1758)	Insect – butterfly	Speckled Wood
<i>Pyrrhosoma nymphula</i> (Sulzer, 1776)	Insect – damselfly	Large Red Damselfly
<i>Aeshna grandis</i> (Linnaeus, 1758)	Insect – dragonfly	Brown Aeshna
<i>Eulithis testata</i> (Linnaeus, 1761)	Insect – moth	Chevron
<i>Xanthorhoe designata</i> (Hufnagel, 1767)	Insect – moth	Flame Carpet

**Source:** National Biodiversity Data Centre (2018) accessed 17/07/2018)

**Evaluation:** The proposed application area is considered to be of Local Importance (Lower Value) in relation to invertebrate species.

### 6.3.3 Hydrology and Aquatic Ecology in the Receiving Environment

The site lies within the surface water catchment of the Roscat Stream, which flows in a southeast to northwest direction, passing the site 520 m to the southwest. The stream has a catchment of 5.9 km<sup>2</sup> as it passes adjacent to the site. The stream rises approximately 2 km southeast of the site in a topographical depression at Aghade. It outfalls to the Burren River just north of Rathtoe, which subsequently enters the River Barrow at Carlow Town.

The series of 5 settlement ponds previously installed in sequence in the southeastern corner of the site will be retained in order to remove suspended solids. Clarified water will then be harvested for re-use on site for dust suppression, with the excess allowed to flow by gravity across the site boundary in line with undisturbed flow gradient.

Pit floor runoff currently flows via gravity towards Pond 1 (the northern-most pond) while runoff from the concrete hardstanding pad is diverted towards Pond 1. Water then overflows via gravity from the edge of the first settlement pond via a 300 mm concrete culvert to a further four interconnected pond. Water overflows from one pond to the next. There is no evidence of an artificial liner and as these ponds were used for clarification, it is assumed that permeability was restricted over time as a function of particulate material effectively sealing the side walls and pond bases as it settles out of solution.

Currently, surface water exits the final settlement pond via a 400 mm culvert which delivers clarified water to an open ditch situated on the southern site boundary, and subsequently towards Ardristan Fen. Surface water elevation within the receiving ditch was surveyed as 61.22 mOD on 27<sup>th</sup> June 2018 (see Chapter 8.0 – Water for further details). During both site visits by the

hydrologist in June 2018 and July 2018, which can be considered representative of summer flow regimes, negligible flow was noted through this outfall drain.

A series of field drains surround the fen and traverse the fen itself. These field drains appear to be interconnected and ultimately transmit water southwest towards the Roscat Stream. No direct route was observed transmitting site runoff towards the Roscat Stream.

There will be no pumping of groundwater across the site boundary. There are no natural surface watercourses or waterbodies within the application boundary. Groundwater is only exposed within the existing pit where settlement ponds or test holes were previously excavated.

The proposed application area is located within the Barrow *Margaritifera* Sensitive Area (MSA), which is categorised as a *catchment with previous records of Margaritifera but the current status is unknown* (NPWS, 2017). While there are no recent records of Freshwater Pearl Mussel from this catchment, in most cases there has been little, if any, survey for the species since 1970. A data request from NPWS for this catchment revealed no records for Freshwater Pearl Mussel.

The Slaney Upper and Slaney Derreen MSAs are located 1.1km and 2.4km to the west of the application area respectively. The Slaney Upper MSA is categorised as a *catchment of other extant populations*. These mussel populations may lie (in part) within SAC, other nature conservation sites or in the wider countryside. Those populations within SAC were not considered of sufficient quality to warrant designation for the species and detailed restoration objectives, targets, plans or measures are unlikely to be developed.

The Slaney Derreen MSA holds the highest level of categorisation as a *catchment of SAC populations listed in S.I. 296 of 2009*. This is one of 27 mussel populations which are within Special Areas of Conservation (SAC) designated for the protection of the species. Site-specific conservation objectives for the restoration of these populations and their habitats are being developed by the NPWS. The proposed application area is not hydrologically connected with either of these two sites.

**Evaluation:** Given its proximity to the Roscat Stream, the proposed application area is considered to be of Local Importance (Higher Value) in relation to aquatic ecology.

## 6.4 Likely Significant Effects

### 6.4.1 Source-Pathway-Receptor-Effect Conceptual Model

Using Source-Pathway-Receptor-Effect (consequences) modelling, all characteristics and activities associated with the proposed development are evaluated for their likelihood to cause significant effects (in the absence of mitigation) on the sensitive ecological aspects of the receiving environment. The conceptual model is presented in Table 6-14 below.

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The description, significance, magnitude, probability, duration and type of effects are then described in the subsequent subsections in accordance with the EPA (2017) *“Draft guidelines on information to be contained in EIA”* (Please see Tables 6-3 – 6-7 in Section 6.2.6.2 for full list of definitions of effects).

**Table 6.14:** Source-Pathway-Receptor-Effect (consequence) conceptual model for all potential effects of individual elements (sources) of the proposed project on sensitive ecological receptors and their respective potential for significant effects.

Source of Effects on Biodiversity	Pathway	Receptor	Effect (Consequences)	Potential for Effects (Y/N)
Excavation activities	Surface water runoff	<ul style="list-style-type: none"> <li>Natura 2000 Designated Sites</li> </ul>	Indirect effects through surface water contamination by virtue of sediment runoff.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.2.1
	Groundwater flow-paths		Indirect effects through groundwater contamination by virtue of percolation of hydrocarbons.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.2.1
	Surface water runoff	<ul style="list-style-type: none"> <li>NHAs and pNHAs</li> </ul>	Direct effects on Ardristan Fen pNHA through surface water contamination by virtue of sediment runoff.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.2.2
	Groundwater flow-paths		Direct effects on Ardristan Fen pNHA through surface water contamination by virtue of sediment runoff.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.2.2
	Groundwater flow-paths	<ul style="list-style-type: none"> <li>Habitats</li> </ul>	Indirect degradation of habitats within the proposed application area through ground water contamination.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.1.



Source of Effects on Biodiversity	Pathway	Receptor	Effect (Consequences)	Potential for Effects (Y/N)
Excavation activities	Surface water runoff	<ul style="list-style-type: none"> <li>Water quality/Aquatic Ecology</li> </ul>	Indirect effects through surface water contamination by virtue of runoff from sediment and/or hydrocarbons.	<b>No.</b> Absence of surface water hydrological connectivity between the source and local water courses ensures no measurable effects.
	Groundwater flow-paths		Indirect effects through ground water contamination by virtue of percolation of hydrocarbons.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.7.
	Air	<ul style="list-style-type: none"> <li>Habitats</li> <li>Amphibians and Reptiles</li> <li>Invertebrates</li> </ul>	Indirect degradation of habitats within the proposed application area through fugitive dust emissions.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.1.
			Indirect degradation of amphibian and reptile habitats within the proposed application area through fugitive dust emissions.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.5.
			Indirect degradation of invertebrate habitats within the proposed application area through fugitive dust emissions.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.6.

Source of Effects on Biodiversity	Pathway	Receptor	Effect (Consequences)	Potential for Effects (Y/N)
Excavation activities	Landtake	<ul style="list-style-type: none"> <li>Habitats (non-volant mammals, birds (general), bats, amphibians/reptiles and invertebrates)</li> </ul>	Direct reduction/loss of habitats within the proposed application area.	<b>Yes. In relation to Sand Martins only.</b> Significance of effect evaluated in Section 6.4.3.1.
		<ul style="list-style-type: none"> <li>Birds</li> </ul>	Direct effect through potential destruction of Sand Martin breeding habitat during the breeding season.	<b>Yes. In relation to Sand Martins only.</b> Significance of effect evaluated in Section 6.4.3.2.
Noise, vibration and human activity	Visibility and blasting	<ul style="list-style-type: none"> <li>Birds (General species)</li> </ul>	Indirect effects on breeding and foraging bird species which use the proposed application area through disturbance/displacement.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.2.
		<ul style="list-style-type: none"> <li>Non-Volant Mammals</li> </ul>	Indirect effects on breeding and foraging non-volant mammal species which use the proposed application area through disturbance/displacement.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.3.
		<ul style="list-style-type: none"> <li>Bats</li> </ul>	Indirect effects on breeding and foraging bat species which use the proposed application area through disturbance/displacement.	<b>Yes.</b> Significance of effect evaluated in Section 6.4.3.4.

## 6.4.2 Potential Effects on Designated Sites

### 6.4.2.1 Potential Effects on European Sites

There are 3 EU sites located within a 15km radius of the proposed application area (see Table 6-8 for a list of SACs and SPAs). A Natura Impact Statement (NIS) has been prepared for this project, which evaluates the potential for significant effects on the integrity of these EU sites.

Given that no element of the proposed development will be undertaken within or directly adjacent to any Natura 2000 site, there is no potential for direct effects on the qualifying interests of any designated site as a consequence of the proposed development.

The conceptual model presented in Table 6-14 reveals that there is potential for indirect effects on the EU sites identified within a 15km radius of the proposed application area through surface and ground water contamination as a result of proposed pit extension and operational excavation activities.

The closest EU site to the proposed application area is the Slaney Valley SAC (Site Code: 000781), which at its closest point, is located at a direct distance of 1.8km to the east of the proposed application area. However, there is no hydrological connectivity between this SAC and the proposed application area.

A potential hydrological connection exists between the River Barrow and River Nore SAC and the proposed application area via the Roscat Stream which is located approximately 520m to the west of the proposed application area. The Roscat Stream flows in a north-westerly direction towards its confluence with the Burren River, which flows into the River Barrow in Carlow town. The total hydrological distance between the application area and the SAC is 15.5km, which provides a potential source-pathway-receptor link, albeit weak, between the two.

However, given the considerable hydrological distance between the proposed application area and the SAC, the surface water hydrological connection is weak owing to the dilution effect and as such, there is no potential for indirect effects on the qualifying interests of the SAC. As such, no pathway exists between the proposed application area and the River Barrow and River Nore SAC. Furthermore, given the considerable distance, there is also no potential for indirect effects from the proposed development on the qualifying interests of the River Barrow and River Nore SAC by virtue of groundwater contamination.

Regarding the remaining EU site, Blackstairs Mountains SAC (Site Code: 000770), the NIS also concludes that, given the distance and the absence of both hydrological and ecological connectivity between the proposed application area and this SAC, the potential for likely significant effects on the integrity of the EU site as a result of the proposed project, does not exist.

#### 6.4.2.2 *Potential Effects on Nationally Designated Sites*

There are 8 proposed Natural Heritage Areas (pNHAs) (Table 6-9) located within a 15km radius of the proposed application area (see Figure 6.4 at the end of this chapter for their locations relative to the proposed application site). The features of interest for these designated sites and any ecological or hydrological connectivity to the proposed application area were examined to determine potential effects on nationally important sites designated for nature conservation.

Ardristan Fen pNHA is due south of the application site, with the western portion of the fen extending from the Roscat Stream to the southern boundary of the application area at which point there is a slight overlap between the pNHA and the application area. The mapped extents appear to be based on peat area as per Figure 8.3 in Chapter 8.0 - Water. It is unclear if these extents have been ground-truthed by NPWS as part of the designation process.

It is important to note that in relatively recent times the area has undergone significant arterial drainage, presumably by local landowners. Reclamation of drained lands has been ongoing since 1975 and aerial photography (Figure 8.3) shows the result of this is prevalence of improved grassland. The arterial drains shown in Figure 8.3 intercept water table and transmit these waters in a general southwest direction toward the Roscat Stream. This is fairly typical in Ireland where undisturbed fens are very rare, with most having been drained and cultivated.

Considering that Ardristan Fen is an area that is permanently or seasonably saturated, and supporting flora and fauna tuned to these hydrological conditions, its actual current extents are more likely to be closer to the green polygon shown in Figure 8.3. The arterial drains tend to be to the sides and downgradient of this area. On this basis, there is no evidence that the application site encroaches on the fen. Furthermore, the groundwater flow direction is perpendicular to the Roscat Stream; as such the application site is not upgradient of the fen in terms of groundwater flow.

Furthermore, as outlined in Section 6.4.1, the conceptual model presented in Table 6-14 reveals that there is no potential for indirect effects on the nationally important sites identified within a 15km radius of the proposed application area owing to the absence of surface and groundwater connectivity and thus, pathways to cause contamination as a result of proposed pit extension and excavation activities.

### 6.4.3 Potential Effects on the Existing Environment

#### 6.4.3.1 *Potential Effects on Existing Habitats*

Commencing top-soil and sand/gravel extraction within the proposed application area will lead to additional land-take and the irreversible loss of habitats existing within that area. The maximum ecological value of the habitats present within the application area is evaluated as being of Local Importance (Higher Value), with the dominant habitat of the site being arable crops (BC1), which is evaluated as being of Local Importance (Lower Value). As such, the general overall ecological value of habitats in the proposed application area is considered to be low.

Considering the generally low ecological value of the habitats to be removed through land-take resulting from the extension of the existing sand and gravel pit and the large availability of alternative habitats of this type in the wider landscape, the potential direct effect on habitats within the proposed application area is evaluated as **imperceptible in the long-term**.

Fugitive dust arising from additional excavation activities, bare ground and stockpiles/overburden has the potential to become deposited on habitats adjacent the proposed application area. The habitats within 25m of bare ground and stockpiles are considered to be susceptible to significant effects as a result of fugitive dust deposition (IEA, 1995). The current and proposed berms around the border of the active excavation area will also assist in filtering and containing air borne emissions as this will further ensure that operational activity is kept well below the surrounding ground level.

As such, the potential for indirect effects on the adjacent habitats as a result of fugitive dust arising from additional quarrying activities is evaluated as **imperceptible in the long-term**.

#### *6.4.3.2 Potential Effects on Birds*

No hedgerow removal will take place onsite. As such, direct and indirect effects by virtue of disturbance/displacement on general breeding bird species using this habitat is evaluated as **imperceptible in the long-term**.

As described in Section 6.3.2.1, there is an active Sand Martin breeding colony onsite. Thus, in the absence of mitigation as outlined in Section 6.5.1, there is potential for direct effects on to this species through disturbance/displacement. This direct effect is evaluated as **moderate in the long-term**.

There is potential for indirect effects on general breeding birds as a result of disturbance during proposed operations onsite. In the absence of mitigation, this effect is likely to be **moderate in the short-term**. Mitigation measures to avoid likely effects on breeding Sand Martin are outlined in Section 6.5.1.1.

#### *6.4.3.3 Potential Effects on Non-Volant Mammals*

The site ecological survey did not yield any evidence of protected non-volant mammals such as Badger (*Meles meles*); although owing to the presence of mature hedgerows, the site contains some suitable breeding and foraging habitat for this species.

Given the absence of protected mammal species onsite and the site's limited ecological value, the potential for indirect effects on non-volant mammal species utilizing the proposed application area by virtue of direct loss of breeding and/or foraging habitat, in addition to noise and vibration from operational excavation activities resulting in disturbance/displacement is evaluated as **imperceptible in the long-term**.

#### 6.4.3.4 *Potential Effects on Bats*

Given that habitats within the proposed application area are of limited ecological value and that there is no suitable roosting habitat within 150m of the proposed application area, the potential for indirect effects on bat species utilizing the proposed application area by virtue of direct loss of foraging habitat, in addition to noise, vibration and lighting from operational excavation activities resulting in disturbance/displacement is evaluated as **imperceptible in the long-term**.

#### 6.4.3.5 *Potential Effects on Amphibians and Reptiles*

The absence of suitable breeding and foraging habitat for amphibians and reptiles and the fact that species of neither taxa were recorded during the ecology walk-over survey will result in **imperceptible long-term effects** on amphibians and reptiles.

#### 6.4.3.6 *Potential Effects on Invertebrates*

The settlement ponds located in the south western corner of the proposed application area will remain in situ and undisturbed by the proposed development. As such, the potential for direct and indirect effects from operational excavation activities resulting in disturbance to and/or displacement of the invertebrates utilizing this habitat by virtue of direct loss of foraging habitat, in addition to noise, vibration and lighting is evaluated as **imperceptible in the long-term**.

#### 6.4.3.7 *Potential Effects on Water Quality and Aquatic Ecology*

Please see Chapter 8.0 – Water for a complete hydrological impact assessment. The main factors with the potential to affect water quality and thus, aquatic ecology, are described below.

Potential impacts on water quality and by consequence, aquatic ecology, which may arise from proposed activities, are summarized in Table 6.15. Table 6.15 has been adapted from Table 8.7 in Chapter 8.0 – Water to include effects of potential water quality deterioration on aquatic ecology using the headings discussed under the criteria for determination of impacts (EPA, 2017). The key activities include stripping and stockpiling of soils, excavation and processing of sands and gravels, and haulage of material off site.

**Table 6.15:** Summary of Potential Impacts of Water Quality Deterioration on Aquatic Ecology

Activity	Attribute	Character of potential impact	Potential consequential impact on aquatic ecology	Importance of attribute	Magnitude of potential impact	Term	Significance of potential impact
Compaction of pit floor and hardstanding pad	Ardristan Fen and Roscat stream	Silt-laden runoff from pit floor. The increased silt content in runoff has potential to degrade local surface water quality.	Silt has the potential to clog salmonid spawning beds and juvenile salmonids are particularly sensitive to siltation of gill structures.  Similarly, plant and macro-invertebrate communities can be blanketed over and this can lead to loss or degradation of valuable habitat.	Very High	Small	Long-term	Moderate
Stockpiling of topsoil/subsoil/screenings	Ardristan Fen and Roscat stream	Silt-laden runoff from stockpiles. The increased silt content in runoff has potential to degrade local surface water quality.	As above.	Very High	Small	Medium-term	Moderate
Removal of overburden	Ardristan Fen /Aquifer	Increase in vulnerability of underlying aquifer.	As above.	Very High	Small	Long-term	Moderate
Storage of hydrocarbons; leakages from machinery; spillages during	Ardristan Fen/Roscat Stream/Aquifer	Runoff/recharge may contain hydrocarbons.	A reduction in water quality due to hydrocarbons has the potential result in effects on salmonids and plant species within Roscat stream.	Very high	Small	Temporary	Moderate

Activity	Attribute	Character of potential impact	Potential consequential impact on aquatic ecology	Importance of attribute	Magnitude of potential impact	Term	Significance of potential impact
refuelling			In addition, although Otter was not recorded during the site survey, given their ubiquitous nature in the Irish landscape, it is likely that they are present in Roscat stream. Otters may be secondarily affected by a reduction in water quality through a reduction in potential prey should fish be impacted upon as a result of hydrocarbon runoff to groundwater.				
Increased runoff rates from hardstanding pad and pit floor	Ardristan Fen /Aquifer	Increase in surface water flow input to Fen. Decrease in infiltration to aquifer	A significant change in the hydrological regime of Ardristan Fen has the potential to result in direct degradation on the fen habitat and the floral species dependent upon it.	Very High	Small	Long-term	Moderate



#### 6.4.4 Potential In-combination Effects

Following a comprehensive desktop review of Carlow County Council's planning website (<http://www.eplanning.ie/CarlowCC/searchtypes>) and satellite imagery; the following developments were evaluated for cumulative effects which have the potential to act in-combination with the proposed development.

##### 6.4.4.1 Capped Landfill Site

An unauthorised capped landfill site of approximately 1.6ha in area and 8m in depth is located approximately 1km to the south of the proposed application area at Roscat Pit. Given its unauthorised status, a Tier 3 Risk Assessment and Restoration Plan was commissioned by Carlow County Council and undertaken by RPS in 2011, in accordance with the "EPA Code of Practice Environmental Risk Assessment for Unregulated Waste Disposal Sites".

A detailed qualitative risk assessment was carried out to determine the potential risks to human health and controlled waters for the contaminants identified as being of concern (e.g. heavy metals, hydrocarbons, ammonia, volatile organic compounds and ground gases). Groundwater monitoring was undertaken as part of the risk assessment. The assessment concluded that, at that time, the site represented a moderate risk to groundwater quality via leachate being produced at the site. However, it has since been shown that the installation of the infiltration barrier led to long term improvements in groundwater quality to an acceptable level.

It is considered that it can be clearly demonstrated that the proposed project will not act in-combination with the proximal unauthorised landfill site to result in significant cumulative effects on the surrounding environmental receptors including the qualifying interests of the River Barrow and River Nore SAC.

##### 6.4.4.2 Ardristan Sand and Gravel Pit (QY 27)

This pit is located 1.3km to the south of the proposed development. Permission for the development of the sand and gravel pit to include continuation of existing extraction, screening crushing, washing and ancillary activities and phased restoration of the pit to agricultural afteruse at Ardristan, Tullow, Co. Carlow was granted with a number of planning conditions in 2007 under PL 07/769; ABP Ref: 01.232014. Of particular relevance to the current application is Condition 11, which directs the implementation of ground water monitoring scheme at the consented site and the submission of the results of same to Carlow County Council.

Groundwater quality monitoring was carried out on behalf of the developer by trained personnel employed by SLR Consulting Ireland (formerly John Barnett and Associates). Groundwater quality was monitored at 3 no. locations. The report concluded results indicate that the operation does not adversely impact on water quality in the locality.

In 2013, a remedial Natura Impact Statement (rNIS) was undertaken on this site, which considered the potential effects associated with the extraction of sand and gravel at the existing pit, of which the proposal is part, on the River Barrow and River Nore SAC.

The rNIS concluded that the extraction of sand and gravel had not had any significant effects on the River Barrow and River Nore SAC, nor is it likely to have any effects through any continuation of extraction operations to affect the integrity of this relevant European site, or on any of its qualifying features for which this site is of European importance, in light of its conservation objectives.

There is a current planning application in progress at Ardristan Sand and Gravel Pit (Carlow Co. Co. PL Ref. 18/220) for permission to import inert waste consisting of soil and stone material to improve land for agricultural use. A Screening for AA was undertaken for this proposed development which concluded that the proposed filling of lands within the existing Ardristan Pit will not result in significant direct or indirect effects on the River Barrow and River Nore SAC. An Environmental Report was produced for the same proposed development also demonstrated that it will not result in either direct or indirect effects on local environmental receptors.

Therefore, it is concluded that the proposed filling of lands at Ardristan Pit will not act in-combination with the current proposed development at Roscat Pit to result in cumulative effects on the surrounding environmental receptors including the qualifying interests of the River Barrow and River Nore SAC.

#### *6.4.4.3 Conclusion of Cumulative Impact Assessment*

In conclusion, it is determined that the surrounding land management will not result in significant in-combination effects i.e. the risk of cumulative impact is deemed to be **not significant**.

As there are no other relevant plans or projects in the vicinity of the proposed application area, no potential in-combination effects as a result of the proposed works with regard to other proposed or existing plans or projects are expected.

## **6.5 Mitigation Measures**

Mitigation is required where moderate or significant effects are likely to occur as the result of proposed extension to the existing pit.

As summarised in Table 6-16, in the absence of mitigation, although potential effects are not likely to be significant but are likely to be moderate, the precautionary principle has been applied and mitigation measures are presented herein to ensure avoidance of any potential effects on breeding Sand Martins within the proposed site.

Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000, restricts the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated land or in hedges or ditches during the nesting and breeding season for birds and wildlife.

## 6.5.1 Mitigation Measures for the Protection of Birds

### 6.5.1.1 *Disturbance/displacement of breeding Sand Martin*

The following mitigation measures will ensure that the operational quarry activities will not result in significant effects on breeding Sand Martin:

- Should Sand Martins be found to be nesting in any of the stockpiles, then no excavation activities will be undertaken within that stockpile during the Sand Martin breeding season (March-September incl.).
- In order to deter Sand Martin from nesting within the active extraction area of the pit, the degree of the side slopes will be constructed to approximately 60°, which is not suitable for breeding Sand Martin. Stockpiles will also be kept to a minimum.
- Alternative breeding sites in the form of stockpiles following standard published best practice guidance (Rodriguez, 2016) will be created in a disused area within the gravel pit site.

### 6.5.1.2 *Disturbance/displacement of General Breeding Birds*

The following mitigation measure will ensure that the vegetation clearance, should it be required, will not result in significant effects on the general breeding bird species within scrub and hedgerow habitats:

- No vegetation clearance will be undertaken onsite between 1<sup>st</sup> March and 31<sup>st</sup> August (incl).

### 6.5.2 Mitigation Measures for the Protection of Water Quality and Aquatic Ecology

Mitigation measures relating to water quality and aquatic ecology are outlined in Table 6-16 with the resultant predicted impact following the implementation of mitigation measures.

**Table 6.16:** Summary of mitigation measures relating to the protection of water quality and aquatic ecology

Activity	Attribute	Character of potential impact	Mitigation measure	Residual impact
Compaction of pit floor and hardstanding pad	Ardristan Fen and Roscat stream	Silt-laden runoff from pit floor. The increased silt content in runoff has potential to degrade local surface water quality.	Runoff passes through a series of settlement ponds which have been shown to clarify the water prior to it crossing the site boundary. Results from sampling show that water quality in the fen has not been negatively impacted upon.  Compacted areas of the pit floor will be broken up using a ripper.	Imperceptible
Stockpiling of topsoil/subsoil/screenings	Ardristan Fen and Roscat stream	Silt-laden runoff from stockpiles. The increased silt content in runoff has potential to degrade local surface water quality.	Stockpiles will be vegetated to enhance stability. Establishment of rooting restricts surface erosion.  Stockpiled material shall be re-used in the restoration process.	Imperceptible
Storage of hydrocarbons; leakages from machinery; spillages during refuelling	Receiving stream/aquifer	Runoff/recharge may contain hydrocarbons.	Potentially contaminating substances will not be stored on site. However, should this be required they will be stored in sealed containers in designated areas isolated from surface water drains or open waters.  Refuelling will be carried out by a licensed third party using a mobile bunded bowser. Haulage vehicles will be refuelled off-site.	Imperceptible

Activity	Attribute	Character of potential impact	Mitigation measure	Residual impact
			Refuelling and parking shall be on the existing hardstanding pad. All runoff from the hardstanding pad shall pass through a newly installed hydrocarbon interceptor.	
Removal of overburden	Ardristan Fen /Aquifer	Increase in vulnerability of underlying aquifer.	A layer of overburden will be spread on the pit floor as part of the restoration plan which will provide a layer of protection to groundwater.	Imperceptible
Increased runoff rates from hardstanding pad and pit floor	Ardristan Fen /Aquifer	Increase in surface water flow input to Fen. Decrease in infiltration to aquifer	Compacted areas of pit floor will be ripped to a depth of 0.5 m to restore original permeability.	Slight

## 6.6 Residual Effects

The residual effect is defined as the degree of environmental change that will occur after the proposed mitigation measures have taken effect (EPA, 2015). Generally, a proposed development adequately considers the ecological issues into its design, so that its effects on the existing environment are minimised to an acceptable level of slight residual effects. Occasionally, where significant effects cannot be avoided or reduced, the consequences of significant residual effects in light of planning policies and legislation should be considered (CIEEM, 2016). Significant residual environmental effects may be offset by appropriate compensatory measures nearby/elsewhere (CIEEM, 2016).

Table 6-17 presents those elements of the environment with the potential for significant or moderate effects prior to any mitigation measures. A revised potential effect of the proposed application on these features post-mitigation is provided here also, in addition to the significance of any potential residual effects. Please refer to the accompanying NIS for conclusions in regard to effects on the integrity of European sites under consideration within same.

**Table 6.17:** Significance of residual effects of the proposed application.

<b>Environmental Element</b>	<b>Ecological Receptor</b>	<b>Potential Significance of Effect - Pre-Mitigation</b>	<b>Potential Significance of Effect - Post Mitigation</b>	<b>Significance of Residual Effect</b>
Birds	Sand Martin, general breeding birds	Moderate	Imperceptible	Not significant
Water quality	Surface and groundwater, Ardristan Fen, Roscat Stream, salmonids, Otter, aquatic plant species	Moderate	Imperceptible	Not significant
<b>Overall Significance of Residual Effects</b>				<b>No Significant Residual Effects</b>

## 6.7 Conclusions and Recommendations

Following a detailed ecological impact assessment of the proposed application, it is concluded that the proposed extension of the existing sand and gravel pit at Roscat, Tullow, Co. Carlow will not have any significant residual effects assuming the mitigation measures outlined herein are strictly adhered to during operations at the pit.

It is recommended that the proposed operational works are monitored periodically, particularly during the bird breeding season to ensure that the mitigation proposed is implemented and that the conservation interests within the receiving environment are effectively protected. Ongoing monitoring of water quality will also be undertaken on a biannual basis during the operation of the pit.

Reports on the findings should be submitted to the National Parks and Wildlife Service, Inland Fisheries Ireland and to the competent authority (Carlow County Council).



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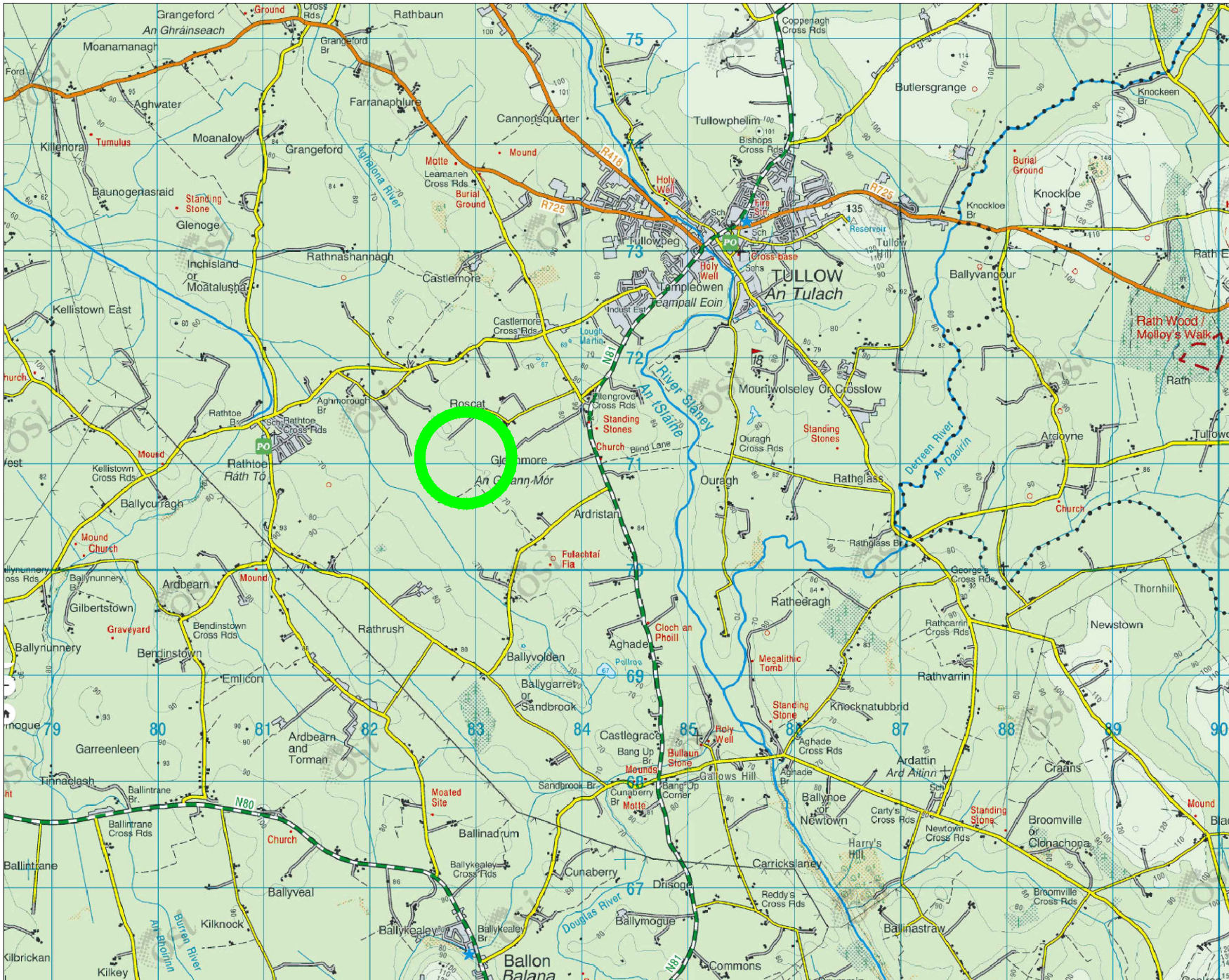
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## Figures







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**Legend**

Site Location



ITM Coordinates: 683027 E, 670998 N

Rev.	Description	Date

**EARTH SCIENCE PARTNERSHIP**

CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
 Tonranny Westport Co. Mayo  
 tel: +353(0)98 289999 fax: +353(0)98 24727  
 e-mail: earthsciencepartnership@gmail.com  
 Ordnance Survey Ireland Copyright Licence No.: EN 0021419

Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Site Location Map

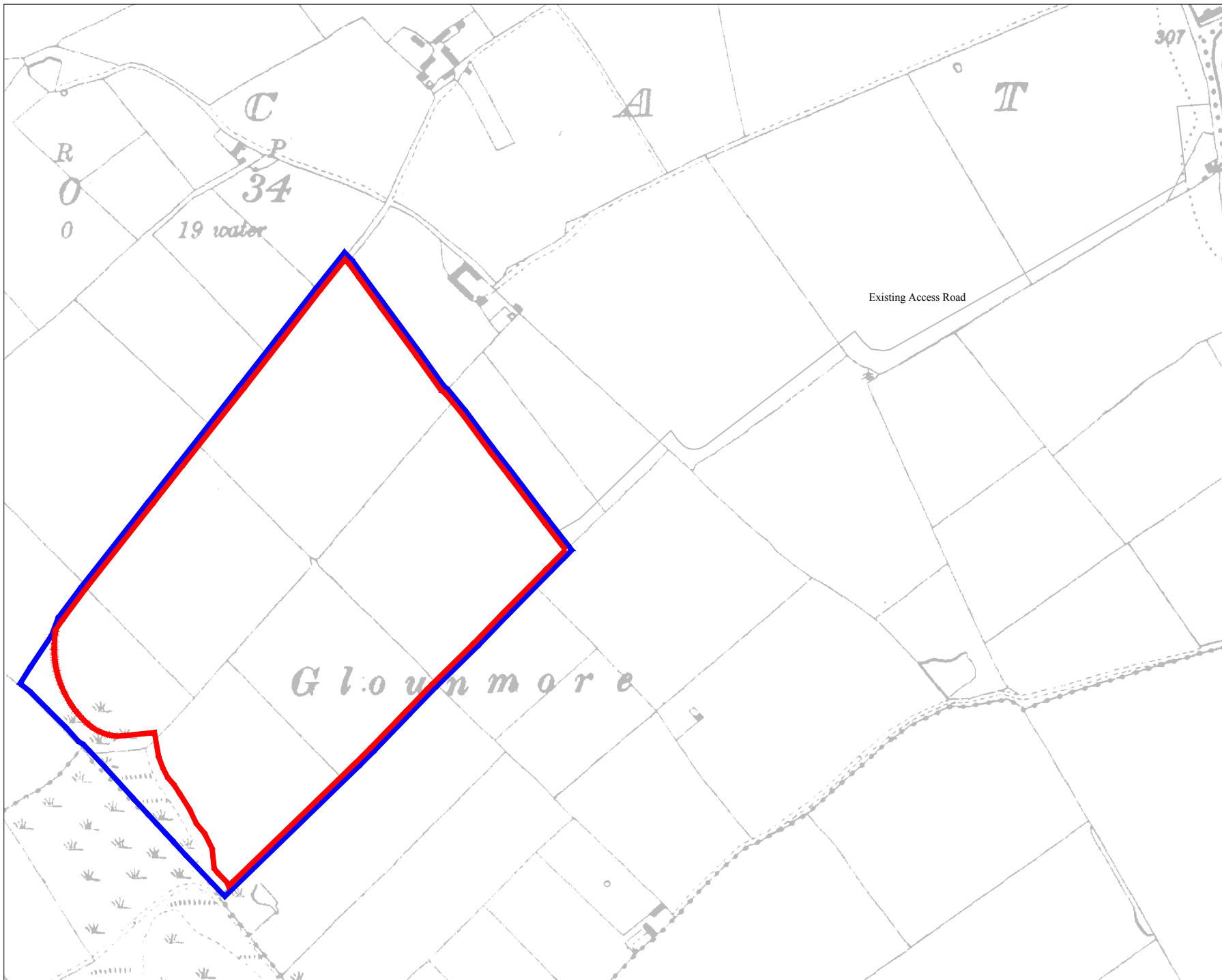
Drawn By: Sean O' Donnell

Checked By: Patrick O' Donnell

Scale: 1:50,000 @ A4 Date: Apr. 2019

Job No: EI 061 Rev: 0

Figure 6.1



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**Legend**

Ownership Boundary



Application Area

Area = 14.7 Ha



O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

Rev	Description	Date

**EARTH SCIENCE PARTNERSHIP**

CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
 Tonranny Westport Co. Mayo  
 tel: +353(0)98 28999 fax: +353(0)98 24727  
 e-mail: earthsciencepartnership@gmail.com  
 Ordnance Survey Ireland Copyright Licence No.: EN 0021419

Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Site Location Map

Drawn By: Sean O' Donnell

Checked By: Patrick O' Donnell

Scale: 1:5,000 @ A4 Date: Apr. 2019

Job No: EI 061 Rev: 0

Figure 6.2



**Earth Science Partnership**  
**Tonranny, Westport, Co. Mayo**  
**Tel: +353 98 28999**  
**Email: earthsciencepartnership@gmail.com**

Client: Kilcarrig Quarries Ltd

Project: Section 37L application for Roscat Quarry, Tullow, Co. Carlow

Title: Natura 2000 within 15km of the application area

Drawn by: Sarah Ingham

Checked by: Patrick O'Donnell

Scale: 1:18k @ A4

Date: 03/01/2019

Job No.: EI 061

Rev.: 1.0

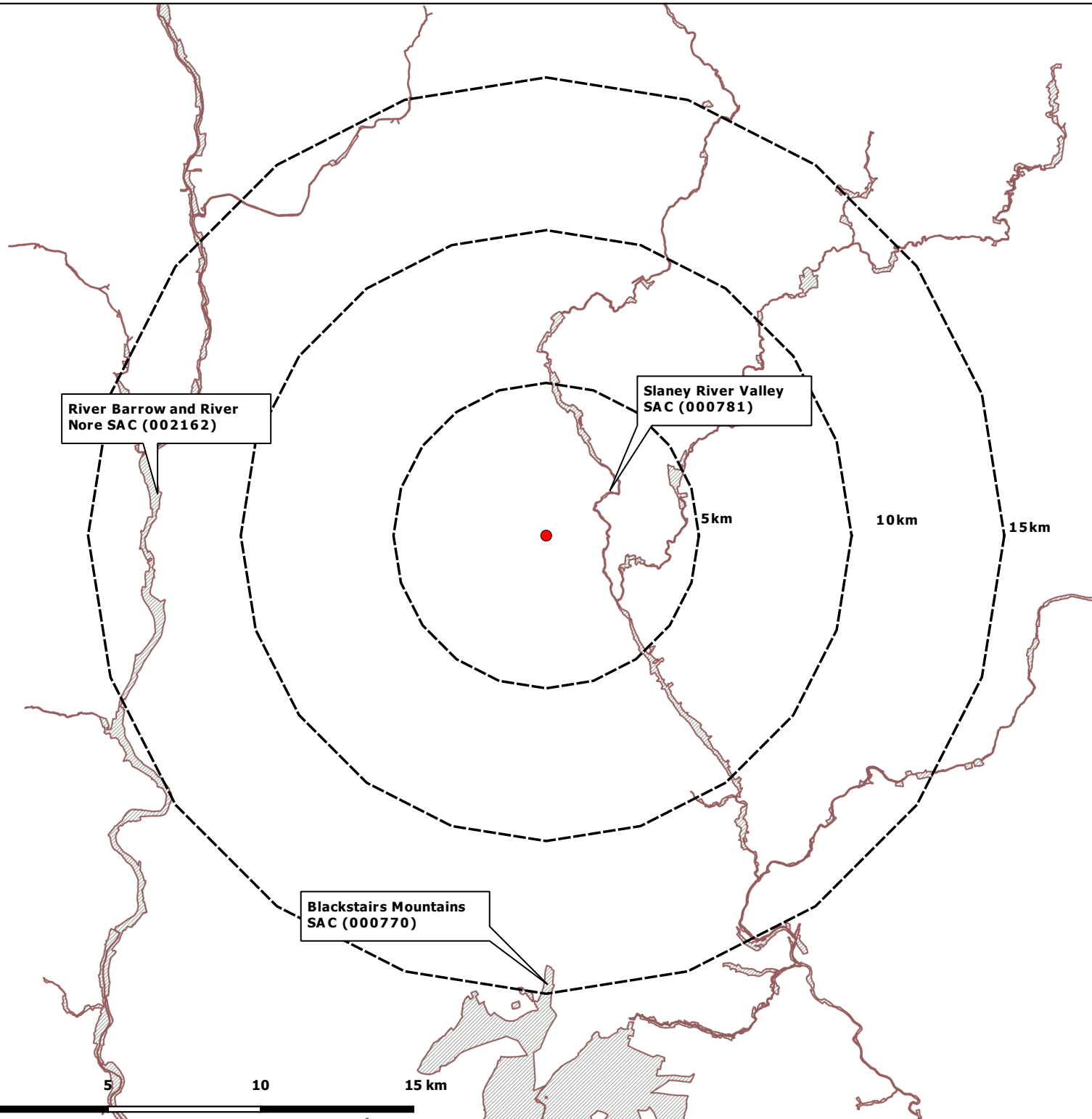
Figure: 6.3

### Legend

- Substitute Consent Application Area Location
- ▨ SAC
- ⋯ 5, 10 and 15km Buffer



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Client: Kilcarrig Quarries Ltd

Project: Planning application for Roscat Pit, Tullow, Co. Carlow

Title: National sites (pNHAs) designated for nature conservation within 15km of the proposed application area

Drawn by: Sarah Ingham

Checked by: Patrick O'Donnell

Scale: 1:18k @ A3



Date: 08/01/2019

Job No.: EI 061

Rev.: 1.0

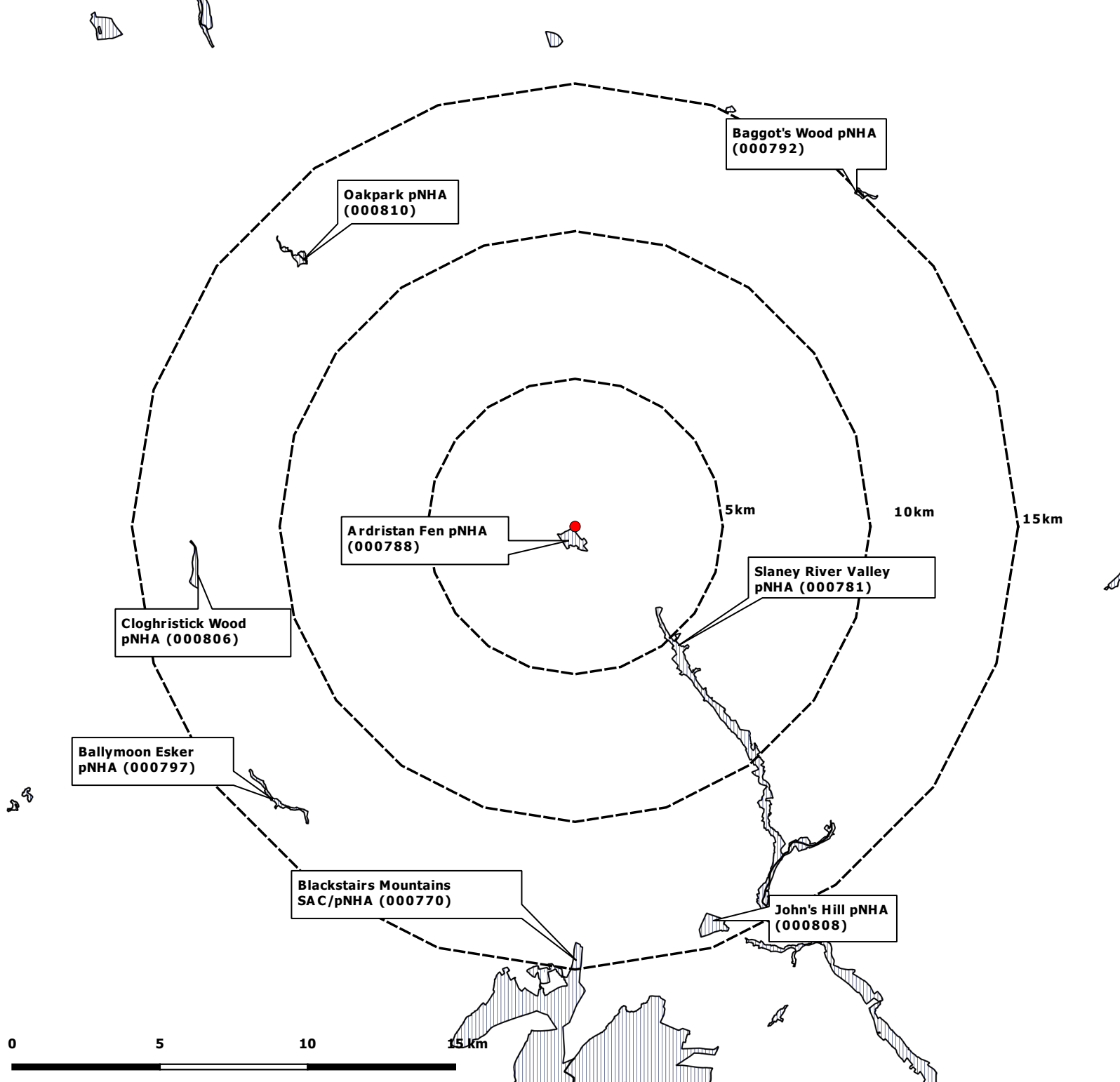
Figure: 6.4

**Legend**

- Proposed Application Area Location
-  pNHA
-  5, 10 and 15km Buffer



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**Earth Science Partnership**  
**Tonranny, Westport, Co. Mayo**  
**Tel: +353 98 28999**  
**Email: earthsciencepartnership@gmail.com**

Client: Kilcarrig Quarries Ltd.

Project: Section 37L Planning Application, Roscat Sand and Gravel Pit, Roscat, Tullow, Co. Carlow

Title: Phase 1 Habitat Map of Proposed Application Area

Drawn by: Sarah Ingham

Checked by: Patrick O'Donnell

Scale: 1:7k @ A4

Date: 08/01/2019

Job No.: EI 061

Rev.: 1.0

Figure: 6.5

**Legend**

- Section 37L Application Area
- Planning Area Ref CW7850
- Ardristan Fen pNHA
- Linear Habitats**
- WL1/WL2
- Non-linear Habitats**
- BC1 - Arable crops
- ED4 - Active quarries and mines
- WS1 - Scrub
- ED3 - Recolonizing bare ground
- ED1 - Exposed, sand, gravel or till
- FL8 - Artificial lakes and ponds (settlement lagoons)
- BL3 - Buildings and artificial surfaces (access road)

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Figure 7.4: Site Investigations Point Locations

## 7.0 LAND, SOILS & GEOLOGY

### 7.1 Introduction

The following EIA section has been prepared by Colin O'Reilly PhD (Hydrology) and Patrick Breheny MSc (Hydrogeology) of Envirolitic Ltd., on behalf of Earth Science Partnership Ltd.

The section is intended to satisfy the requirements of An Bord Pleanála, in relation to a Section 37L application to An Bord Pleanála for development of a sand and gravel pit of 14.7 hectares in area. The aims of this EIA section are to:

- Conduct a review to establish current baseline conditions relevant to the land, soil and geological environment within the site boundary, and the local surrounding environs;
- Assess the potential impacts to the land, soil and geological environment, which can be reasonably expected to occur as a result of the proposed development;
- Recommend suitable mitigation measures to address identified adverse impacts.

### 7.2 Methodology

The initial evaluation consisted of inspections of the site and adjacent lands by examination of aerial photography and Ordnance Survey plans, following by site walkover survey in June 2018. Relevant geological data from the Geological Survey of Ireland (1:100,000 Sheet 19: Geology of Carlow-Wexford) was reviewed together with additional data collated from data sources at Carlow County Council, Environmental Protection Agency (EPA), National Parks and Wildlife Service (NPWS), Ordnance Survey of Ireland (OSI), Office of Public Works (OPW), Teagasc and Met Eireann.

An examination of the exposed faces in the existing working pit was carried out in order to assess the material previously excavated and to gain an understanding of the material likely to be encountered within the proposed extension area. Intrusive investigation involved trial pitting and borehole drilling with geological strata logged and presented graphically.

The report has been compiled primarily taking cognisance of:

- *Guidelines for the preparation of soils, geology and hydrogeology chapters of environmental impact statement.* Institute of Geologists of Ireland (2013);
- *Revised guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency (2015);
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports.* Environmental Protection Agency (2017).

- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department by the Department of Housing, Planning and Local Government (August, 2018)*

## 7.3 Existing Environment

### 7.3.1 Land

The site is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathtoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site.

In terms of regional topography, lands within a 6 km radius of the site form part of a broad valley partially confined by the following features:

- a narrow north-south trending ridge 7km to the west, that peaks locally at 195 mOD;
- the southern extents of the Wicklow Mountains 11.5 km to the east, which peak locally to the east at Aghowle Upper (420 mOD)
- to the northeast by lands which rise gradually through Tullow and Rathvilly;
- the northern limits of the Blackstairs Mountains 13 km to the south which peak locally at Croaghaun (455 mOD). Another small hill is noted 5 km south of the site at Ballon (131 mOD).

At a more local scale the site is situated on the eastern side of a minor valley which is defined by a small north-south trending ridge that peaks at 94 mOD, 1 km northeast of the site at Ellengrove Crossroads, and a wider area of raised ground which reaches 93 mOD, 1.8 km southwest of the site. This valley flattens out to less than 70 mOD a short distance southwest of the site. OS Discovery maps indicate the site elevation to be in the range 68 – 74 mOD.

Natural ground levels adjacent to the northeastern and southwestern boundaries of the existing working pit are 70 mOD and 61.7 mOD, respectively. The current floor of the existing pit is reasonably level with elevations generally between 62 – 64 mOD. Hence it has been deduced that land in the existing working pit has been lowered by a maximum of 7 m. Ground levels in the extension area rise gradually from the southwest (70 mOD) and northeastern (73.6 mOD) field boundaries, respectively. Land use in the extension area is consistent with that of surrounding lands, being used for moderate to high intensity tillage and grassland agriculture. A dwelling with an accompanying farmyard is located 68 m northeast of the application site. Within a 500 m radius of the site are a relatively low density of dwellings with farmyards. Beyond this dwellings tend to be present in linear clusters along roads.

### 7.3.2 Soils

Reference was made to Gardiner and Radford (1980) and Teagasc soil maps which show that the agricultural soils which originally overlaid the pit, and overlie the proposed extension area, consist principally of shallow, well-drained mineral soils with alkaline signature (Figure 7.1).

Soils of County Carlow (Conry and Ryan, 1967) show that soils at the site belong to the shallower sub-group Broughillstown Complex Series. These have developed on esker hummocks and are described as gravelly sandy (coarse) loams, classified as Brown Earths. The profile is characterised by a dark greyish-brown, friable and crumb-structured upper horizon of depth 150 – 250 mm, which passes directly into the coarse-texture, calcareous parent material. These soils are shown to have a wide-use range but are best suited to tillage. They exhibit moderate to rapid permeability which can develop a moisture deficit during dry periods, resulting in crops maturing unevenly, as evidenced in the summer of 2018.

Extraction of sand and gravel requires the stripping/removal and storage of soils. Soils observed in-situ over exposed faces were noted as being thin. Soils have been stripped in order to facilitate extraction of overburden during previous activities. This stripped material has been stockpiled and formed into earthen bunds which partly define the site boundary. This soil will be utilised during site rehabilitation. It is intended that this practice shall be continued into the extension area. Figure 7.1 shows that a small area inside the southwestern boundary is classified as fen peat.

### 7.3.3 Quaternary Deposits

The quaternary period encompasses the last 1.6 million years and deals with the current soils that were deposited over the bedrock described below. The Pleistocene (1.6 million years - 10,000 years ago) is commonly known as the last Ice Age, which was a period of intense glaciation separated by warmer inter-glacial periods. Deposits resulting from this glaciation period were widespread and laid down in a diverse range that differ in thickness, extent and lithology. During the early stages of the Holocene, i.e. today's climate, the climate became warmer and wetter, approaching that which pertains to today.

Figure 7.2 shows that quaternary deposits in the wider area, including the application site, consist almost entirely of limestone-derived gravels. Parent material of the Broughillstown Complex consists of fluvio-glacial outwash and esker gravels of Weichsel Age, composed mainly of limestone with an admixture of mica-schist, granite and sandstone. In general, the outwash material is coarse and poorly sorted with inter-bedded lenses of better sorted material (GSI, 1998). Meltwater tunnels and channels through the retreating glaciers washed out finer sediment, leaving behind deposits of fluvio-glacial coarse-textured sands and gravels in the form of kames, moraines and eskers. Esker deposits tend to be linear in form and a minor, discontinuous, linear deposits of esker gravels are present between the site and the nearby watercourse. Moraines tend to resemble humps or small hillocks and these are more prevalent in the area. The flow direction of the primary meltwater channel in this part of north Carlow is from north to south.

Overburden on local ridges and elevated grounds are made up of granite-derived tills. This till thins out sufficiently on topographical peaks to expose bedrock. Peats have developed on topographically depressed grounds, including those south of the site which are denoted as fen-type peats. The watercourse to the southwest of the site is underlain and narrowly flanked by discontinuous alluvial deposits. Other segments are flanked by fen peat and cut peat which infers that the watercourse is not naturally formed along its entirety.

#### 7.3.4 Bedrock & Structural Geology

The bedrock and structural geology in the vicinity of the site is illustrated in Figure 7.3. The 1:100,000 GSI bedrock geology Sheet 19: Geology of Carlow-Wexford (Tietzsch-Tyler and Sleeman, 1995) shows the subject site and surrounding area to be underlain by the Tullow Type 2 Sparsely Porphyritic Granite Formation.

The Tullow Granites are described by the GSI as a late Silurian granite which was formed underground as molten igneous rock was forced upward before being slowly cooled beneath the remnants of older sea floor Ordovician sediments. The rock is characterised as porphyritic granite containing some microcline phenocrysts. Porphyritic is an adjective used to describe the physical differences in in crystal sizes present in the rock matrix which is characterised by larger crystals surrounded by a finer grained rock mass.

Conry and Ryan (1967) describe how the rolling lowlands that slope gently from the foot of the mountains defining the Barrow valley have developed over an extensive granite intrusion. The granite is mostly of medium-grained texture but some coarse and fine veins cut the mass. Being composed of well-developed potash feldspar crystals, glassy quartz and black mica, it has a white background colour flecked with black. Along joints the granite is often deeply weathered to sand leaving solids blocks in between.

The Tullow granite is intersected by a fault orientated along in a northwest – southeast plane, located approximately 700m northeast of the site.

#### 7.3.5 Site Geology

Previous operations in the existing pit have targeted the local sands and gravels for extraction. Multiple exposures show this material to be of a thickness of approximately 7 to 8m.

Multiple exposures of sub-vertical sand and gravel faces of up to 8-10 m, generally along the northern extents of the worked out area reveal the nature of targeted material. A typical exposure exhibits rounded to sub-rounded intermixed limestone gravels and cobbles, up to 100 mm in diameter. On the whole material is generally poorly sorted but interbedded in places with (i) lenses of well-sorted coarse-grained sands and (ii) rounded gravels and cobbles (<50 mm) in a coarse sand matrix. The multiple layering doesn't necessarily follow surface topography when considered in 3 dimensions and this is attributed to the chaotic environment under which this



material was deposited. A typical example of the exposed pit face (northern pit boundary) is shown in Plate 7.1.

**Plate 7.1 – View of exposed pit face in northern portion of site**



### 7.3.6 Depth to Bedrock

The GSI well database shows depth to bedrock (DTB) information ascertained from two wells drilled previously for Carlow County Council in the Roscat area as follows (n.b. these could not be located as the mapped information is only accurate to 1 km resolution):

1. Well depth = 12.5 m; DTB = 6.1 m; well yield = 32.7 m<sup>3</sup>/d; yield class = moderate.
2. Well depth = unconfirmed; DTB = 7.0 m; yield class = poor.

Bedrock was encountered in three of the recently installed monitoring wells at depths of between 12.25 m (MW1) and 13 m (MW2) below ground level (bgl). Bedrock was described as being soft weathered granite. There was no evidence of exposed bedrock within the general vicinity of the site. Sands and gravels were exposed across the floor of the existing pit.

### 7.3.7 Geological Heritage

The site is not a geological heritage area. The nearest such designation is the Ballymoon Esker formation 15 km south-east of the site, close to Bagnelstown. This unit is described as a ridge of glacial sand and gravels which developed beneath and within melting ice sheets towards the end of the last glaciation period.

## 7.4 Site Investigation

### 7.4.1 Trial Pitting

Four trial pits were excavated on 18<sup>th</sup> June 2018 within the existing pit using a tracked excavator. The purpose of this was to observe fresh exposures which would facilitate a detailed examination of subsurface lithology.

Trial pit locations (TP1, TP2, TP3, & TP4) are presented in Figure 7.4, with summary details shown in Table 7.2. Where possible subsoil descriptions were logged at each location in accordance with BS: 5930 (1999). In summary the excavated trial pits encountered gravels and coarse sand, deemed to be representative of overburden across the site. Bedrock was not encountered in any of the trial pits.

**Table 7.2 – Trial Pit Details**

ID	Location	Easting, m	Northing, m	Ground elevation, mOD	Pit depth, m	Pit base elevation, mOD
TP1	Western boundary, base of exposure	682,859	671,100	62.26	3.4	58.86
TP2	Northern boundary, base of exposure	683,006	671,101	63.22	2.92	60.30
TP3	Southeastern corner	682,965	670,880	63.03	3.73	59.30
TP4	Centrally, towards southeastern boundary	682,937	670,963	63.16	3.94	59.22

The pit face from TP2 and described as generally grey-brown, small to medium rounded to sub rounded, unbedded gravels with medium to coarse sand. The pit face from TP3 (Plate 7.2) was noted as consisting silty sand, possibly screening material.

**Plate 7.2 – Typical subsurface profile as encountered in TP3**



In the other two trial pits (TP1 and TP4) groundwater was intercepted between 1.0 to 1.5 mbgl. This made the pit faces unstable and prevented collection of accurate subsoil descriptions beyond these depths.

With the exception of TP4 there was no evidence of clay or silt banding within any of the excavated trial pits. With the absence of localized clay banding, vertical and horizontal permeability in this stratum is likely to be uninhibited and therefore high (as water can move unrestricted both vertically and laterally within the sand and gravel layers).

**Plate 7.3 – Shallow deposition of outwash from previous washing plant (central area)**



#### 7.4.2 Monitoring Well Installation

Three monitoring wells were installed in the proposed extension area on 19<sup>th</sup>-20<sup>th</sup> June 2018 using air rotary drilling. The wells were installed in a triangular arrangement close to the boundaries of the proposed extension area in order to establish lithology, depth to bedrock, and to provide suitable groundwater quality monitoring points (see Figure 7.4). Borehole logs for these installations are included in Appendix II. Summary details of the wells are provided below in Table 7.3.

**Table 7.3 – Details of Monitoring Wells Installed in Proposed Extension Area**

	<i>MW1</i>	<i>MW2</i>	<i>MW3</i>
Location	Eastern boundary, in laneway	Northern boundary, d/g of 3 <sup>rd</sup> party dwelling	Western boundary
Easting, m	683,145	683,192	682,913
Northing, m	671,002	671,311	671,218
Ground elevation, mOD	69.01	73.22	72.65
Top of Casing, mOD	69.41	73.63	73.13
Well Depth, m	12.7	15.51	15.30
Base of Well, mOD	56.31	57.71	57.35

## 7.5 Characteristics of the Development

### 7.5.1 Description of Activities

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares. This area is broadly rectangular with a width of 300 m perpendicular to the slope, and length of 220 m. The perimeter of this area is reasonably well defined by hedgerows and soil berms. The greenfield area extends northwards from the northeastern boundary of the existing site for a distance of 210 – 300 m. The site will continue to be accessed via a 1 km private haul road which extends southwest from the N81 at Ardristan Heights.

Proposed activities at the site will include:

- Stripping and stockpiling of topsoil in screening embankments. Vegetation will be established on the perimeter berms.
- Extraction of sands and gravels above water table using a mechanical excavator in the existing working pit;
- Processing of extracted material into various grades of aggregate or extraction of material and transporting off-site unprocessed.
- Refuelling of on-site machinery, i.e. loading shovel/excavator, will be carried out by a local third party supplier using a double-skinned mobile fuel tanker. There will be no storage of fuels or hydrocarbons on site.
- A portable chemical toilet will be used to provide sanitary services at the site and serviced as required by a licenced contractor.
- There will be 1 staff member based at the site on a part-time basis.

### 7.5.2 Use of Natural Resources

Natural resources to be extracted at the site consist of glaciofluvial sands and gravels derived from limestone. Sand and gravel are extremely important in the construction industry, and these materials are generally considered to be suitable for a wide range of uses as construction aggregates. Extracted resource is suitable for use in the construction industry for the production of precast concrete, readymix concrete, readymix mortar, blocks and bricks. Sands and gravels are also important for local agriculture as permeable fill, yard surfacing, drainage material, etc.

The destinations of this raw material will most likely be at a local scale serving agriculture, extending to a regional scale as required for use in the construction industry. The regional extents are presumed to be north Carlow, south Wicklow and north Wexford.

Diesel will be consumed by on-site machinery (loading shovel/excavator), and in haulage vehicles transporting material from the site and upon return. Water may be used for dust suppression as required. This is most likely to be sourced on-site.

## 7.6 Impact Assessment

The procedure for determination of potential impacts on the receiving soil and geological environment is to identify potential receptors within the site boundary and surrounding environment and use the information gathered during the desk study and field work to assess the degree to which these receptors will be impacted upon. Impacts are described in terms of quality, significance, duration and type in accordance with current EIAR guidelines (EPA, 2017; DHPLG, 2018). The impact definitions and criteria are further detailed in Appendix II.

In accordance with the NRA Guidelines (2009) (as included in 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013)), the site is deemed to be an attribute of Medium importance as a function of being a small existing pit. The target geological resource is an attribute of value or significance on a local scale.

The potential impacts from the enabling and operational phases of the proposed development are summarised below and in further detail in Table 7.4.

### 7.6.1 Direct Impacts

By definition the proposed extraction of sand and gravel involves the excavation and removal of glacial deposits. This is therefore considered to be a permanent, adverse impact to an attribute of medium importance. Any soils and screening by-product currently stockpiled on site, or to be stockpiled in future, as perimeter berms shall be reused or integrated as a fundamental part of site rehabilitation. Impact to subsoils will be limited to site and there will be no impact to subsoils outside the application boundary. There shall be no impact to underlying bedrock.

The sand and gravel proposed to be extracted is destined for use as a raw aggregate. This activity shall have a beneficial impact to the local and regional economy in this regard. The necessity for such raw materials is recognised in the Carlow County Development Plan 2015-2021.

Proposed works have the potential to contaminate of exposed subsoils as a result of spillages during refuelling or leakages from machinery breakdown. Providing adequate mitigation control measures are in place the risk of such during continuation of sand and gravel extraction is deemed to be negligible. There are no designated sites with respect to geological features within the vicinity of the site.

### 7.6.2 Indirect Impacts

The extraction of sands and gravels will have the following adverse indirect impact to the land, soil and geological environment:

- extraction has, and will, temporarily remove the capacity of these lands to provide agricultural production until future restoration. The resulting impact on the soils may be considered to be of a medium term nature in that they will be reused or integrated as a fundamental part of future site rehabilitation.

The extraction of extraction of sands and gravels will have the following positive indirect impact to the land, soil and geological environment:

- upon completion of extraction stockpiled soils will be reused to rehabilitate the site to a condition suitable for agricultural production.
- The use of the geological resource, i.e. sand and gravel, as a raw material brings benefits in the production of aggregates and products for use in construction and agriculture. These aggregates and products cannot be reasonably be manufactured by other means.

Proposed activities will not have any indirect impact on the soil and geological environment outside the site.

### 7.6.3 Cumulative Impacts

Proposed works will involve further removal of sands and gravels in addition to those previously removed and are considered to be a continuation of historical activities at the site. The existing working pit and proposed extension area are considered to be small in terms of scale in the quarrying industry.

Aerial photographs reveal a quarry 1 km to the south of the application area. The presence of large, irregularly shaped ponds suggest resource has been extracted below groundwater at this location. There are no other clearly identifiable quarries within 5 km of the site.

Hence the cumulative impact to the geological resources in the area is considered to be negligible. It is considered more appropriate to continue activities at and adjacent to, the existing pit, as opposed to opening a new quarry on a greenfield site, in order to meet the demands of the construction industry. Quarrying is established at this site and it has been integrated into the local environment. It is also in line with the Carlow County Development Plan 2015 – 2021. Once activities have been established it is assumed that the operational phase will not involve an intensification in extraction rates above those in place between 2000 - 2008. There will be no increase in haulage rates above that associated with previous extraction.

### 7.6.4 Do-Nothing Effects

This item requires consideration of the effect on the environment as it would be in the future should the proposed works not be carried out. As the proposed activities involve a continuation of use at, and adjacent to, an existing site in line with previous activities it is envisaged that no new or different potential impacts shall be introduced when compared to the previous operational phase.

The proposed activities also include restoration of the existing working pit and restoration of the extension area following completion of sand and gravel extraction. In the event that the proposed works do not go ahead the scenario may arise where there is no valid permission to complete restoration works on the existing working pit which would leave it in an unrestored post-works condition.

### 7.6.5 Interaction with other Impacts

The EIA guidelines (EPA, 2017; DHPLG, 2018) highlight that the interaction of impacts to the land, soils and geological environment, arising from proposed activities, must be given due consideration alongside potential receptors identified in other EIA sections. The likely interactions have been identified as follows:

- The movement of soils and subsoils can give rise to increased dust emissions.
- The operation of plant associated with extraction and haulage can give rise to increased noise emissions.
- The extraction of overburden can impact upon surface and groundwater quality and flow patterns.
- The extraction of overburden can impact upon biodiversity and cause disturbance to habitats in the area.
- Haulage of resource can give rise to increased traffic movements.

Each of these issues and the mitigation measures proposed are addressed in detail in the relevant sections of this EIA. These impacts are considered to be negative but with mitigation measures in place their significance can be reduced.

### 7.6.6 Unplanned Events

The 2014 EIA directive requires the development be assessed in terms of vulnerability to the risks of major accidents and/or disasters which are relevant to the project. It is highly unlikely that any unplanned events should occur that could lead to an impact on Land, Soils & Geology. Side slopes will be extracted to a stable angle to ensure stability at the end of extraction of material.

## 7.7 Mitigation Measures

The significant potential impacts identified in Table 7.4 are resolved under the mitigation measures set out under Table 7.5.

### 7.7.1 Residual Impacts

Residual impacts refer to the degree to environmental change that will occur after the proposed mitigation measures have taken effect.

The enabling phase in the extension area will involve stripping of topsoils and stockpiling of same in perimeter berms and stockpiling for restoration of the pit. The operational phase will primarily involve excavation of sands and gravels via mechanical means. Assuming implementation of the mitigation measures described in Table 7.5 the residual impacts on the land, soil and geological environment during the enabling and operational phases are assessed to be long-term and negligible.

There are no mitigation measures to alleviate permanent loss of sands and gravels as this is the desired resource material.



### 7.7.2 End of Use

It is envisaged that, subject to a grant decision, sands and gravels will be extracted within the current site boundary and the extension area to the proposed floor level (see EIAR Section: Water). Following end of use stage any on-site structures would be removed/demolished.

**Table 7.4 – Summary of potential impacts**

Activity	Attribute	Character of potential impact	Importance of attribute (refer to Table 7.A.1)	Magnitude of potential impact (refer to Table 7.A.2)	Term	Significance of potential impact (refer to Table 7.A.3)
Enabling Phase						
Stripping and stockpiling of topsoil necessary to facilitate extraction of sands and gravels	Soil	Loss of soils due to erosion and dust generation. Damage to soil structure	Medium: thin, rapid permeability soils	Adverse/Small: small proportion of local soils	Medium term	Slight
Operational Phase						
Opencast extraction of sands and gravels	Subsoils	Mechanical excavation of sands and gravels	Medium: extension to small existing quarry	Adverse/Moderate: loss of moderate proportion of future quarry or pit reserves	Permanent	Moderate
Handling of subsoils	Subsoils	Dust generation	Medium	Negligible	Short term	Imperceptible
Handling/placement of screenings stockpiled in existing working pit	Screenings	Dust generation	Low	Negligible	Short term	Imperceptible
Use of fuels/hydrocarbons	Soil, subsoil, bedrock	Potential for contamination of exposed subsoils and/or bedrock as a result of spillages/leakages.	Medium	Adverse/Moderate	Temporary	Moderate

**Table 7.5 – Summary of mitigation measures**

Activity	Attribute	Character of potential impact	Mitigation measure	Predicted impact
Enabling Phase				
Stripping and stockpiling of topsoil necessary to facilitate extraction of sands and gravels	Soil	Loss of soils due to erosion and dust generation. Damage to soil structure.	In order to reduce potential for widespread compaction traffic movements will be restricted to define internal haul routes insofar as possible. Works shall not be carried out during excessively dry or wet weather. Dust monitoring shall be carried on a prescribed basis. Dust suppression to be employed as necessary. Slope stability of any retained perimeter berms should prevent slippage, and berms should be to establish vegetation which will strengthen soil cohesion and mitigate against sediment losses. Excavated topsoil will be used as part of site rehabilitation. The site will be capped	Imperceptible/Slight

			with a layer of topsoil in order to restore the back to agricultural use.	
Operational Phase				
Opencast extraction of sands and gravels	Subsoils	Mechanical excavation of sands and gravels.	No measure to mitigate against loss of sands and gravels. The amount to be extracted is considered negligible in terms of the available resource in the area.	Moderate
Handling of subsoils	Subsoils	Dust generation	Works shall not be carried out during excessively dry or wet weather. Dust monitoring shall be carried on a prescribed basis. Dust suppression to be employed as necessary.	Imperceptible/Slight
Handling/placement of screenings stockpiled in existing working pit	Screenings	Dust generation	Stockpiled screenings will be retained on site and used for contouring/landscaping as part of rehabilitation. Such works shall not be carried out during excessively dry or wet weather. Dust monitoring shall be carried on a prescribed basis. Dust suppression to be employed as necessary.	Imperceptible/Slight
Use of fuels/hydrocarbons	Soil, subsoil, bedrock	Potential for contamination of exposed bedrock as a result of spillages/leakages.	There will be no storage of fuels on site. Refuelling shall be carried out by an external fuel supplier at a designated area or where possible off-site. Fuelling and servicing of plant (where required) will be in a designated area, not within 30m of drainage ditches or surface waters. Drip trays will be used during refuelling. An adequate supply of spill kits and hydrocarbon absorbent packs shall be stored on site and staff shall be trained in the appropriate use of same. No waste containers shall be stored on-site and shall be removed from the site by fitters undertaking work.	Neutral

## 7.8 Monitoring

A designated person from the project management team will have overall responsibility for ensuring that all operations are carried out in such a way as to minimise potential impacts to soils and geological receptors. This person will also have responsibility of monitoring the performances of any pollution control measures adopted.

A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractor during all phases of work. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures during a site induction meeting.

## 7.9 Summary

The extraction of sands and gravels at this location is well established and the landscape has a moderate capacity to absorb land use consistent with the quarrying industry.

Trial pitting displayed that the sands and gravels present are rounded as a result of the fluvio-glacial outwash event and grey due to their limestone origins, with a minor proportion consisting of beige granite. Where greenfield is present, topsoil depth of 0.3-0.4m was observed. A graphical log of depth of soils and subsoils, and depth to bedrock, is included in a series of lithology logs from drilling.

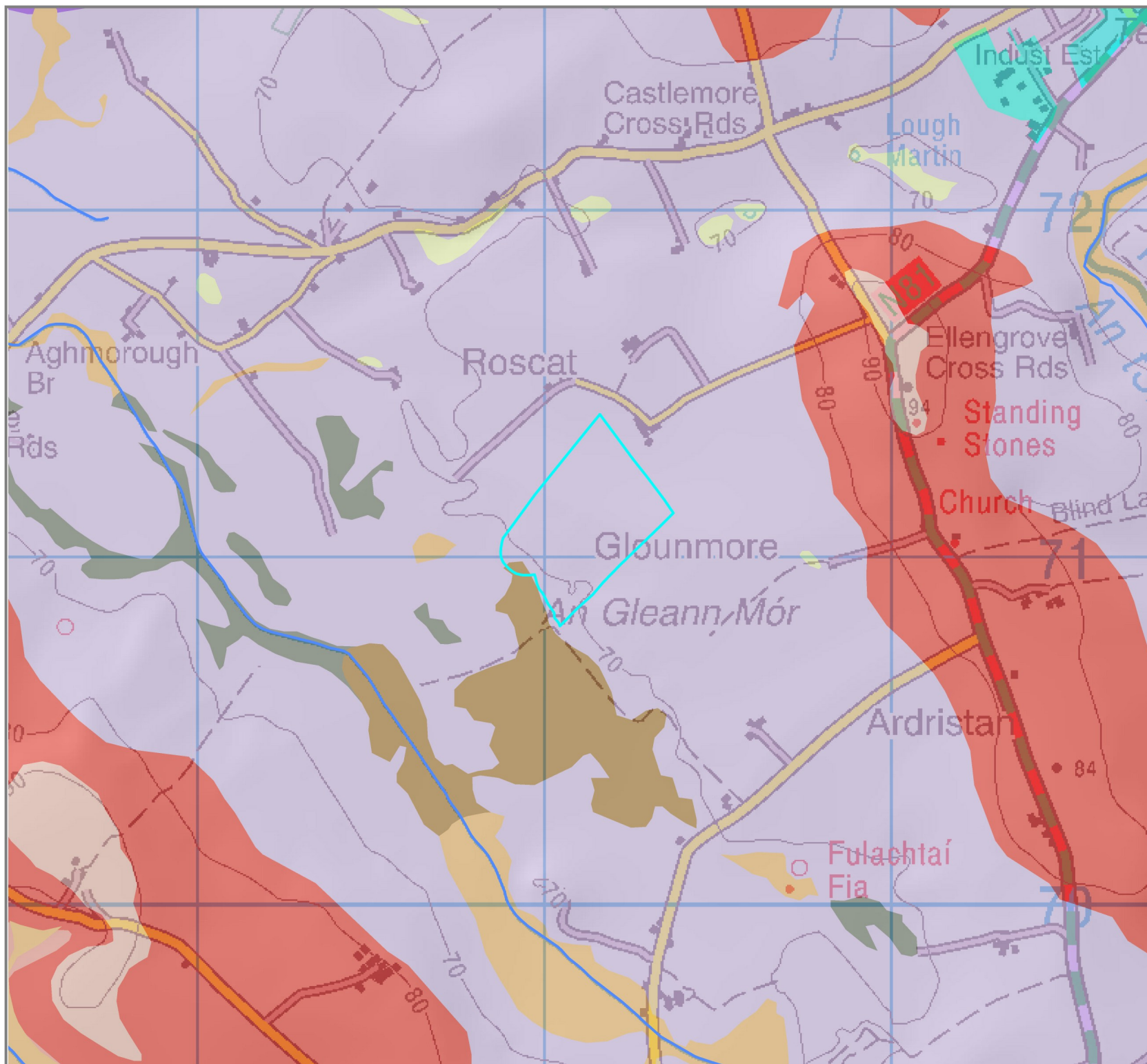
Impacts to the land, soils and geology environment were assessed, and appropriate mitigation measures have been presented. These measures relate to protection of soil structure, dust suppression, protection from contaminants, and reinstatement practices to return the site to a condition suitable for agricultural use. Removal of the underlying sand and gravel will not interfere with quality of the land for standard agricultural purposes provided the preparation and restoration of the site is carried out in an organised manner based on recognition of the properties and fertility status of the various horizons.

## 7.10 References

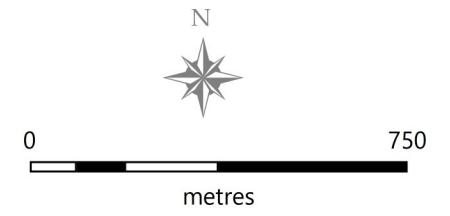
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## **Figures**





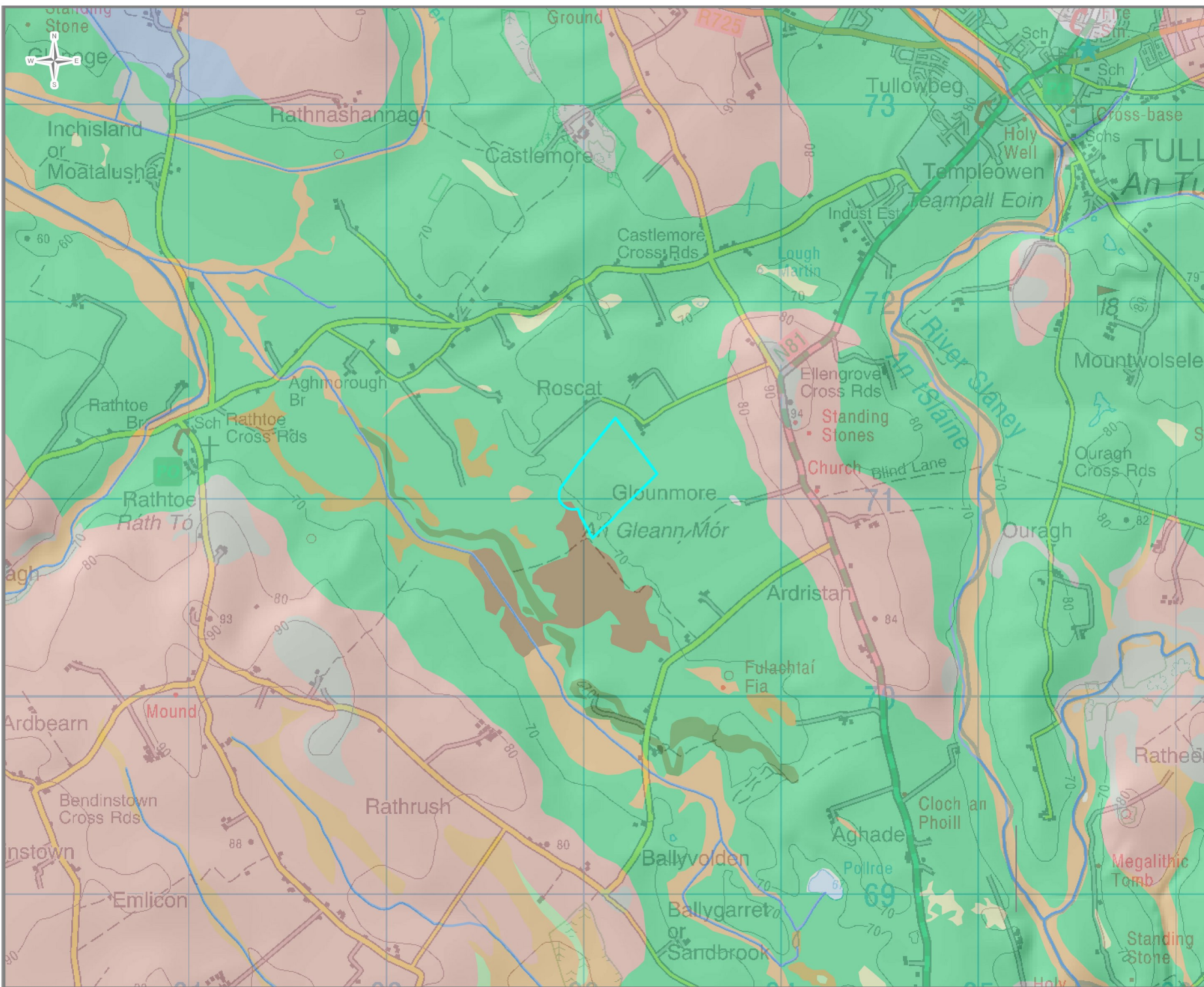
- Application Boundary
  - Surface Watercourses
- Soils Legend:
- Alluvium
  - Deep well drained mineral (acidic)
  - Mineral poorly drained (acidic)
  - Shallow poorly drained mineral (acidic)
  - Shallow well drained mineral (acidic)
  - Deep well drained mineral (basic)
  - Shallow poorly drained mineral (basic)
  - Shallow well drained mineral (basic)
  - Cutover / cutaway peat
  - Fen peat
  - Lacustrine deposits
  - Made ground
  - Water



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Client:	Earth Science Partnership Ltd	
Project:	EiAR Section: Land, Soils & Geology	
Location:	Roscat, Tullow, Co. Carlow	
Figure 7.1:	General Soils Classification Map	
Scale:	1 : 15 000	Date: September 2018
Ref:	1679	Author: C. O'Reilly



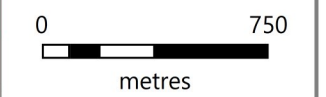


**Legend:**

- Application Boundary
- EPA River Network

**Subsoils:**

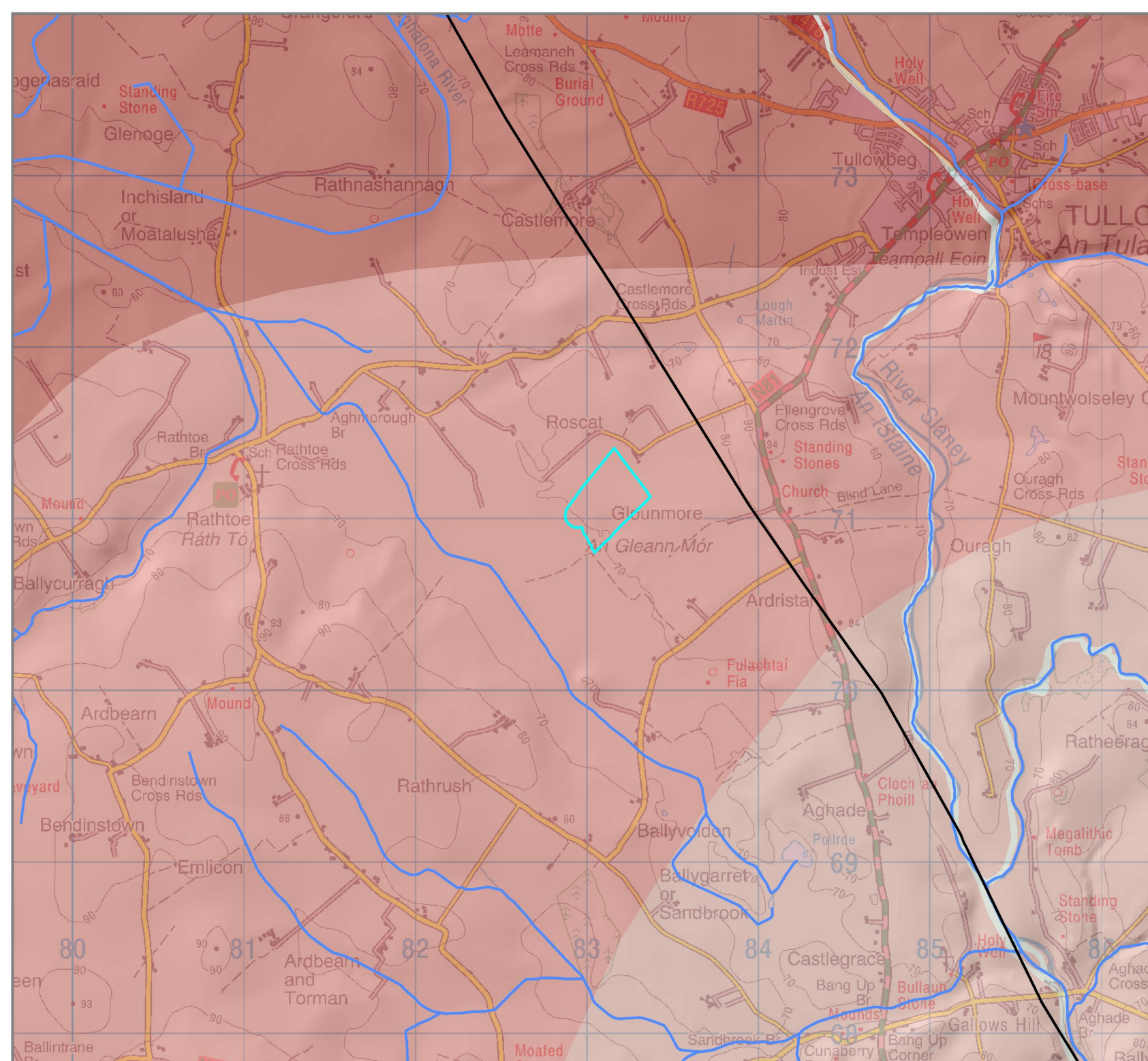
- Alluvium
- Esker comprised of gravels
- Cutover peat
- Fen peat
- Gravels derived from granite
- Gravels derived from limestone
- Lacustrine Deposits
- Bedrock outcrop or subcrop
- Till derived from granites
- Till derived from limestones
- Water



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<b>Fig. 7.2:</b>	Quaternary Deposits Map
<b>Date:</b>	September 2018
<b>Author:</b>	C. O'Reilly
<b>Scale:</b>	1 : 25 000
<b>Client:</b>	ESP Ltd
<b>No.:</b>	1679
<b>Project:</b>	EIAR Section: Land, Soils & Geology
<b>Location:</b>	Roscat, Tullow, Co. Carlow





Application Boundary  
 Surface Watercourses

**Bedrock Legend:**

- Type 2 Equigranular Granite (Tullow Pluton)
- Type 2 Sparsley Porphyritic Granite (Tullow Pluton)
- Type 2 Microcline Porphyritic Granite, (Tullow Pluton)

Structural Geology



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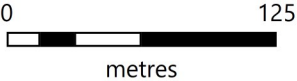
Client: Earth Science Partnership Ltd.	
Project: EIAR Section: Land, Soils & Geology	
Location: Roscat, Tullow, Co. Carlow	
Figure 7.3: Bedrock & Structural Geology Map	
Scale: 1 : 30 000	Date: September 2018
Ref: 1679	Author: C. O'Reilly





Legend:

- Application Boundary
- Trial Pit Location
- Monitoring Well Location



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Fig. 7.4: Site Investigation Point Locations

Date:	September 2018
Author:	C. O'Reilly
Scale:	1 : 3 500
Client:	ESP Ltd
No.:	1679
Project:	EIAR Section: Land, Soils & Geology
Location:	Roscat, Tullow, Co. Carlow

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Figure 8.6 – Groundwater Level Contour and Flow Direction

## 8.0 WATER

### 8.1 Introduction

The following EIA section has been prepared by Colin O'Reilly PhD (Hydrology) and Patrick Breheny MSc (Hydrogeology) of Envirollogic Ltd., on behalf of Earth Science Partnership Ltd.

The section is intended to satisfy the requirements of An Bord Pleanála, in relation to a Section 37L application to An Bord Pleanála for development of a sand and gravel pit of 14.7 hectares in area. The aims of this EIA section are to:

The aim of this EIA section is to establish the following:

- Conduct a review to establish current baseline conditions relevant to the hydrological and hydrogeological environment within the site boundary, and the local surrounding environs;
- Assess the potential impacts to the hydrological and hydrogeological environment, which can be reasonably expected to occur as a result of the proposed development;
- Recommend suitable mitigation measures to address identified adverse impacts.

### 8.2 Methodology

The initial evaluation consisted of inspections of the site and adjacent lands by examination of aerial photography and Ordnance Survey plans, following by site walkover survey. Relevant hydrogeological data from the Geological Survey of Ireland (1:100,000 Sheet 19: Geology of Carlow-Wexford) was reviewed together with additional data collated from data sources at Carlow County Council, Environmental Protection Agency (EPA), National Parks and Wildlife Service (NPWS), Ordnance Survey of Ireland (OSI) and Met Eireann.

The report has been compiled primarily taking cognisance of:

- *Guidelines for the preparation of soils, geology and hydrogeology chapters of environmental impact statement.* Institute of Geologists of Ireland (2013);
- *Revised guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency (2015);

- *Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency (2017).*
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department by the Department of Housing, Planning and Local Government (August, 2018).*

Intrusive investigation in June 2018 involved trial pitting and borehole drilling to assess groundwater flow patterns. Groundwater sampling along with groundwater and surface water level monitoring was carried out to interpret summer and winter hydrogeological regimes.

### 8.3 Existing Environment

#### 8.3.1 Aquifer Classification

Figure 8.1 shows that the site is underlain by a poor bedrock aquifer, consisting bedrock which is generally unproductive except for local zones (PI). This type of aquifer is described as having limited groundwater potential whereby flow is generally restricted to the uppermost weathered bedrock zone. They exhibit relatively shallow and short localised flow systems with very little continuity between them. Much of the potential recharge to these strata is rejected and throughflow is low. There is no primary permeability and limited fracture possibilities in these rock units, which restricts groundwater seepage and movement. Groundwater is likely to circulate predominantly through faults and fractures, or perhaps along the axes of anticlines.

Due to the low permeability and poor storage capacity, the aquifer has a low recharge acceptance. Some recharge in the upper, more fractured/weathered zone is likely to flow along the relatively short flow paths and rapidly discharge to streams, small springs and seeps. Groundwater discharge to streams (baseflow) can significantly decrease in the drier summer months. The bedrock aquifer lies within the New Ross Groundwater Body (GSI, 2004) which is large and as such there is no site specific data relevant to the study area.

The GSI have determined that the Burren Basin gravel deposits that overlie the bedrock unit are of sufficient magnitude to be classified as a locally important gravel aquifer (Lg). The Burren Valley Gravels may contribute to abstractions in the area and provide storage for the underlying aquifer, possibly helping to maintain yields during dry weather. Since groundwater levels are relatively close to the surface in this body surface water levels may be influential.

Limited information is available from the GSI website on well yields in the vicinity of the site. Historical data in the townland of Roscat indicates the existence of two Carlow County Council boreholes (No. 163 & 228) and an unnamed borehole (GSI name 2617SEW138). The installations are situated to the northwest of the existing site. With the exception of the unnamed borehole which exhibits a poor yield, the recorded yields in the County Council wells are indicated to be moderate between 30-40 m<sup>3</sup>/d.

### 8.3.2 Vulnerability

The vulnerability categories, and methods for determination, are presented in Groundwater Protection Schemes (1999). The guidelines state that *'as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area:*

1. the subsoils that overlie the groundwater;
2. the type of recharge - whether point or diffuse;
3. the thickness of the unsaturated zone through which the contaminant moves.

As shown in Figure 8.2, the GSI has assigned the existing site and proposed extension area as having groundwater vulnerability classification of High (H), consistent with the broad valley area. In accordance with the criteria in Table 8.1 this infers high permeability sand and gravel greater than 3 m in thickness. Depth of overburden decreases on elevated ground where glacial deposits have been washed with receding meltwaters, with resultant vulnerability increasing through Extreme (E) to Extreme (X).

**Table 8.1 - Vulnerability Mapping Criteria (DELF/EPA/GSI, 1999)**

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability & Type			(Swallow holes, losing streams)	(sand & gravel aquifers <i>only</i> )
	High permeability (sand & gravel)	Moderate permeability (sandy subsoil)	Low permeability (clayey subsoil, clay, peat)		
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High

Notes: (i) N/A = not applicable  
(ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method



### 8.3.3 Source Protection Areas

There are no mapped groundwater source protection zones within an 18 km radius of the site. Potable water supplying the dwelling to the northeast of the extension area is abstracted from an on-site well. There are no drinking water supply wells downgradient of the site.

### 8.3.4 Climatic Data

Monthly gridded rainfall data was sourced from Met Éireann (Walsh, 2012) and is presented in Table 8.2.

**Table 8.2 – Long term mean monthly rainfall data (mm) (Met Éireann)**

<i>J</i>	<i>F</i>	<i>M</i>	<i>A</i>	<i>M</i>	<i>J</i>	<i>J</i>	<i>A</i>	<i>S</i>	<i>O</i>	<i>N</i>	<i>D</i>	Annual
82	58	64	60	61	65	60	74	72	90	87	82	854

The closest synoptic station to the site is at Oak Park, Carlow, 15 km to the northwest, where average potential evapotranspiration (PE) is 529 mm yr<sup>-1</sup>. This value is used as a best estimate of the site PE. Actual evapotranspiration (AE) is estimated by multiplying PE by 0.95, to allow for the reduction in evapotranspiration during periods when a soil moisture deficit is present (Water Framework Directive, 2004). Actual evapotranspiration is therefore 502.7 mm yr<sup>-1</sup> (0.95 PE).

The Effective Rainfall (ER) for the site is determined from:

$$\begin{aligned} \text{ER} &= \text{AAR} - \text{AE} \\ &= 854 \text{ mm yr}^{-1} - 502.7 \text{ mm yr}^{-1} \\ \text{ER} &= 351.3 \text{ mm yr}^{-1} \end{aligned}$$

The application site area is 14.7 ha. Hence, the volume of water from precipitation that is available for runoff or recharged directly is given by:

Site area runoff-recharge:

$$\begin{aligned} &= \text{area} \times \text{ER} \\ &= 147,000 \text{ m}^2 \times 0.351 \text{ m yr}^{-1} \\ &= 51,597 \text{ m}^3 \text{ yr}^{-1} \text{ (141 m}^3 \text{ d}^{-1}) \end{aligned}$$

### 8.3.5 Recharge

Recharge coefficients can be utilised to estimate the proportion of water infiltrating to bedrock, against that moving laterally as shallow subsurface flow and surface overland flow. The recharge coefficient applicable to high groundwater vulnerability and sand and gravel overburden thicker than 3 m is 85% (as per the Recharge Coefficient Calculation Method developed by the Geological Survey of Ireland (Water Framework Directive,

2004)). The volume of groundwater recharge generated by precipitation falling within the application site area can thus be estimated as:

$$\begin{aligned}\text{Annual Recharge} &= (\text{area} \times \text{ER}) \times \text{recharge coefficient} \\ &= \text{recharge on high permeability sands and gravels} \\ &= 51,597 \text{ m}^3 \text{ yr}^{-1} \times 0.85 \\ &= 43,857 \text{ m}^3 \text{ yr}^{-1} (120 \text{ m}^3 \text{ d}^{-1})\end{aligned}$$

The recharge estimates above do not take into account bedrock permeability and are therefore more a representation of the amount of water available for recharge to bedrock. The national recharge map (GSI) implies between 0 – 100 mm yr<sup>-1</sup> infiltrates bedrock and this seems reasonable given the poor aquifer classification and low-moderate well yields in the area.

### 8.3.6 Surface Water Catchment

The site lies within the surface water catchment of the Roscat Stream, which flows in a southeast to northwest direction, passing the site 520 m to the southwest. The stream has a catchment of 5.9 km<sup>2</sup> as it passes adjacent to the site (see Figure 8.4). The stream rises approximately 2 km southeast of the site in a topographical depression at Aghade. It outfalls to the Burren River just north of Rathtoe, which subsequently enters the River Barrow at Carlow Town.

### 8.3.7 EPA Water Quality

The EPA Maps application and [www.catchments.ie](http://www.catchments.ie) were viewed to obtain data on chemical and biological water quality assessments undertaken in the area since 2007. A national water monitoring station is present on the Roscat Stream, immediately upgradient of its confluence with the Burren River, however there is no biological or chemical water quality data for this station. Under WFD Risk Classification the Roscat Stream has been designated as 'not at risk'. WFD Status is 'unassigned' for the Roscat Stream, and designated 'good' for the Burren River.

### 8.3.8 Flood Risk

The OPW pFRA maps show that the site is not at risk of potential fluvial flooding during a 1 in 100 year or 1 in 1000 year return period. Given the high permeability sands and gravels underlying the application site there is no risk of pluvial flooding. OPW Floodmaps show there are no historical flood events in the area.

### 8.3.9 Designated Areas

Designated areas within 15 km of the application site are shown in Table 8.3.

**Table 8.3– Designated Areas of Hydrogeological Importance**

<i>Designation</i>	<i>County Carlow</i>
Proposed NHA	Ardristan Fen, adjacent to southern boundary
SAC	Slaney River Valley, 1.4 km northeast
SAC	River Barrow and River Nore, 13 km west

The extents of Ardristan Fen, a proposed Natural Heritage Area (pNHA), as defined by National Parks and Wildlife Service, are presented in Figure 8.3. The mapped extents occupy an area of 38 ha, most of which is due south of the application site, with the western portion of the fen extending from the Roscat Stream to the southwestern boundary of the site, at which point there is a slight overlap. The mapped extents appear to be based on peat area as per Figure 7.2. There was no evidence of peat within the site boundary and it is unclear if the NPWS fen extents have been groundtruthed as part of the designation process.

A fen is a peat-substrate wetland fed by mineral-rich, basic groundwater. Local hydrogeology is therefore an important element in fen peat formation as the wetland conditions are maintained by groundwater levels being close to, or above, ground surface. Fen peat typically occurs on undulating lowlands, predominantly Carboniferous limestone glacial drifts. Within this geological landscape fens tend to form in river valleys and poorly drained hollows, as well as adjacent to raised bogs, and have an average depth of 1-2m (Hammond, 1981). Sphagnum peat is not found on fen peats because of the continued flushing with groundwater.

Historical mapping (OSI 6" and 25" maps) suggests that Ardristan Fen was formerly a more extensive area of seasonally saturated fen and marshland that developed within a topographical depression. The historical marsh extents in the 6" and 25" OSI maps correspond with the peat-based NPWS extents outlined in Figure 8.3.

It is important to note that in relatively recent times the area has undergone significant arterial drainage, presumably by local landowners. Reclamation of drained lands has been ongoing since 1975 and aerial photography (Figure 8.3) shows the result of this as prevalence of improved grassland. The arterial drains shown in Figure 8.3 intercept water table and transmit these waters in a general southwest direction toward the Roscat Stream. This is fairly typical in Ireland where undisturbed fens are very rare, with most having been drained and cultivated.

If we consider Ardristan Fen to be the area that is permanently or seasonably saturated, and supporting flora and fauna tuned to these hydrogeological conditions, it's actual current

extents are more likely to be closer to the green polygon shown in Figure 8.3. The arterial drains tend to be lateral to, and downgradient of, this area. On this basis there is no evidence that the application site encroaches on the fen. Furthermore, if the groundwater flow direction is perpendicular to the Roscat Stream, i.e. from northeast to southwest, then the application site is not upgradient of the fen in terms of groundwater flow. This approach is based on hydrology only and needs to be verified by an ecologist.

The estimated area contributing groundwater to the fen (NPWS extents) based on topographical divides and inferred groundwater flow direction is shown in Figure 8.4. In this scenario the application site is hydraulically upgradient of the fen.

The Slaney River SAC passes 1.4km to the northeast of the site. The river rises at the base of Lugnaquilla mountain (near Glendalough) and flows westwards towards Baltinglass, changing direction southward as it flows towards Tullow. Although relatively close to the site it is considered to be within a separate surface water catchment to the application site.

The River Barrow SAC is situated approximately 13 km west of the site. The Barrow rises in the Slieve Bloom mountains, County Laois and flows southwards to its confluence with the River Nore and River Suir at Waterford Harbour.

## 8.4 Site Investigation

### 8.4.1 Groundwater Level Survey

Groundwater level surveys were conducted on 27<sup>th</sup> June 2018, 14<sup>th</sup> February 2019 and 11<sup>th</sup> March 2019, results of which are shown in Table 8.4. Groundwater level monitoring events were selected on the basis that June 2018 was during what has been recognised as an extensive drought period (i.e. summer groundwater regime), with February/March 2019 representative of winter groundwater regime.

Ground and top of casing elevations were surveyed using RTK VRS, and depth to water table measured using a dipmeter. Groundwater levels were surveyed at:

1. Three groundwater monitoring wells installed June 2018 – MW1, MW2, MW3 (see Appendix II for logs);
2. Four standpipes installed in trial pits TP01 – TP04;
3. Private well at upgradient farm/dwelling – TPW1.

**Table 8.4– Groundwater level survey data**

<i>ID</i>	<i>Top of casing, mOD</i>	<i>Depth to water table, m btoc</i>	<i>Groundwater level, mOD</i>	<i>Depth to water table, m btoc</i>	<i>Groundwater level, mOD</i>	<i>Depth to water table, m btoc</i>	<i>Groundwater level, mOD</i>
		27/06/18		14/02/19		11/03/19	
MW1	69.41	7.00	62.41	6.94	62.47	7.01	62.40
MW2	73.63	10.24	63.40	10.25	63.38	10.23	63.40
MW3	73.13	10.72	62.41			11.01	62.12
TP01	63.05	1.13	61.93	1.03	62.02	1.02	62.03
TP02	64.01	1.97	62.05	1.88	62.13	1.89	62.12
TP03	63.94	2.10	61.84	2.05	61.89	2.01	61.93
TP04	64.33	2.46	61.87	2.39	61.94	2.36	61.97
TPW1	72.61	9.45	63.16				

Table 8.4 shows that there is negligible difference between groundwater levels when comparing summer to winter groundwater regimes. Groundwater levels surveyed during Summer 2018 are illustrated in Figure 8.5.

Surface water levels are also shown in Figure 8.5 and it can be seen that surface and groundwater appear to be broadly in continuum.

#### 8.4.2 Groundwater Flow Direction

Groundwater levels surveyed demonstrate a relatively low range (61.84 – 63.40 mOD) suggesting a low hydraulic gradient, when compared with the steeper topographical gradients. Groundwater elevation contours have been superimposed on Figure 8.6, from which groundwater flow direction is inferred as being in a general northeast to southwest direction. This is broadly in line with local topographical patterns, i.e. falling from the ridgetop at Ellengrove Crossroads towards the Roscat Stream.

#### 8.4.3 Site-Specific Vulnerability

At each of the trial pit standpipes in the existing pit groundwater is within 1.1 – 2.5 m of ground level, which equates to groundwater vulnerability classification of Extreme. At each of the monitoring wells in the proposed extension area groundwater is within 7 – 10.7 m of ground level. Groundwater vulnerability in the greenfield extension area is High.

#### 8.4.4 Groundwater Quality

Groundwater samples were retrieved on 27<sup>th</sup> June 2018 from:

- two monitoring wells (MW1 and MW2);
- two trial pit standpipes (TP1 and TP3);
- the centre of Ardristan Fen, recognised in this case as the green polygon in Figure 8.3.

Follow up samples were obtained on 14<sup>th</sup> February 2019 to measure any differences in hydrochemistry between summer and winter conditions. The latter samples were retrieved from the final quarry pond outfall and from the centre of the fen.

The monitoring well and standpipe samples were obtained in compliance with Envirolitic internal protocols using low-flow sample technique before being dispatched to Exova and ALS for analysis. The pond outfall and fen samples were retrieved as grab samples. Results are presented in Table 8.5 below and accompanying certificates of analysis are included in Appendix III.

In terms of groundwater flow, monitoring points MW2 and MW1 represent upgradient. Of these, MW2 has the potential to have been affected by the upgradient farm, making MW1 a more credible upgradient baseline dataset.

Results from the samples obtained from trial pit standpipes should be treated with caution due to unknown chemical signature of backfill material around the screened standpipe. The primary reason for sampling these points was to serve as indicators of significant historical activity.

Groundwater in the upgradient baseline dataset is of good quality with the majority of parameters satisfying the Groundwater Regulations (SI 9 of 2010 as amended by SI 366 of 2016). Three exceedances were noted:

- Elevated suspended solids at MW2 – likely due to excessive fine sands/silt in the natural substrate surrounding the screened section.
- Elevated nitrates in MW1, MW2 (and TP1) – attributed to pressures from organic and inorganic nutrient application to tillage lands, and typical of groundwater in this region.
- Slight detection of faecal contamination in MW2 – attributed to septic tank, yard runoff or slatted tank at farmyard in close proximity and upgradient.

Groundwater collected from TP1 was of a similar hydrochemical signature to the groundwater collected from MW1 and MW2. Groundwater from TP3 was shown to have a different hydrochemical signature, perhaps being influenced by its proximity to the on-site ponds:

- Elevated nitrites in TP3 – when considered in tandem with the very low nitrate concentrations this is symbolic of denitrification.
- Elevated manganese in TP3 – when considered in combination with the slightly elevated iron this is suggestive of anaerobic conditions. TP3 was less than 20 m

from the final settlement pond and there is a possibility that it was installed in the remnants of what was previously part of Pond 5. Trial pit logging of TP3 noted possible screening material in TP3. The water in Pond 5 was observed as being stagnant.

- Elevated faecal and non-faecal coliforms in TP3 – as per above rationale, this water is presumed to be in connectivity with the contents of Pond 5 which was drawn in during pre-sampling purge. The exposed water in Pond 5 water is prone to direct faecal contamination from birds, wildfowl and grazing animals with access to the quarry (i.e. sheep). Historical activities do not present any potential sources of faecal coliforms. As a rule of thumb faecal coliforms are considered to have a lifespan of 100 days. There has been no human activity at the site for a minimum of 5 years, hence human wastewater is not considered to be a viable source of faecal coliforms detected in water samples.

The central portion of Ardristan Fen was inundated with water and was heavily vegetated. Samples were retrieved as close to the centre as possible, approximately 150 m from the site boundary. Results are therefore representative of groundwater quality in the fen. Elevated nutrients were detected in Ardristan Fen only in the summer samples and are attributed to increased eutrophication due to the high water temperatures, combined with the high amount of suspended solids in the sample container:

- Elevated suspended solids in Ardristan Fen (summer only) – sampling was performed in prolonged warm, drought conditions resulting in excessive algal growth on the water surface. Sediment was mobilised when retrieving the sample unavoidably resulted in disturbance of this algal growth.
- Elevated ammonia and nitrite in Ardristan Fen (summer only) – when considered in tandem with the very low nitrate concentrations this is presumed to be a result of denitrification in the fen. No historical sources of ammonia and nitrite were identified in the existing working pit, nor are any associated with historical activities.
- Elevated orthophosphate in Ardristan Fen (summer only) – attributed to grazing sheep observed defecating throughout the fen.

Modestly elevated microbiological contamination in the fen was attributed to grazing sheep observed defecating throughout the saturated area.

No hydrocarbons were detected in groundwater at the downgradient during June sampling event. Minor detections were reported in February 2019 samples but give comments on the laboratory cert, which is unaccredited for this parameter, these

detections are attributed to laboratory error. There have been no hydrocarbon sources at the site since previous activities ceased, and there are no sources between the final pond outfall and the fen.

**Table 8.5– Groundwater and fen hydrochemistry 2018/2019**

Parameter	Units	27/06/18					14/02/19		Groundwater Regs (2010 as amended 2016)*	Drinking Water Regs (SI 278 2010)
		MW1	MW2	TP1	TP3	Ardristan Fen	Final Pond Outfall	Ardristan Fen		
Temperature	C	10.7	10.2	15.2	15.0					
Conductivity	$\mu\text{S cm}^{-1}$	665	668	718	723	730	608	568	1875	
pH		7.68	7.70	7.50	7.52	7.43			6.5 - 9.5	6.5 – 9.5
DO	mg/l	9.9	10.02	6.63	7.02		9.1 (lab)	9.2 (lab)		
Suspended solids	mg/l	< 10	<b>1512</b>	< 10	11	<b>105</b>	4	7		
Alkalinity (CaCO <sub>3</sub> )	mg/l	262	360	230	190	358	273	352		
Ammoniacal Nitrogen as N	mg/l	< 0.03	0.03	< 0.03	0.14	<b>0.61</b>	0.015	0.082	0.175	0.23
Nitrate (NO <sub>3</sub> )	mg/l	<b>49.7</b>	<b>54.5</b>	<b>48.9</b>	6.2	5.0	57.9	<0.44	37.5	50
Nitrite (NO <sub>2</sub> )	mg/l	< 0.02	0.04	< 0.02	<b>0.62</b>	0.33	<0.017	<0.017	0.375	0.5
Orthophosphate (PO <sub>4</sub> )	mg/l	<0.03	<0.03	<0.03	<0.03	<b>1.24</b>	0.034	<0.03	0.11	
Arsenic	$\mu\text{g/l}$	<2.5	<2.5	<2.5	<2.5	<2.5	0.6	1.2	7.5	10
Barium	$\mu\text{g/l}$	15	14	19	33	44	25	19		
Cadmium	$\mu\text{g/l}$	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6	<0.6	3.75	
Chromium	$\mu\text{g/l}$	<1.5	<1.5	<1.5	<1.5	<1.5	0.6	<0.6	37.5	50
Cobalt	$\mu\text{g/l}$	<2	<2	<2	<2	<2	<0.6	<0.6		
Copper	$\mu\text{g/l}$	<7	<7	<7	<7	<7	<1.2	<1.2	1500	2000
Iron	$\mu\text{g/l}$	< 20	< 20	< 20	88	<20	13	28	200	200
Lead	$\mu\text{g/l}$	<5	<5	<5	<5	<5	<0.6	<0.6	18.75	10
Manganese	$\mu\text{g/l}$	<2	16	11	<b>1647</b>	<2	<6	89	50	50
Mercury	$\mu\text{g/l}$	< 1	< 1	< 1	< 1	<1			0.75	1
Nickel	$\mu\text{g/l}$	<2	<2	<2	5	<2	<0.6	1	15	20
Zinc	$\mu\text{g/l}$	<3	<3	<3	<3	<3	<6	<6		
EPH	$\mu\text{g/l}$				<10		32**	97**		
Total coliforms	mpn/100ml	<b>23</b>	<b>135</b>	<b>1982</b>	<b>&gt;2420</b>	<b>185</b>				0
E Coli	mpn/100ml	0	<b>4</b>	<b>228</b>	<b>1046</b>	<b>121</b>				0
Faecal coliforms	mpn/100ml	0	<b>4</b>	<b>361</b>	<b>&gt;2420</b>	<b>39</b>				

\* threshold values relevant to an assessment of the general quality of groundwater in a groundwater body in terms of whether its ability to support human uses has been significantly impaired by pollution. Where this threshold was not stated, that relevant to an assessment of inverse impacts of chemical inputs from groundwater on associated surface water bodies.



## 8.5 Characteristics of the Development

### 8.5.1 Site Water Management

The majority of precipitation that lands within the existing working pit infiltrates freely to ground. This pattern will be replicated in the extension area.

Although every effort will be made to promote full infiltration on exposed subsoils on site there may be some runoff during heavy rainfall from areas that become compacted due to trafficking and from hardstanding. Surface gradients are such that the existing pit slopes slightly towards the southeastern corner and any runoff is likely to flow in this general direction.

The series of 5 settlement ponds previously installed in sequence in the southeastern corner of the site will be retained in order to remove suspended solids. Clarified water could then be harvested from final pond for re-use on site for dust suppression, with the excess allowed to flow by gravity across the site boundary in line with undisturbed flow gradient.

Excess infiltration from the pit floor flows via gravity towards Pond 1. Water overflows between each pond via gravity through a 300 mm PVC pipe or open ditch. Figure 8.5 shows that settlement pond water levels as surveyed on 27<sup>th</sup> June 2018 were in the range 62.14 – 61.84 mOD, approximately 2 m below surrounding ground level. There was no evidence of an artificial liner and as these ponds were used for clarification it is assumed that permeability may have been restricted over time as a function of particulate material effectively sealing the side walls and pond bases as it settles out of solution. Figure 8.5 suggests that pond water levels are in continuum with groundwater.

Currently, surface water exits the final settlement pond via a 400 mm culvert which delivers clarified water to an open ditch outside the southern site boundary, and subsequently towards Ardristan Fen. Surface water elevation within the receiving ditch was surveyed as 61.22 mOD on 27<sup>th</sup> June 2018. During all site visits in 2018 and 2019, which can be considered representative of summer and winter flow regimes, negligible flow was noted through this outfall drain. A series of open channels surround the fen and traverse the fen itself. These field drains appear to be interconnected and ultimately transmit water southwest towards the Roscat Stream. No direct route was observed transmitting site runoff towards the Roscat Stream.

There will be no pumping of groundwater across the site boundary. There are no natural surface watercourses or waterbodies within the application boundary. Groundwater is only exposed within the existing pit where settlement ponds or test holes were previously excavated.

#### **8.5.2 Process Water Management**

Water may be recycled from the final settlement pond for dust suppression.

#### **8.5.3 Potable Water**

It is understood that drinking water for the temporary office/canteen will be supplied from a water bowser.

#### **8.5.4 Domestic Wastewater**

A portable chemical toilet will be utilised at the site, and emptied by a licensed contractor as necessary. It is envisaged that there will be one site worker who will operate on a part time basis.

### **8.6 Conceptual Site Model**

The impact assessment is guided by the source-pathway-receptor (S-P-R) model, as outlined in Table 8.6 below. The S-P-R model is used to identify the sources of water and potential contaminants, the environmental assets affected by such, and the pathways by which water and contaminants reach those receptors. It is refined as the assessment evolves and more information is acquired.

**Table 8.6 – Preliminary S-P-R**

<i>Sources</i>		<i>Pathways</i>		<i>Receptors</i>
Precipitation		Surface overland flow		Gravel aquifer
Process water		Infiltrating water		Bedrock aquifer
Sediment transport		Gravel aquifer flow		Ardristan Fen pNHA
Hydrocarbons -refuelling/maintenance		Bedrock aquifer flow		Roscat Stream
Domestic wastewater		Settlement ponds		Burrin River
		Ditch connecting ponds to Fen		River Barrow and River Nore SAC

The conceptual model can be summarised as follows:

- The majority of precipitation landing within the existing working pit and the proposed extension area penetrates the exposed pit surface and infiltrates freely to the saturated zone in the sands and gravel aquifer (Lg). In areas where original overburden remains, or areas of the pit floor that have become excessively compacted, recharge rate may be slightly lower. Any excess rainfall-runoff infiltrates as it passes through more permeable portions of the pit floor, or enters the settlement ponds.
- A limited amount of groundwater that passes vertically through the sand and gravel aquifer will enter the underlying poor bedrock aquifer (PI) via a network of fractures. The remainder is likely to discharge as baseflow to the local surface water network or the fen.
- Groundwater is within 3 m of ground level in the existing pit, hence groundwater vulnerability in this area is classified as Extreme (E). Vulnerability in the extension area is extreme.
- Groundwater flow direction generally follows topographical gradients, predominantly from northeast-southwest, towards the Roscat Stream and to a lesser degree Ardristan Fen pNHA. Groundwater is unconfined. The majority of flow takes place in the sand and gravel aquifer with a much lower proportion occurring in the bedrock aquifer.
- Excess surface water on site (either rainfall-runoff or hardstanding runoff) will be diverted towards an existing series of interconnected settlement ponds. Clarified water outfalls via a concrete culvert to a ditch which directs it into Ardristan Fen.
- A proportion of the existing pit is mapped as being within the NPWS limits of Ardristan Fen. The NPWS extents of the fen appear to be an overestimate of the actual functioning fen observed on the ground (i.e. saturated peats).

- Baseline monitoring results show groundwater quality in the upgradient extension area to be good. High nitrates are indicative of surrounding land use, i.e. intensive tillage agriculture.
- Groundwater quality in the existing pit was shown to be moderate, in light of gross microbial contamination. This was attributed to faeces from grazing animals and natural wildlife, and in the case of TP3 proximity to the final settlement pond which was noted as being effectively stagnant. Nutrient concentrations were very low in the gravity outfall from the site in February 2019. No hydrocarbons were detected at the downgradient site boundary.
- Hydrochemical signature of groundwater in the fen is different to other samples, indicative of altered nutrient cycling processes. Elevated ammonia and nitrite were attributed to denitrification of the high agricultural nitrate loading in the area. Elevated orthophosphate is attributed to faeces from sheep openly grazing throughout the fen. There are no nutrient sources attributed to historical or proposed site activities that can introduce same to the hydrological and hydrogeological receptors.

## 8.7 Impact Assessment

The procedure for determination of potential impacts on the receiving hydrological and hydrogeological environment is to identify potential receptors within the site boundary and surrounding environs and use the information gathered during the desk study and site investigation to assess the degree to which these receptors will likely have been impacted upon. Impacts are discussed in terms of quality, significance, duration and type in accordance with current EIA guidelines (EPA, 2017).

In accordance with the NRA Guidelines (2009) (as included in 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013)), the site is deemed to be an attribute of Very High importance which signifies it has a high quality, significance or value on a regional or national scale (see Appendix IV). Groundwater passing through the site potentially supports a wetland which is designated as a proposed NHA. Given that the NHA is only proposed the attribute's importance could be downgraded to High, but as a conservative measure the initial consideration of Very High will be upheld.

### 8.7.1 Direct Impacts

Potential impacts that may arise from proposed activities are summarized in Table 8.7, using the headings discussed under the criteria for determination of impacts (Tables 8.B.1, 8.B.2, 8.B.3 Appendix III).

The key activities include stripping and stockpiling of soils, excavation of sands and gravels, and haulage of material off site. The primary potential impacts to the hydrological and hydrogeological environment arising from such activities are considered to be:

- Groundwater quality due to alteration in vulnerability classification;
- Groundwater quality due to use of hydrocarbons;
- Groundwater quality due to domestic wastewater;
- Groundwater quality flowing into Ardristan Fen;
- Groundwater quality and flows in local third party wells;
- Groundwater flow patterns due to impermeable surfaces;
- Surface water quality leaving the site boundary and flowing into Ardristan Fen;
- Surface water quality in Roscat Stream;
- Surface water flows resulting from precipitation falling on impermeable surfaces;
- Flood risk resulting from increase surface water flows from site.

### 8.7.2 Indirect Impacts

Proposed activities at the site may have the following indirect impacts relating to the hydrological and hydrogeological environment:

- No extraction will take place within approximately 1 m of groundwater table.

### 8.7.3 Cumulative Impacts

The site is considered to be small in terms of scale in the quarrying industry. Aerial photographs reveal a quarry 1 km to the south of the application area. The presence of large, irregularly shaped ponds suggest resource has been extracted below groundwater at that location. There are no other clearly identifiable quarries within 5 km of the site and hence cumulative impacts are considered to be negligible.

Quarrying is established at the application site and it has been integrated into the local environment. It is also in line with the Carlow County Development Plan 2015 – 2021.

### 8.7.4 Do-nothing Scenario

If the proposed development were not to go ahead the existing greenfield area would continue to be used for agricultural use and the existing pit area would be restored as per the restoration plan proposed or agreed with the planning authority.

### 8.7.5 Interaction with other Impacts

The EIAR guidelines (EPA, 2017; DHPLG, 2018) highlight that the interaction of impacts to the hydrological and hydrogeological environment, arising from historical activities, must be given due consideration alongside potential receptors identified in other EIAR sections. The likely interactions have been identified as follows:

- The extraction of overburden may impact biodiversity and cause disturbance to habitats in the area.
- Precipitation can result in mobilisation and transport of sediment within water leaving the site as runoff. Unsatisfactory control and removal of sediment can impact habitats in Ardristan Fen;
- Haulage of resource may give rise to increased traffic movements.

Each of these issues are addressed in detail in the relevant sections of this EIAR.

### 8.7.6 Unplanned Events

Consideration has been given to the likely environmental impacts that may have arisen in association with unplanned events such as accidents, floods, etc. Intense rainfall events during the operational phase may give rise to increased runoff and hence increased sediment mobilisation. Overland flow from compacted areas will pass through a settlement lagoon system consisting of 5 ponds, resulting in retention of particulates on site. The perimeter of the site being confined by elevated perimeter berms in combination with the very high permeability characteristics of overburden, means that no overland flow is leaving the site untreated.

Unplanned events such as high-speed winds would have had the potential to generate dust. It is assumed that works will cease during excessively high winds. It is also assumed that dust suppression techniques will be enabled during activities as required.

## 8.8 Mitigation Measures

The significant impacts that may potentially occur, as identified in Table 8.7, are resolved under the mitigation measures set out under Table 8.8. The following primary mitigation measures relating to hydrology and hydrogeology will be implemented:

- Given that historical excavation removed up to 7 m of overburden it can be deduced that historical activities have resulted in the groundwater vulnerability classification increasing from High to Extreme. In order to restore vulnerability the working pit floor shall be restored using stockpiled screenings.
- Excavation in the greenfield extension area will not come within 1 m of groundwater.

- Increased permeability on the existing pit floor by mechanical ripping to a depth of 0.5 m. This will decrease the amount of surface runoff being diverted towards the ponds, and subsequently the fen, and will restore substrate permeability characteristics closer to that of pre-works, prior to raising the floor by deposition of screenings.
- Any parking of vehicles or refuelling will take place on the existing hardstanding pad. Runoff from the hardstanding pad shall pass through a hydrocarbon interceptor before being diverted to the settlement ponds.

### 8.8.1 Residual Impacts

Residual impacts refer to the degree to environmental change that will occur after any proposed mitigation measures have taken effect.

Assuming implementation of the mitigation measures described in Table 8.8 the residual impacts on the hydrological and hydrogeological environment during the operational phase are assessed to be long-term and negligible.

**Table 8.7 – Summary of Potential Impacts**

Activity	Attribute	Character of potential impact	Importance of attribute (refer to Table 3.4.C.1)	Magnitude of potential impact (refer to Table 3.4.C.2)	Term	Significance of potential impact (refer to Table 3.4.C.3)
Compaction of pit floor and hardstanding pad	Ardristan Fen and Roscat stream	Silt-laden runoff from pit floor. The increased silt content in runoff has potential to degrade local surface water quality.	Very High	Small	Long-term	Moderate
Stockpiling of topsoil/subsoil/screenings	Ardristan Fen and Roscat stream	Silt-laden runoff from stockpiles. The increased silt content in runoff has potential to degrade local surface water quality.	Very High	Small	Medium-term	Moderate
Storage of hydrocarbons; leakages from machinery; spillages during refuelling	Ardristan Fen/Roscat Stream/Aquifer	Runoff/recharge may contain hydrocarbons.	Very high	Small	Temporary	Moderate
Removal of overburden	Ardristan Fen /Aquifer	Increase in vulnerability of underlying aquifer.	Very High	Small	Long-term	Moderate
Increased runoff rates from hardstanding pad and pit floor	Ardristan Fen /Aquifer	Increase in surface water flow input to Fen. Decrease in infiltration to aquifer	Very High	Small	Long-term	Moderate
Increased runoff rates from hardstanding pad	Roscat Stream	Increase in flood risk to local watercourses	Low	Small	Long-term	Imperceptible
Historical activities	3 <sup>rd</sup> party well	Decrease in yield/quality in 3 <sup>rd</sup> party well	Moderate	Negligible	n/a	Imperceptible



**Table 8.8– Summary of mitigation measures**

Activity	Attribute	Character of potential impact	Mitigation measure	Predicted impact
Compaction of pit floor and hardstanding pad	Ardristan Fen and Roscat stream	Silt-laden runoff from pit floor. The increased silt content in runoff has potential to degrade local surface water quality.	Runoff passes through a series of settlement ponds which have been shown to clarify the water prior to it crossing the site boundary. Results from sampling show that water quality in the fen has not been negatively impacted upon. Compacted areas of the pit floor will be broken up using a ripper.	Imperceptible
Stockpiling of topsoil/subsoil/screenings	Ardristan Fen and Roscat stream	Silt-laden runoff from stockpiles. The increased silt content in runoff has potential to degrade local surface water quality.	Stockpiles will be vegetated to enhance stability. Establishment of rooting restricts surface erosion. Stockpiled material shall be re-used in the restoration process.	Imperceptible
Storage of hydrocarbons; leakages from machinery; spillages during refuelling	Receiving stream/aquifer	Runoff/recharge may contain hydrocarbons.	Potentially contaminating substances will not be stored on site. However, should this be required they will be stored in sealed containers in designated areas isolated from surface water drains or open waters. Fuelling, lubrication and storage areas will be in a designated area, not within 30 m of drainage ditches or surface waters. Refuelling will be carried out by a licensed third party using a mobile bunded bowser. Haulage vehicles will be refuelled off-site. Refuelling and parking shall be on the existing hardstanding pad. All runoff from the hardstanding pad shall pass through a newly installed hydrocarbon interceptor.	Imperceptible
Removal of overburden	Ardristan Fen /Aquifer	Increase in vulnerability of underlying aquifer.	Excavated topsoil will be used as part of site rehabilitation. The site will be capped with a layer of topsoil in order to restore the back to agricultural use.	Imperceptible
Increased runoff rates from hardstanding pad and pit floor	Ardristan Fen /Aquifer	Increase in surface water flow input to Fen. Decrease in infiltration to aquifer	Compacted areas of pit floor will be ripped to a depth of 0.5 m to restore original permeability.	Slight
Increased runoff rates from hardstanding pad	Roscat Stream	Increase in flood risk to local watercourses	Natural attenuation deemed to be provided by settlement ponds and Ardristan Fen.	Imperceptible
Historical activities	3 <sup>rd</sup> party well	Decrease in yield/quality in 3 <sup>rd</sup> party well	No decrease on yield or water quality envisaged as only third party well in vicinity is upgradient of site.	Neutral

## 8.9 Monitoring

A designated person from the project management team will have overall responsibility for ensuring that all operations are carried out in such a way as to minimise potential impacts to hydrological and hydrogeological receptors. This person will also have responsibility of monitoring the performances of any pollution control measures adopted.

A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractor during all phases of work. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures during a site induction meeting.

## 8.10 Summary

An existing working sand and gravel pit is situated on the southern edge of a significant deposit of quaternary sands and gravels a short distance southwest of Tullow, Co Carlow. It is proposed that operations be continued at the existing working pit, along with an extension into a greenfield area extending north. Trial pit standpipes and monitoring wells were installed to gain information on baseline groundwater regime in terms of flow and quality.

There will be no significant impacts to the groundwater regime in terms of flow and quality, and as such there will be no impacts to the groundwater supply to Ardristan Fen pNHA. Mitigation measures are proposed to ensure a minimum of 1 m of protective overburden is maintained across the site. There will be no pumping of groundwater within or across the site boundary.

Runoff from compacted areas of the pit floor and a hardstanding pad will be passed through an existing series of settlement ponds to remove suspended sediment prior to outfalling at the southern boundary. All refuelling and parking of vehicles will take place on the existing hardstanding pad. Any runoff generated on the hardstanding pad shall pass through a hydrocarbon interceptor prior to outfalling to the ponds.

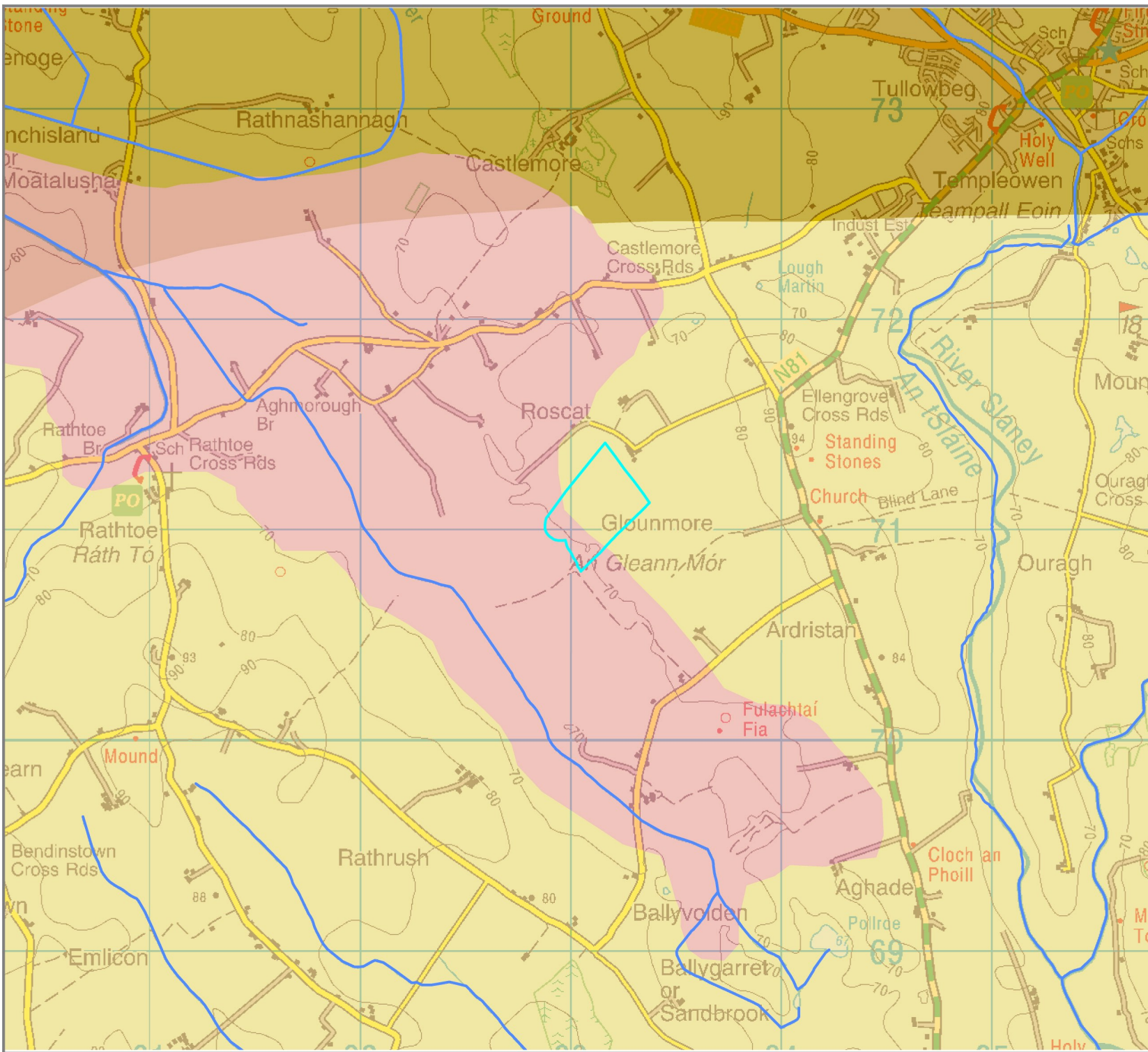
Ardristan Fen has contracted significantly in the latter part of the last century due to arterial drainage, implemented to restore peats to productive grassland soils. Water quality in the fen appears to be affected by nutrient inputs from agriculture, through this was less pronounced during winter conditions. There are no nutrient sources associated with proposed activities.


## 8.11 References

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## Figures







 Application Boundary

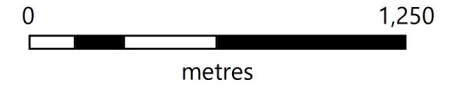
 Surface Watercourses

Aquifer Legend:

 Poor Aquifer - generally unproductive except for local zones (PI)

 Locally Important Aquifer - moderately productive only in local zones (LI)

 Sand & Gravel Aquifer (Lg)



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Client: Earth Science Partnership Ltd.

Project: EIAR Section: Water

Location: Roscat, Tullow, Co. Carlow

Figure 8.1: Aquifer Classification Map

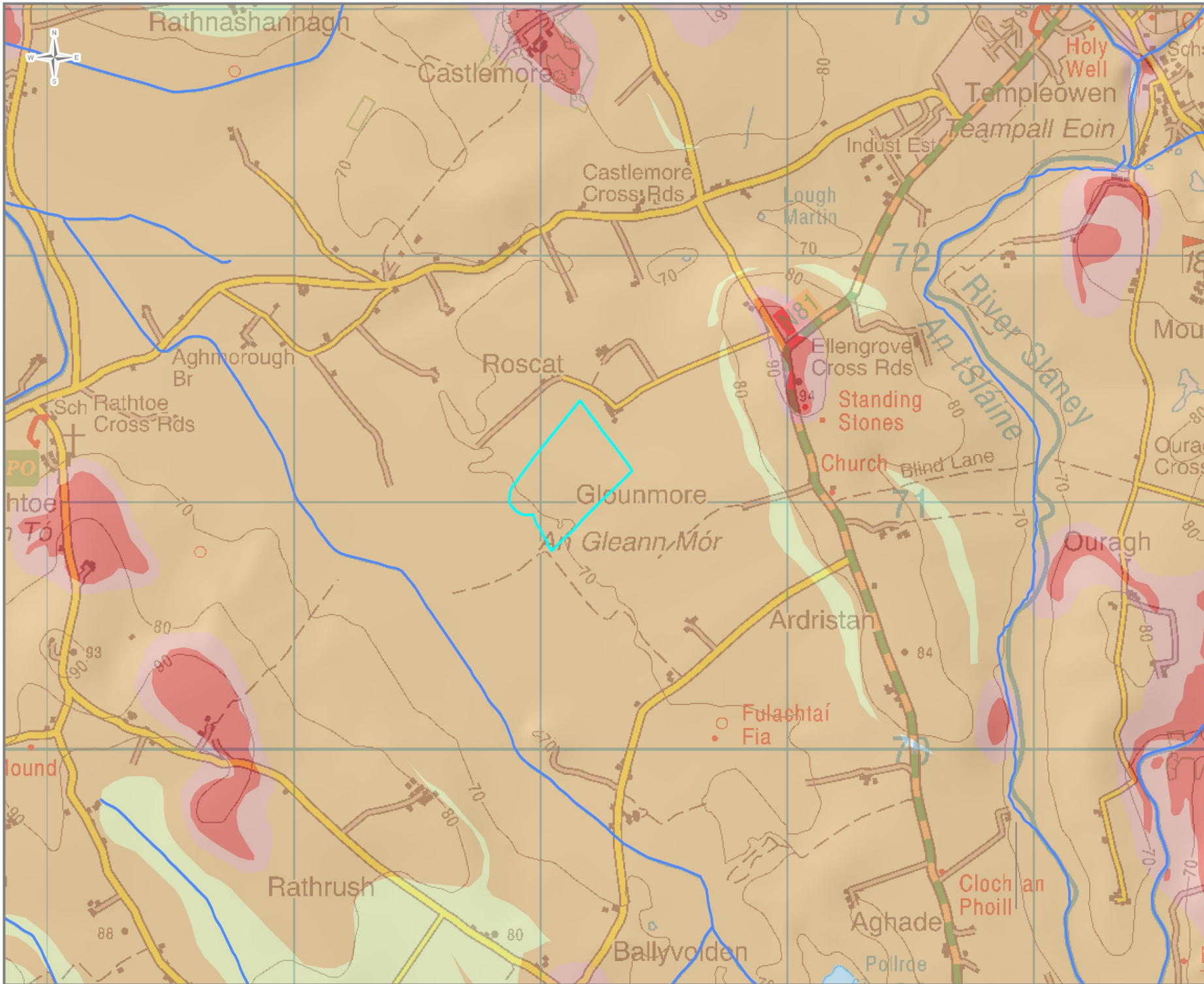
Scale: 1 : 25 000      Date: September 2018

Ref: 1679      Author: C. O'Reilly

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78 ST PETER'S TERRACE, HOWTH, CO. DUBLIN - 01 8323004 - 087 2024695 - info@envirologic.ie



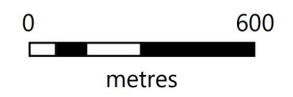


**Legend:**

- Application Boundary
- EPA River Network

**Vulnerability:**

- Extreme (X)
- Extreme (E)
- High (H)
- Moderate (M)
- Water



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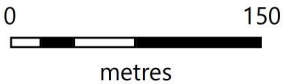
<b>Fig. 8.2:</b>	Groundwater Vulnerability Map
<b>Date:</b>	September 2018
<b>Author:</b>	C. O'Reilly
<b>Scale:</b>	1 : 20 000
<b>Client:</b>	ESP Ltd.
<b>No.:</b>	1679
<b>Project:</b>	EIAR Section: Water
<b>Location:</b>	Roscat, Tullow, Co. Carlow





Legend:

- Application Boundary
- EPA River Network
- Open Drain
- NPWS Ardristan Fen Extents
- Heavily vegetated and undrained area of fen
- Pit settlement ponds

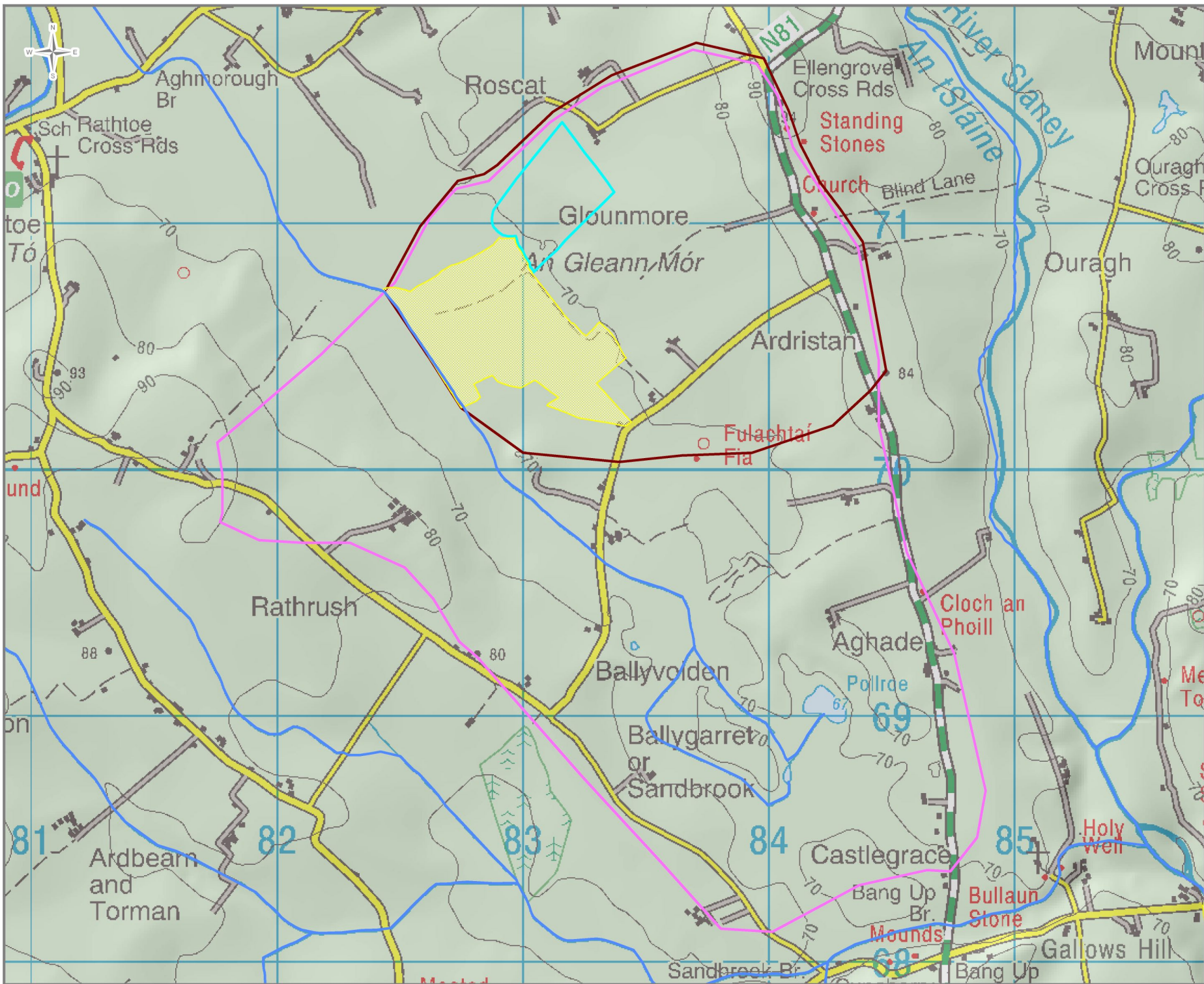


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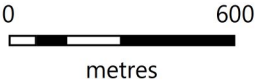
Fig. 8.3: NPWS Fen Extents Map

Date:	September 2018
Author:	C. O'Reilly
Scale:	1 : 4 500
Client:	Earth Science Partnership
No.:	1679
Project:	EIAR Section: Water
Location:	Roscat, Tullow, Co. Carlow





- Legend:
- Application Boundary
  - EPA River Network
  - Surface Water Catchment to Roscat Stream as it Passes Site
  - NPWS Extent of Ardristan Fen
  - Approximate Groundwater Catchment to Ardristan Fen



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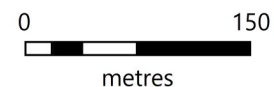
Fig. 8.4:	Surface Water & Groundwater Catchment
Date:	September 2018
Author:	C. O'Reilly
Scale:	1 : 20 000
Client:	Earth Science Partnership
No.:	1679
Project:	EIAR Section: Water
Location:	Roscat, Tullow, Co. Carlow





Legend:

- Application Boundary
- EPA River Network
- ⊕ Groundwater Level Monitoring Point, GW Elevation, mOD Malin
- × Surface Water Elevation, mOD Malin 27/06/18



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Fig. 8.5: Groundwater and Surface Water Levels Map

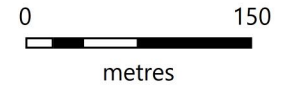
Date:	September 2018
Author:	C. O'Reilly
Scale:	1 : 5 000
Client:	Earth Science Partnership
No.:	1679
Project:	EIAR Section: Water
Location:	Roscat, Tullow, Co. Carlow

**ENVIROLOGIC**  
HYDROGEOLOGICAL | HYDROLOGICAL CONSULTING





- Legend:
- Application Boundary
  - NPWS Ardristan Fen Extents
  - ⊕ Groundwater Level Monitoring Point, GW Elevation, mOD Malin 27/06/18
  - Groundwater Elevation Contour
  - Inferred Groundwater Flow Direction



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Fig. 8.6:	Groundwater Level Contour & Flow Direction
Date:	September 2018
Author:	C. O'Reilly
Scale:	1 : 5 000
Client:	Earth Science Partnership
No.:	1679
Project:	EIAR Section: Water
Location:	Roscat, Tullow, Co. Carlow

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## 9.0 CLIMATE

### 9.1 Introduction

This section of the EIA assesses the development in terms of climate and climate change and assesses potential impacts that the development may have with regards to climate. Climate can be thought of as the 'average weather' over an extended period of time and so refers to temperature, precipitation and wind.

The topic of 'Climate' is more often discussed with reference to 'Climate Change' which is any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

### 9.2 Methodology

The methodology for the description of the current climate in the region of the proposed development included a desk study review of the data available from Met Éireann, the Environmental Protection Agency and other bodies which have responsibility for the Climate of Ireland. Met Éireann data from the closest synoptic station at Oak Park, Co. Carlow, 15km to the northwest of the application area.

### 9.3 Climate Change

Climate change is a significant change in the average weather or climate that a region experiences. Climate change can be caused by natural factors such as variations in solar intensity or volcanic eruptions. The term climate change is now generally used to refer to changes in our climate due to the build-up of Greenhouse Gases (GHGs) in the atmosphere. This build-up of GHGs is caused by excess emissions due to certain human activities, like burning fossil fuels for energy, transport and heating.

#### 9.3.1 Kyoto Protocol

The Kyoto Protocol was adopted in Kyoto, Japan on the 11<sup>th</sup> December, 1997, but not enacted or enforced until the 16<sup>th</sup> February, 2005. The protocol was adopted to help combat the adverse effects of climate change, or global warming.

Recognizing that developed countries were principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol placed a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

Under the Kyoto Protocol, Ireland is required to limit total national greenhouse gas emissions to 314.2 Mtonnes of CO<sub>2</sub>eq over the five year period 2008 – 2012 which is equivalent to 62.8 Mtonnes of CO<sub>2</sub>eq per annum. The Kyoto Protocol limit was calculated being as 13% above Ireland's 1990 baseline value which was established and fixed at 55.61 Mtonnes of CO<sub>2</sub>eq



following an in-depth review of Ireland's 2006 greenhouse gas inventory submission to the UNFCCC (United Nations Framework Convention on Climate Change).

In December 2009, efforts were made to negotiate a successor to the Kyoto Protocol. Whilst the conference was not as successful as many countries had hoped it did result in the Copenhagen Accord which many countries signed up to. The Copenhagen Accord endorsed the continuation of the Kyoto Protocol. The Copenhagen Accord, while only a political agreement, reflected significant progress on several fronts.

The following year in Cancun, parties adopted the Cancun Agreements, effectively formalising the essential elements of the Copenhagen Accord under the UNFCCC. The Cancun Agreements were regarded as an interim arrangement through 2020, and parties left the door open to further negotiations toward a legally binding successor to the Kyoto Protocol.

In December 2012, the Kyoto Protocol was amended by the parties to the Kyoto Protocol. This amendment was referred to the "Doha Amendment to the Kyoto Protocol" which included the following amendments:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2020;
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the second commitment period, parties committed to reduce GHG emissions by at least 18 percent below 1990 levels in the eight-year period from 2013 to 2020; however, the composition of parties in the second commitment period differed from the first. This placed binding targets on Ireland in climate change, with penalties for non-compliance.

### 9.3.2 Paris Agreement 2015

A legally binding, global agreement on climate change was agreed in Paris on 12<sup>th</sup> December 2015. The Paris Agreement puts in place the necessary framework for all countries to take ambitious mitigation action. It sets out a long-term goal to put the world on track to limit global warming to well below 2 degrees centigrade above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees. It aims to tackle 95% of global emissions through 188 Nationally Determined Contributions (NDCs). The agreement also places significant importance on actions needed, both nationally and globally, to help people adapt to climate change.

Ireland will contribute to the Paris Agreement via the NDC tabled by the EU in March 2015 on behalf of Member States, which commits to at least a 40% reduction in EU-wide emissions by 2030 (compared to 1990 levels); this is based on reductions in the Emissions Trading Scheme (ETS) and non-ETS sectors of 43% and 30% respectively (compared to 2005).

In July 2016, the European Commission presented a legislative proposal, the Effort Sharing Regulation (ESR), setting out binding annual greenhouse gas emission targets for Member States for the period 2021–2030. The ESR proposal suggests a 39% GHG reduction target for Ireland, based on GDP per capita, for the period 2021 to 2030. This target is adjusted downward for cost-effectiveness by 9 percentage points to give a headline target of 30%. While this target is not yet agreed, it is clear that it will present an enormous challenge for Ireland, which will require substantial investment by both the public and private sectors, as well as a broad range of non-financial policy tools, including regulations, standards, education initiatives and targeted information campaigns. Work is ongoing to cost various suites of measures that could meet the 2030 target as cost-effectively as possible.

### 9.3.3 Compliance with EU and International Commitments

Projections of emission levels are based on two measures depending on the level of policy implementation which are as follows:

- With Existing Measures (WEM) scenario assumes that no additional policies and measures, beyond those already in place by the end of 2016, are implemented.
- The With Additional Measures scenario assumes implementation of the With Existing Measures scenario in addition to, based on current progress, further implementation of Government renewable and energy efficiency targets for 2020, as set out in the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP).

EU greenhouse gas emission targets and reduction obligations for Ireland are split into two broad categories. The first category covers the large energy and power (i.e. energy intensive) industry which have their emissions controlled under the EU Emissions Trading Scheme. The second category (which is the main subject of the press release) deals with the non-Emissions Trading Scheme sectors such as agriculture, transport, residential, commercial, waste and non-energy intensive industry.

A recent update by the EPA on the 31<sup>st</sup> May 2018 in relation to compliance with projected targets stated the following:

- Greenhouse gas emissions are projected to increase from most sectors, given strong economic growth and an expansion of the agriculture sector.
- These figures show that, at best, Ireland will only achieve a 1% reduction by 2020 compared to a target of 20%.

- Fossil fuels such as coal and peat are expected to continue to be significant contributors to emissions from power generation.
- Agriculture emissions are projected to increase with an expansion of animal numbers, particularly for the dairy herd.
- Further growth in emissions from the transport sector is projected in line with a growth in fuel consumption in diesel cars and freight up to 2025.

In relation to 2030, Ireland's target calls for a 30 per cent reduction of emissions compared to 2005, with binding annual limits over the 2021-2030 period. These latest projections indicate that Ireland will exceed the allowable carbon budget implied by those limits. The latest projections also show that increasing fossil fuel consumption and an expanding agriculture sector are leading to increased emissions. The following are the main points taken from the data:

- Energy industry emissions – mainly power generation – are projected to grow strongly from 2020 to 2025 as a result of an expansion of co-firing of peat and biomass;
- Transport emissions are projected to increase from current levels by 17-18 per cent by 2020 and by 17-20 per cent by 2030. A decline in emissions is projected from 2025 to 2030, resulting from an acceleration in the number of electric vehicles on Irish roads;
- Agriculture emissions are projected to increase by between 3-4 per cent by 2020 and 6-7 per cent by 2030 on current levels based on an expansion of animal numbers, particularly for the dairy herd.

**Table 9-1:** Projected greenhouse gas emissions to 2030 under the “with additional measures scenario”

Mt CO <sub>2</sub> eq	2016	2020	2025	2030	Growth 2017 - 2030
<b>Energy Industries</b>	12.55	11.08	12.17	7.48	-40.3%
<b>Residential</b>	6.04	6.53	6.47	6.45	6.7%
<b>Manufacturing Combustion</b>	4.55	4.72	4.90	5.06	11.1%
<b>Commercial and Public Services</b>	1.86	1.68	1.81	1.94	4.3%
<b>Transport</b>	12.29	14.39	15.26	14.32	16.5%
<b>Industrial Processes</b>	2.14	2.43	2.83	3.27	52.34%
<b>F-Gases</b>	1.26	0.96	0.88	0.75	-40.5%
<b>Agriculture</b>	19.85	20.50	20.78	20.94	5.5%
<b>Waste</b>	0.95	0.57	0.49	0.44	-53.3%
<b>Total</b>	61.54	62.91	65.64	60.70	-1.3%

### 9.3.4 Regional and Local Climate

#### 9.3.4.1 Regional Climate

The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. The climate in the area of the site is typical of the Irish climate, which is temperate maritime.



Over the summer months the influence of anti-cyclonic weather conditions on the western and north-western region results in dry continental air interspersed by the passage of Atlantic frontal systems. During much of the winter period the climate is characterised by the passage of Atlantic low-pressure weather systems and associated frontal rain belts. Occasionally the establishment of a high-pressure area or anticyclone over Ireland results in calm conditions and during the winter months these are characterised by clear skies and the formation of low-level temperature inversions with light wind conditions at night time.

The closest Met Éireann synoptic station to the pit is at Oak Park, Co. Carlow, which is approximately 15km northwest of the application area. Mean monthly and annual rainfall and temperature data from 2013 to 2017 recorded at Oak Park weather station are tabulated in Tables 9-2 and 9-3 respectively and analysed below.

**Table 9-2:** Mean monthly and annual precipitation recorded at Oak Park Synoptic Station (mm) from January 2013 to December 2017.

Month	Year					Mean Monthly Precipitation
	2013	2014	2015	2016	2017	
January	76.2	147.2	66.0	110.9	36.3	<b>87.3</b>
February	35.8	176.7	36.3	95.7	57.8	<b>80.5</b>
March	57.6	65.0	53.5	40.6	66.6	<b>56.7</b>
April	44.4	52.6	26.3	64.3	15.8	<b>40.7</b>
May	35.6	78.6	89.4	61.6	81.8	<b>69.4</b>
June	37.5	61.9	29.7	61.7	91.0	<b>56.4</b>
July	-*	24.6	79.4	29.6	52.7	<b>46.6</b>
August	85.6	122.1	83.0	46.0	62.3	<b>79.8</b>
September	24.4	18.2	27.6	97.4	-*	<b>41.9</b>
October	170.0	138.2	56.8	32.3	62.9	<b>92.0</b>
November	27.7	165.6	110.0	26.3	52.8	<b>76.5</b>
December	136.6	47.7	270.9	80.2	84.2	<b>123.9</b>
<b>Mean Annual Precipitation</b>	<b>66.5</b>	<b>91.5</b>	<b>77.4</b>	<b>62.2</b>	<b>60.4</b>	<b>71.0</b>
<b>Total Annual Precipitation</b>	<b>731.4</b>	<b>1098.4</b>	<b>928.9</b>	<b>746.6</b>	<b>664.2</b>	<b>851.6</b>

\* No data available

\*\*Data source: Met Éireann (2018) <https://www.met.ie/climate/available-data/historical-data>

The mean rainfall from January 2013 to December 2017 recorded at Oak Park was 71 mm/month/year (total/year = 851.6mm). Average rainfall across the 5 years ranged from a low of 60.4mm/month in 2017 to a high of 91.5mm/month in 2014. A total mean monthly precipitation rate of approximately 517mm across all years fell during the winter months (October to March). The monthly total during the winter months (October-March) accounts for approximately 61% of the annual total for these years. Indeed, trends in the data show that the highest rainfall

occurrences alternated between December and February across each of the analysed years, with a maximum monthly precipitation rate of 270.9mm falling in December 2015. The lowest monthly rainfall rate across each of the years occurred in April 2017 with 15.8mm recorded.

During the winter months, the rainfall will be commonly associated with Atlantic frontal depressions, whereas during the summer months high rainfall amounts will tend to be associated with intense thundery showers.

**Table 9-3:** Mean monthly temperatures recorded at Oak Park Synoptic Station (mm) from January 2013 to December 2017.

Month	Year					Mean Monthly Temperatures
	2013	2014	2015	2016	2017	
January	5.3	5.5	5.0	5.9	6.0	<b>5.5</b>
February	4.7	5.7	4.3	4.9	6.5	<b>5.2</b>
March	3.8	7.0	6.2	6.1	8.3	<b>6.3</b>
April	7.5	10.1	8.7	7.5	9.0	<b>8.6</b>
May	10.4	11.9	10.2	12.3	12.4	<b>11.4</b>
June	13.7	14.5	13.4	15.1	15.0	<b>14.3</b>
July	18.2	16.9	14.6	16.0	15.7	<b>16.3</b>
August	16.3	14.5	14.6	16.0	15.0	<b>15.3</b>
September	14.0	14.3	12.4	14.6	-*	<b>13.8</b>
October	12.1	11.4	10.2	10.6	11.5	<b>11.2</b>
November	6.4	7.2	9.2	5.2		<b>7.0</b>
December	6.6	5.6	8.6	6.3	5.6	<b>6.5</b>
<b>Mean Annual Temperatures</b>	<b>9.9</b>	<b>10.4</b>	<b>9.8</b>	<b>10.0</b>	<b>10.5</b>	<b>10.1</b>

\* No data available

\*\*Data source: Met Éireann (2018) <https://www.met.ie/climate/available-data/historical-data>

The mean annual temperature recorded at Oak Park across all 5 analysed years was 10.1°C. The lowest and highest recorded mean monthly temperature was 4.7°C in February 2013 and 18.2°C in July 2013 respectively. As expected, July was the warmest month across all years with an average temperature of 16.3°C.

#### 9.3.4.2 Local Climate

Long-term rainfall and evaporation data was sourced from Met Éireann (Walsh, 2012).

The 30-year (1981–2010) average monthly rainfall recorded at Oak Park, Co. Carlow is presented in Table 9-4 with the Average Annual Rainfall (AAR) calculated as the sum of all monthly averages across the 30 years.

**Table 9-4: Long term mean monthly rainfall data (mm) (Met Éireann)**

J	F	M	A	M	J	J	A	S	O	N	D	Annual
82	58	64	60	61	65	60	74	72	90	87	82	855

Average potential evapotranspiration (**PE**) at Oak Park is 529 mm yr<sup>-1</sup>. This value is used as a best estimate of the site PE.

Actual Evapotranspiration (**AE**) is the amount of water removed from the land surface through the combination of evaporation and transpiration. It is a function of solar radiation, wind speeds, air pressure and nature of plant cover. AE is estimated by multiplying PE by 0.95, to allow for the reduction in evapotranspiration during periods when a soil moisture deficit is present (Water Framework Directive, 2004). Actual evapotranspiration is therefore 502.6 mm yr<sup>-1</sup> (0.95 PE).

Effective rainfall (**ER**) is the proportion of rainfall which is available to recharge groundwater. Using the following equation, the effective rainfall (**ER**) is therefore taken to be an average of 352.4mm/yr<sup>-1</sup>:

$$\begin{aligned}
 \mathbf{ER} &= \mathbf{AAR} - \mathbf{AE} \\
 &= 855 \text{ mm yr}^{-1} - 502.6 \text{ mm yr}^{-1} \\
 \mathbf{ER} &= \mathbf{352.4 \text{ mm yr}^{-1}}
 \end{aligned}$$

### 9.3.5 Land-Use

The Section 37 L application area is comprised of an existing sand and gravel pit, haul road, undisturbed areas and a greenfield area which the applicant proposes to extract the available resource from. Topography in the existing pit has been lowered by up to 7 m below surrounding land. The current floor of the existing pit is reasonably level with elevations generally between 62 – 64mOD. Ground levels in the extension area rise gradually from the southwest (70 mOD) and northeastern (73.6 mOD) field boundaries, respectively. Land use in the extension area is consistent with that of surrounding lands, being used for moderate to high intensity tillage and grassland agriculture.

### 9.4 Characteristics of the Development

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares. The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel from the greenfield area, will result in the extension of the previously disturbed area into the greenfield area.

Material will be extracted by excavators and processed into various grades of aggregate on-site using mobile processing plant or exported to a processing plant offsite. Material will be processed into various grades depending on market demand for aggregate and will be stockpiled close to the processing plant or at designated stockpiles.

Plant and machinery which will operate in the application area will consist of tracked excavators, wheel loaders, dump trucks and mobile processing plant. Ancillary plant such as a water bowser will be deployed where required. Production will consist of dry processing with no water required.

## 9.5 Impact Assessment

The proposed development consists mainly of sand and gravel extraction related activity associated with the removal of the resource for the local construction industry.

Activities associated with the preparation of the proposed application area for the extraction of material are evaluated under the enabling phase. Day to day activities associated with the operation of the pit are evaluated under the operational phase.

### 9.5.1 Enabling Phase Impacts

The key works which have the potential to affect climate are emissions from plant and vehicles deployed as part of the works associated with the removal of overburden and the construction of berms onsite.

The operation of plant will generate exhaust emissions (e.g. CO<sub>2</sub> and N<sub>2</sub>O). However, these activities will be undertaken over a short period of time, therefore emissions will be minimal. Emissions associated with the development are assessed as having an imperceptible effect over a temporary period.

### 9.5.2 Operational Phase Impacts

#### 9.5.2.1 Plant and Vehicle Emissions

The movement of all vehicles and particularly heavy commercial vehicles and operation of plant will generate exhaust emissions (e.g. CO<sub>2</sub> and N<sub>2</sub>O) which cannot be eliminated as, in order for material to be extracted, plant and vehicles need to operate.

No new plant or machinery will be required for the proposed development and it is not proposed to increase the annual rate of extraction and production above that experienced in the past when operational.

Therefore, there will be no increase in emissions to the local and regional climate above that which were experienced in the past with the existing development. Emissions associated with the development are assessed as having a slight impact over a long term period.

### 9.5.3 Cumulative Impact

Other contributors of CO<sub>2</sub> emissions within the study area would be associated with road traffic using national, regional and local roads in the vicinity. Another main contributor of emissions to the atmosphere in the region is likely to be associated with the agricultural sector with livestock farming being practiced.

#### 9.5.3.1 Conclusion

It is unlikely that there will be a cumulative impact on the local climate as a result of activities associated with the proposed development and other activities of the study area, as it is not proposed to increase the level of production and due to the low level of activity in the area which is unlikely to generate significant emissions.

#### 9.5.4 Do-Nothing Effect

Construction materials are required for continued growth and expansion of both public and private construction projects. If the proposed development were not to proceed, the pit would continue to operate in the permissible area. If no further planning permission was secured the pit would then cease to operate. Materials would then have to be sourced from an alternative pit which would mean that a reduction in greenhouse gas emissions at the subject area may result in an increase in in greenhouse gas emissions at an alternative site.

#### 9.6 Mitigation Measures

The following mitigation measures will be practiced at the development during the enabling and operational phase of the development in order to limit the effects of the development on the local and regional climate:

- Strict adherence to 'good site/engineering practices' (e.g. all vehicles and plant will be switched off when not in use) should minimise the generation of any unnecessary air emissions.
- Plant will be serviced regularly to ensure efficient fuel consumption.
- Energy consumption and emission volumes will be considered when purchasing new plant or vehicles.
- Energy audits will be undertaken at the quarry in order to reduce energy requirements.
- When purchasing plant, preference will be given to plant which have low emissions.

#### 9.7 Residual Impacts

No residual impacts are predicted.

#### 9.8 Technical Difficulties

No technical difficulties were encountered.

## 9.9 References

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## 10.0 AIR QUALITY

### 10.1 Introduction

This chapter assesses the likely air quality and climate impacts, if any, associated air quality in the vicinity of the application area. Sensitive receptors, such as residential areas were reviewed as part of the assessment.

Dr. Avril Challoner completed this Chapter. She is a Senior Consultant in the Air Quality section of AWN Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin. She is a Member of the Institute of Air Quality Management and specialises in the fields of air quality, EIA and air dispersion modelling.

### 10.2 Methodology

The methodology used as part of this assessment involved undertaking a desk-based study to examine all relevant information relating to air quality conditions in the vicinity of the application site.

The air quality assessment has been carried out following procedures described in the publications by the EPA (EPA 2010, 2015, 2017) and using the methodology outlined in the guidance documents published by the USEPA (USEPA 2004, 2005, 2017). The air dispersion modelling input data consisted of information on the physical environment, design details from all emission sources on-site and a full year of meteorological data. Using this input data the model predicted ambient ground level concentrations and deposition rates beyond the land ownership boundary for each hour of the modelled meteorological year. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration and deposition rate was then added to the background concentration and deposition rate to give the worst-case predicted environmental concentration (PEC) and deposition flux. The PEC was then compared with the relevant ambient air quality standard to assess the significance of the releases from the site.

#### 10.2.1 Assessment Methodology

The rating of potential environmental effects of the proposed project on air quality is based on the criteria presented in Table 10-1 below. These criteria consider the quality, significance, duration and types of effect characteristics identified and are based on Table 3.3 presented in the EPA (2017) document titled *“Guidelines on the Information to Be Contained in Environmental Impact Assessment Reports”*.

**Table 10-1:** Criteria Used in the Assessment of Impacts on Air Quality (EPA, 2017)

Characteristic	Level	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects/effects which are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Magnitude	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect.
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions.
Probability	Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration and Frequency	Momentary	Effects lasting from seconds to minutes.
	Brief	Effects lasting less than a day.
	Temporary	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible	Effects that can be undone, for example through remediation or restoration.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

Characteristic	Level	Description
Types of Effects	Indirect (Secondary)	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out.
	'Worst Case'	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described Irreversible When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.

### 10.2.2 Dispersion Modelling Methodology

In order to assess the dust deposition flux at the land ownership boundary, and the PM<sub>10</sub> and PM<sub>2.5</sub> concentrations associated with the proposed activities at sensitive locations beyond the land ownership boundary, air dispersion modelling was undertaken. Modelling using the United States Environmental Protection Agency (USEPA) new generation dispersion model AERMOD (USEPA 2017) (version 18081) was used as recommended by the USEPA (USEPA 2005). The model is a steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources. The model has been designated the regulatory model by the USEPA for modelling emissions from industrial sources in both flat and rolling terrain (USEPA 2005). The AERMET PRO meteorological pre-processor (USEPA 2004) was used to generate hourly boundary layer parameters for use by AERMOD. Dust generation rates were calculated from factors derived from empirical assessment and detailed in the USEPA database entitled "Compilation of Air Pollution Emission Factors", Volume 2, AP-42 (1986, updated periodically) (USEPA 1986). The emission factors have been presented in Appendix IV.

### 10.2.3 Process Emissions

Extractive activities typically emit dust. Dust is characterised as encompassing particulate matter with a particle size of between 1 and 75 microns (1-75µm). Deposition typically occurs in close proximity to each site and potential impacts generally occur within 500 metres of the dust generating activity as dust particles fall out of suspension in the air. Larger particles deposit closer to the generating source and deposition rates will decrease with distance from the source. Sensitivity to dust depends on the duration of the dust deposition, the dust generating activity, and the nature of the deposit. Therefore, a higher tolerance of dust deposition is likely to be

shown if only short periods of dust deposition are expected and the dust generating activity is either expected to stop or move on.

The potential for dust to be emitted will depend on the type of activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed, wind direction and dust prevention measures in place. This report identifies and quantifies the dust sources from the development.

#### 10.2.4 Dust Generation Rates

Dust generation rates depend on the site activity, particle size, the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2mm has fallen.

Large particle sizes (greater than 75 microns) fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and give rise to the potential dust nuisance at the sensitive receptors. This size range would broadly be described as silt. Emission rates are normally predicted on a site-specific particle size distribution for each dust emission source. In the absence of such information, the particle size distribution outlined in AP-42 Appendix B.2.2 for Category 3 (mechanically generated aggregate) (USEPA 1986) has been used and is outlined in Table 10-2. The moisture content of limestone (site contains limestone derived gravel) has been estimated at 2.1%, which is based on a literature review.

**Table 10-2:** Category 3 Mechanically Generated Aggregate Taken From AP-42 (USEPA 1986)

Cumulative % ≤ Stated Size	Particle Size, µm	Minimum Value	Maximum Value	Standard Deviation
4	1.0	-	-	-
11	2.0	-	-	-
15	2.5	3	35	7
18	3.0	-	-	-
25	4.0	-	-	-
30	5.0	-	-	-
34	6.0	15	65	13
51	10.0	23	81	14

Dust deposition typically occurs in close proximity to the dust-generating source. Only a small number of sensitive locations are present which can be affected by dust deposition. The pit is located in an area with a low population density and there is only one house within 500m from the extraction of material. Generally, the potential for severe dust impacts is greatest within 100m of dust generating activities, though residual impacts can occur for distances beyond 100m.

A receptor grid was created at which concentrations would be modelled. The receptor grid was based on a Cartesian grid with the site at the centre. The inner grid extended to 1.25 km from the site with concentrations calculated at 50m intervals. The outer grid extended to 5 km from the site with concentrations calculated at 250m intervals. Boundary receptor locations were also placed along the land ownership boundary of the site, at 25m intervals. The modelling has investigated the deposition and concentrations of dust, PM<sub>10</sub> and PM<sub>2.5</sub> for the activities outlined in Section 10.5.

### 10.3 Legislation

#### 10.3.1 Air Quality

A number of international initiatives, protocols and Directives exist to limit and reduce emissions at a national level. The following criteria were considered in the assessment of impact on air quality:

- Air Quality Standards Regulations (S.I. No. 180 of 2011).
- Directive 2001/81/EC on National Emission Ceilings for certain pollutants (NECs) (S.I. No. 10 of 2004).
- There are no statutory limits for deposition of dusts and industry guidelines are typically employed to determine any impact. The TA Luft (German Government 'Technical Instructions on Air Quality') states a guideline of 350 mg/m<sup>2</sup>/day for the deposition of non-hazardous dusts. This value was used to determine the impact of dust deposition as an environmental nuisance.
- The National Roads Authority (NRA) has published guidance for assessing dust impacts from road construction ('Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes'). This has been used to determine the potential impacts from the proposed construction site operations.

The relevant Irish ambient air standards have been adopted from the European Commission (EC) Directives 1996/62/EC, 1999/30/EC and 2000/69/EC and are cited as the Air Quality Standards Regulations, which came into force on 17<sup>th</sup> June 2002 (Irish Legislation S.I. No. 271 of 2002). In May 2008, these EC Directives on air quality were replaced with a new Directive on ambient air quality and cleaner air for Europe (2008/50/EC), which has been transposed into Irish Legislation through the revised Air Quality Standards Regulations (S.I. 180 of 2011). The new legislation specifies limit values in ambient air for sulphur dioxide (SO<sub>2</sub>), lead (Pb), benzene (C<sub>6</sub>H<sub>6</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>). These limits are set for the protection of human health and are largely based on review of epidemiological studies on the health impacts of these pollutants. The pollutants of concern for the EIAR are PM<sub>10</sub> and PM<sub>2.5</sub>, the limit values of which are presented in Table 10-3.

**Table 10-3:** Revised Air Quality Standard Regulations S.I. 180 of 2011 and TA-Luft

Pollutant Criteria Value	Criteria	Value
Particulate Matter (PM <sub>10</sub> )	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m <sup>3</sup> PM <sub>10</sub>
	Annual limit for protection of human health	40 µg/m <sup>3</sup> PM <sub>10</sub>
Particulate Matter (PM <sub>2.5</sub> )	Annual target value for the protection of human health	25 µg/m <sup>3</sup> PM <sub>2.5</sub>
Dust deposition (non-hazardous dust)	Average daily dust deposition at the boundary of the site	350 mg/(m <sup>2</sup> *day) Total Dust

### 10.3.2 Dust Deposition

There are no statutory limits on dust deposition and the focus is on the prevention of nuisance and minimising air borne dust emissions where practicable. Although coarse dust is not regarded as a threat to health, it can create a nuisance by depositing on surfaces. No statutory or official air quality criterion for dust annoyance has been set in Ireland, UK, Europe or at World Health Organisation level.

The most commonly applied guideline is the German (TA Luft) (German VDI 2002) guideline of 350mg/m<sup>2</sup>/day as measured using Bergerhoff type dust deposit gauges as per the German Standard Method for determination of dust deposition rate (VDI 2119). This is commonly applied to ensure that no nuisance effects will result from specified industrial activities. Below these thresholds dust problems are considered less likely. Dust Deposition is normally measured by gravimetrically determining the mass of particulates and dust deposited over a specified surface area over a period of one month (30 days +/- 2 days).

Recommendations outlined by the Department of the Environment, Health & Local Government (DOELG 2004), apply the Bergerhoff limit of 350 mg/(m<sup>2</sup>\*day) to the land ownership boundary of quarries.

### 10.3.3 Environmental Management and Guidance Documents

A number of publications were referred to during the compilation of this chapter which are detailed below. All offer guidance in relation to assessing air quality.

- *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (NRA, 2011) – This document provides updated guidance for the assessment of air quality impacts during the planning and design of national road schemes.
- *AG4 Air Dispersion Modelling from industrial installations guidance Note #4* (AG4) (EPA, 2009) - This guidance note was commissioned by the EPA to provide information on the subject of air dispersion modelling in the Irish context.

- *AERMOD Description of Model Formulation and Evaluation* (USEPA, 2017) This document describes the USEPA approved air quality dispersion model AERMOD.
- *Advice Notes for Preparing Environmental Impact Statements (Draft) on the Information to be Contained in Environmental Impact Assessment Reports (Draft)* (EPA, 2015) This draft advice note document informs the reader what information should be contained within an environmental assessment.
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft)* (2017) This draft document informs the reader what information should be contained within an environmental assessment.

#### 10.4 Existing Environment

The proposed application area is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site. Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm is located nearby. The application area is comprised of an existing sand and gravel pit, undisturbed areas, haul road and a greenfield area subject to agricultural use.

##### 10.4.1 Meteorological Conditions

Meteorological conditions significantly affect the level of dust emissions and subsequent deposition downwind of the source. The most significant meteorological elements affecting dust deposition are rainfall and wind-speed. High levels of moisture either retained in soil or as a result of rainfall help suppress the generation of dust due to the cohesive nature of water between dust particles. Rain also assists in removing dust from the atmosphere through washout. Wind can lift particles up into the air and transport the dust downwind as well as drying out the surface. The worst dust deposition conditions typically occur, therefore, during dry conditions with strong winds.

The closest Met Éireann synoptic station to the pit is at Oak Park, Co. Carlow, which is approximately 15km northwest of the application area.

The mean monthly rainfall from January 2013 to December 2017 recorded at Oak Park was 71 mm/month (total/year = 851.6mm). Average rainfall across the 5 years ranged from a low of 60.4mm/month in 2017 to a high of 91.5mm/month in 2014. A total mean monthly precipitation rate of approximately 517mm across all years fell during the winter months (October to March). The monthly total during the winter months (October-March) accounts for approximately 61% of the annual total for these years. Indeed, trends in the data show that the highest rainfall occurrences alternated between December and February across each of the analysed years, with a maximum monthly precipitation rate of 270.9mm falling in December 2015. The lowest monthly



rainfall rate across each of the years occurred in April 2017 with 15.8mm recorded. Long-term (1981–2010) average monthly rainfall was also recorded at Oak Park. Met Éireann records for this station show that the Average Annual Rainfall (AAR) for the period 1981 - 2010 in the area was 854 mm.

Wind frequency is important as dust can only be dispersed by winds, and deposition of dust is a simple function of particle size, wind speed and distance. The closer the source of dust is to a receptor; the higher the potential risk of impact of dust blow. The prevailing winds in the area, in common with most of Ireland, are south-westerly, thereby predominantly dispersing any potential dust emissions to the north-east of the site.

The air quality dispersion model, AERMOD, requires a more detailed data set than is available at the Oak Park site. The nearest representative weather station collating detailed weather records is at Casement Aerodrome meteorological station, which is located approximately 60 km north east of the site. Long-term hourly observations at Casement Aerodrome meteorological station provide an indication of the prevailing wind conditions for the region (see Figure 10-1). This location is a similar distance to the Johnstown Castle Meteorological station, however Casement Aerodrome was chosen due to its location being further from the coastline and therefore considered more representative of the likely meteorological conditions at the subject site. Results indicate that the prevailing wind direction is westerly to south-westerly in direction over the period 2013 - 2017. The mean wind speed was approximately 5.7 m/s over the period 1981 - 2010.

All meteorological data referenced within this report is provided by Met Éireann (source [www.met.ie](http://www.met.ie)).

#### 10.4.2 Background Sources of Dust

The sources of dust arising from the facility contribute to background levels of dust. Dust is present naturally in the air from a number of sources including weathering of minerals, and pick-up across open land and dust generated from fires.

A study by the UK ODPM (UK ODPM 1986) gives estimates of likely dust deposition levels in specific types of environments. In open country a level of 39 mg/(m<sup>2</sup>\*day) is typical, rising to 59 mg/(m<sup>2</sup>\*day) on the outskirts of town and peaking at 127 mg/(m<sup>2</sup>\*day) for a purely industrial area. A level of 39 mg/m<sup>2</sup>\*day can be estimated as the background dust deposition level for the region of the pit at Roscat, Co Carlow.

#### 10.4.3 Dust Deposition Monitoring

As the applicant has only recently gained control of the development, no environmental monitoring results were available for review. The Environmental Section of Carlow County Council was contacted in relation to environmental monitoring results and none were available on file.

For this reason historical dust deposition monitoring is not available. Monitoring began on October 15<sup>th</sup> 2018. The currently available baseline data is shown in Table 10-4 below and the monitoring locations are shown in Figure 10-2.

The average dustfall level from the initial set of monitoring data measured at three locations did not exceed the TA Luft limit value of 350 mg/(m<sup>2</sup>\*day). Overall, dustfall levels are low with two locations considerably lower than the third location. The peak across the three sites reached at most 55% of the TA Luft limit value. However, these results should be taken with caution as they are only a single month of monitoring data. As long-term dustfall levels in the pit are not available, the estimate of 191 mg/m<sup>2</sup>\*day is the worst case conservative background level assumed for the area prior to adding the contribution due to pit related activities.

**Table 10-4:** Dust Deposition Monitoring at Kilcarrig Pit

Monitoring Period	Limit Value	D 1 mg/(m <sup>2</sup> *day)	D 2 mg/(m <sup>2</sup> *day)	D 3 mg/(m <sup>2</sup> *day)
15/10/2018 -10/11/2018	350	25	68	191
Average		25	68	191
Percentage of Limit		7%	19%	55%

**Note 1:** Limit value is TA Luft limit of 350 mg/m<sup>2</sup>\*day

There are no significant air emissions from industrial or commercial properties in the area, with the surrounding land-use mainly agricultural in nature.

#### 10.4.4 Background Sources of PM<sub>10</sub> and PM<sub>2.5</sub>

Long-term PM<sub>10</sub> monitoring was carried out at the rural Zone D locations of Killkitt and Claremorris in 2017 (EPA 2017, 2018). The maximum 24-hour concentration (as a 90<sup>th</sup>%ile) at each of the Zone D locations is shown in Table 10-5. The long-term average of the 90<sup>th</sup>%ile of 24-hour concentrations at rural locations ranges from 15.5 – 16.2 µg/m<sup>3</sup>. The average annual mean concentrations at rural locations measured at the two sites (Claremorris and Killkitt) from 2013 to 2017 were 10.2 and 8.5 µg/m<sup>3</sup>, respectively, as shown in Table 10-6. Based on the above information an estimate of the background PM<sub>10</sub> concentration in the region of Roscat is 11 µg/m<sup>3</sup> whilst a value of 17 µg/m<sup>3</sup> has been selected for the 90<sup>th</sup>%ile of 24-hr means.

**Table 10-5:** 90<sup>th</sup>%ile of 24-Hour PM<sub>10</sub> Concentrations In Zone D Locations 2013 – 2017 (µg/m<sup>3</sup>)

Year	Claremorris	Kilkitt	Enniscorthy	Castlebar
2013	21	18.6	-	26.9
2014	9.5	15.4	37.6	21.4
2015	10.2	18	34.4	22.7
2016	17.4	15	32.3	20
2017	17.3	14	46.9	19.1
<b>Average</b>	<b>15.5</b>	<b>16.2</b>	<b>34.8</b>	<b>21.7</b>

**Table 10-6:** Annual Mean PM<sub>10</sub> Concentrations In Zone D Locations 2013 - 2017 (µg/m<sup>3</sup>)

Year	Claremorris	Killkitt	Enniscorthy	Castlebar
2013	13	11	-	15
2014	10	9	22	12
2015	10	9	18	13
2016	10	8	17	12
2017	10.8	7.8	29	11.2
<b>Average</b>	<b>10.2</b>	<b>8.5</b>	<b>21.5</b>	<b>12.1</b>

The results of PM<sub>2.5</sub> monitoring at Claremorris (Zone D) in 2018 (EPA 2018) indicated an average PM<sub>2.5</sub>/PM<sub>10</sub> ratio of 0.52. Based on this information, a ratio of 0.52 was used to generate a rural background PM<sub>2.5</sub> concentration of 6.2 µg/m<sup>3</sup>.

In relation to the annual averages, the ambient background concentration is added directly to the process concentration. However, in relation to the short-term peak concentration, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the UK DEFRA (UK DEFRA 2016) and the EPA (EPA 2010) advises that for PM<sub>10</sub> an estimate of the maximum combined pollutant concentration can be obtained as shown below:

**PM<sub>10</sub>** - The 90.4<sup>th</sup>ile of total 24-hour mean PM<sub>10</sub> is equal to the maximum of either A or B below:

- a) 90.4<sup>th</sup>ile of 24-hour mean background PM<sub>10</sub> + annual mean process contribution PM<sub>10</sub>
- b) 90.4<sup>th</sup>ile 24-hour mean process contribution PM<sub>10</sub> + annual mean background PM<sub>10</sub>.

#### 10.4.5 Dust Sensitive Receptors

Potentially dust sensitive activities, which can be categorised in relation to their dust sensitivity as potential increases in ambient dust levels, will have varying degrees of effects. This is dependent on the type and sensitivity of the receptor. Although this principle does not always apply, Table 10-7 categorises dust sensitive receptors and highlights their risk in relation to potential sources of dust.

**Table 10-7:** Levels of Sensitivity per Receptor Type

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and clinics	Schools	Farms
Retirement homes	Residential areas	Light and heavy industry
Hi-tech industries	Food retailers	Outdoor storage
Painting and furnishing	Greenhouses and nurseries	
Food processing	Horticultural land	
	Biodiversity	

The receptor types in the study area consist of medium and low sensitivity receptors consisting mainly of residential areas and farms. There are a limited number of human receptors in the vicinity of the application site in the form of occupied dwellings. There are of 16 dwellings located within a 1km radius of the application area, 1 of which is within 500m. Vegetation, berms and the natural topography can act as breaks between the sources and the receptor. Tree lines can also act as an efficient dust filter and can be a useful dust control safeguard.

#### 10.5 Characteristics of the Development

The proposed application area is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathtoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site. Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm is located nearby.

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares.

The pit commenced operations in 1987 with the existing working pit being most active within the period 2000 - 2008. The existing working area has generally been unused since 2008.

The Kilcarrig pit is a sand and gravel pit. For the purposes of this assessment it has been assumed that 50,000 tonnes of sand and gravel will be extracted in a one-year period. This extraction rate has been used in order to estimate the impact of the pit in the surrounding environment.

During the average year, there is a maximum of 20 truck movements in and 20 truck movements out of the site per day. Thus, for the purpose of the assessment an estimate of 2 truck movements in and out of the site per hour has been assumed.

The hours of operation at the pit will be Monday to Friday 7:00 to 19:00 and Saturday 7:00 to 17:00. These hours have been used for the purpose of the assessment.

The following operations are the main dust generating sources or activities at the pit:

- 1) Movement of empty trucks along paved public roads
- 2) Movement of empty trucks along unpaved haul roads
- 3) Extraction of material
- 4) Screening of material
- 5) Stockpiling of material
- 6) Loading of material
- 7) Movement of full trucks along unpaved haul roads
- 8) Movement of full trucks along paved public roads
- 9) Wind erosion at dump areas, stockpiles and exposed pit surface.

## **10.6 Impact Assessment**

### **10.6.1 Enabling Phase**

As part of the enabling phase the berms will be constructed. Earthworks associated with the construction of berms would have involved the use of overburden for berm construction and for reinstating areas around the pit on completion of extraction. The material was unloaded and shaped or graded using an excavator and allowed to vegetate using the natural seed bank in the soil. With use of dust mitigation measures as discussed in Section 10.7.1, the impact of the enabling phase is considered imperceptible, localised and temporary.

There is the potential for a number of greenhouse gas emissions to atmosphere during the enabling phase. Construction vehicles, generators etc., may give rise to CO<sub>2</sub> and N<sub>2</sub>O emissions. However, based on the short-term duration and relatively small scale nature of the enabling works, the impact on climate is considered to be imperceptible, localised and temporary.

### **10.6.2 Operational Phase**

The main potential sources of emissions to air would have been associated with plant and machinery undertaking day to day activities such as extraction, onsite processing and transportation of material and dust blow generated during dry windy conditions. Potential impacts associated with day to day activities have been separated into dust deposition and vehicle and plant emissions.

#### Dust

Emissions from the application site lead to a dust deposition level averaged over the full year of 42.2 mg/(m<sup>2</sup>\*day) at the land ownership boundary to the pit (see Table 10-8). Based on a worst case background dust deposition of 191 mg/(m<sup>2</sup>\*day) in the region of the site, the combined dust deposition level peaks at 233mg/(m<sup>2</sup>\*day) which is 67% of the TA Luft Limit Value of 350 mg/(m<sup>2</sup>\*day), see Figure 10-3. However, operational activities from the pit contributes a maximum of 12% of the TA-Luft Limit Value. The impact of dust deposition is considered slight adverse, localised and long-term.

**Table 10-8:** Dispersion Modelling Results for Dust Deposition at Boundary

Pollutant / Scenario	Worst Case Background Level (mg/(m <sup>2</sup> *day))	Process Contribution (mg/(m <sup>2</sup> *day))	Predicted Deposition (mg/(m <sup>2</sup> *day))	Limit Value (mg/(m <sup>2</sup> *day)) Note 1
Dust Deposition / 2013	191	37.5	228	350
Dust Deposition / 2014	191	35.0	226	350
Dust Deposition / 2015	191	36.4	227	350
Dust Deposition / 2016	191	39.2	230	350
Dust Deposition / 2017	191	42.2	233	350

Note 1 TA-Luft as interpreted by DOEHLG (2004)

#### PM<sub>10</sub>

Predicted PM<sub>10</sub> concentrations are significantly lower than the ambient air quality standards at the worst-case residential receptor due to background concentrations and emissions from the application site (see Table 10-9). For emissions from application site the predicted 24-hour and annual concentrations (excluding background) at the worst-case receptor peak at 2.0µg/m<sup>3</sup> and 0.86 µg/m<sup>3</sup> respectively. Based on a background PM<sub>10</sub> concentration of 11 µg/m<sup>3</sup> in the region of the application site, the combined annual PM<sub>10</sub> concentration including the site peaks at 11.84 µg/m<sup>3</sup> (See Figure 10-4). This predicted level equates to at most 30% of the annual limit value of 40 µg/m<sup>3</sup>. The predicted 24-hour PM<sub>10</sub> concentration (including background) peaks at 17.84µg/m<sup>3</sup> which is 36% of the 24-hour limit value of 50 µg/m<sup>3</sup> (measured as a 90.4<sup>th</sup>ile). Operational activities from the pit will contribute a maximum of 2.2% of the PM<sub>10</sub> annual mean limit value. The impact of PM<sub>10</sub> is considered negligible, localised and long-term.

**Table 10-9:** Dispersion Modelling Results for PM<sub>10</sub>

Pollutant / Scenario	Annual Mean Background (µg/m <sup>3</sup> )	Averaging Period	Process Contribution PM <sub>10</sub> (µg/m <sup>3</sup> )	Predicted Immission Concentration PM <sub>10</sub> (µg/m <sup>3</sup> ) <sup>Note 2</sup>	Standard (µg/m <sup>3</sup> ) <sup>Note 1</sup>
PM <sub>10</sub> / 2013	N/A	90.4 <sup>th</sup> ile of 24-hr means	1.85	17.76	50
	11	Annual Mean	0.76	11.76	40
PM <sub>10</sub> / 2014	N/A	90.4 <sup>th</sup> ile of 24-hr means	1.81	17.84	50
	11	Annual Mean	0.84	11.84	40
PM <sub>10</sub> / 2015	N/A	90.4 <sup>th</sup> ile of 24-hr means	1.67	17.74	50
	11	Annual Mean	0.74	11.74	40
PM <sub>10</sub> / 2016	N/A	90.4 <sup>th</sup> ile of 24-hr means	2.04	17.86	50
	11	Annual Mean	0.86	11.86	40
PM <sub>10</sub> / 2017	N/A	90.4 <sup>th</sup> ile of 24-hr means	1.99	17.84	50
	11	Annual Mean	0.84	11.84	40

Note 1

S.I. 180 of 2011 and EU Directive 2008/50/EC

Note 2

90.4<sup>th</sup>ile of 24-Hr PM<sub>10</sub> Concentration Calculated According To UK DEFRA Guidance and using background data from the rural Zone D EPA monitoring stations.**PM<sub>2.5</sub>**

Predicted PM<sub>2.5</sub> concentrations at the worst-case receptor are significantly lower than the limit value of 25 µg/m<sup>3</sup> (see Table 10-10) for the application site.

The predicted annual concentration (excluding background) at the worst-case receptor peaks at 0.24 µg/m<sup>3</sup>. Based on a background PM<sub>2.5</sub> concentration of 5.7 µg/m<sup>3</sup> in the region of the sand and gravel pit, the annual PM<sub>2.5</sub> concentration including the operations peaks at 5.96 µg/m<sup>3</sup>. This peak level equates to 24% of the annual limit value for PM<sub>2.5</sub>. Operational activities from the pit contribute a maximum of 1 % of the PM<sub>2.5</sub> annual mean limit value. The impact of PM<sub>2.5</sub> is considered negligible, localised and long-term.

**Table 10-10:** Dispersion Modelling Results for PM<sub>2.5</sub>

Pollutant / Scenario	Annual Mean Background (µg/m <sup>3</sup> )	Averaging Period	Process Contribution PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Predicted Immission Concentration PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Standard (µg/m <sup>3</sup> ) <sup>Note 1</sup>
PM <sub>2.5</sub> / 2013	5.72	Annual Mean	0.21	5.93	25
PM <sub>2.5</sub> / 2014	5.72	Annual Mean	0.24	5.96	25
PM <sub>2.5</sub> / 2015	5.72	Annual Mean	0.21	5.93	25
PM <sub>2.5</sub> / 2016	5.72	Annual Mean	0.24	5.96	25
PM <sub>2.5</sub> / 2017	5.72	Annual Mean	0.24	5.96	25

Note 1

S.I. 180 of 2011 and EU Directive 2008/50/EC

### Contour Plots

The geographical variation at the Application Site concentrations as a percentage of the relevant limit values for the worst-case scenario for each pollutant are illustrated as concentration contours in Figures 10-3 and 10-4. The contents of each figure are described below:

Figure 10-3 Annual Average Dust Deposition (g/m<sup>2</sup>/year)

Figure 10-4 Annual Average PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)

The concentrations and deposition levels listed in Tables 10-8 – 10-10 are for the maximum concentrations / deposition levels predicted at the worst-case receptors. All other receptors are below these values. The concentration contours show where the maximum concentrations and deposition levels are predicted to occur and the reduction in concentration or deposition with distance away from the maximum.

### Road Traffic emissions

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO<sub>2</sub>, CO, benzene, PM<sub>10</sub> and PM<sub>2.5</sub>.

The nature of the development is such that there is no significant predicted impact on traffic emissions. The development will generate an increase of less than 20 HGVs daily. As detailed in the DMRB guidance on which TII's 2011 document *Guidelines for the Treatment of Air Quality*



*During the Planning and Construction of National Road Schemes* was based, a quantitative air quality assessment is required in the following circumstances:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGVs flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Therefore, using the DMRB screening criteria, no road links can be classed as 'affected' by the proposed development and therefore, a local air quality assessment is not required as impacts are neutral in the long and short term.

### 10.6.3 Cumulative Impacts

Cumulative effects have been assessed for the Application Site. Background concentrations have been included in the modelling study for dust deposition and EPA data for PM<sub>10</sub> and PM<sub>2.5</sub>. These background concentrations account for non-localised sources of the pollutants of concern.

There are no other significant sources of dust, PM<sub>10</sub> or PM<sub>2.5</sub> within the area of impact from the pit and therefore no further prediction of cumulative impact is required.

## 10.7 Mitigation Measures

### 10.7.1 Enabling Phase

The following mitigation measures were implemented as part of the pit site preparation phase:

- Imposition and enforcement of an appropriate speed limit on haul roads to prevent unnecessary generation of fugitive dust emissions.
- Inspection of the work area to be undertaken on a daily basis to ensure that there is no dust blow.
- Stockpiles were sprayed with water to reduce dust blow where required.

### 10.7.2 Operational Phase

The following mitigation measures will be implemented in order to limit the effects of pit activity on air quality:

- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 30 kph, and on hard surfaced roads as site management dictates.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- The access road will be inspected regularly and kept in good condition.

- During very dry periods, dust emissions from heavily trafficked locations will be controlled by spraying surfaces with water.
- Stockpiles will be re sprayed with water to reduce dust blow where required.
- Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Inspection of the work area to be undertaken on a daily basis to ensure that there is no dust blow.

### 10.8 Monitoring

To ensure that the existing development is not impacting on air quality, dust deposition monitoring will be undertaken at the locations shown on Figure 10-2 at the end of this chapter. If monitoring indicates a potential issue with dust deposition, additional mitigation measures shall be implemented to remediate.

### 10.9 Residual Impacts

It is not anticipated that there was an adverse impact on air quality in the vicinity of the application site.

Modelled emissions from the Application Site lead to ambient concentrations which are within the relevant ambient air quality standards for dust, PM<sub>10</sub> and PM<sub>2.5</sub>. Thus, the impact on air quality and climate of the proposed Application Site is not significant and thus no residual impact is anticipated.

### 10.10 Technical Difficulties

There were no significant difficulties encountered during the completion of the chapter.

### 10.11 References

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DOELG (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

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USEPA (2017) AERMOD Description of Model Formulation and Evaluation

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USEPA (2004) User's Guide to the AERMOD Meteorological Preprocessor (AERMET)

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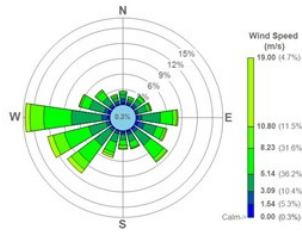
UK ODPM (2000) Controlling Environmental Effects: Recycled and Secondary Aggregates Production

UK DEFRA (2016) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. TG(16)

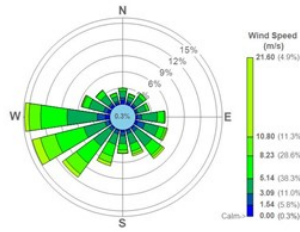
## Figures



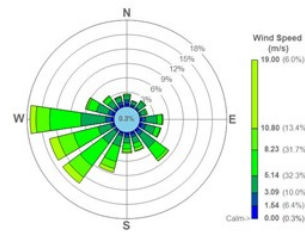
Casement Aerodrome 2013



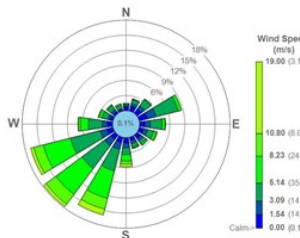
Casement Aerodrome 2014



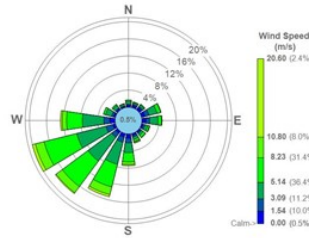
Casement Aerodrome 2015



Casement Aerodrome 2016



Casement Aerodrome 2017



**Project**  
Roscat Pit EIAR

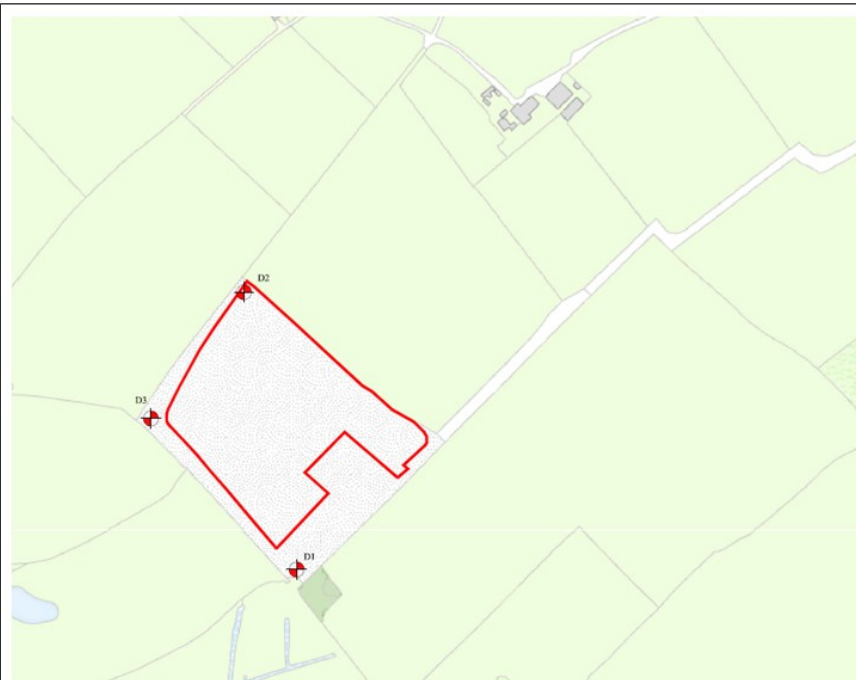
**Reference**  
19/107015AR01

**Figure 10-1**  
Casement Aerodrome  
Windrose 2013 - 2017



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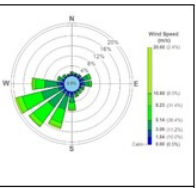
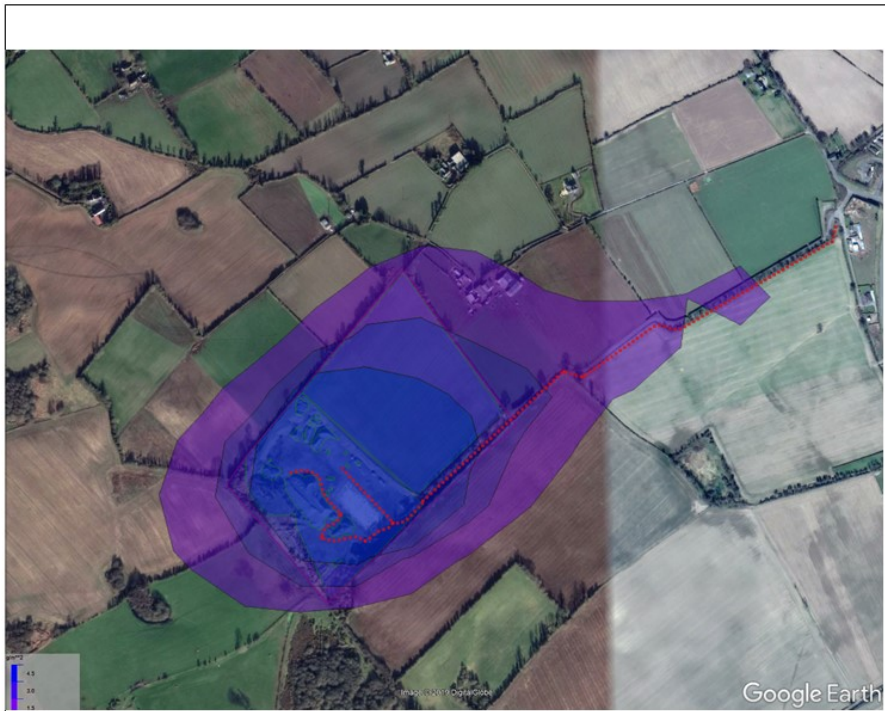
**Project**  
Roscat Pit EIAR

**Reference**  
19/107015AR01

**Figure 10-2**  
Monitoring Locations for  
Dust Deposition



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Background Mapping from Google Earth

Annual Mean Dust Deposition (excluding background)  
Maximum Deposition Rate = 15.41 g/m<sup>2</sup>/yr (42.2 mg/m<sup>2</sup>/day)

□ Boundary Of Land Ownership

Scale 1:5,500



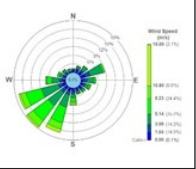
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Reference 19/107015AR01

Figure 10-3 Annual Mean Dust Deposition Rate (g/m<sup>2</sup>/yr) (Year 2017)



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Background Mapping from Google Earth

Annual Mean PM<sub>10</sub> Concentrations (excluding background)  
Worst case Receptor Concentration = 3.9 µg/m<sup>3</sup>

□ Boundary Of Land Ownership

Scale 1:5,500



Project Roscat Pit EIAR

Reference 19/107015AR01

Figure 10-4 Annual Mean PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) (Year 2016)



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## 11.0 NOISE AND VIBRATION

### 11.1 Introduction

This chapter of the EIA was prepared by Noise and Vibration Consultants Ltd who were commissioned by Kilcarrig Quarries Ltd. to assess the potential noise and vibrations impacts of a proposed development at a sand and gravel pit in Roscat, Tullow, Co. Carlow (referred to as Roscat Pit).

The application relates to an area of approximately 14.7 hectares comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares. The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel, will result in the extension of the previously disturbed area associated with the existing pit into the greenfield area. Landscaping of the sand and gravel pit will be undertaken during the operational phase and restoration of the pit on completion of extraction. (refer to Chapter 3 – Project Description for full details).

#### 11.1.1 Site Location and Setting

The existing sand and gravel pit area is situated approximately 3 km south of Tullow and 2 km east of Rathtoe, Co Carlow. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5km of the site.

The application site consists of an area which currently comprises a greenfield area, currently subject to agricultural use, and the existing pit area.

Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the quarry and surrounding lands. The site is surrounded by agricultural fields and a farm is located nearby.

The area immediately around the site is sparsely populated, with individual farmsteads and scattered houses along the road network. A series of irregular third class roads run around the lands, serving a number of dwellings and farms.

### 11.2 Description of Proposed Activity

The application site comprises of a total area of 14.7 hectares comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares. The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel from the greenfield area will result in the extension of the previously disturbed area into the adjacent greenfield area. Landscaping of the sand and gravel pit will be undertaken during the operational phase and restoration of the pit on completion of extraction. All associated ancillary facilities/works are also included in this application.

### 11.3.1 Existing Development On-Site

Part of application site comprises of an existing sand and gravel pit which was subject to extraction and processing of sand and gravel into various grades of aggregate. Material was extracted from the by excavators and passed through mobile processing plant which processed the material into various grades of aggregate. The material was then stockpiled on site and sold as aggregate. Material was also extracted and loaded directly onto trucks and transported off-site.

### 11.3 Statement of Authority

This section of the EIAR has been prepared by Mr. Brendan O'Reilly of Noise and Vibration Consultants Ltd. Mr. O'Reilly has a master's degree in noise and vibration from Liverpool University and has over 35 years' experience in noise and vibration control (and many years' experience in preparation of noise impact statements) and is a member of a number of professional organisations.

Mr. O'Reilly was a co-author and project partner (as a senior noise consultant) in 'Environmental Quality Objectives Noise in Quiet Areas' administered by the Environmental Protection Agency on behalf of the Department of the Environment, Heritage and Local Government (as a first step towards implementation of the EC Directive relating to the Assessment and Management of Environmental Noise (EU, 2002).

Noise and Vibration Consultants have considerable experience in the assessment of noise impact and have compiled EIA studies ranging from quarries, mines, retail development, wastewater treatment plants, housing developments and wind farms.

### 11.4 Methodology

In order to carry out a baseline noise survey at receptors surrounding the site and to assess the potential noise emissions from the proposed development, the following relevant guidance and legislation were consulted:

- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (Jan 2016).
- ISO 1996-1-2016: Acoustics: Description and Measurement of Environmental Noise-Basic Quantities and Assessment Procedures.
- Integrated Pollution Control Licensing – Guidance Note for Noise in Relation to Scheduled Activities, EPA 1995.
- ISO 9613-2, First Edition 1996-12-15. Acoustics-Attenuation of sound during propagation outdoors-Part 2: General method of calculations
- Draft Guidelines for the Treatment of Noise and Vibration in National Road Schemes

- BS5228, 2009 Code of Practice for Noise Control on Construction and Open Sites: Part 1: Noise.
- EPA, 2006, Environmental Management Guidelines-Environmental Management in Extractive Industry (Non Scheduled Minerals).
- EPA, 2003, Environmental Quality Objectives-Noise in Quiet Areas
- HMSO, Welsh Office, 1988. Calculation of Road Traffic Noise

#### 11.1.1 Baseline Noise Monitoring Survey

A baseline noise survey was carried out at some of the nearest receptors to the proposed development. Three noise monitors were set up to run continuously between 4<sup>th</sup> and 6<sup>th</sup> October 2018.

#### 11.1.2 Noise Monitoring Methodology

The following instruments were used:

- One Larson Davis LxT Sound Expert Precision Integrating Sound Level Analyser/Data logger.
- Two Larson Davis 812 Precision Integrating Sound Level Analyser/Data logger
- Wind Shields Type: Double Skinned Wind Screens.
- Calibration Type: Larson Davis Precision Acoustic Calibrator.

All instruments conform to BS EN 61672-1 and BS EN 60942, Class 1 and ISO Type 1.

##### 11.1.2.1 Weather

The baseline noise survey was in a range of wind speeds between 2-6m/s. There was no precipitation during the day periods (08.00 to 20.00hrs).

During the survey there was dry conditions with a west to north-west light wind ranging from 1 to 2m/s (14-18 degrees C).

##### 11.1.2.2 Measurement Parameters

- L<sub>Aeq</sub>** is the A-weighted equivalent continuous sound level measured during the sample period. It is an average of the fluctuating noise level over the sample period. It can also be described as a notional steady level that has the same sound energy as the real fluctuating noise over a specified time interval- it is a type of average represented by a single number over a specified time interval.
- L<sub>AFMax</sub>** is the maximum A-weighted sound level during a stated time period (Fast Time weighting).
- L<sub>A10</sub>** is the A-weighted sound level, which is exceeded for 10% of the sample period.
- L<sub>A90</sub>** is the A-weighted sound level, which is exceeded for 90% of the sample period and is defined as the background noise level within BS 4142.

$L_{A5}$  is the A-weighted sound level, which is exceeded for 5% of the sample period.

#### 11.1.2.3 Measurement Procedure

Noise monitors were set up to run continuously with instruments set on 30 minute intervals with microphones at 1.2-1.5m above ground level. All the environmental noise analysers had data logging facilities set on real-time, the logged data was later downloaded via a personal computer using software. All noise monitors were calibrated before and after the survey and the maximum drift of calibration was 0.02dB. All monitors were within calibration certification times.

The noise monitoring and prediction locations are shown in Plate 11.1. Locations N1A and N3A on Plate 11.1 are used as additional locations for prediction.



**Plate 11-1:** Noise monitoring and predictive locations

### 11.5 Results of Baseline Noise Survey

Results of noise monitoring are located in Appendix V. A summary of the baseline mean noise levels (rounded to whole numbers) is given in Table 11.1.

**Table 11-1:** Recorded mean noise levels taken at 30-minute intervals

ID	Date	Leq dBA	L10 dBA	L50 dBA	L90 dBA	Comments
N1	4 <sup>th</sup> – 6 <sup>th</sup> Oct'18	52	56	48	39	Mainly from N80 traffic flow
N2	4 <sup>th</sup> – 6 <sup>th</sup> Oct'18	51	51	44	41	Mainly from N80 traffic flow
N3	4 <sup>th</sup> – 6 <sup>th</sup> Oct'18	47	48	42	37	Local domestic activity with the background L90 noise levels being from the N80 traffic flow

### 11.6 Relevant Guidance and Legislation

The EPA has produced Environmental Management Guidelines 2006<sup>2</sup>. This document references 'A Guidance Note for Noise in Relation to Scheduled Activities (EPA, 1996<sup>1</sup>)'. It deals with the approach to be taken in the measurement and control of noise, and provided advice in relation to the setting of emission limits values and compliance monitoring.

In relation to quarry developments and ancillary activities, it recommended that noise from the activities on site shall not exceed the following noise limits at the nearest noise-sensitive receptor:

Daytime	08.00-20.00 hrs	LAeq (1h) = 55dBA
Night-time	20.00-08.00 hrs	LAeq (1h) = 45dBA

95% of all noise levels shall comply with the specified limits values(s). No noise level shall exceed the limit value by more than 2dBA.

The guidelines also recommend that where existing background noise levels are very low, lower noise levels ELV's may be appropriate. It is also appropriate to permit higher ELV's for short term temporary activities such as construction of screening bunds etc. where such activities will result in considerable environmental benefit.

<sup>2</sup> Environmental Management in the Extractive Industry (Non-Scheduled Minerals), 2006

<sup>1</sup> Ref. EPA's Guidance Note For Noise In Relation to Scheduled Activities, 1996

Very low background noise environment is well defined and referenced in the EPA's NG4 (Jan'16). Quiet areas are referenced in NG4 and referred to in Environmental Quality Objectives-Noise in Quiet Areas. To qualify the first stage involves screening and a number of criteria needs to be satisfied, one which involves being more than 5km from a National Primary Route. The N80 is a National Primary Route and is significantly closer to the nearest receptors. The background noise survey demonstrates that the noise level at receptors around the proposal are well above that encountered a low level noise environment.

The proposed times of operation are between 0700 hours and 1800 hours Monday to Friday and 0700 to 1400 hour on Saturdays. The pit will not operate outside these hours or on Sundays or Public Holidays. The pit will provide employment for approximately 1 person on a part-time basis.

### 11.1.3 Construction

#### Relevant Guidance

There is no published national guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. However National Roads Authority ("NRA") give limit values which are deemed acceptable ("the NRA Guidelines")<sup>1</sup>. Guidance to predict and control noise is also given in BS 5228:2009, *Code of Practice for Noise and Vibration Control on Construction and Open Sites* (two parts) where Part 1 deal with Noise. The NRA guidelines for construction noise which are considered typically acceptable are given in Table 11.2.

**Table 11-2:** Noise levels that are typically acceptable

Day / Times	Guideline Limits
Monday to Friday 07:00 – 19:00hrs 19:00 – 22:00hrs	70dB LAeq, (1h) and LAmax 80dB *60dB LAeq, (1h) and LAmax 65dB*
Saturday 08:00 – 16:30hrs	65dB LAeq,1h and LAmax75dB
Sunday and Bank Holidays 08:00 – 16:00hrs	*60dB LAeq,1h and LAmax 65dB*

\*Construction outside of these times, other than required by an emergency works, will normally require explicit permission from the relevant local authority

Part 1 of BS 5228 provides several example criteria for the assessment of the significance of noise effects from construction activities. Noise levels generated by construction activities are considered significant if:

- The LAeq, period level of construction noise exceeds lower threshold values of 65dB during daytime, 55dB during evenings and weekends or 45dB at night, and;

<sup>1</sup> National Roads Authority, *Guidelines for Noise and Vibration in National Road Schemes*.

- The total noise level (pre-construction ambient noise plus construction noise) exceeds the pre-construction noise level by 5dB or more for a period of one month or more.

## 11.7 Noise Impacts

### 11.1.4 Development proposal

The development includes removal of overburden and extraction of underlying sand and gravel. Material will be extracted by excavators and passed through mobile processing plant on-site which will process material into various grades of aggregate or will be extracted and loaded directly onto dump trucks and exported to a processing plant offsite. This material will be stockpiled close to the processing plant or on occasions the processing may take place close to the excavation face.

Plant and machinery which will operate in the application area will consist of tracked excavators, wheel loaders, dump trucks and mobile processing plant. Ancillary plant such as a water bowser for dust suppression will be deployed where required. A list of the equipment and associated noise levels is given in Table 11.3.

**Table 11-3:** Main noise sources and associated noise levels

Noise Source	Noise level @ 10m Leq dBA*	Comments
Mobile screener	81	Operating at normal operation
Mobile crusher with mobile screener plant	83	Crushing and screening system
CAT 966H front-end loader-7 tonne	84.5	Pulling load up a low level slope
Komatsu 400 dump truck-30 tonne	84	Load being carried on low level slope
Komatsu 400-idling	73.5	Idling
Komatsu excavator	83.5	Operating filling truck
Tractor and bowser	77	Spraying water

\*Noise levels obtained from measurements from active quarries

### 11.1.5 Predicted noise levels

The predicted noise levels are made for construction development at the boundary of the site when maximum levels are envisaged. A number of scenarios are assessed, and these are:

1. **Scenario 1:** Removal of overburden at the boundary of the site at locations nearest to receptors.
2. **Scenario 2:** Extraction of sand and gravel at the boundary of the site assuming mobile processing being carried out at the concrete laydown area.

3. **Scenario 3:** Extraction of sand and gravel in the middle of the site assuming mobile processing being carried out at the concrete laydown area.
4. **Scenario 4:** Extraction of sand and gravel at the boundary of the site assuming mobile processing being carried out alongside excavation.

Table 11.4 gives the distance to the nearest receptors surrounding the site of the main noise sources in the sand and gravel pit for the different scenarios. The boundary distance referred to is the nearest distance from the boundary of the site to each receptor.

**Table 11-4:** Distance to receptors from noise sources (m)

Scenario No.	Noise Monitor ID				
	N1	N1A	N2	N3	N3A
1. Overburden removal at boundary of site	754m	600m	750m	76m	208m
2. Processing at concrete laydown area	948m	605m	1011m	420m	601m
2. Excavation - On boundary of site	754m	600m	750m	76m	208m
3. Excavation - Mid-site	924m	775m	885m	230m	412m
3. Processing at concrete laydown area	948m	605m	1011m	420m	601m
4. Excavation at boundary of site	754m	600m	750m	76m	208m
4. Processing at boundary of site	754m	600m	750m	76m	208m

The difference between noise levels at two different locations can be modelled as follows:

$$L_{p2} - L_{p1} = 10 \log (R_2 / R_1)^2 - (A_{atm} + A_{gr} + A_{br} + A_{mis})$$

$$= 20 \log (R_2 / R_1) - (A_{atm} + A_{gr} + A_{br} + A_{mis})$$

Where

$L_{p1}$  = sound pressure level at location 1

$L_{p2}$  = sound pressure level at location 2

$R_1$  = distance from source to location 1

$R_2$  = distance from source to location 2, and where

$A_{atm}$  = Attenuation due to air absorption

$A_{gr}$  = Attenuation due to ground absorption

$A_{br}$  = Attenuation provided by a berm/barrier

$A_{mis}$  = Attenuation provided by miscellaneous other effects

Attenuation by air absorption and miscellaneous effects is assumed as zero in all the predictions.

An allowance of 20dBA has been assumed with a 3m high barrier constructed of overburden / topsoil on the north-east boundary. Noise levels within 10m in development works using excavators / dumpers have the highest spectral energy in the range above 500Hz (refer to Appendix V - barrier calculations as per BS 5228-1:2009).



Table 11.5 gives the predicted noise levels for the different operating scenarios. Maximum LAeq 1hr noise levels are given for the different scenarios including construction of a 3m high barrier on north-east boundary.

**Table 11-5:** Predicted noise level for Scenario 1, 2 and 3

Scenario No.	Noise Monitor ID				
	N1	N1A	N2	N3	N3A
Scenario 1* LAeq 1hr – Construction	46.3	47.2	46.3	59.3	51.4
LAeq 1hr – Constructing berm (NE boundary)	43.5	45.4	43.5	63.5	54.6
Scenario 2 LAeq 1hr - Operation	41.5	43.4	42.2	51.0	44.0
Scenario 3-LAeq 1hr - Operation	37.6	41.3	39.1	46.0	41.6
Scenario 4-LAeq 1hr - Operation	40.8	42.9	45.8	50.8	42.9

\* Maximum levels from construction and barrier construction of berm will be of duration of no more than 1 week equivalent (40 hrs)

#### 11.1.6 Noise Assessment of Berm Construction Works (Scenario 1)

Noise levels have been predicted at receptor locations on the perimeter of the site. The maximum level predicted are during the construction of a barrier / berm on the north-east development which will persist for no more than 1 week equivalent (40 hrs). The maximum levels from construction involving overburden removal will persist for no more than 1 week equivalent. The predicted noise levels are within the guidelines recommended by the NRA and by those given in Part 1 of BS 5228.

#### 11.1.7 Noise Assessment of Sand and Gravel Operation Proposal

Noise levels have been predicted at receptor locations using different scenarios for receptors surrounding the site. Mitigating measures have been recommended where deemed necessary. The predicted noise levels are maximum levels and include the cumulative effects of all activity. The predicted noise levels are below the levels recommended by the EPA Environmental Management Guidelines for Quarries.

#### 11.1.8 Road Traffic Noise Impacts

The low level traffic flow from the pit is via an established slip tarred road which leads on to a L7062 road and then a short distance on to the N80 road. There are no houses along this section of road, however there are houses located to the north and south which are more than 20m away.

A traffic flow assessment has been undertaken by road traffic consultant (Mr. Alan Lipscombe) for years 2020 and 2034. Flows were taken of the Local Road and the N80 north and south. The increase to the N80 is given as 2.1% while the greatest increase is 28.1% on the Local Road.

There is a logarithmic relationship between traffic flow and noise levels and typically doubling the road traffic flow will increase the noise levels by 3dBA. An increase in traffic flow by 28.1% will

increase traffic noise levels by no more than 1dBA. The increase in road traffic will be negligible at all receptors.

#### 11.1.9 Ground Vibration

The level of ground vibration at 20m from a loaded truck will be below the human threshold at less than PPV of 0.03mm/sec.

#### 11.1.10 Mitigation Measures Proposed

- Reversing beeper on mobile plant can be replaced with 'white noise beepers' which is not audible to any receptors.
- Acoustic berms of minimum 3m height will be constructed along the north-east extraction boundary of the site.
- The mobile crushing and screening plant will be located in the concrete laydown area of the existing sand and gravel pit, or alternatively be located close to the operating face thereby giving maximum barrier attenuation effect
- Rubber lining will be installed on crusher / screener systems
- All motors and pulleys will be maintained to a high standard with regular maintenance so as to avoid any tonal or impulsive components in the emission.
- All mobile plant on site will have well maintained silencers.
- Machinery will be throttled down or turned off when not in use.
- A noise buying standard will be put in place where any replacement of plant will have noise characteristics considered.

#### 11.8 Do-nothing Scenario

If the proposed development were not to proceed, the operator would continue to operate in the area with existing planning permission until resource material in that area expired. Work would then be suspended.

#### 11.9 Decommissioning

Noise effects during decommissioning are likely to be of a similar nature to that during construction. It is likely that the duration of decommissioning will be shorter than that during construction. Any legislation, guidance or best practice relevant at the time of decommissioning would be complied with.

#### 11.10 Noise Monitoring

It is proposed to carry out noise monitoring at locations on the perimeter of the site on an annual basis close to receptors, at locations where road traffic would be at a minimum, or excluded from measurement.

### 11.11 Residual Impacts

It is not anticipated that there will be an adverse impact on noise quality in the vicinity of the application site provided that mitigation measures and best practice is applied.

### 11.12 Technical Difficulties

The only technical difficulty encountered was the fact that the site is currently dormant and without operations and as such, a real-time assessment of noise impacts could not be undertaken. However, this was overcome by noise level prediction modelling as outlined in Section 11.7. Noise monitoring will be undertaken going forward.

### 11.13 Conclusion

Noise levels for the proposal have been predicted and include the cumulative effects of activity. Predictions have been made of maximum hourly noise levels with no allowance made for ground absorption or air attenuation. The predicted noise levels are well within the levels recommended by the EPA Environmental Management Guidelines-Environmental Management in Extractive Industry (Non Scheduled Minerals).

## 11.14 References

Department of Communities and Local Government (1993) Minerals Planning Guidance 11 – The Control of Noise at Surface Mineral Workings (MPG-11)

Department of the Environment, Heritage and Local Government (2004) Quarries and Ancillary Activities: Guidelines for Planning Authorities

DEFRA (2005) Update of Noise Database for Prediction of Noise on Construction and Open Sites

EPA (2006) Environmental Management Guidelines Environmental Management in the Extractive Industry (Non-Scheduled Minerals)

EPA (2012) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)

EPA (2016) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)

BS5228 (2009) Code of Practice for Noise Control on Construction and Open Sites. Part 1: Noise

Safety Health and Welfare at Work (Control of Noise at Work) Regulations 2006 (S.I. No. 371 of 2006)



## Figures





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**Legend**

Application Area  
Area = 14.7 Ha

N1 Noise Monitoring Location



O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

Rev	Description	Date

**EARTH SCIENCE PARTNERSHIP**  
CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
Tonranny Westport Co. Mayo  
tel: +353(0)98 28999 fax: +353(0)98 24727  
e-mail: earthsciencepartnership@gmail.com  
Ordnance Survey Ireland Copyright Licence No.: EN 0021419

Client: Kilcarrig Quarries Ltd.  
Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Noise Monitoring Location Map  
Drawn By: Sean O' Donnell  
Checked By: Patrick O' Donnell  
Scale: 1:7,000 @ A4 Date: Apr. 2019  
Job No: EI 061 Rev: 0

Figure 11.1



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## 12.0 TRAFFIC

### 12.1 Introduction

#### 12.1.1 Purpose of Chapter

The purpose of this chapter is to assess the traffic impact of the additional traffic movements that will be generated by the proposed development, which is located in the townland of Roscat, County Carlow. The site is situated approximately 3 kms to the south of Tullow off the N81 National Secondary Road, which links Tullow and Enniscorthy. The magnitude of the increase in traffic volumes experienced on the surrounding network is identified during the operational phase of the proposed development.

#### 12.1.2 Scoping and Meetings

In order to ensure the scope of this report was to the satisfaction of Carlow County Council, a scoping document was issued in October 2018 to Carlow County Council Roads Department.

All of the traffic and transport related issues raised in the written correspondence received from Carlow County Council are addressed in this Section

#### 12.1.3 Statement of Authority

This section of the EIAR has been prepared by Alan Lipscombe of Alan Lipscombe Traffic and Transport Consultants. Alan is a competent expert in traffic and transport assessments. In 2007, Alan set up a traffic and transportation consultancy providing advice for a range of clients in the private and public sectors. Prior to this, he was a founding member of Colin Buchanan's Galway office having moved there as the Senior Transportation Engineer for the Galway Land Use and Transportation Study.

Since the completion of that study in 1999, Alan has worked throughout the West of Ireland on a range of projects including: major development schemes, the Galway City Outer Bypass, Limerick Planning Land-Use and Transportation Study, Limerick Southern Ring Road Phase II and Shannon Tunnel traffic forecasts and cost benefit analyses (COBA) and various studies for the NUI Galway. Before moving to Galway in 1997, Alan was involved in a wide variety of traffic and transport studies for CBP throughout the UK, Malta and Indonesia. He has particular expertise in the assessment of development related traffic and transport modelling, including for numerous wind and solar farm developments, and is an accomplished analyst who has experience of a wide variety of modelling packages and methods.

## 12.2 Methods

### 12.2.1 Method and Structure of the Traffic Assessment

The report adopts the guidance for such assessments set out by Transport Infrastructure Ireland (TII) in the document PE-PDV-02045-01 “Traffic and Transport Assessment Guidelines”. The key elements of the study are:

- A review of the existing transport infrastructure in the vicinity of the proposed development, including an assessment of 2018 traffic flows and traffic forecasts during an assumed opening year of 2019 and future year of 2034 (*Section 12.3 - Receiving Environment*),
- A description of the nature of the proposed development and the traffic volumes that will be generated when it is operational (*Section 12.4 – Proposed Development and Traffic Generation*),
- A review of the impact of development generated traffic on the surrounding network (*Section 12.5 –Traffic impact of Proposed Development*),
- A geometric assessment of the route and its capacity to accommodate the loads associated with the development (*Section 12.6 – Route Assessment*),
- A summary of likely and significant impacts (*Section 12.7 – Likely and Significant Impacts*),
- A summary of the proposed mitigation measures (*Section 12.8 – Mitigation Measures*).
- The conclusion is presented in the final section (*Section 12.9 – Conclusion*)

During the preparation of this assessment reference was made to the following documents:

- PE-PDV-02045-01 *‘Traffic and Transport Assessment Guidelines*, Transport Infrastructure Ireland (TII), May 2016,
- DN-GEO-03060 *“Geometric Design of Junctions*, Transport Infrastructure Ireland (TII), April 2017,
- PE-PAG- 02017 *“Project Appraisal Guidelines, Unit 5.3 Travel Demand Projections*, Transport Infrastructure Ireland (TII), October 2016,
- Automatic Traffic Count Data – TII Ireland
- Collision Statistic – Road Safety Authority.
- Carlow County Development Plan 2015 to 2021

## 12.3 Receiving Environment

### 12.3.1 Site Location and Network Summary

The location of the proposed development in Roscat, Tullow, County Carlow, is shown in the context of the national and local highway networks in Figure 12.1. The site is accessed from the

N81 approximately 3 kms south of Tullow, followed by the L6026 westbound for approximately 80 metres, and then south towards the site access on an un-named local road.

The existing road network is shown in Plates 12.1 to 12.9 attached in Appendix VI.

The most likely route for HGV trips to (and from) the proposed development will be from the direction of Tullow on the N81, followed by a right turn at the existing priority junction with the L6026, as shown in Plates 12.1 to 12.3. This junction is a standard priority type junction with a right turn facility for vehicles turning right off the N81. The junction has standard geometry with 3 x 3 m lanes on the N81 with the L6026 having a width of 6 metres. As shown in Plates 12.1 and 12.2 visibility splays are clear at this junction.

The route then turns left off the L6026 at the priority junction with the un-named local road (see Plates 12.4 to 12.6) which is just over 5 metres wide. While visibility is clear to the east at this junction, as shown in Plate 12.5, visibility to the west, while sufficient to see approaching vehicles, would be significantly improved by trimming existing trees that overhang the carriageway edge.

It is proposed that access is gained to the site via an existing access junction that serves the existing Kilcarrig Sand & gravel Pit (see Plates 12.7 to 12.9).

A geometric assessment of the locations indicated in Figure 12.2 along the transport route is included in Section 5 based on the largest vehicles that will require access to the site, which is a large Tipper Truck with dimensions shown in Figure 12.3.

### 12.3.2 Existing and Future Traffic Flows

#### 12.3.2.1 Hours for traffic impact assessment

Trip generation estimates provided by the Client, as discussed in Section 12.4.2, show that the peak hours of activity for the proposed development will be the AM and PM peak hours. As background traffic flows also peak during these hours they were selected as the time periods on which to base the traffic impact assessment for the proposed development.

#### 12.3.2.2 Observed 2018 flows

Traffic count surveys were undertaken at the N81 / L6026 junction during the AM and PM peak periods on 24<sup>th</sup> May by Traffnomics Ltd. The counts are shown in terms of PCUs (passenger car equivalent units) for the weekday AM and PM peak hours, in Figure 12.4. The main points to note are as follows:

- The AM and PM peak hours were observed to be 08:45 to 09:45 and 16:45 to 17:45 respectively,

- Traffic flows on the N81 were observed to be slightly higher during the PM peak hour compared to the AM, with a maximum of 390 PCUs observed during the PM peak hour and 326 pcus during the AM.
- While traffic volumes on the L6026 were observed to be very light, flows were also observed to be higher during the PM peak hour (48 PCUS) compared to the AM peak hour (37 PCUs).

These traffic counts were adopted as base flows for the purpose of the junction capacity tests discussed in Section 12.5.2 of this report. A full listing of the traffic counts is included as Appendix VII.

A review of continuous Automatic Traffic Count (ATC's) sites maintained by Transport Infrastructure Ireland (TII), would suggest that a count on the N81 located to the south of Tullow is the most appropriate available source of continuous seasonal traffic count data. Data from 2017 shows that traffic flows during August were observed to be 5% higher than the survey month of May. The observed traffic flows were therefore factored by 1.05 in order to provide seasonally adjusted base year traffic flows, as shown in Figure 12.5. The TII data for the N81 is included as Appendix VIII.

#### *12.3.2.3 Opening year 2019 and future year 2034 traffic forecasts*

For the purpose of the traffic assessment it is assumed that the proposed development will open in the year 2019. While this could vary slightly in practical terms, the conclusions of this report would not be affected. In addition to the opening year, in accordance with TII guidelines, the capacity assessment was also based on traffic conditions forecast for the year 2034, 15 years after it is proposed that the development will open.

Opening year 2019 and future year 2034 traffic volumes on the study network were derived by applying a growth factor to the observed, seasonally adjusted, 2018 traffic counts. Annual growth indices were updated in October 2016 by TII, with annual indices and cumulative growth forecasts shown for the mid-eastern region in Table 12.1. The derived growth factors applied to 2018 flows to determine background traffic flows for the study years are shown in Table 12.2. Based on TII growth factors for cars and light vehicles for the medium growth scenario, traffic is forecast to grow by 1% between 2018 and 2019, and by 14% between 2018 and 2034. These growth estimates were adopted for the purpose of this assessment. Background traffic forecasts for the years 2019 and 2034 are shown in Figures 12.6 and 12.7 respectively.

**Table 12-1:** TII traffic growth rates, light vehicles, mid-east region.

Year	Lights - Annual factor			Lights - Cumulative index		
	Low	Medium	High	Low	Medium	High
2018	1.0076	1.0106	1.0118	1.008	1.011	1.012
2019	1.0076	1.0106	1.0118	1.015	1.021	1.024
2020	1.0076	1.0106	1.0118	1.023	1.032	1.036
2021	1.0076	1.0106	1.0118	1.031	1.043	1.048
2022	1.0076	1.0106	1.0118	1.039	1.054	1.060
2023	1.0076	1.0106	1.0118	1.046	1.065	1.073
2024	1.0076	1.0106	1.0118	1.054	1.077	1.086
2025	1.0076	1.0106	1.0118	1.062	1.088	1.098
2026	1.0076	1.0106	1.0118	1.071	1.100	1.111
2027	1.0076	1.0106	1.0118	1.079	1.111	1.124
2028	1.0076	1.0106	1.0118	1.087	1.123	1.138
2029	1.0076	1.0106	1.0118	1.095	1.135	1.151
2030	1.0076	1.0106	1.0118	1.103	1.147	1.165
2031	0.9996	1.0022	1.0038	1.103	1.149	1.169
2032	0.9996	1.0022	1.0038	1.103	1.152	1.174
2033	0.9996	1.0022	1.0038	1.102	1.155	1.178
2034	0.9996	1.0022	1.0038	1.102	1.157	1.183

**Table 12-2:** TII derived traffic growth rates.

Period	Lights - Cumulative index		
	Low	Medium	High
2018 to 2019	1.01	1.01	1.01
2018 to 2034	1.09	1.14	1.17

#### 12.3.2.4 RSA Collision data

It is noted from the collision database maintained by the Road Safety Authority, included as Appendix IX, that there were no collisions at the N81 / L6026 junction, or on the local road leading to the site during the years 2005 to 2014 inclusive. This would indicate that the local road network has operated relatively safely during this 10 year period.

### 12.4 Proposed Development and Traffic Generation

#### 12.4.1 Description of the Proposed Development

The proposed development comprises of a greenfield area of an existing sand and gravel pit which is not currently operational. It is proposed that sand and gravel will be extracted from the existing greenfield area, with a full description of the proposed development and likely day to day activity presented in Section 3 (Project Description) of this EIAR.

#### 12.4.2 Development Trip Generation

Traffic generation resulting from the proposed development is based on the following;

- 50,000 tonnes of material will be extracted per annum, with 20 tonnes per truck load, resulting in 2,500 truck movements per annum.
- Based on 255 working days per year, there will be approximately 20 truck movements in and out of the site per day.
- For the AM and PM peak hours it was assumed that 2 of these trips travelling in and out of the site will occur during each peak hour.
- The proposed development will require 1 employee on site, who is assumed to arrive by car during the AM peak hour, and leave during the PM peak hour.
- Each HGV movement was weighted by 2.4 to convert to PCUs.

A summary of the trips generated by the proposed development is provided by time period in Table 12.3 with the additional trips generated through the N81 / L6026 junction in Figure 12.8. With proposed development traffic flows are shown for the opening year 2019 and future year 2034 in Figures 12.9 and 12.10 respectively.

**Table 12-3:** Trip generation for Proposed Development, by time period.

Time period	In			Out		
	Cars	HGVs	PCUs	Cars	HGVs	PCUs
AM peak hour	1	2	6	0	2	5
PM peak hour	0	2	5	1	2	6
All day	1	10	25	1	10	25



## 12.5 Traffic Impact of Proposed Development

### 12.5.1 Impact on link flows

The impact that the proposed development is forecast to have on link flows on the surrounding road network during the AM and PM peak hours, and all day, is shown for both the opening year 2019, and future year 2034, in Tables 12.4 to 12.6. The key points to note are as follows:

- The maximum increase in traffic volumes on the N81 due to the proposed development is forecast to be +2.1%, which will apply to the N81 northern arm during the AM peak hour.
- In terms of all day traffic flows, the proposed development is forecast to increase traffic volumes on the N81 by a maximum of 0.5%.
- The proposed development is forecast to increase traffic volumes by a maximum of 28.2% on the L6026 during the AM peak hour, and by 5.8% all day.

TII guidelines suggest that a detailed capacity assessment should be undertaken for junctions where the proposed development is forecast to result in an increase in traffic volumes of +10% on the main traffic route, or +5% in instances where the network is already congested. This would suggest that a detailed junction capacity assessment is not required for the proposed development. As an assessment of this junction was, however, requested by Carlow County Council, a detailed capacity assessment is presented in the following Section 12.5.2.

**Table 12-4:** Link flows for without and with Proposed Development, AM peak hour (2-way in PCUs)

Arm	Year 2019				Year 2034			
	Existing	With Proposed Dev.	Difference	% diff	Existing	With Proposed Dev.	Difference	% diff
N81 (north)	336	343	7	2.1%	379	386	7	1.8%
L6026	39	50	11	28.2%	44	55	11	25.0%
N81 (south)	346	350	4	1.2%	390	394	4	1.0%

**Table 12-5:** Link flows for without and with Proposed Development, PM peak hour (2-way in PCUs)

Arm	Year 2019				Year 2034			
	Existing	With Proposed Dev.	Difference	% diff	Existing	With Proposed Dev.	Difference	% diff
N81 (north)	380	387	7	1.8%	429	436	7	1.6%
L6026	51	62	11	21.6%	57	68	11	19.3%
N81 (south)	414	418	4	1.0%	467	471	4	0.9%

**Table 12-6:** Link flows for without and with Proposed Development, All day (2-way in PCUs)

Arm	Year 2019				Year 2034			
	Existing	With Proposed Dev.	Difference	% diff	Existing	With Proposed Dev.	Difference	% diff
N81 (north)	6,411	6,442	32	0.5%	7,237	7,269	32	0.4%
L6026	860	910	50	5.8%	962	1,012	50	5.2%
N81 (south)	6,984	7,002	18	0.3%	7,878	7,896	18	0.2%

### 12.5.2 Traffic impact on N81 Tullow Road / L6026 junction

The junction capacity assessment was undertaken using the industry recognised junction analysis programme PICADY which allows the capacity of any priority junction to be assessed with respect to existing or forecast traffic movements and volumes for a given time period. The capacity for each movement possible at the junction being assessed is determined from geometric data with the output used in the assessment as follows:

- Queue – This is the average queue forecast for each movement and is useful to ensure that queues will not interfere with adjacent junctions.
- Ratio of flow to capacity (RFC) – As suggested, this offers a measure of the amount of available capacity being utilised for each movement. Ideally each movement should operate at a level of no greater than 0.85, or at 85% of capacity.
- Delay – Output in minutes, this gives an indication of the forecast average delay during the time period modelled for each movement.

Tests were undertaken for the AM and PM peak hours at the N81 / L6026 junction for the opening year of 2019 and future year of 2034, and for the existing and with proposed development flow scenarios.

The results of the capacity test for the priority junction are shown in Tables 12.7 and 12.8 with the main points to note as follows:

- The impact of the proposed development traffic during the opening year 2019 is to increase the maximum RFC, which applies to the right turn onto the N81 during the PM peak hour, from 6.2% to 6.8%.
- By the future year 2034, the junction is forecast to continue to operate within capacity with a maximum RFC of 7.4%, increasing to 8.0% with the proposed development in place.

With an RFC of up to 85% considered to be within capacity, it is therefore concluded that the junction will operate well within capacity up to and beyond the year 2034, and that the impact of the additional traffic generated by the proposed development will be negligible.

The PICADY output file for the worst case scenario (PM peak hour with proposed development, year 2024) is attached as Appendix X.

**Table 12-7:** Junction capacity test results - N81 / L6026 junction, without and with proposed development, by time period, year 2019.

Year	Arm	No development			With development		
		RFC	Q	Delay	RFC	Q	Delay
AM	Right turn onto N81	3.4	0.04	0.15	4	0.04	0.15
	Left turn onto N81	2.3	0.02	0.12	2.9	0.03	0.12
	Right turn into L6026	0.8	0.01	0.11	1.6	0.02	0.11
PM	Right turn onto N81	6.2	0.07	0.14	6.8	0.07	0.15
	Left turn onto N81	1	0.01	0.14	1.9	0.02	0.14
	Right turn into L6026	0.8	0.01	0.11	1.4	0.01	0.11

**Table 12-8:** Junction capacity test results - N81 / L6026 junction, without and with proposed development, by time period, year 2034

Year	Arm	No development			With development		
		RFC	Q	Delay	RFC	Q	Delay
AM	Right turn onto N81	3.7	0.04	0.15	4.4	0.05	0.16
	Left turn onto N81	2.5	0.03	0.12	3.1	0.03	0.12
	Right turn into L6026	1	0.01	0.11	1.8	0.02	0.11
PM	Right turn onto N81	7.4	0.08	0.15	8	0.09	0.15
	Left turn onto N81	1.3	0.01	0.14	2.2	0.02	0.14
	Right turn into L6026	1	0.01	0.11	1.6	0.02	0.11

## 12.6 Route Assessment

### 12.6.1 Design vehicle

The largest vehicles that will require access to the site is a large tipper truck 10.2 meters long and 2.5 meters wide. The profile of such a vehicle is provided in Figure 12.3.

### 12.6.2 Route assessment

#### 12.6.2.1 Location 1 – N81 / L6026 junction

Tipper trucks travelling to / from Tullow will be required to negotiate this junction. An autotrack assessment based on OS mapping and the large tipper truck, as illustrated in Figure 12.11, shows that the largest vehicles that will require access to the site will be accommodated at this location.

#### 12.6.2.2 Location 2 – L6026 / local road junction

The autotrack assessment shown in Figure 12.12 indicates that the tipper truck visiting the site will be able to negotiate this junction.

#### 12.6.2.3 Location 3– Proposed access junction

It is noted that the access junction that will serve the proposed development is an existing junction that served to existing Kilcarrig sand and gravel pit when it was operational. Details for the proposed access junction off the local road are shown in Figures 12.13 to 12.15.

The existing / proposed access junction takes the form of a simple priority junction with the development access forming the minor arm of the junction. It is proposed to improve the existing junction by providing the following;

- Formal STOP markings and signage at the junction, in accordance with Figure 7.35 of the Traffic Signs Manual, as shown in Figure 12.13.
- Edge of carriageway markings and junction radii delineating the junction in order to reduce speeds for traffic entering and exiting the site and improve traffic safety.

Available visibility splays are shown in Figure 12.14. Sections 11.19.1 to 11.19.3 of the Carlow County Development Plan 2015 – 2021 states that “*where a new entrance onto a public road is proposed*” for a local road, a sight distance, or visibility splay, of 90 metres is required “*unless a safety audit is submitted to justify a reduced sight distance*”. While 90 metre visibility splays are not available, the junction with the L6026 is just 45m away, the following justification for reduced visibility splays is provided. Visibility requirements at junctions are directly related to sight stopping distances, which in turn relate to traffic speeds. In the current TII guidelines DN-GEO-03060 Geometric Design of Junctions, no guidelines are provided for the situation at the Proposed Development access, where speeds on the local road are low. Due to the close proximity of the L6026 junction, and the fact that the access is located on a bend in the local road, actual speeds are likely to be maximum of 50 km/h. The best indicator of what may be considered safe based on this speed, is given in the Design Manual for Urban Roads and Streets (DMURS), which provides visibility splay requirements according to traffic speeds. As set out in Table 4.2 of DMURS, visibility splay requirements of 45m would be required for a design speed of 50km/h. Visibility splays of 2.4m x 45m are shown in Figure 12.14. While the 45m visibility splay is provided to the nearside carriageway edge to the north, due to the existing shrubs and boundary (see Plate 8) it is shown to the centre of the road to the south. While trimming existing shrubs will improve visibility in this direction, as oncoming vehicles are visible from 45m away, it is considered that this will provide a safe access for all road users at this location. This would be supported by the RSA data presented in Appendix X, which shows that no collisions occurred at this access junction when the existing development was operational.

It was considered that a Road Safety Audit was not required for this location as it is an existing junction.

An autotrack assessment showing that the junction will accommodate the design tipper truck is shown in Figure 12.15.

## 12.7 Likely and Significant Impacts

### 12.7.1 “Do Nothing” Scenario

If the proposed development does not proceed there would be no impact in terms of changes in traffic levels on the surrounding road network.

### 12.7.2 Likely Effects of Proposed Development on Highway Network

During the operational phase of the proposed development the impact of the additional development generated traffic on the N81 will be slight, increasing traffic flows by a maximum of 2.1% during the AM peak hour and by 0.5% all day.

On the L6026 leading to the site access, existing traffic volumes are very low, and the impact of the additional traffic generated by the proposed development will be more noticeable. With a daily maximum 2-way flow of 50 pcus, equating to +28.2% during the AM peak hour, and +5.8% during the day, the impact on the L6026 and local road leading to the site will also be slight.

## 12.8 Mitigation Measures

The following measures will be implemented in order to minimise the impact of the proposed development:

- Improvements to the existing junction that will provide access to the proposed development, as set out in Section 12.6.2 and Figure 12.13, including junction markings and signage in accordance with the Traffic Signs Manual,
- Vehicle washing facilities will be provided as part of the proposed development in order to prevent mud and debris on the local road network.
- Road sweeping equipment will be available on the site in the event material is transported and deposited on public roads.

## 12.9 Conclusion

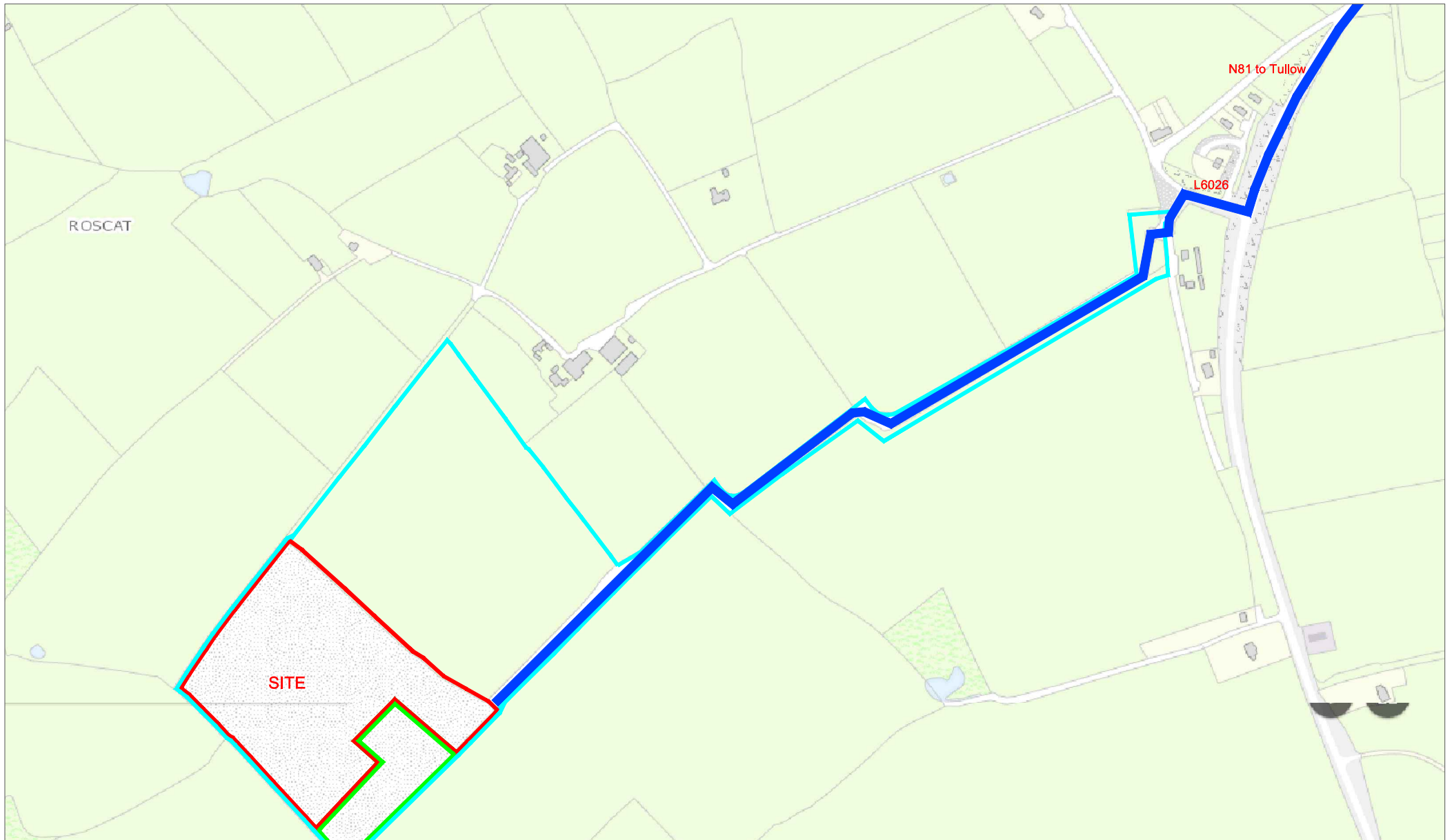
From the assessment outlined in this section, it is concluded that the relatively low volumes of traffic that will be generated by the proposed development will have a slight impact on the existing local highway network, which is forecast to operate well within capacity up to the year 2034 and beyond.



## Figures







NOTES:

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Figure 12.1 Site location and delivery route

PROJECT: Roscat Pit, Tullow, County Carlow

CLIENT: Kilcarraig Quarries Ltd

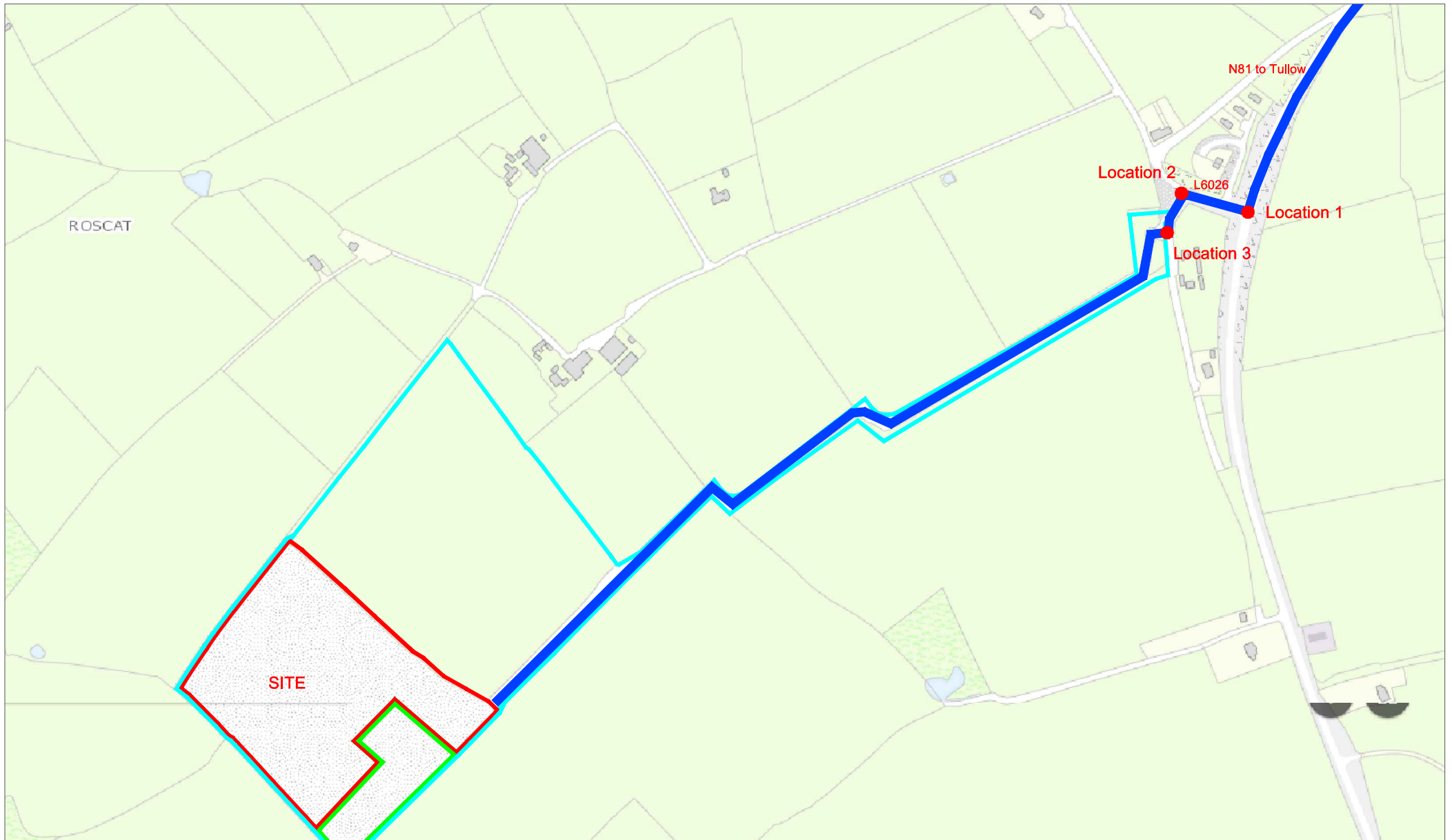
PROJECT NO: 7150

DATE: 02.12.18

SCALE: NTS

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Figure 12.2 Delivery route and autotrack assessment locations

PROJECT: Roscat Pit, Tullow, County Carlow

CLIENT: Kilcarraig Quarries Ltd

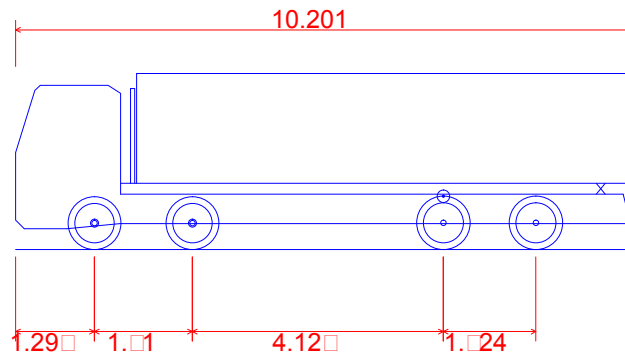
PROJECT NO: 7150

DATE: 02.12.18

SCALE: NTS

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Large Tipper  
 Overall Length  
 Overall Width  
 Overall Body Height  
 Min Body Ground Clearance  
 Max Track Width  
 Loc to Loc  
 Kerb to Kerb Turning Radius

10.201  
 2.00  
 2.9  
 0.4  
 2.00  
 0.00  
 11.000

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Figure 12.3 Large Tipper Truck Profile

PROJECT: Roscat Pit, Tullow, County Carlow

CLIENT: Kilcarraig Quarries Ltd

SCALE: 1:500

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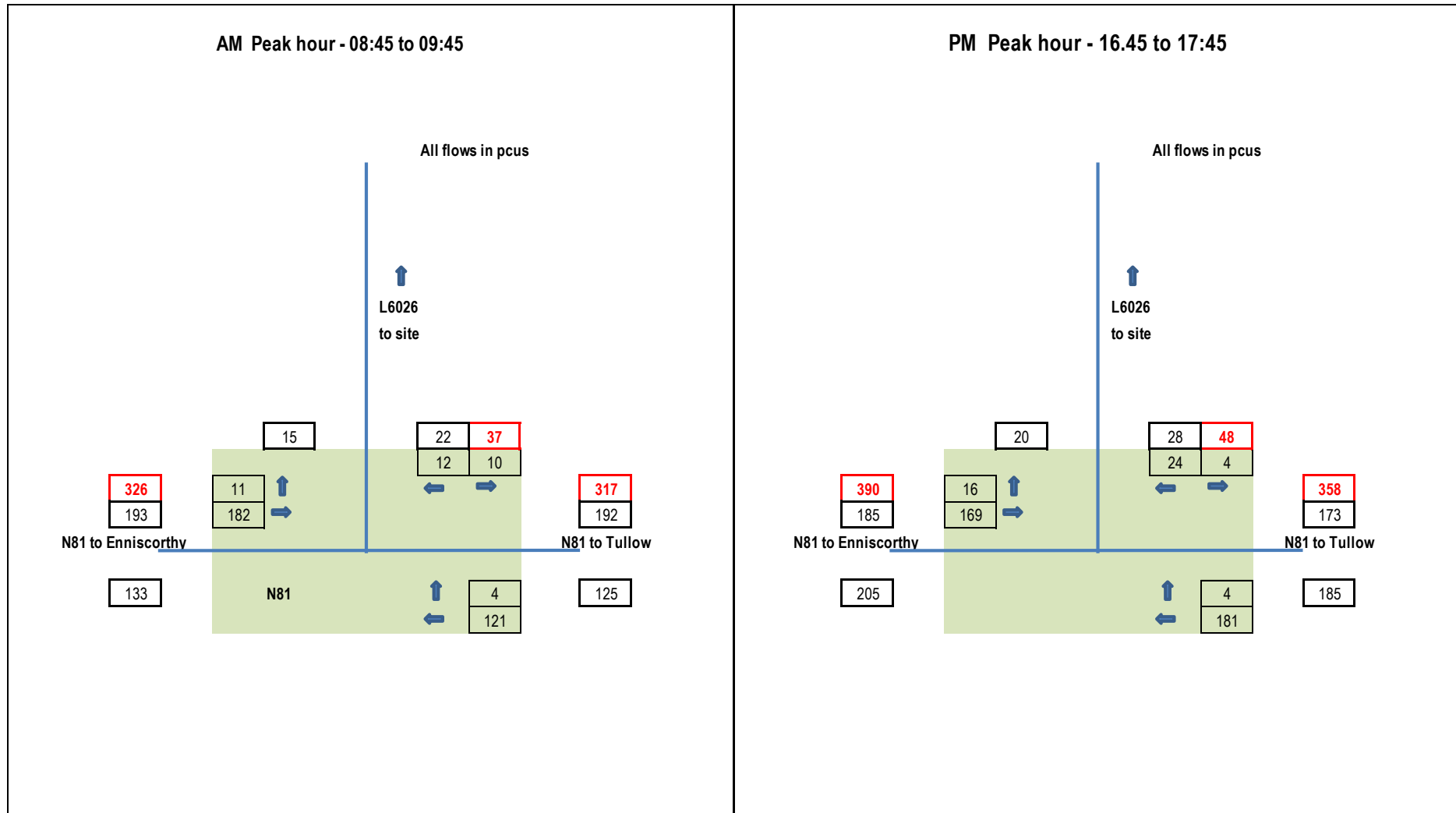


Figure 12.4 Observed traffic flows, AM & PM peak hours, May 2018

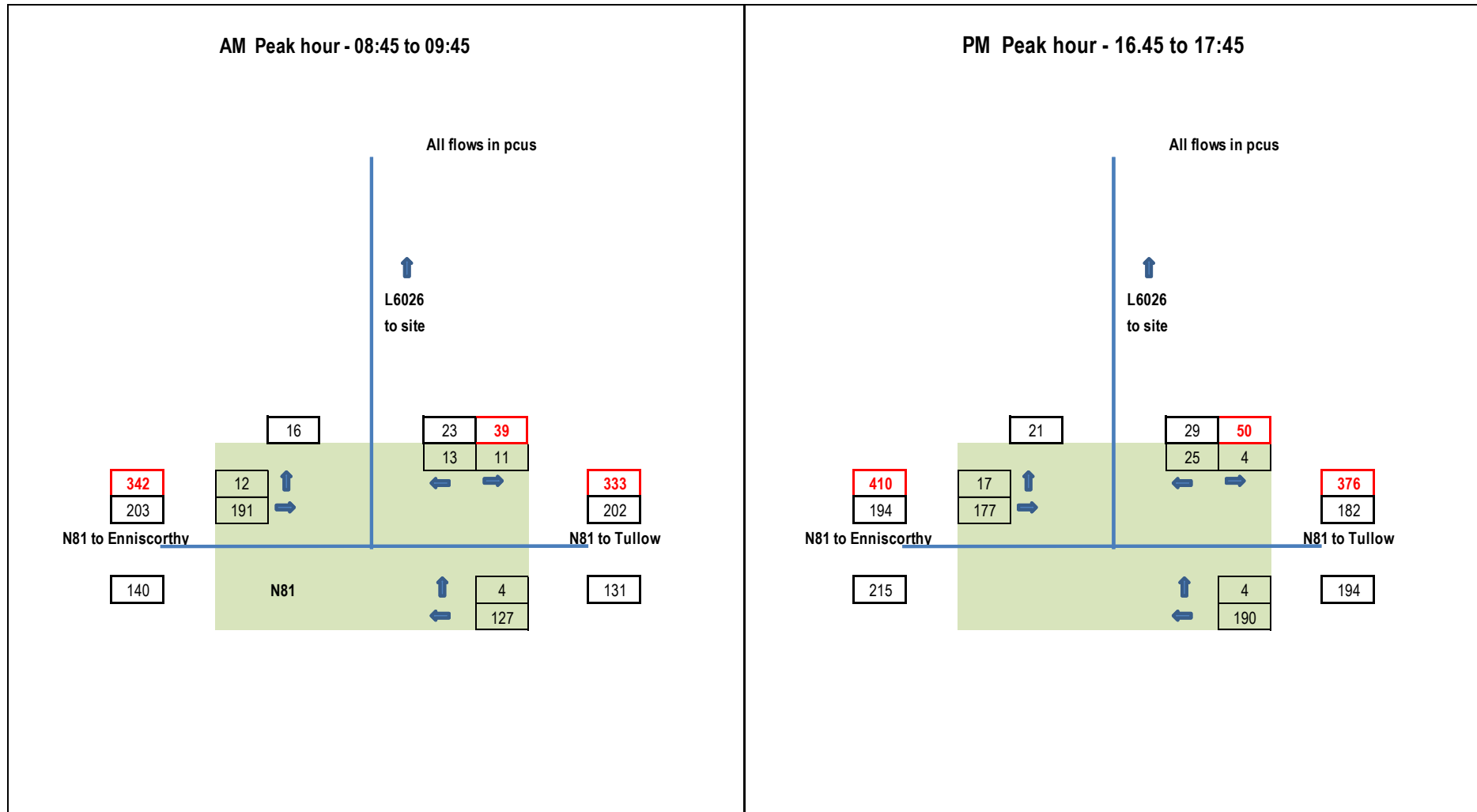


Figure 12.5 Seasonally adjusted traffic flows, AM & PM peak hours, August 2018

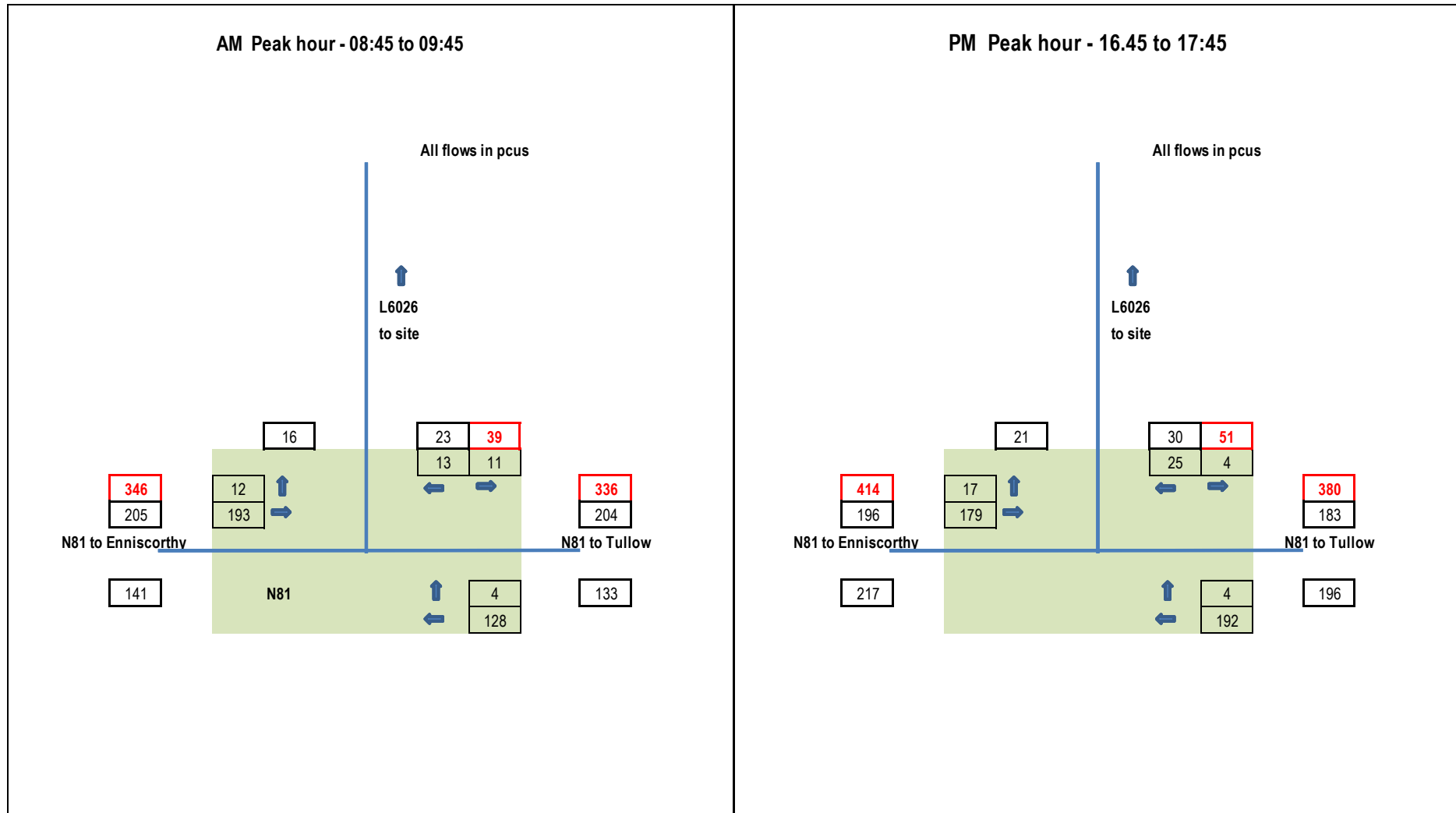


Figure 12.6 Background opening year traffic flows, AM & PM peak hours, year 2019

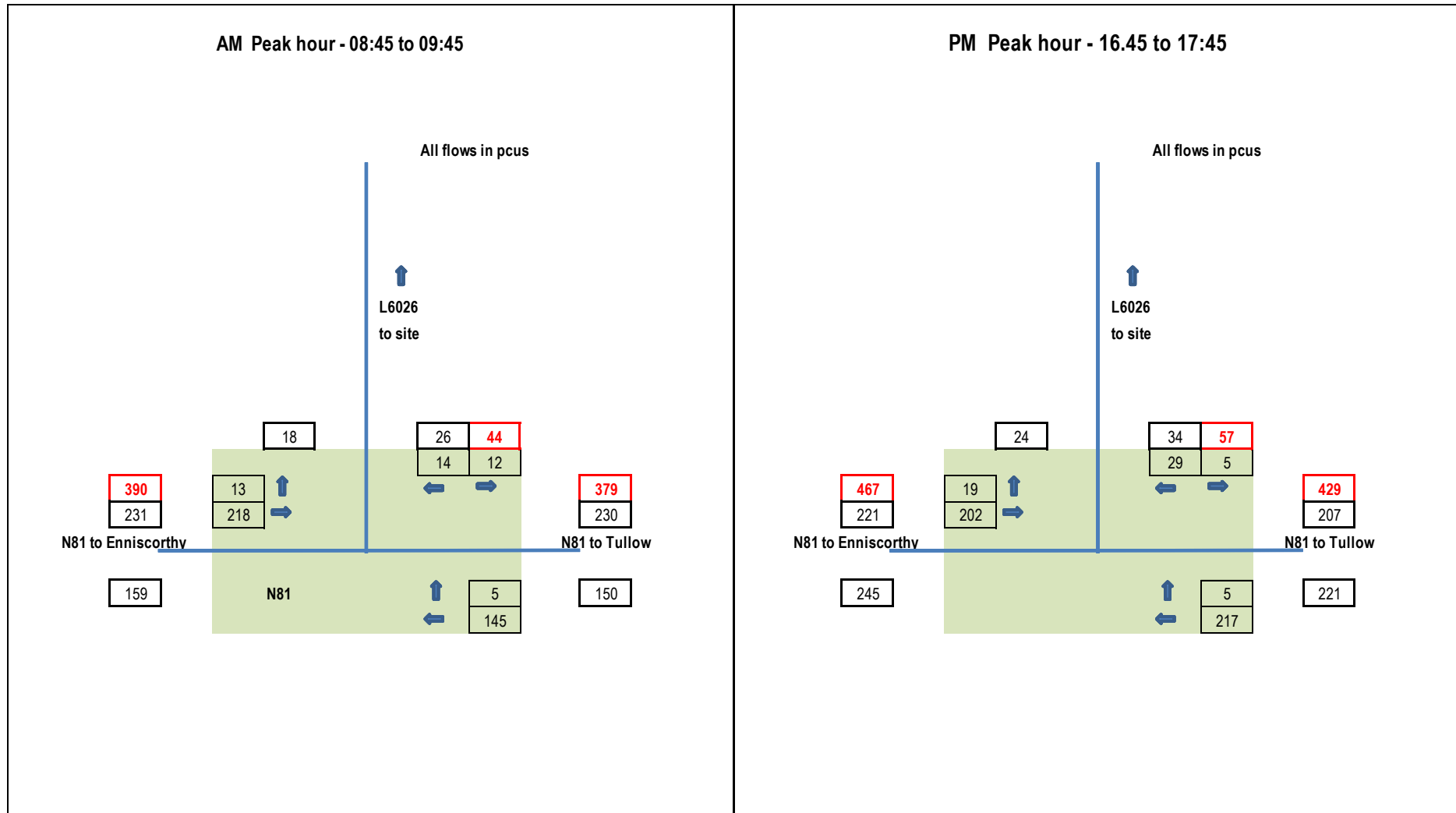


Figure 12.7 Background future year traffic flows, AM & PM peak hours, year 2034

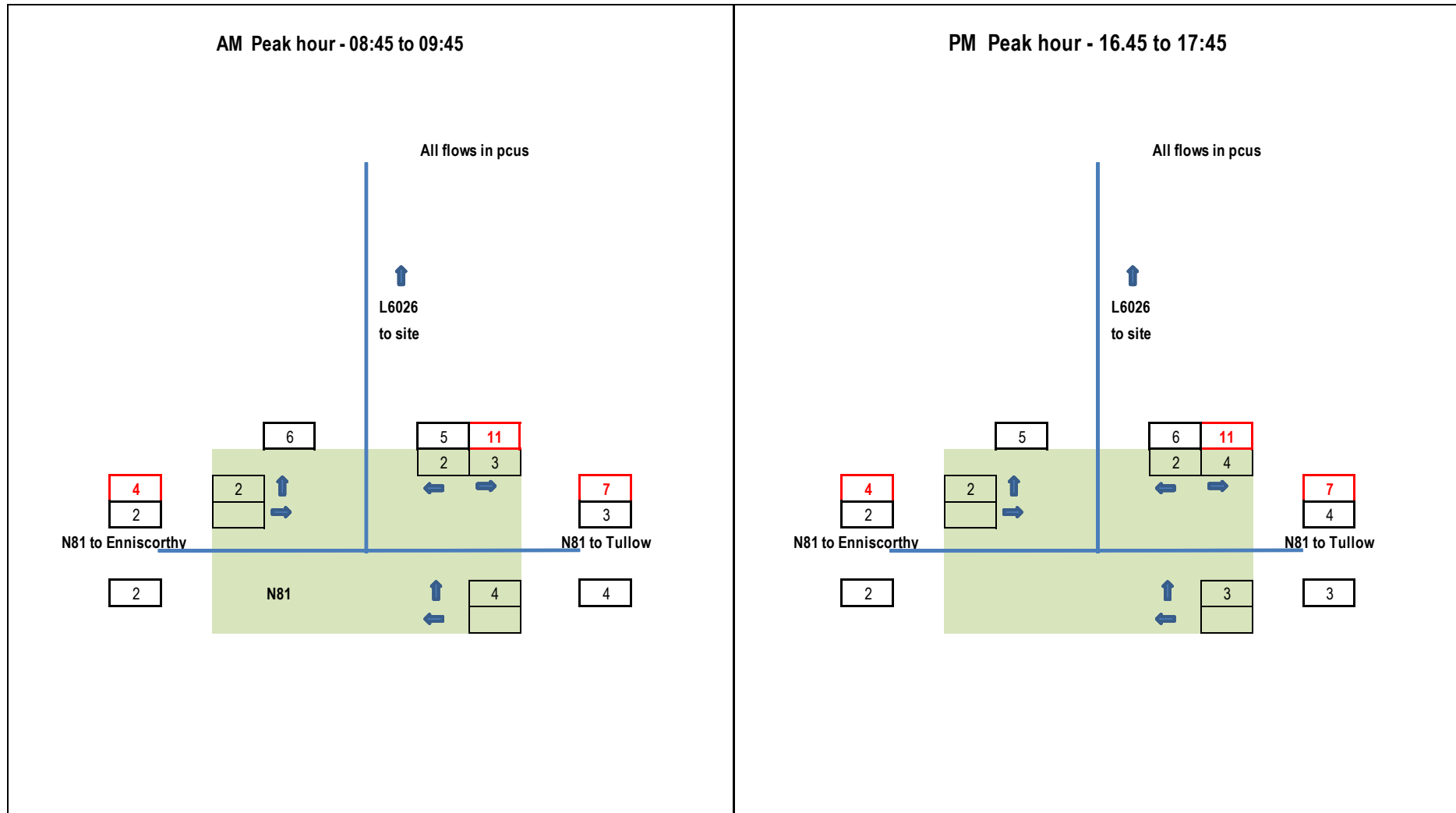


Figure 12.8 Additional development generated traffic flows, AM & PM peak hours



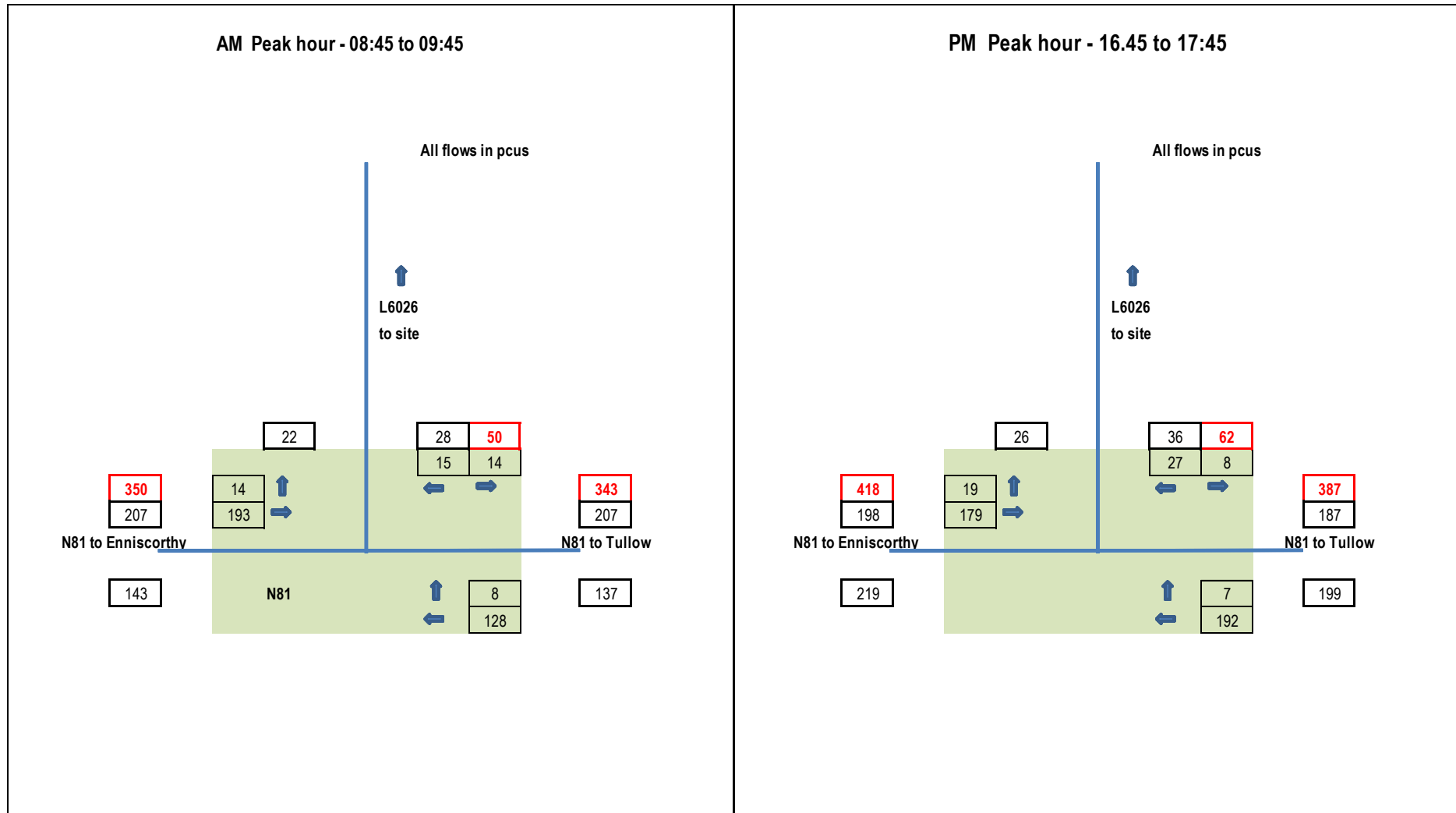
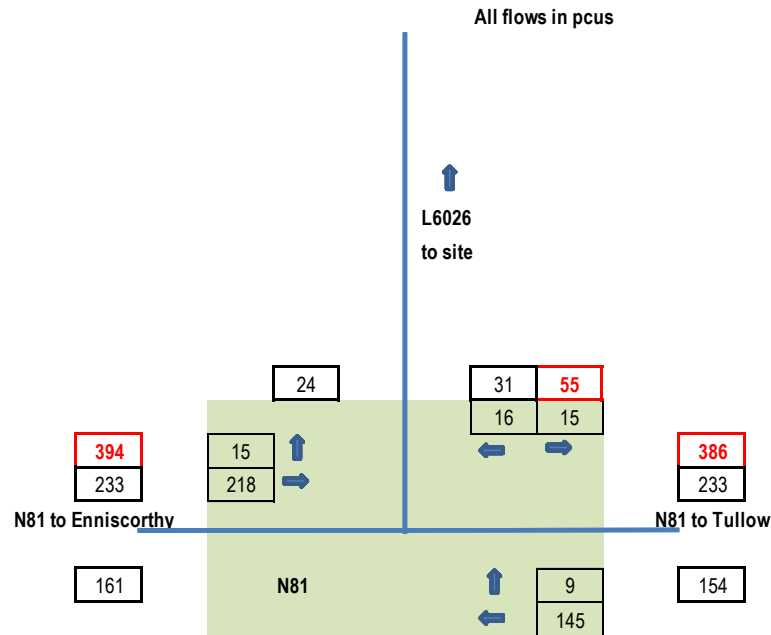


Figure 12.9 With development opening year traffic flows, AM & PM peak hours, year 2019

AM Peak hour - 08:45 to 09:45



PM Peak hour - 16.45 to 17:45

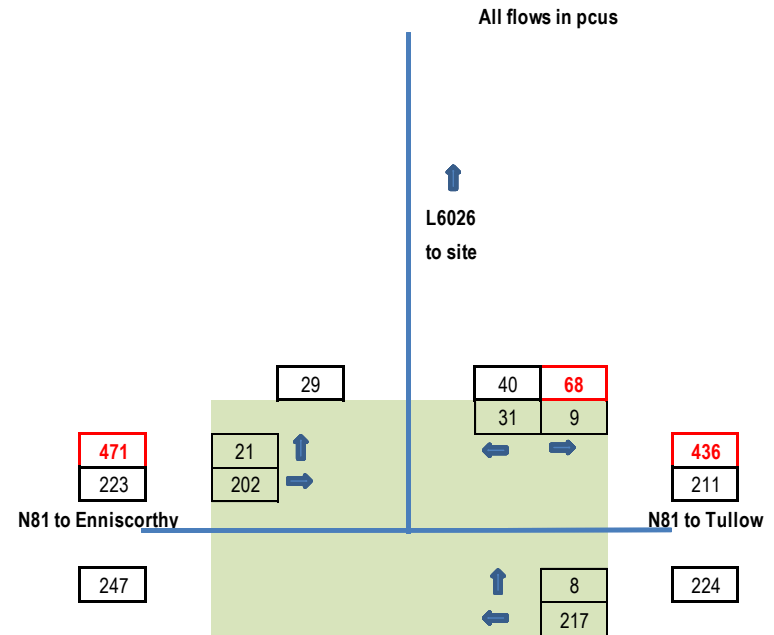
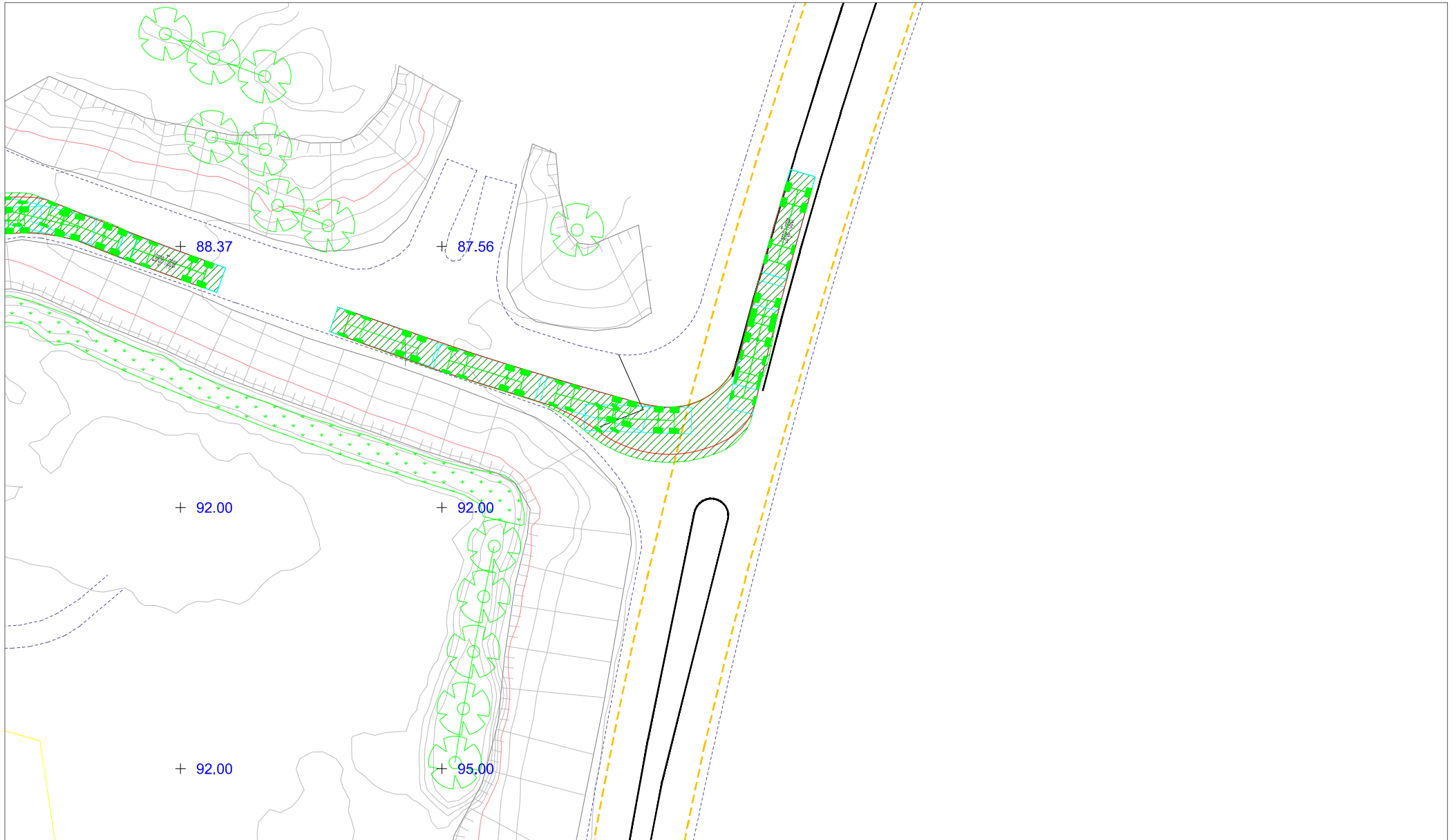


Figure 12.10 With development future year traffic flows, AM & PM peak hours, year 2034

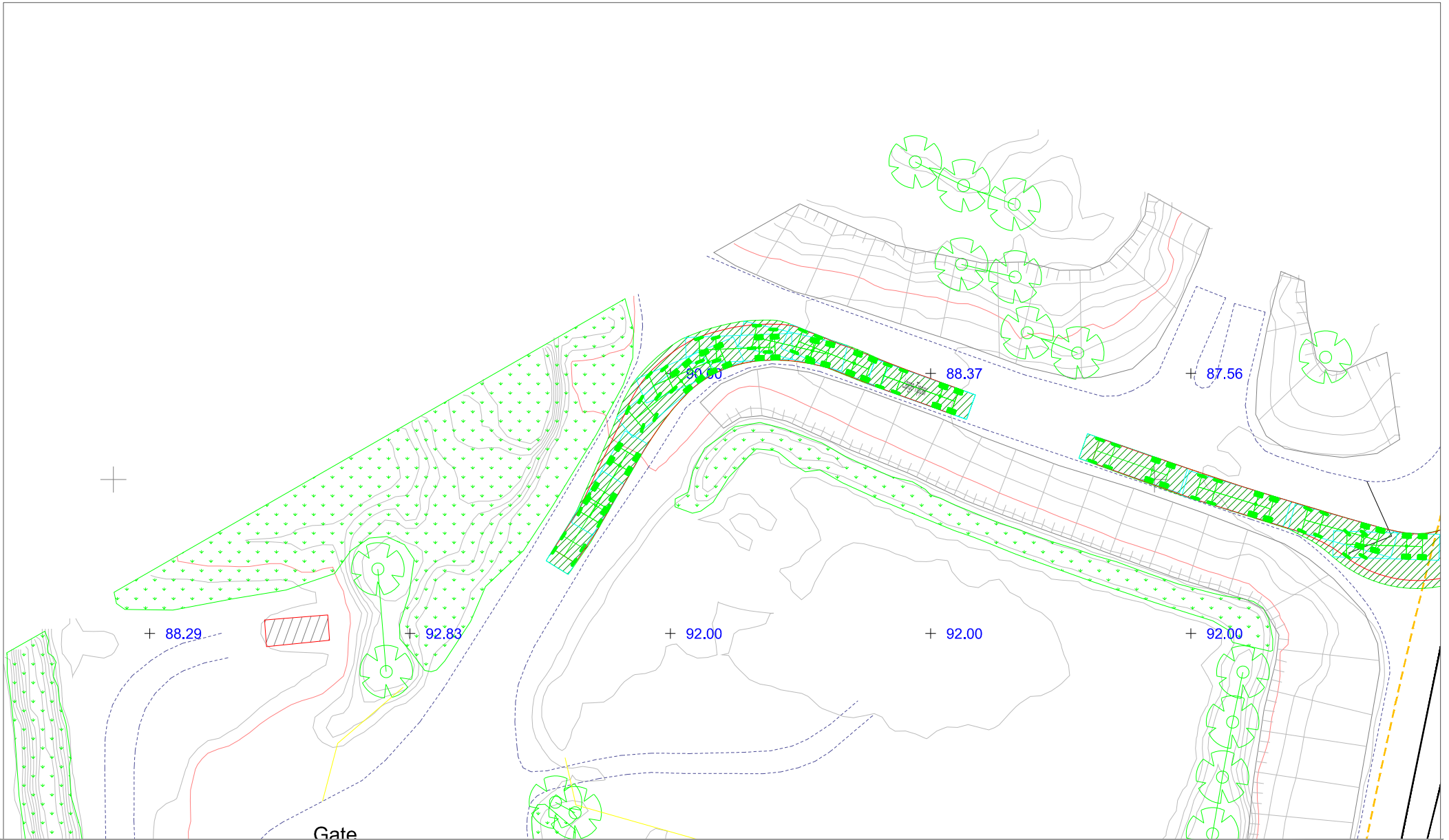


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Figure 12.11 Location 1 - autotrack assessment - N81 / L6026 junction

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CLIENT: Kilcarraig Quarries Ltd	SCALE: 1:500	
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Figure 12.12 Location 2 - autotrack assessment - L6026 / local road junction

PROJECT: Roscat Pit, Tullow, County Carlow

CLIENT: Kilcarraig Quarries Ltd

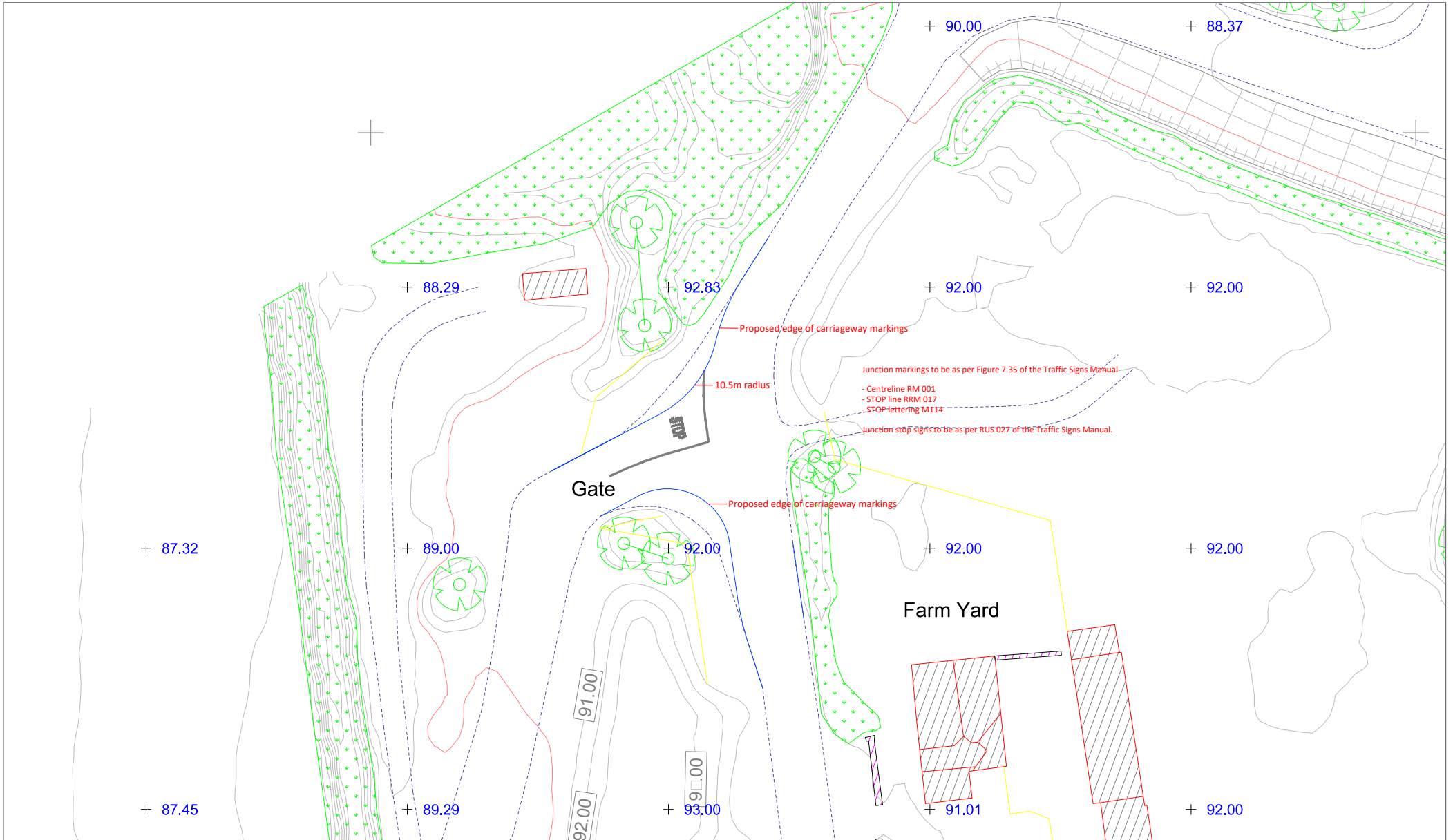
SCALE: 1:500

PROJECT NO: 7150

DATE: 02.12.18

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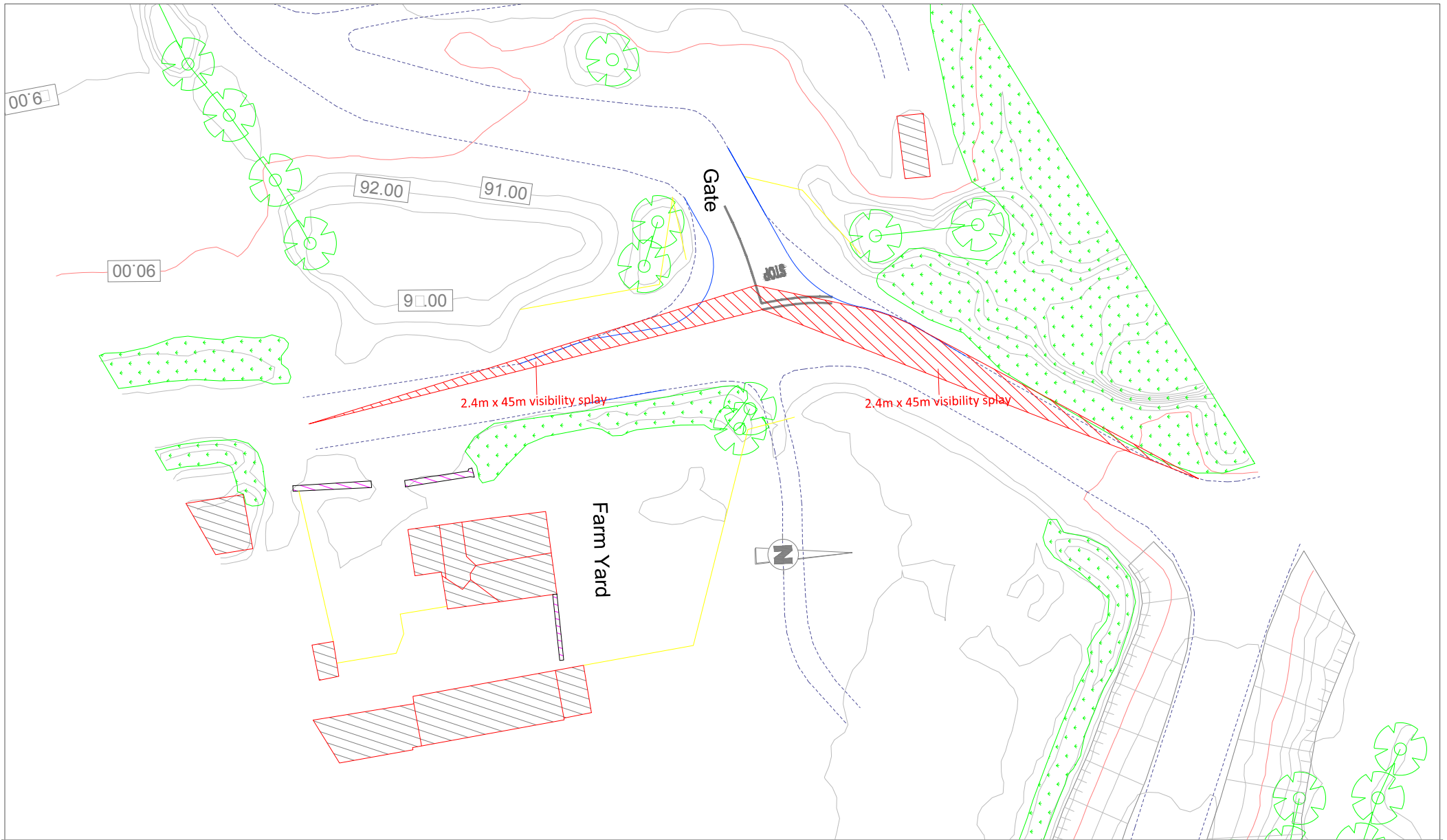
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Figure 12.13 Location 3 - Proposed access junction on local road

PROJECT: Roscat Pit, Tullow, County Carlow		<b>ALAN LIPSCOMBE</b> <b>TRAFFIC &amp; TRANSPORT CONSULTANTS</b>
CLIENT: Kilcarraig Quarries Ltd	SCALE: 1:500	
PROJECT NO: 7150	DATE: 02.12.18	



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Figure 12.14 Location 3 - Proposed access junction and visibility splay

PROJECT: Roscat Pit, Tullow, County Carlow

CLIENT: Kilcarraig Quarries Ltd

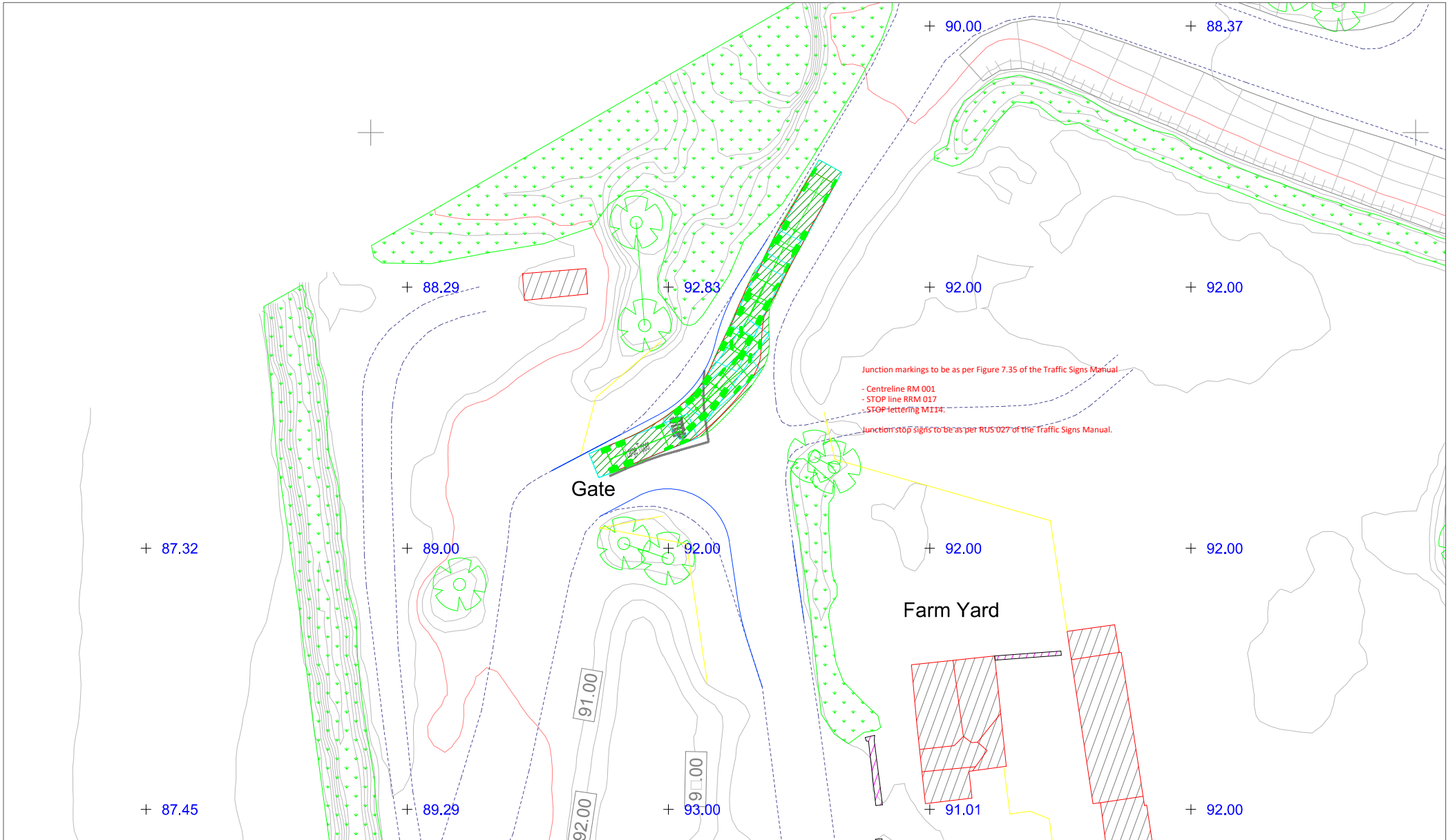
PROJECT NO: 7150

DATE: 02.12.18

SCALE: 1:1000

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Figure 12.15 Location 3 - Autotrack assessment - proposed access junction on local road

PROJECT: Roscat Pit, Tullow, County Carlow

CLIENT: Kilcarraig Quarries Ltd

PROJECT NO: 7150

DATE: 02.12.18

SCALE: 1:500

DRAWN BY: AL

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Figure 13.3 – Proposed Side Slope and Berm Details

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## 13.0 LANDSCAPE AND RESTORATION

### 13.1 Introduction

This chapter of the EIA assesses the landscape and visual impact associated with the development on the surrounding landscape in the vicinity of the sand and gravel pit site. Methodologies used to assess the landscape and visual impacts are outlined and mitigation measures are proposed where required. A landscaping plan is proposed which will be implemented during the operational lifetime of the development with a restoration plan which will be implemented on closure of the pit.

A landscape and visual impact assessment combines the magnitude of change with the sensitivity of the landscape to the development, which provides a measure of the significance of the impact. The acceptability of a development is determined by the extent to which the long-term landscape and visual effects are significant. Understanding the character quality and value of the landscape determines the sensitivity of that landscape to accommodate change through development. The two principal factors determining the visual impact of a development are the sensitivity of the location or receptor and the scale or magnitude of the development.

Figures 13.1 to 13.4 presented at the end of this chapter detail existing and proposed layouts and sections of the application site.

### 13.2 Methodology

A detailed landscaping assessment was undertaken to assess the impact of the proposed development on the surrounding landscape. This involved undertaking a visual impact assessment of the area and a desk-based study to gather information on the existing landscape, visual resource, planning context and landscape designations. Information has been gathered from the following sources:

- Ordnance Survey Ireland 1:2,500 maps and 1:50,000 maps
- Satellite imagery
- Carlow County Development Plan 2015 – 2021

The following methodologies for the assessment of landscape character, landscape sensitivity and visual impact have also been used in the preparation of this report:

- Department of the Environment (2000) Landscape and Landscape Assessment Guidelines
- Landscape Institute and the Institute of Environmental Management and Assessment (2002) 'Guidelines for Landscape and Visual Impact Assessment' by the (Second Edition).

- Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Assessment (Third Edition).
- CAAS Ltd. (2015) Carlow County Landscape Character Assessment and Schedule of Protected Views. Produced for Carlow County Council
- EPA (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR)

Field observations were undertaken to assess the landscape character and structure of the pit and its surroundings. A visual impact assessment of the pit was undertaken from publicly accessible viewpoints in the vicinity during May 2018. The Landscape Assessment of County Carlow was also consulted as part of the assessment. The county assessment is utilized during the decision making process in relation to development to ensure that protection of the environment, natural resources and heritage.

### 13.2.1 Landscape Assessment Criteria

When assessing the potential impacts on the landscape resulting from a development, the following criteria are considered:

- Landscape character, value and sensitivity
- Magnitude of likely impacts
- Significance of landscape effects

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new features without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified following the criteria outlined in Table 13-1.

**Table 13-1:** Landscape Value and Sensitivity

<b>Sensitivity</b>	<b>Description</b>
<b>High</b>	A landscape of particularly distinctive character, susceptible to relatively small changes.
<b>Medium</b>	A landscape of moderately valued characteristics reasonably tolerant to change.
<b>Low</b>	A relatively unimportant landscape, the nature of which is potentially tolerant to substantial change.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the proposal site boundary that may have an effect on the landscape character of the area (Table 13-2).

**Table 13-2:** Magnitude of Landscape Impacts

Magnitude of Impact	Description
<b>High</b>	Notable change in landscape characteristics over an extensive area and/or permanent long-term change.
<b>Medium</b>	Moderate changes in a localised area and/or medium-term change.
<b>Low</b>	Small change in any components and/or short-term/temporary change.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the matrix in Table 13-3.

**Table 13-3:** Landscape Impact Significance Matrix

Magnitude of Landscape Resource Change	Landscape Sensitivity		
	Low	Medium	High
<b>No Change</b>	No Change	No Change	No Change
<b>Low</b>	Slight	Slight/Moderate	Moderate
<b>Medium</b>	Slight/Moderate	Moderate	Moderate/Substantial
<b>High</b>	Moderate	Moderate/Substantial	Substantial

Note that potential beneficial landscape impacts are not accounted for in the tables and matrix above. This is on the basis that quarrying activities are very unlikely to generate beneficial landscape impacts. In the rare instance that this might occur, perhaps by facilitating the rehabilitation of a degraded landscape, the benefits will be discussed in the assessment and the significance of the impact would default to the lowest end of the range (Imperceptible).

### 13.2.2 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the development is assessed as a function of sensitivity versus magnitude. In this instance the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

#### 13.2.2.1 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It balances the visual susceptibility of the viewer against the value of the view on offer. The susceptibility of a viewer to changes in a particular view relates to the occupation or activity they are engaged in at that location and whether views of the surrounding landscape are an important aspect of that occupation or activity e.g. hill walkers versus commuters (Table 13-4). By comparison, the value of the view relates to the visual setting of the viewer and whether this is recognised through county designations and guidebooks or is likely to just have local value.

**Table 13-4:** Examples of Visual Receptor Sensitivity at Various Levels

Sensitivity	Examples
High	<ul style="list-style-type: none"> <li>• Users of an outdoor recreation feature which focuses on the landscape</li> <li>• Valued views enjoyed by the community</li> <li>• Tourist visitors to scenic viewpoint</li> <li>• Occupiers of residential properties with a high level of visual amenity</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Outdoor sports or recreation pass-times which do not offer or focus attention on landscape</li> <li>• Occupiers of residential properties with a medium level of visual amenity</li> </ul>
Low	<ul style="list-style-type: none"> <li>• Regular commuters</li> <li>• People at place of work</li> <li>• Occupiers of residential properties with a low level of visual amenity</li> </ul>

### 13.2.2.2 Magnitude of Visual Impact

The magnitude of visual effects is determined on the basis of two factors; the visual presence of the development and its effect on visual amenity. Visual presence is something of a quantitative measure relating to how noticeable or visually dominant the proposal is within a particular view. This is based on a number of aspects beyond simply scale in relation to distance. Some of these include the extent of the view as well as its complexity and the degree of movement experienced i.e. within a busy street scene. The backdrop against which the development is presented and its relationship with other focal points or prominent features within the view is also considered. Visual presence is essentially a measure of the relative visual dominance of the proposal within the available vista (Table 13-5).

**Table 13-5:** Magnitude of Visual Impact

Criteria	Description
<b>High</b>	Total loss or alteration to key elements/features/characteristics of the existing landscape or view and/or introduction of elements considered totally uncharacteristic when set within the attributes of the receiving landscape or view.
<b>Medium</b>	Partial loss or alteration to key elements/features/characteristics of the existing landscape or view and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic when set within the attributes of the receiving landscape/view.
<b>Low</b>	Minor loss or alteration to key elements/features/characteristics of the existing landscape or view and/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape/view.
<b>No Change</b>	Very minor loss or alteration to key elements/features/characteristics of the existing landscape or view and/or introduction of elements that are not uncharacteristic when set within the attributes of the receiving landscape/view.

### 13.2.2.3 Significance of Visual Impact

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the significance matrix in Table 13-6 below.

**Table 13-6:** Visual Impact Significance Matrix

Magnitude of Visual Resource Change	Visual Sensitivity		
	Low	Medium	High
<b>No Change</b>	No Change	No Change	No Change
<b>Low</b>	Slight	Slight/Moderate	Moderate
<b>Medium</b>	Slight/Moderate	Moderate	Moderate/Substantial
<b>High</b>	Moderate	Moderate/Substantial	Substantial

### 13.2.2.4 Assessments of Impacts

The classification of an impact results from assessing the following parameters:

- The scale and nature of any visual impact;
- The visibility of any visual impact;
- The potential number of receptors affected (i.e. residences, roads, tourists, etc.).

The assessment of visual impacts of the proposed application area can be determined by studying photographs of views from the main road and also the by-roads around the development, observing the surrounding landscape and its form, and the examining the local land use and location of local residences.

The vegetative visual impact on the surrounding countryside is affected by:

- The scale and outline of the development.
- The exposure and appearance of the sand and gravel pit and its interaction with its environment.
- The scale and character of stockpile areas.

### 13.2.2.5 Zone of Visual Influence

The ZVI is the area within which views of the development can be obtained. The extent of the ZVI is determined primarily by the topography of the area. The ZVI is refined by field studies to indicate where relevant buildings, woodlands, berms, hedges or other local features obscure visibility from the main roads, local viewpoints/landmarks, settlement, etc. It is through such field studies that prediction of visual impacts takes place within the ZVI. A series of representative viewpoints were selected within the ZVI to illustrate typical views towards the existing development.

### 13.3 Landscape Appraisal

County Carlow contains significant areas of landscape importance, which are important not only for their intrinsic value as places of natural beauty but also because they provide a real asset for residents and visitors alike in terms of recreation, tourism and other uses.

The National Landscape Strategy for Ireland 2015-2025 promotes the sustainable protection, management and planning of the landscape. By increasing understanding of landscape and its dynamic interactive characteristics, the Strategy aims to deal with competing objectives while improving the decision-making process. The implementation of the National Landscape Strategy saw Landscape Character Assessments being prepared at local and intra-local authority level, using the Landscape Character Assessment Guidelines. These regional and local landscape character assessments inform and guide landscape policy, action plans and local authority development plans.

#### 13.3.1 Carlow County Landscape Character Assessment

Carlow County Landscape Character Assessment and Schedule of Protected Views (CAAS, 2015) was commissioned by Carlow County Council for incorporation into the County Development Plan Review with a renewed emphasis on the significance and sensitivity of landscape resources. The report is an amalgamation and revision of the previously prepared *Carlow Landscape Character Assessment* (Locii and Cregan 2008) and an associated *Schedule of Views, Prospects and Scenic Routes* (Cregan 2008). These were prepared in 2008 and adopted in 2009 as part of the two Carlow County Development Plans which have been published since that time (2009-2014 and 2015-2021).

The Landscape Character Assessment categorises Carlow into the following four Landscape Character Areas (LCA):

- Blackstairs and Mount Leinster Uplands;
- Central Lowlands;
- River Slaney – East Rolling Farmland;
- Killeshin Hills.

One of the aims of the Landscape Character Assessment was to integrate these components so that Landscape Character Areas for the County could be defined. A Landscape Character Area (LCA) is defined as: “Units of the landscape that are geographically specific and have their own character and sense of place. Each LCA has its own distinctive character, based upon patterns of geology, landform, landuse, cultural, historical and ecological features.”

The proposed application area is situated within the “Central Lowlands” LCA (Plate 13-1).



**Plate 13-1:** Principle Landscape Character Areas in County Carlow relative to the approximate location of the proposed application area (Source: CAAS, 2015).

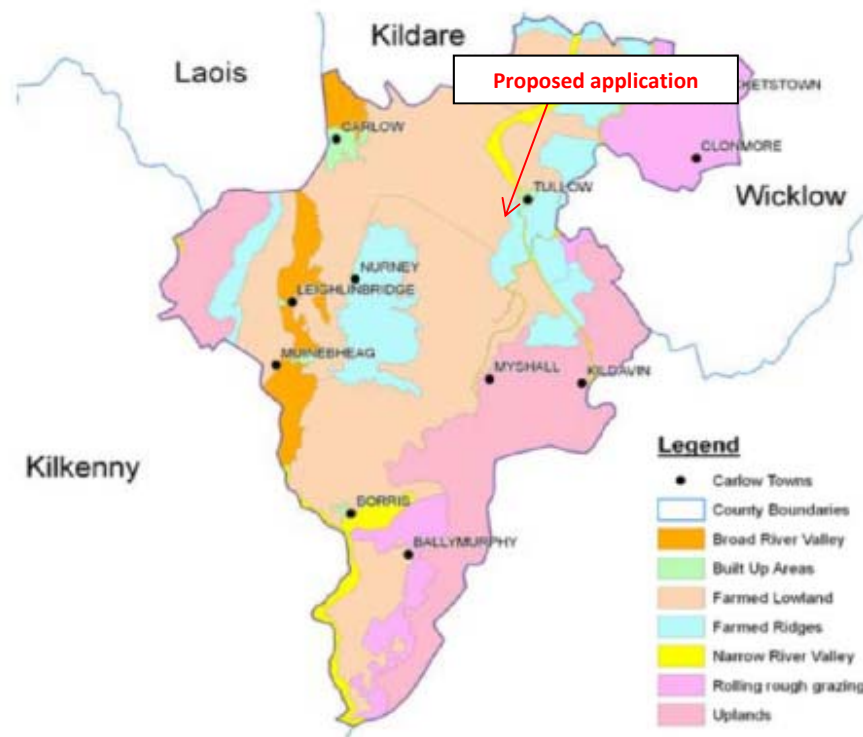
These LCAs were subject to more detailed analysis that identified the following 6 Landscape Types Plate 13-2:

- Built Up Areas;
- Farmed Lowland;
- Broad River Valley;
- Farmed Ridges;
- Narrow River Valley;
- Rolling Rough Grazing;
- Uplands.

These were intended to provide a more specific basis to assist development management by recognising specific features such as river valleys and transitional mid slope areas. This is good practice because these smaller features often contain some of the more significant and sensitive landscape that are highly valued for scenery and amenity.

The proposed application area is situated within the Landscape Type categorised as “Farmed Lowland” (Plate 13-2).





**Plate 13-2:** Carlow Landscape Types relative to the approximate location of the proposed application area (Source: CAAS, 2015).

### 13.3.1.1 Central Lowlands Character Area

#### 13.3.1.1.1 Key Characteristics

The central plain landscape character area occupies a substantial portion of the County and includes the County's major settlements. The landscape is primarily rural, with medium to quite large fields defined by well maintained and generally low hedges and occasional to frequent hedgerow trees. Since the 1950's field enlargement has been taken place to accommodate larger farm machinery, and has involved the removal of hedges and trees.

The boundary of the area is based on soil types and topography. 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, N81 and the M9. 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 following Landscape Types are in the Character Area:

- Broad and narrow river valleys;
- Farmed lowlands;
- Farmed ridges.

The key characteristics of the county Carlow Central Lowlands LCA are as follows:

- Most of the County lies within this character area;
- Landscape is level to gently rolling;
- Predominantly fertile agricultural lands with medium to large fields defined by low trimmed hedgerows and occasional to frequent mature hedgerow trees;
- Open views and vistas, notably on ridge farmland;
- Low vegetation – grassland - and long distant views with a limited capacity to absorb developments unobtrusively;
- Extensive road network penetrating the character area;
- The character area contains most of the County's designated habitats and listed buildings.

#### 13.3.1.1.2 Geology, Soils and Topography

The topography is underlain by limestone in the western portion of the area (flanking the Barrow River), and by granite in the east.

The limestone is generally pure and bedded, but some units of impure bedded limestone and muddy, often cherty limestones occur. The limestone rarely crops out in the character area and is blanketed by thick tills or stratified sands and gravels, as well as peat and alluvial sediments.

The area within the slightly higher, eastern portion of this landscape area is underlain by granite bedrock. This often results in rounded hills characterising the landscape, such as around Nurney, and at Ballon Hill. With respect to subsoils, till derived from Lower Carboniferous limestone dominates the lowlands in the Barrow Valley area.

This till is basic in reaction and found over all the lowland undulations which are subglacial landforms. It is generally stony and blue-grey in colour, reflecting its source in the pure limestone rocks.

Till derived from granite occurs in the area east of this and in the region of the proposed application area, blanketing the area with granite bedrock. This deposit is generally yellowish in colour, being heavily oxidized, and sandy in texture. It forms an acidic deposit.

#### 13.3.1.1.3 Landcover

The area is primarily a rural landscape. Landcover is intensively agricultural with a mix of grassland pasture and tillage. Shelterbelts as mature trees and copses are a common feature around farm buildings and when viewed from a distance the landscape can present the appearance of being well-wooded.

Many fields in the area have been enlarged by the removal of internal boundary hedges. Both the loss of hedgerows and field enlargement represents a decline in landscape condition.

Views within and from the Character Area are generally open and expansive except where restricted by buildings, plantations or ridges. Distant views include the Blackstairs, the Wicklow Mountains, the Castlecomer Plateau/ Western Uplands and Brandon Hill.

#### 13.3.1.1.4 Settlements

60% of the County's population lives in the northern portion of the Character Area. The County's major settlements are also located in the Character Area. They include Carlow town, Tullow, Muine Bheag and Leighlinbridge.

Patterns of settlements and one-off houses in the rural areas are visible along roads leading out of Carlow and notably to the east and the south of Carlow Town.

Tullow and Muine Bheag are showing signs of poorly structured suburban expansion. There are also a number of compact villages in the area, which, in some instances, are showing signs of economic stagnation.

#### 13.3.1.1.5 Ecology and Habitats

The majority of the County's designated habitats are in this LCA including Ardristan Fen, which is adjacent the application area.

#### 13.3.1.1.6 Historical Landscapes

The majority of the County's important monuments are located in this LCA including a Standing Stone in Ardristan, which is adjacent to the proposed application area.

#### 13.3.1.1.7 Tourism

The County Tourism Development Strategy locates the area for the purpose of tourism planning in the Carlow Urban Development Sub-Zone.

Most of the County's tourism infrastructure is located in the area. It lies within an easy day trip distance of Dublin and in the future may become part of the planned hinterland of the Greater Dublin Area particularly with the upgrading of the N9. It is considered for tourism purposes to be suitable for higher intensity developments combining recreational activities such as golf (with

accommodation), conference facilities and shopping. The focus of the development would be concentrated on improving the attractiveness of Carlow Town.

Carlow Leader and Carlow County Council have jointly produced a feasibility study of Heritage Drives in the County. Three drives are proposed and two of them pass through the Central Lowlands. These are 'a Megalithic Heritage Drive' visiting resources in Tullow, Nurney and other locations, and 'a Barrow Heritage Drive' that would visit resources in Carlow Town, Old Leighlin, Leighlinbridge, Borris and Muine Bheag.

#### 13.3.1.1.8 Key Issues

The Carlow County Landscape Character Assessment (CAAS, 2015) identified the following key issues and pressures relating to the general character of the landscape across the county:

- Development pressure on the countryside particularly in the vicinity of Carlow Town and the other centres. Impact on water supplies;
- Degrading of the typical landscape character through the removal of internal hedgerows.
- Over management of roadside hedges;
- Degrading of the typical landscape character through the construction of modern one-off houses in the countryside, many of them two storied with prominent elements in an open landscape and lacking any connection to the characteristic styles of rural houses in the County;
- Erosion of the landscape setting of existing settlements by inappropriate developments;
- Tourism and recreation pressure.

#### 13.3.1.1.9 Recommendations

The Carlow County Landscape Character Assessment (CAAS, 2015) also lists the following recommendations relating to the general character of the landscape across the county:

- Maintain the existing grain of the landscape with its well-developed pattern of fields, hedgerows, trees and shelterbelts;
- Review the hedge maintenance regime. Overcutting reduces species richness and consequently, their contribution to biodiversity;
- Discourage the replacement of hedgerow boundaries with wire fences;
- Encourage the use of native and indigenous planting in new developments to integrate buildings into the surrounding landscape. Compile a list of suitable trees and shrubs for planting in the County;
- Small villages and scattered residences and farm buildings are the typical rural settlement pattern. New development should be monitored to protect the integrity of the settlement pattern. Continuous ribbon development along the roads leading into the major settlements should be discouraged. Likewise scattered small clusters of residential developments in rural areas should be discouraged. The expansion of villages by

developments on their edges or by sporadic development should be discouraged as they erode the integrity and character of the villages;

- The use of traditional styles, materials and colours in new developments should be encouraged;
- New developments should not be sited in prominent locations such as ridges and areas with open exposed vistas;
- Infrastructure for tourism should be carefully sited and in sympathy with the character of the landscape.

The above lists are not intended to be comprehensive lists of all the factors/sensitivities that should be taken into account in the design and assessment of any development (as there may be other site specific factors which will influence the design and siting of a particular development) but these will be particularly used as an assessment tool in any application for permission.

The overall aim of this chapter is to outline the key considerations that should be taken into account in order to ensure the adequate protection and management of the key features that make up each of these varying landscape areas within the County.

### **13.4 Existing Environment**

The sand and gravel pit is situated in a semi-rural area with the predominant land use of the study area consisting of agricultural land located in the vicinity of the pit. Settlement patterns in the area consist of one off housing and farmsteads located along local and regional roads in the vicinity of the pit. The nearest urban centre is the town of Tullow located approximately 2.5km to the northeast of the pit.

#### **13.4.1 Landscape Value**

Communities and individuals will credit their surrounding landscape with certain values. These values have environmental and cultural benefits. These attributes can be derived from images of the landscape as already described in the landscape character assessment. A number of single dwellings form part of the local landscape. There are 56 residences within 1km of the existing site.

#### **13.4.2 Landscape Sensitivity**

Any development will change the landscape character and values attributed to a site. The sensitivity of a landscape measures its ability to accommodate that change, with minimal intrusion of the visual and characteristic elements of that site. Minimal disturbances to the surrounding landscape can be carried out through detailed planning and design, public reassurance, construction and operational procedures and putting mitigation recommendations into each operational phase as soon as is possible.

Extraction activities were previously undertaken at the site between 1987 and 2008 (approx.). The operators have taken various measures to screen the site from the surrounding landscape such as constructing berms on either side of the main entrance and planting these with native trees.

## 13.5 Impact Assessment

### 13.5.1.1 Vantage Point Photographic Survey

The vantage points were chosen to give a representative sample of views of the development within the landscape. A total of 6 vantage points (VPs) were identified surrounding all boundaries of the proposed application area. All VPs are illustrated on Plate 13-3. Each vantage point is detailed below (Plates 13-4 – 13-9) with a brief description of the view from each location.



**Plate 13-3:** Visual impact assessment vantage points surrounding Kilcarrig's Sand and Gravel Pit at Roscat, Tullow, Co. Carlow.

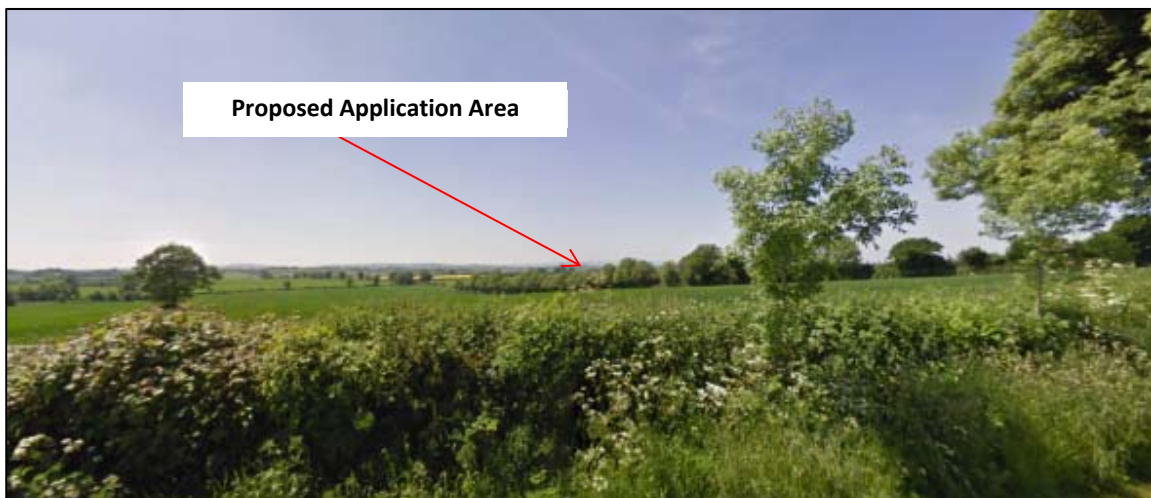
Plate 13-4 shows the view from VP1 at the main site entrance. A vegetated berm is visible on the lefthand side of the image with a line of native trees planted as screening along this section of the access road immediately inside the boundaries of the site. The proposed application area is not visible from this location.





**Plate 13-4:** Vantage Point 1 – Westward view of the main entrance to the proposed application area.

The view from a private dwelling approximately 200m to the south of the of the main entrance to the site is presented in Plate 13-5. As evident in Plate 13-5, given that the local topography is flat and that the south-eastern boundary of the proposed application area is screened by a row of mature deciduous trees, the proposed application area is not visible from this location.



**Plate 13-5:** Vantage Point 2 – Westward view from the unnamed local road approximately 200m to the south of the main entrance to the pit, in front of a private dwelling and approximately 800m east the proposed application area.

Plate 13-6 shows that, from Vantage Point 3, the flat topography and natural mature deciduous treeline surrounding the application site screens the site from the local road L6040 which runs approximately 780m to the south east of the southern boundary through the townland of Ardristan. As such, the pit is not visible from this location.



**Plate 13-6:** Vantage Point 3 – Northward view from the local road L6040 approximately 780m to the south of the proposed application area.

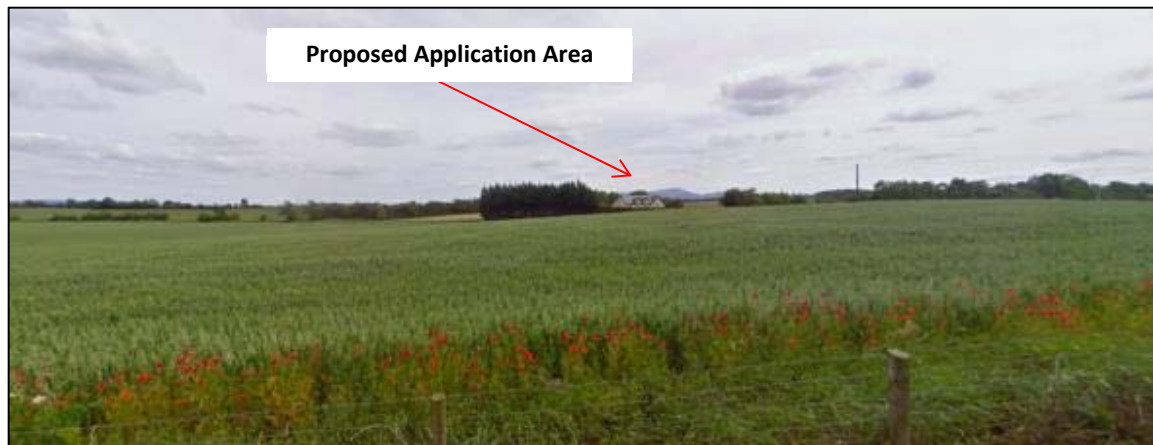
Vantage Point 4 is approximately 1.8km to the west of the proposed application area along the local road L7113 to the south of the village of Rathoe (Plate 13-7). As with the other VPs, as a result of the flat topography and natural screen of mature deciduous trees, the proposed application area is not visible from this location.



**Plate 13-7:** Vantage Point 4 – Eastward view from the local road L7113 approximately 1.8km to the west of the proposed application area.

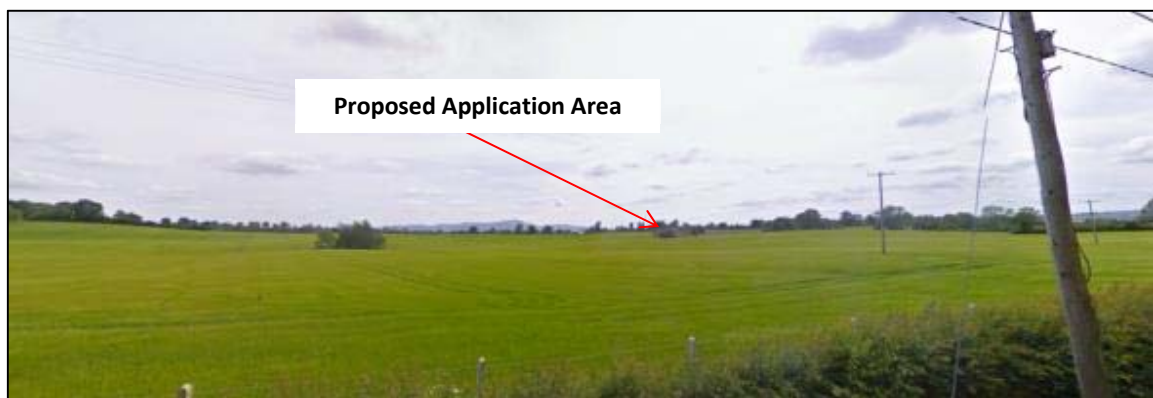
Vantage Point 5 is located approximately 930m to the northwest of the application area along the local road L10244 in the townland of Roscat. The site is not visible from this location owing, again, to the flat topography of the landscape surrounding the application site (Plate 13-8).





**Plate 13-8:** Vantage Point 5 – South-eastward view from local road L10244 approximately 930m to the northwest of the proposed application area.

Vantage Point 6 is located approximately 900m to the northeast of the proposed application area along the L1024 to the west of Castlemore Cross Roads. Again, owing to the flat topography, the application area is not visible from this location.



**Plate 13-9:** Vantage Point 6 – South-westward view from the local road L1024 approximately 900m to the northeast of the proposed application area.

### 13.5.2 Landscape Impact Assessment

Based on the field survey and reference to the Carlow County Development Plan 2015-2021 and the Carlow County Landscape Character Assessment, the landscape value of the study area has been given a rating of 'Medium'.

While sand and gravel extraction operations at the pit to-date have altered the landform and vegetation cover, the magnitude of change in the landscape as a result of the proposed development has been assessed as 'Medium'. As defined by Table 13-3, the significance of landscape impacts of the development is assessed as 'Moderate'. The losses of existing vegetation

as a result of extraction of sand and gravel will be offset by the proposed landscape and restoration plan for the pit.

### 13.5.3 Visual Impact Assessment

The visual assessment shows that the application site is extremely well screened due to existing hedgerows, field boundaries and the topography of the study area.

Based on the visual impact assessment criteria detailed above, an assessment of each vantage point location was undertaken which is summarised below. The significance of visual impact from quarrying activity will result in 'No Change' at all of the vantage point locations as the existing pit site and thus, the proposed application area are screened from the surrounding landscape by existing vegetated berms.

As illustrated in Table 13-7, the assessment of the significance of visual impacts on the vantage point is based on a combination of the visual sensitivity and magnitude of visual changes to the viewpoint. While sand and gravel extraction has altered the landscape to date, the assessment of the existing visual environment and the impact of extraction of the proposed application site and its various component parts on visual receptors have been assessed.

The proposal of sand and gravel extraction will not result in a significant increase in visibility of the pit. For example, the increase in footprint area of the pit will not result in an increase in visual impact at the various viewpoints; therefore the magnitude of visual impact is assessed as 'Low'.

**Table 13-7: Visual Impacts with Mitigation**

VP No.	Viewpoint Sensitivity	Magnitude of Visual Impact	Visual Impact Significance	Mitigation Measures
1	Low	No Change	No Change	None
2	Low	No Change	No Change	None
3	Low	No Change	No Change	None
4	Low	No Change	No Change	None
5	Low	No Change	No Change	None
6	Low	No Change	No Change	None

### 13.5.4 Tourism, Recreation and Amenity

As stated in the visual assessment, the proposed development will not result in a significant increase in visibility of the pit above that already experienced. The existing development is not

visible from any vantage point. Therefore, it is envisaged that there will be no impact on amenity or tourism of the area.

### 13.6 Landscaping and Restoration Measures

A landscape and restoration plan has been compiled for the existing pit to ensure that the pit and the proposed application area remain invisible from the surrounding road network and dwellings. The following matters were taken into consideration as part of the restoration plan:

- Habitat type and species local to the site.
- Planning requirements and applicable legislation.
- Interaction with the surrounding environment.
- Health and safety considerations.
- Resources available.
- Nature and extent of aggregates extraction.
- Availability of suitable restoration materials.

This section outlines the work to be carried out in a phased programme to ensure that the restoration of the sand and gravel pit lands will be implemented in accordance with the landscaping proposals. The restoration of the pit, which will include the proposed application area, is divided into the following 3 phases:

- Phase I – Construction of Berms
- Phase II – Restoration of side slopes.
- Phase III – Final restoration of areas after completion of the extraction process.

The following drawings relating to landscaping and restoration of Roscat Pit are available at the end of this chapter:

- Figure 13.1 – Existing site layout
- Figure 13.2 – Proposed extracted site sections of the application area
- Figure 13.3 – Proposed side slope and berm detail
- Figure 13.4 – Proposed final restoration layout

#### 13.6.1 Phase I – Construction of Berms

Berms have already been formed along the western, southern and northern boundaries of the existing extraction area and on either side of the site entrance gate using the overburden and waste material from processing of aggregate. All materials used for the construction of the berms have been sourced within the curtilage of the site.

Following overburden stripping, berms with identical dimensions and planting scheme to the berms in the existing pit will be constructed along the southern, western and northern boundaries

of the proposed extension area. This will act as a screen to proposed application area from the south.

For vegetation to be successful, berms will need to be covered with subsoil and topsoil material which will allow vegetation to grow successfully by naturally vegetating or by planting. These materials will be sourced from the site and will include soil which is screened from the aggregate during processing of material and topsoil stored on site. The material recovered from screening will be placed in layers on berms where no soil material is present to make a base layer. Topsoil stored on site will then be placed on top of these layers to form the finished surface for planting.

#### 13.6.1.1 Proposed Berm Planting Scheme

All planting works will be carried out during the dormant season i.e. November to March. Planting will be undertaken on all berms where necessary to provide screening of works.

**Top Planting** – Proposed berms will be planted with a range of species which are native to the area. This will create an immediate visual impression in keeping with the surrounding indigenous landscape. It is proposed to plant species which are native to the area and the county. In keeping with trees and shrubs native to the area, some of the following species will be planted on the proposed berms to screen the extraction activities.

These include the following species:

- Ash (*Fraxinus excelsior*)
- Common Alder (*Alnus glutinosa*)
- Silver Birch (*Betula pendula*)
- Blackthorn (*Prunus spinose*)
- Hawthorn (*Crataegus monogyna*)
- Holly (*Ilex aquifolium*)
- Gorse (*Ulex europaeus*)
- Broom (*Cytisus scoparius*)
- Dog Rose (*Rosa canina*)

**Side Planting** – As with top planting, native species, as listed above, will be used for planting the sides of berms.

**Other Areas** – Surfaces exposed by excavations that are undergoing low levels of disturbance have the potential to be valuable habitats for species such as (depending on the substrate type): Ling heather, tormentil and yarrow as well as a wide variety of grasses, ferns, lichens and mosses.

Areas of bare ground also provide an opportunity for the establishment of species, some of which may be locally or regionally important. This can also be of benefit as a food resource for invertebrates.

In carrying out the proposed work during the extraction phase of the pit, the impact as a result of activities will be positive and contribute to the protection of flora, amphibians, birds, mammals, insects and habitats. These berms will also help to reduce the migration of dust and noise levels from the pit and reduced their impact on the surrounding ecology.

### 13.6.2 Phase II – Restoration of Side Slopes

Throughout the operational lifetime of the sand and gravel pit, the side slopes of the pit will be restored such that they will remain in position permanently following decommissioning of the pit. Side slopes restored using the following management measures are proven to be of significant benefit to breeding Sand Martins (Rodriguez, 2016):

- The top 2 meters of the internal face of the side slopes of the perimeters of the pit will be treated using an excavator, so that they are as close to vertical as possible (70-75°) before each breeding season;
- The bottom 6 meters of the face will be sloped at approximately 60° for stability of load bearing material;

### 13.6.3 Phase III – Final Restoration of Areas after Completion of Extraction

The final restorations will commence on the completion of the pit excavations and will consist of the following:

1. All stock piled material will be removed from the site.
2. All plant and machinery will be removed off the excavation area.
3. All site boundaries will be secured.
4. The pit floor area will be covered with subsoil and topsoil which is stored on site in stockpiles and will be seeded and allowed to regenerate to grassland.
5. Additional planting of trees and shrubs may be necessary in some areas.
6. The existing and proposed berms and planted areas will be retained as shown on Figure 13.3 and 13.4.
7. The pit excavation area will be levelled out, covered with a layer of top soil, harrowed and seeded with perennial grass-seed so as to restore it for use as agricultural grassland.

These measures will also reduce the cost of final restoration of the pit over its operational years. By the end of the pit working life, the vegetation of the site will be well established, and have blended with the surrounding countryside.

### 13.7 Additional Measures and Monitoring

The perimeter vegetation around the proposed application area will be retained. Landscape work and planting as part of the restoration process will serve to reduce the long-term visual impact of the development. The landscaping measures have been designed to conceal the site, as much as possible, screening it from outside views. Mitigation measures will reduce as much as possible, any visual impact resulting from ongoing development of the site.

As part of the proposed application, measures will be put in place to reduce loss of biodiversity and enhance the conservation value of the area and reduce environmental impacts of extraction activity on the surrounding area. These include the following:

- Reshaping overburden stockpiles and vegetating these.
- Provision of berms which will be planted and allowed to develop with the natural seed bank in the soil to create ecosystems and to provide corridors of natural habitat which connect existing natural areas around the pit.
- The use of native species will support a wider range of insects and animals and will contribute more to the ecology of the region.
- This added vegetation will also enhance the local wildlife corridor, connecting the site with the surrounding landscape.
- Using plants adapted to or tolerant of the existing site conditions will reduce the need for expensive remedial measures (such as replacing failed plants).
- Hedgerows and tree lines along the site perimeter will be retained on closure of the pit.
- All planting of trees and shrubs will take place during the dormant seasons. Bare-rooted plants transplant most successfully during their dormant season, this is usually between November and March/April. Avoiding times when the ground is actually frozen, this will mean either autumn or spring planting.
- Planting areas will be suitably fenced to exclude farm stock, rabbits, sheep and other browsing animals. It may be more economical to protect each tree individually rather than fence the whole area.
- No herbicides, pesticides or fertiliser will be applied to the berm.
- Ensuring the site perimeter side slopes remain in a condition suitable for breeding Sand Martin as outlined above in Section 13.6.2.

### 13.8 Mitigation Measures

The landscape and restoration plan will serve to offset the impact associated with previous activity at the pit and will be implemented during the life time of the pit with final restoration undertaken on completion of extraction.

### 13.9 Decommissioning and After Use

Since the extraction process is a temporary land-use, restoration and the desired final condition of the land should be considered in the operation and decommissioning of the pit. Progressive restoration is generally more appropriate for sand and gravel pits. However, as the promotion of biodiversity is a significant objective in this pit, a balance between progressive restoration and creating physical habitat diversity must be achieved.

The main feature of the worked out area will be an improved agricultural grassland field and all preparations for the formation of the agricultural grassland are designed to make it support plant and animal life along its perimeters.

The measures to be taken are as follows:

- When the site has ceased to operate, all equipment, fuel tanks, toilets and plant machinery will be removed.
- Any portable chemical toilet systems will be removed offsite by a licensed contractor.

Habitats and species that are attracted to a site should be reflective of the local habitat and species in order to restore a natural ecological balance. When creating habitats, it is beneficial to create a new habitat block close to a similar habitat as this will assist colonisation by desirable species and will allow larger populations to inhabit the area.

### 13.10 Residual Impacts

The proposed works will reduce the visibility of the application site from the receiving environment and offset the impact associated with quarrying activity.

### 13.11 Technical Difficulties

No technical difficulties were encountered.

### 13.12 References

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[Accessed on: 27/11/2018]





## Figures



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**Legend**

Ownership Boundary

Application Area

Area = 14.7 Ha

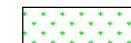
Aggregate Stockpile



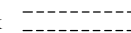
Water



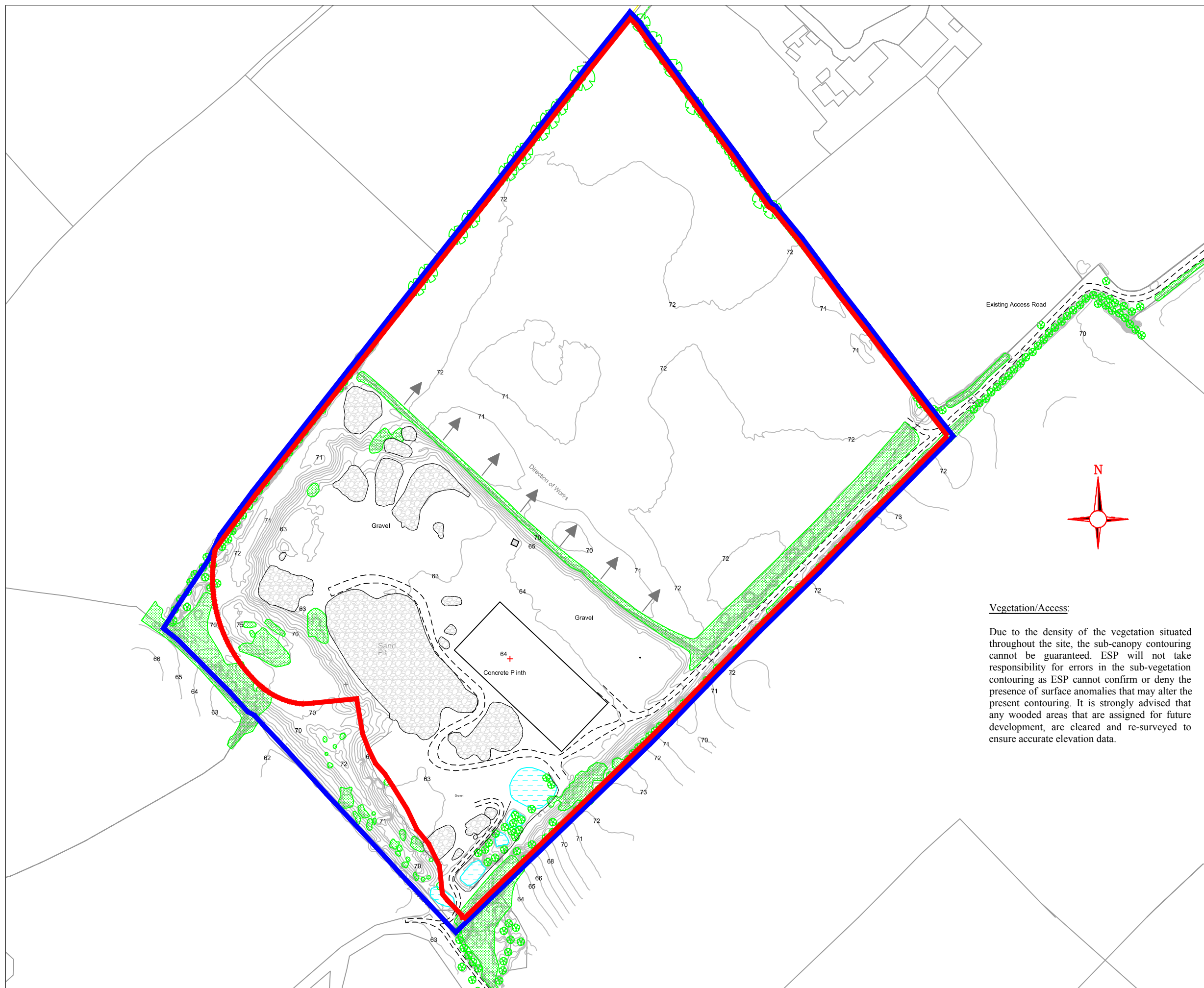
Vegetation



Access Road/Track



Tree Cover



**Vegetation/Access:**

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All Levels Relative to Ordnance Datum

O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

**EARTH SCIENCE PARTNERSHIP**  
CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

Tonranny Westport Co. Mayo  
tel.:- +353(0)98 28999 fax:- +353(0)98 24727  
e-mail: earthsciencepartnership@gmail.com  
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Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Existing Site Layout Map

Drawn By: Sean O' Donnell

Checked By: Patrick O' Donnell


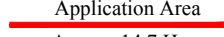



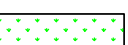
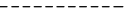


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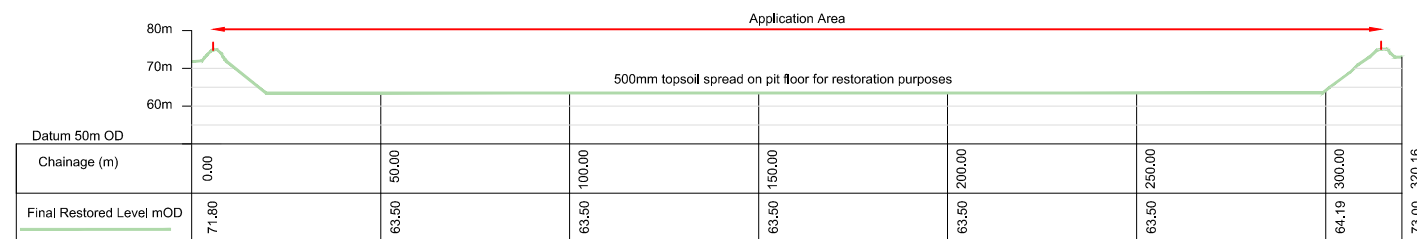
Job No: EI061 Rev: 0

Figure 13.1

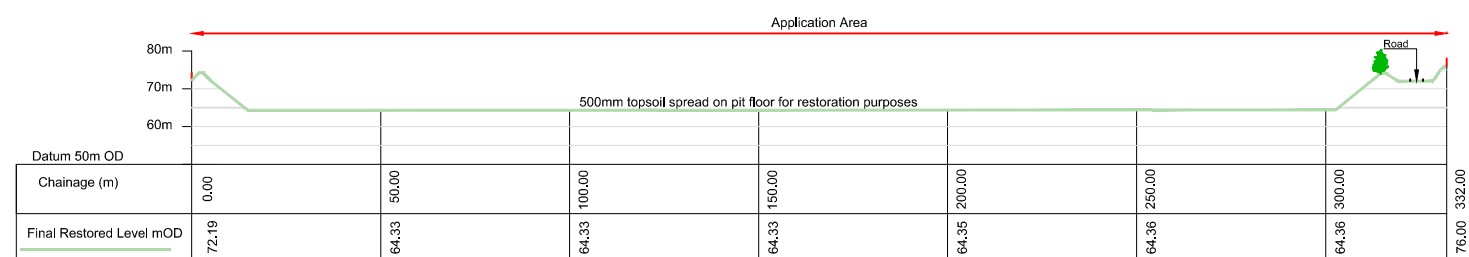
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**Legend**

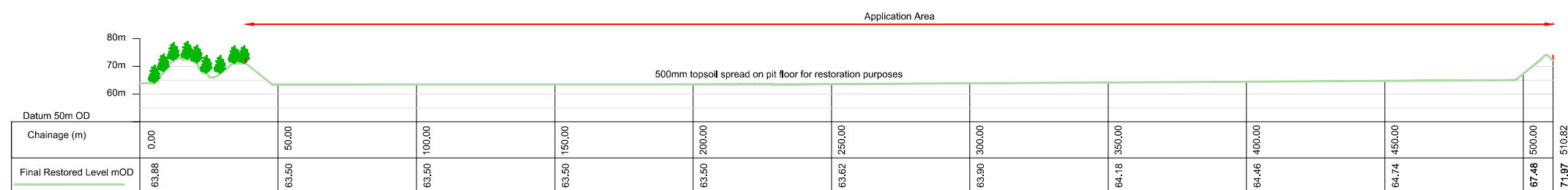
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  -  Application Area  
Area = 14.7 Ha
  -  Final Restored Level
  -  Constructed Berms
  -  Water
  -  Vegetation
  -  Access Road/Track
  -  Tree Cover
  -  Vegetation
- All Levels Relative to Ordnance Datum  
O.S. Map Ref No. 4475 - B  
ITM Coordinates: 683027 E, 670998 N



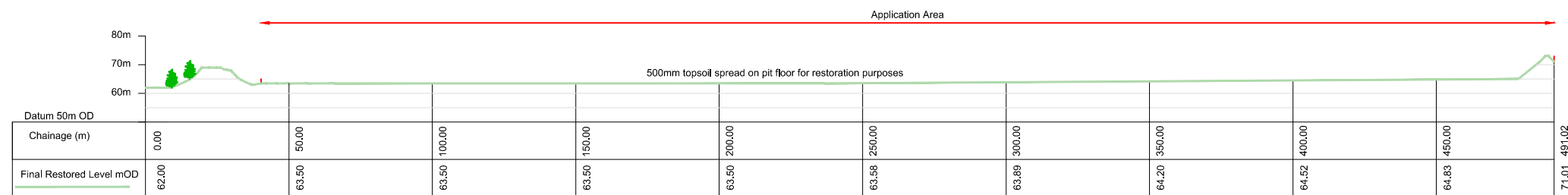
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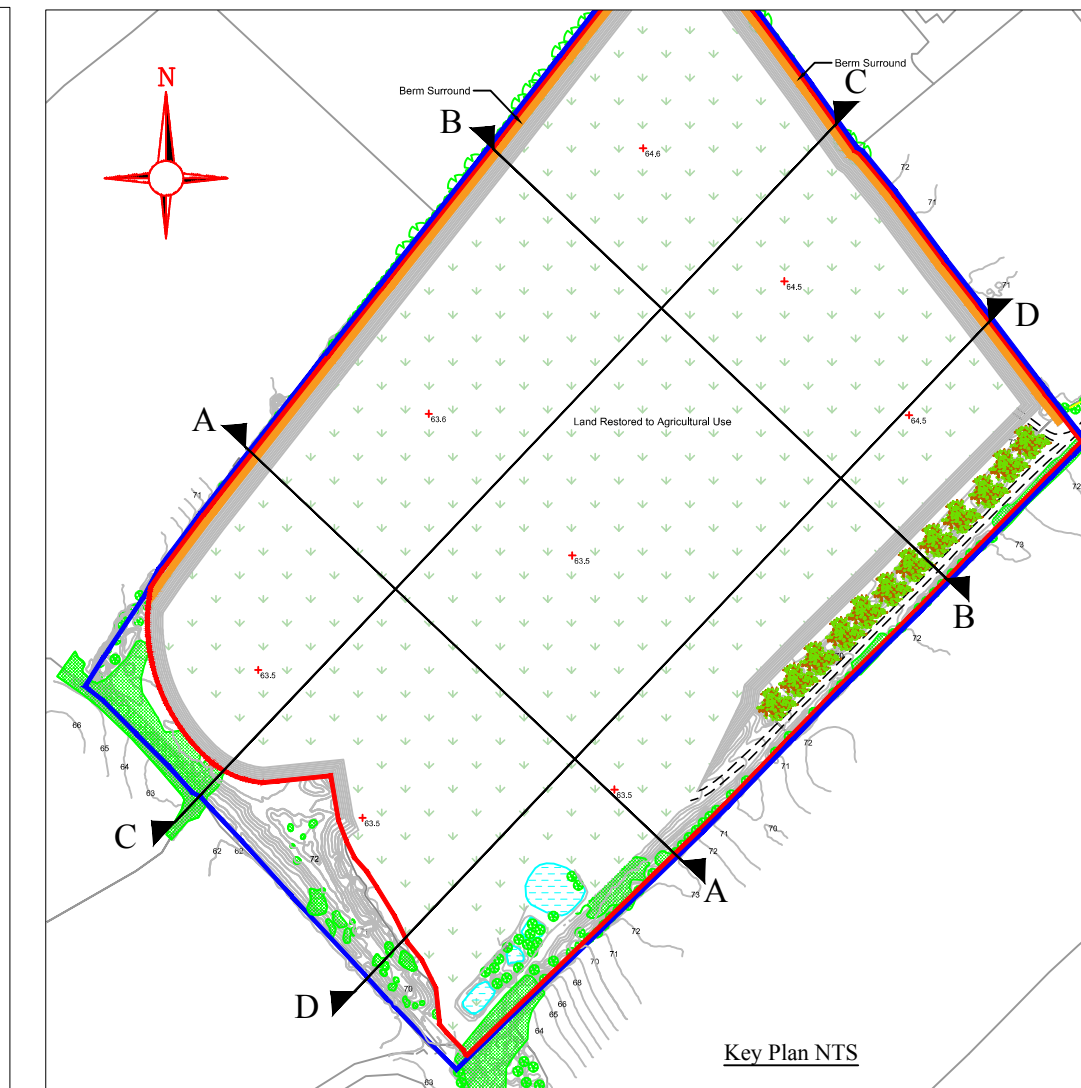
Section B - B Scale 1:2,000



Section C - C Scale 1:2,000



Section D - D Scale 1:2,000



Key Plan NTS

**Vegetation/Access:**

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CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
Tonranny Westport Co. Mayo  
tel:- +353(098) 28999 fax:- +353(098) 24727  
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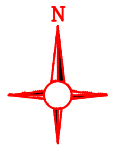
Client: Kilcarrig Quarries Ltd.  
Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Proposed Final Restored Sections  
Drawn By: Sean O' Donnell  
Checked By: Patrick O' Donnell  
Scale: 1 : 2,000 @ A3 Date: Apr. 2019  
Job No: EI061 Rev: 0

Figure 13.2

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**Legend**



O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

Rev	Description	Date

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 tel.: +353(0)98 28999 fax: +353(0)98 24727  
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Client: Kilcarrig Quarries Ltd.

Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Proposed Side Slope & Berm Detail

Drawn By: Sean O' Donnell

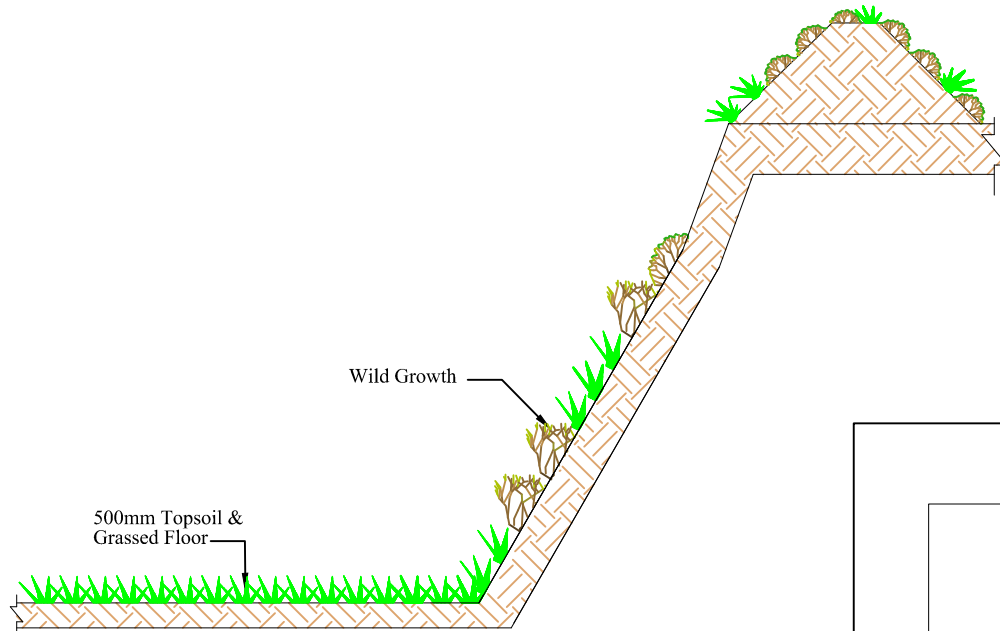
Checked By: Patrick O' Donnell

Scale: As Shown @ A4 Date: Apr. 2019

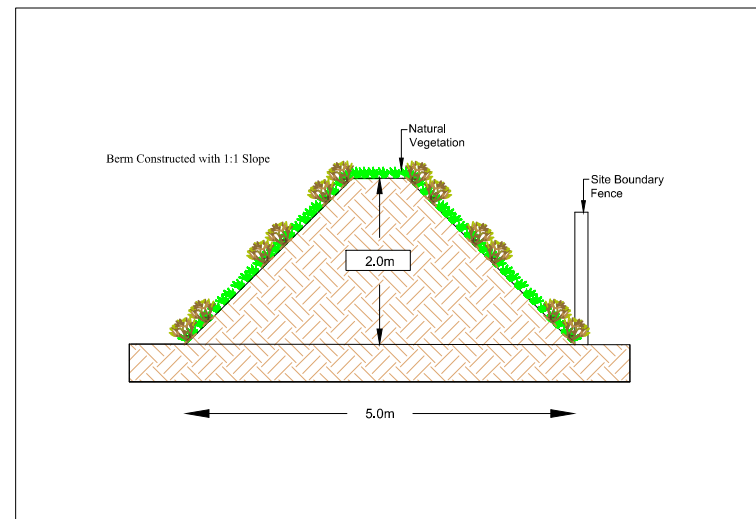
Job No: EI 061 Rev: 0

Figure 13.3

Grassed Pit Floor      Side Slope & Berm Planting



Typical Side Slope Detail  
(Scale 1:150)



Typical Berm Detail  
(Scale 1:100)



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**Legend**

Ownership Boundary


Application Area  
Area = 14.7 Ha


Water 

Vegetation 

Access Road/Track 

Tree Cover 

Constructed Berms 

Vegetation 

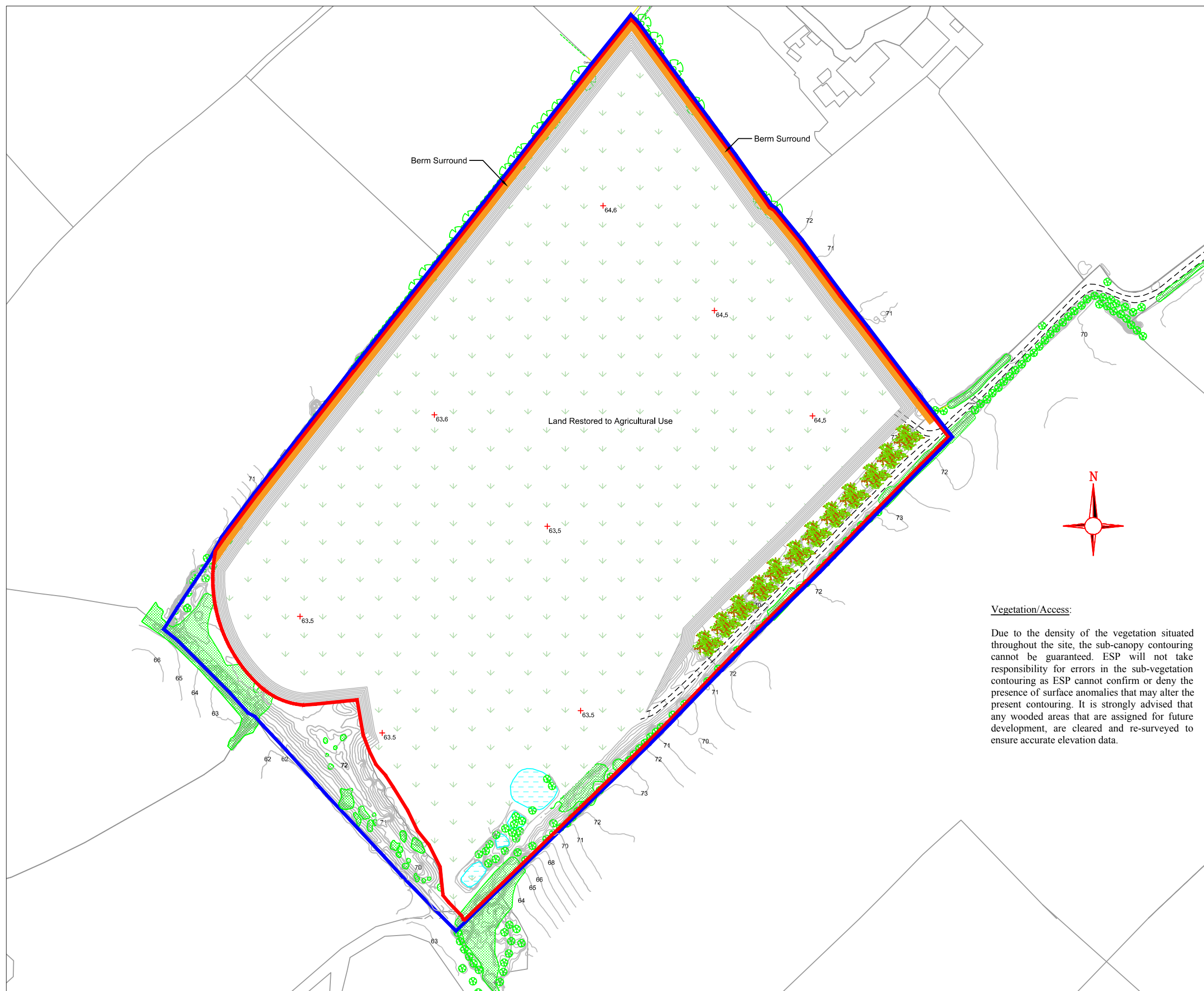
All Levels Relative to Ordnance Datum

O.S. Map Ref No. 4475 - B

ITM Coordinates: 683027 E, 670998 N

Vegetation/Access:

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CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS  
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Project: Environmental Impact Assessment Report to Accompany a Planning Application for a Sand & Gravel Pit Located at Roscat, Tullow, Co. Carlow

Title: Proposed Final Restoration Layout

Drawn By: Sean O' Donnell

Checked By: Patrick O' Donnell

Scale: 1 : 2,500 @ A3 Date: Apr. 2019

Job No: EI061 Rev: 0

Figure 13.4

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## 14.0 MATERIAL ASSETS

### 14.1 Introduction

This chapter of the EIAR addresses the impacts of the development on the material assets located in the vicinity of Roscat Sand and Gravel Pit. Material assets are defined in the EPA “Draft Advice Notes for preparing an EIAR” (2017) as ‘resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons’.

The developments utilisation of the area’s material assets, or proximity to these material assets, can lead directly and indirectly to potential environmental impacts. The objective of the assessment is to ensure that these assets are used in a sustainable manner with respect to the development and propose measures where necessary to ensure that they are used in a sustainable manner.

### 14.2 Methodology

The information for the assessment of the impacts of the application site was obtained from:

- Guidelines on the Information to be contained in Environmental Impact Statements Environmental Protection Agency (2002);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements Environmental Protection Agency (2003);
- Draft Revised Guidelines on the Information to be contained In Environmental Impact Statements (EPA, September 2015);
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA, September 2015);
- Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR) (EPA, August 2017);
- Carlow County Development Plan 2015 – 2021;
- Site visits.

The material assets, which have been identified as being within and adjacent to the pit and which may be directly affected by the activities undertaken are addressed below. The EPA Guidelines on the information to be contained in Environmental Impact Statements (March 2002) states that the material assets should be assessed under the headings of:

- Archaeological Heritage
- Folklore/Tradition/History
- Architecture/Settlements
- Monuments/Features
- Designed Landscape
- Natural Resources of Economic Value
- Buildings and Structures
- Infrastructure

The Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements (2015) and Draft Advice Notes for Preparing Environmental Impact Statements (2015) state that the following material assets should be assessed in relation to quarries:

- Built services
- Roads and traffic
- Effects of vibration on surface structure
- Road damage due to transport and machinery use
- Loss of, or damage to, water supplies
- Effects potential for groundwater development in the area, in the future, especially downgradient of the site
- Impacts on geological heritage

The EPA draft guidelines on the Information to be contained in an Environmental Impact Assessment Report (2017) state that built services, roads and traffic, and waste management should be assessed as part of this chapter of the EIAR.

There is an element of crossover between this chapter and certain other chapters. Some of the items listed above have been dealt with under the relevant chapters of the EIAR. For instance, impacts on geological heritage have been dealt with under Chapter 7.0 Land, Soils and Geology, designed landscape is dealt with under Chapter 13.0 Landscape and Restoration, and archaeological heritage, folklore, architecture and monuments have all been dealt under Chapter 15.0 Cultural Heritage.

### 14.3 Existing Environment

The proposed application area is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathtoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site. Vehicular access is off a local road and via a c.1km long gated laneway that provides access to the pit and surrounding lands. The site is surrounded by agricultural fields and a farm is located nearby.

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares. Topography in the existing pit has been lowered by up to 7 m below surrounding land. The current floor of the existing pit is reasonably level with elevations generally between 62 – 64mOD. Ground levels in the extension area rise gradually from the southwest (70 mOD) and northeastern (73.6 mOD) field boundaries, respectively.

The site is situated on the eastern side of a minor valley which is defined by a small north-south trending ridge that peaks at 94 mOD, 1 km northeast of the site at Ellengrove Crossroads, and a wider area of raised ground which reaches 93 mOD, 1.8 km southwest of the site. This valley

flattens out to less than 70 mOD a short distance southwest of the site. OS Discovery maps indicate the site elevation to be in the range 68 – 74 mOD. Land use in the 8 hectare greenfield area is consistent with that of surrounding lands, being used for moderate to high intensity tillage and grassland agriculture.

The material assets that have been identified within proximity of the application site and in the surrounding landscape are listed below:

- Residential buildings
- Geological resource
- Land resource
- Roads and traffic
- Public utilities
- Groundwater and water supplies
- Scenic routes and views
- Tourism
- Archaeology
- Waste

#### 14.3.1 Residential Buildings

The local residences within 1km of development are shown on Figure 5.1 (available for reference at the end of Chapter 5.0 – Population and Human Health). The potential impacts on residences associated with quarries are in relation to landscape, noise, vibration, dust and traffic as a result of the day to day activities.

#### 14.3.2 Geological Resource

Reference was made to Gardiner and Radford (1980) and Teagasc soil maps which show that the agricultural soils which originally overlaid the pit, and overlie the proposed extension area, consist principally of shallow, well-drained mineral soils with alkaline signature (Figure 7.1 presented at the end of Chapter 7.0 – Land, Soils and Geology).

Soils of County Carlow (Conry and Ryan, 1967) show that soils at the site belong to the shallower sub-group Broughillstown Complex Series. These have developed on esker hummocks and are described as gravelly sandy (coarse) loams, classified as Brown Earths. The profile is characterised by a dark greyish-brown, friable and crumb-structured upper horizon of depth 150 – 250 mm, which passes directly into the coarse-texture, calcareous parent material. These soils are shown to have a wide-use range but are best suited to tillage. They exhibit moderate to rapid permeability which can develop a moisture deficit during dry periods, resulting in crops maturing unevenly, as evidenced in the summer of 2018.

Extraction of sand and gravel requires the stripping/removal and storage of soils. Soils observed in-situ over exposed faces were noted as being thin. Soils have been stripped in order to facilitate extraction of overburden during previous activities. This stripped material has been stockpiled and formed into earthen bunds which partly define the site boundary. This soil will be utilised during site rehabilitation. It is intended that this practice shall be continued into the extension area.

### 14.3.3 Land Resource

The site is located in the townland of Roscat approximately 3 km south west of Tullow and 2 km east of Rathoe. The N81 national road which connects Tullow with the N80 at Ballon passes in a north-south direction 1.5 km east of the site.

In terms of regional topography, lands within a 6 km radius of the site form part of a broad valley partially confined by the following features:

- a narrow north-south trending ridge 7km to the west, that peaks locally at 195 mOD;
- the southern extents of the Wicklow Mountains 11.5 km to the east, which peak locally to the east at Aghowle Upper (420 mOD)
- to the northeast by lands which rise gradually through Tullow and Rathvilly;
- the northern limits of the Blackstairs Mountains 13 km to the south which peak locally at Croaghaun (455 mOD). Another small hill is noted 5 km south of the site at Ballon (131 mOD)

At a more local scale the site is situated on the eastern side of a minor valley which is defined by a small north-south trending ridge that peaks at 94 mOD, 1 km northeast of the site at Ellengrove Crossroads, and a wider area of raised ground which reaches 93 mOD, 1.8 km southwest of the site. This valley flattens out to less than 70 mOD a short distance southwest of the site. OS Discovery Series maps indicate the site elevation to be in the range 68 – 74 mOD.

Topography in the existing pit has been lowered by up to 7 m below surrounding land. The current floor of the existing pit is reasonably level with elevations generally between 62 – 64mOD. Ground levels in the extension area rise gradually from the southwest (70 mOD) and northeastern (73.6 mOD) field boundaries, respectively. Land use in the extension area is consistent with that of surrounding lands, being used for moderate to high intensity tillage and grassland agriculture.

A dwelling with an accompanying farmyard is located to the northeast of the application site. Within a 500 m radius of the site are a relatively low density of dwellings with farmyards. Beyond this dwellings tend to be present in linear clusters along roads.

### 14.3.4 Roads and Traffic

The sand and gravel pit is located in a semi-rural setting with the road infrastructure typical consisting of regional roads and local roads, however it is also in close proximity to national roads,

particularly the N81 which runs to the east of the site. The pit generates a number of traffic movements based on the transport of products to market. The proposed development does not intend to increase levels of traffic on the road infrastructure in the vicinity of the pit as levels will be similar to that which was granted as part of previous planning permissions attached to the pit.

#### **14.3.5 Public Utilities and Access**

There are no existing ESB and telecommunications utilities at the pit.

#### **14.3.6 Groundwater and Water Supplies**

It is understood that drinking water for the temporary office/canteen was previously supplied from a water bowser. In future operations bottled water will be used as a potable water supply.

Groundwater elevation contours have been superimposed on Figure 8.6 (available at the end of Chapter 8.0 – Water), from which groundwater flow direction is inferred as being in a general northeast to southwest direction. This is broadly in line with local topographical patterns i.e. falling from the ridgetop at Ellengrove Crossroads to the Roscat Stream.

There has been no pumped discharge of groundwater across the site boundary in the past, and there shall be none under proposed activities. Hence proposed activities shall have no influence on groundwater levels or flow patterns in the area.

#### **14.3.7 Scenic Routes and Views**

The photographic visual impact assessment undertaken and presented in Chapter 13 – Landscape and Restoration concludes that given the extensively flat topography of the surrounding landscape and presence of the existing mature treeline/hedgerow which acts as a natural screen around the site, the proposed application area is not visible within the surrounding landscape.

#### **14.3.8 Tourism**

Tourism is a major industry in County Carlow and it attracts thousands of people on an annual basis which is recognised in the County Development Plan. There are a number of tourist attractions in the Carlow region as detailed in Section 5.0.

#### **14.3.9 Archaeology**

There are no Recorded Monuments situated within the application area (see Figure 15.1 1 at the end of Chapter 15.0 – Cultural Heritage). There are no undesignated monuments listed in the Sites and Monuments Record situated in the application area. The review established that there are no structures listed in the Record of Protected Structures situated within the application area.

#### **14.3.10 Waste**

All material extracted from the pit will have a use. Overburden will be used to construct berms or for landscaping and restoring areas around the pit. All material designated as waste, such as canteen waste, scrap metal, etc. will be collected by an appropriately licenced contractor and

recycled or disposed of at an appropriate facility. An emphasis will be placed on recycling where possible.

#### **14.4 Characteristics of the Proposed Development**

The application area consists of an area of 14.7 Ha. comprising of an existing pit area, haul road undisturbed areas and a greenfield area of approximately 8 hectares subject to agricultural use.

The proposed activity, which includes the removal of overburden and extraction of underlying sand and gravel, will result in the extension of the previously disturbed area associated with the existing Substitute Consent area into the greenfield area.

Material will be extracted by excavators and passed through mobile processing plant which will process the material into various grades of aggregate, as and when required or will be loaded onto dump trucks unprocessed and exported to a processing plant offsite. Material processed into various grades will be stockpiled close to the processing plant or at designated stockpiles.

Plant and machinery which will operate in the application area will consist of tracked excavators, wheel loaders, dump trucks and mobile processing plant. Ancillary plant such as a water bowser for dust suppression will be deployed where required.

#### **14.5 Impact Assessment**

##### **14.5.1 Residential Buildings**

The existing extraction area will be extended in a north easterly direction and it is proposed to be extracted to the existing pit floor level.

Existing and proposed management measures in relation to sand and gravel extraction activities are listed in various chapters of the EIAR. These measures will aid in reducing any potential impacts of the proposed development. Environmental monitoring including noise, dust and vibration monitoring will be undertaken in order to ensure that the pit is compliant with standard published guidelines.

##### **14.5.2 Geological Resource**

Sand and gravel extraction is an established activity in the study area with the existing site dating back to 1987 and continued to approximately 2008 as a result of the continued demand for aggregate at that time. The existing site has not been operational for approximately 10 years due to the economic downturn.

The loss of a geological resource will result in a significant impact which will be permanent in duration as the natural topography will be changed as a result of quarrying. However, material will be used to supply the local, national and international markets thereby contributing to the local,

regional and national economy. The proposed landscape and restoration plan will serve to reduce the impact associated with extraction activity to date and going forward.

#### 14.5.3 Land Resource

The application area is currently used as agricultural tillage. As agriculture is a significant land use in the wider area, this will not result in a significant loss of land resource.

The assessment of the Natura 2000 sites and nationally designated sites in the area and the related conservation objectives found that the proposed development will not result in significant effects on the conservation objectives of the designated sites.

#### 14.5.4 Roads and Traffic

The current project does not propose to increase levels of traffic on the road infrastructure in the vicinity of the pit as levels will be similar to those during the past development.

Inspections will be carried out to ensure roads are clean and tidy of any debris and to ensure that no debris or mud is being transported onto the public road. Road sweeping will be undertaken as required.

#### 14.5.5 Public Utilities and Access

The proposed continuation of sand and gravel extraction will not result in an increase in traffic levels on the local road infrastructure as the applicant proposes to extract the same amounts of material per annum as where extracted in the past. There has been no impact on the quality or availability of public utilities of the study area and it is not anticipated to impact on these going forward. There is no public access to the application site. All visitors must report to the site office before entering the site.

#### 14.5.6 Groundwater and Water Supplies

As all proposed works are of a dry process nature and are above the water table, it is not foreseen that works will have any potential impacts on groundwater and water supplies in the surrounding area.

#### 14.5.7 Scenic Routes and Views

The visual impact assessment undertaken concluded that owing to the extensively flat topography of the landscape, the existing pit/proposed application area are not visible from public roads. Therefore, there will be no significant impact on scenic routes and views as a result of the proposed development.

#### 14.5.8 Tourism

Sand and gravel extraction activity in the area is an established land use and has not impacted on tourism in the past. This is anticipated to be the case going forward.

#### 14.5.9 Archaeology

No impact on archaeology or cultural heritage is anticipated.

#### 14.5.10 Waste

Overburden will be used construct berms or for landscaping and restoring areas around the pit. All material designated as waste will be collected by an appropriately licenced contractor and recycled or disposed of at an appropriate facility. An emphasis will be placed on recycling where possible. As such, there is no potential for significant impacts on the local environment as a result of waste generated from the proposed development.

#### 14.5.11 Unplanned Events

The various chapters of the EIAR have assessed the potential impacts associated with unplanned events occurring and have included mitigation measures or procedures to follow should such events occurs.

### 14.6 Mitigation Measures

Mitigation measures are discussed in the relevant chapters where required to ameliorate any impacts identified.

### 14.7 Residual Impacts

Continued sand and gravel extraction activity will result in the loss of a geological resource and the extension of the extraction area will be permanent in duration. The proposed restoration plan will offset the impact in so far as possible with the creation of new habitats.

### 14.8 Technical Difficulties

No technical difficulties were encountered during the completion of this assessment.



## 14.9 References

Carlow County Council (2015) Carlow County Development Plan 2015 – 2021.

DECLG (2013) Guidance for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

Directive 2014/52/EU European Parliament and of the Council EIA Directive (April, 2014)

EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements, Environmental Protection Agency

EPA (2003) Advice notes on current practice in the preparation of Environmental Impact Statements

EPA (2006) Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non – Scheduled Minerals)

EPA (2015) Draft Revised Guidelines on the Information to be contained In Environmental Impact Statements

EPA (2015) Draft Advice Notes for Preparing Environmental Impact Statements

EPA (2017) Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

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## 15.0 CULTURAL HERITAGE

### 15.1 Introduction

This cultural heritage chapter, prepared Dr Charles Mount on behalf Earth Science Partnership, has been undertaken to assess the significant effects, if any, on the cultural heritage, archaeology and architecture that can reasonably be expected to occur as a result of a proposal to carry out sand and gravel extraction by the applicant on land in the townland of Roscat, Co. Carlow. A wide variety of papers, cartographic, photographic and archival sources were consulted. All the lands of the application area were visually inspected.

An impact assessment and mitigation strategy has been prepared. The assessment has been undertaken to assess the significant effects, if any, on the cultural heritage, archaeology and architecture that can reasonably be expected to occur because of the proposal to continue extraction in the application area, while a mitigation strategy has been designed to remedy any significant adverse effects on cultural heritage.

The assessment was prepared by Dr. Charles Mount who has more than twenty years of cultural heritage assessment experience. He holds B.A., M.A. and Ph.D. degrees in archaeology as well as a professional diploma in EIA and SEA Management and is a member of the Institute of Archaeologists of Ireland and the Discovery Programme.

### 15.2 Methodology

This study which complies with the requirements of Directive EIA 2014/52/EU is an assessment of the known or potential cultural heritage resource within a specified area and includes the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the project on the environment, taking into account current knowledge and methods of assessment. It consists of a collation of existing written and graphic information in order to identify the likely context, character, significance and sensitivity of the known or potential cultural heritage, archaeological and structural resource using an appropriate methodology (EPA 2002 and 2003).

The study involved detailed investigation of the cultural heritage including the archaeological, architectural and historical background of the proposed development site and the surrounding area up to 1km from the development. The study area is indicated on Figure 15.1 at the end of this chapter. This area was examined using information from the following sources:

- Record of Monuments and Places (RMP) of County Carlow;
- The Sites and Monuments Record;
- The Carlow County Development Plan 2015-21 including the Record of Protected Structures;
- The National Inventory of Architectural Heritage;

- Aerial photographs;
- Excavation reports;
- Cartographic and
- Documentary sources.

A field assessment was carried out on the 15<sup>th</sup> June 2018 to identify and assess any known archaeological sites and structures and previously unrecorded features, possible finds and structures within the application area.

### 15.3 Existing Environment

#### 15.3.1 The Landscape

The application area is situated in north County Carlow, c.1.5km south-west of the town of Tullow and c.1km south-west of the N81 road. It is situated in flat to undulating lowland with a surface level between 60-90m OD.

#### 15.3.2 Archaeological and Historical Development of the Study Area

The following is a brief summary of the archaeological and historical development of the study area and the main types of sites and monuments that are known from the surrounding landscape. The information is drawn from the assessment. It is intended to indicate the types of sites and monuments known to be present in the study area as well as the pattern of landholding and to place this material in its cultural heritage context. The application area is situated in the townland Roscat, the parish of Ardristan and the barony of Rathvilly. Note the spellings of place names varied throughout history, the historical spellings are used here.

##### 15.3.2.1 Prehistoric Period

Prehistoric activity in the study area is indicated in Ardristan townland to the east of the application area by the presence of two standing stones in Ardristan townland (RMP CW013-012--- and RMP CW013-013----) and a Fulacht fia (RMP CW013-082----).

##### 15.3.2.2 Early Medieval Period

In the early medieval period the study area formed part of Fortharta Fea the cantred of Fothryd (Onolan) which were ruled by the Uí Nualláin from the ninth century (MacCotter 2008, 127). Classically, settlement at this period is indicated by the presence of enclosed farmsteads known as ringforts, when they are enclosed by an earthen bank and cashels, when they are enclosed by a stone wall. There is one ringforts known from the study area in Ardristan townland (RMP CW013-029----) and a possible example in Rathoe townland (SMR CW013-123----) that indicate significant settlement in the study area in the early medieval period.

### *15.3.2.3 The Later Medieval Period*

Following the loss of the Kingdom of Leinster in 1166 Diarmait Mac Murchade regained the Kingdom in 1169-70 with the aid of Anglo-Norman mercenaries. He paid them with land grants and promised the succession of Leinster and his daughter to their leader Richard fitz Gilbert de Clare. On the death of Diarmait Mac Murchade in 1171 Leinster duly passed to de Clare, who became the first Anglo-Norman Lord of Leinster. Following his acquisition of Leinster de Clare rewarded his soldiers by granting them substantial lands throughout Leinster to hold as fiefs. The Fotheret Onolan incorporating the study area was granted to Raymond le Gros (MacCotter 2008, 127).

The process of Norman infeudation is normally associated with the construction of timber castles, known as Motte and Baileys. However, there are no Motte castles known from the study area although there are examples in Co. Carlow. In Ireland the manor houses of local lords were sometimes enclosed by rectangular moats and are referred to as moated sites. They are a useful indicator of Anglo-Norman settlement. However, there are no moated sites in the study area although there are examples in Co. Carlow.

The inquisition ordered by King Edward 1 to ascertain the Irish possessions of Roger Le Bygod, Earl of Norfolk, and Lord of Carlow, who died in 1306 records that in 1307 Ardristan and Roscat were held by John de Valle (The Calendar of Justiciary Rolls of Ireland, 1305-1307, 35th Edward I).

### *15.3.2.4 The Post-Medieval Period*

In 1558 Queen Elizabeth granted Edward Moore Arbistell and Ruskogh at a rent of sixteen shillings (Ryan 1833, 122). The Down Survey records that in 1641 Roscat, which was part of Ardristan, was held by the Earl of Ormond and it was held in 1670 by James Butler Earl of Ormond (<http://downsurvey.tcd.ie>). In the early-nineteenth century Roscat formed part of the estate of the Eustace family until Hardy Eustace was forced to sell the lands by Commissioners for the Sale of Incumbered Estates in Ireland in June 1851.

## **15.3.3 Buildings**

### *15.3.3.1 Field Inspection*

On the 15<sup>th</sup> of June 2018 fieldwork was carried out to identify any additional non-designated structures of heritage interest in the vicinity of the application area. This involved assessing all upstanding structures that are marked on the 1939 edition of the six-inch Ordnance Survey mapping within 300m of the application area (see Figure 15.1 at the end of this chapter).

### *15.3.3.2 Designated Structures*

The Carlow County Development Plan 2015-21 was examined as part of the baseline study for this section of the EIAR. The review established that there are no structures listed in the Co. Carlow Record of Protected Structures situated within the application area. There are five Protected Structures situated in the study area (Tables 15-1 – 15-5).

**Table 15-1:** Details of Protected Structure No. CW239 as per the Record of Protected Structures

Item	Details
No.	CW239
Structure type	Forge
Townland	Castlemore
Designation	Protected Structure
Data source	Carlow Co. Development Pan 2015-21
Perceived significance	Regional
Type of impact	None
Significance and quality of impact	None
Description	A three-bay, single-storey, architect-designed forge with walls of coursed-rubble granite, a wide, segmental-headed arch in the centre with a brick head, crow-stepped gables and roof of natural slates. The forge probably dates from circa 1870. On the gable end is a wall-mounted, letter box with an ER VII monogram. The forge has been converted to residential use.
Mitigation proposal	No mitigation required
Illustration	-

**Table 15-2:** Details of Protected Structure No. CW240 as per the Record of Protected Structures

Item	Details
No.	CW240
Structure type	Cottage
Townland	Castlemore
Designation	Protected Structure
Data source	Carlow Co. Development Pan 2015-21
Perceived significance	Regional
Type of impact	None
Significance and quality of impact	None
Description	A pair of semi-detached, single-storey, estate cottages dating from circa 1870, built of coursed-rubble granite with square-headed doorcases, brick dressings and brick drip-labels to the openings and high-pitched, slated roofs with recent dormer windows. The stacks have been removed and the windows have unsuitable, uPVC glazing.
Mitigation proposal	No mitigation required
Illustration	-

**Table 15-3:** Details of Protected Structure No. CW241 as per the Record of Protected Structures

Item	Details
No.	CW241
Structure type	Cottage
Townland	Castlemore
Designation	Protected Structure
Data source	Carlow Co. Development Pan 2015-21
Perceived significance	Regional
Type of impact	None
Significance and quality of impact	None
Description	A small, three-bay, single-storey gate lodge with rendered walls and pointed windows and doorcase, hipped roof with natural slates. It dates from circa 1820 and is now derelict. Beside the lodge are granite gate piers.
Mitigation proposal	No mitigation required
Illustration	-

**Table 15-4:** Details of Protected Structure No. CW517 as per the Record of Protected Structures

Item	Details
No.	CW517
Structure type	Cottage
Townland	Tullowbeg
Designation	Protected Structure
Data source	Carlow Co. Development Pan 2015-21
Perceived significance	Regional
Type of impact	None
Significance and quality of impact	None
Description	A late-19th century estate cottage of three bays with a single storey and attic. It has coursed-rubble, granite walls, with the rendering recently removed, monolithic, granite lintels and a gable-ended, slated roof with wide eaves. The cottage has recently been extended at the rear.
Mitigation proposal	No mitigation required
Illustration	-

**Table 15-5: Details of Protected Structure No. CW470 as per the Record of Protected Structures**

Item	Details
No.	CW470
Structure type	Farm House
Townland	Roscat
Designation	Protected Structure
Data source	Carlow Co. Development Pan 2015-21
Perceived significance	Regional
Type of impact	None
Significance and quality of impact	None
Description	A five-bay, single-storey, gable-ended cottage (originally three bays) with rough-cast walls and a square-headed, granite doorcase. The windows have modern uPVC glazing and the roof has asbestos slates. The house has been added to at the rear in recent times.
Mitigation proposal	No mitigation required
Illustration	-

The closest Protected Structure to the application area is a Farm House (RPS CW470) in Roscat townland (See Fig. 15.1 at the end of this chapter). This building is situated more than 1km north-east of the application area and is considered to be too far distant to have been impacted by the development. The remaining structures in the study area are considered too far distant to be impacted.

#### 15.3.3.3 Non-Designated Structures

The National Inventory of Architectural Heritage (NIAH) which is maintained by the Department of Culture, Heritage and the Gaeltacht was examined as part of the baseline study for this section of the EIAR on 14 June 2018. The review established that there are no additional structures listed in the NIAH situated within the application area or the study area.



### 15.3.4 Archaeological Assessment

#### 15.3.4.1 Field Inspection

On the 15 of June 2018 fieldwork was carried out to identify any additional non-designated structures of heritage interest in the vicinity of the application area. This involved assessing all upstanding structures that are marked on the 1908 edition of the six-inch Ordnance Survey mapping within 100m of the application area (see Figure 15.1). There is one group of upstanding structures situated within this area (see Figure 15.1 - No.1), namely, a group of farm buildings of no heritage interest.

For the purposes of the cultural heritage field assessment, the application area was divided into two distinct areas i.e. Area 1 and Area 2 (Plate 15.1).



**Plate 15-1:** Aerial image of the application area outlined in red with fieldwork areas numbered.

Area 1 is the existing area of extraction and processing that has been extracted to subsoil levels. There is no visible indication of any cultural heritage material.

Area 2 is situated to the north of the extracted area and is a large sub-rectangular, flat to undulating arable field enclosed by high banks and hedges. At the time of the site visit there was a crop of cereals and leaf-vegetables in the field. There is no visible indication of any cultural heritage material.

#### *15.3.4.2 Recorded Monuments*

There are no Recorded Monuments situated within the application area (see Appendix IX). The closest Recorded Monument externally CW013-012----a Standing stone in Ardristan townland, is situated 0.97km to the north-east of the application area and is considered too far distant to be impacted. The remaining Recorded Monuments in the study area and are considered too far distant to have been impacted by the development.

#### *15.3.4.3 Undesignated Monuments*

A review of the Sites and Monuments Record which is maintained by the Department of Culture, heritage and the Gaeltacht at <http://webgis.archaeology.ie/historicenvironment/> on 13 June 2018 indicated that there is one additional site listed in the study area (see Appendix IX). This site CW013-123---- is the cropmark of a curvilinear enclosure defined by a fosse in Rathoe townland. This site is situated 0.78km to the south-west of the application area and is considered too far distant to have been impacted by the development.

#### *15.3.4.4 Cartographic Sources*

The Ordnance Survey 1<sup>st</sup> and 3<sup>rd</sup> edition six-inch maps of the area were examined. This analysis did not indicate any previously unrecorded archaeological sites or monuments.

#### *15.3.4.5 Place Name Evidence*

The place names were extracted from the cartography in order to facilitate the search for structures and monuments and small finds, to help identify any unrecorded monuments or structures, to search for any published papers and documents related to the study area and to assist in the study of the historical development of the area. The English translations of the townland names of the study presented below are based on the Place-names Database of Ireland. The analysis did not indicate any additional cultural heritage material in the application area.

**Table 15-6:** Place-names and their meanings in the vicinity of the proposed application area.

Place Name	Meaning
Ardristan	Hill of the brambles
Castlemore	Great castle
Rathrush	Ringfort of the wood
Rathtoe	North fort
Roscat	Wood of the cats
Tullowbeg	Small hillock

#### 15.3.4.6 Aerial Photographs

Examination of the Ordnance Survey 1995, 2000 and 2005 imagery as well as Google Earth imagery from 2003, 2007, 2009, 2013 and 2015 and Bing maps imagery from 2011 did not indicate any additional cultural heritage or archaeological sites.

#### 15.3.4.7 Other Sources

Examination of archaeological corpus works on prehistoric artefacts (Harbison 1969, Eogan 1965, 1983, 2000, Kavanagh 1991, Simpson 1990), and pottery (O' Riordáin and Waddell 1993) and Iron Age material (Raftery 1984) did not reveal any additional material in the study area.

#### 15.3.4.8 Excavations

Examination of the Excavations Bulletin [www.excavations.ie](http://www.excavations.ie) indicated that there have been no archaeological excavations carried out in the application area or the study area.

## 15.4 Potential Effects of the Proposed Development

### 15.4.1 Direct Effects

There are no direct effects on any known items of cultural heritage, archaeology or buildings of heritage interest in the application area or the vicinity.

### 15.4.2 Indirect Effects

There are no indirect effects on any known items of cultural heritage, archaeology or buildings of heritage interest in the application area or the vicinity

### 15.4.3 Interaction with Other Effects

No interaction with other any other impact has been identified.

### 15.4.4 Do Nothing Scenario Effects

No "do nothing" scenario effects have been identified.

#### 15.4.5 Worst Case Scenario Effects

In the worst case scenario soil-stripping of the unstripped lands within the application area, in Area 2, may impact previously unknown archaeological deposits or artefacts without preservation by record taking place.

### 15.5 Proposed Mitigation Measures

#### 15.5.1 Direct Effects

No direct effects warranting specific remedial measures were identified during the course of the cultural heritage assessment and no mitigation measures are required.

#### 15.5.2 Indirect Effects

No indirect effects warranting specific remedial measures were identified during the course of the cultural heritage assessment and no mitigation measures are required.

#### 15.5.3 Worst Case Scenario Effects

Due to the possibility of the survival of previously unknown sub-surface archaeological deposits or finds within the un-extracted part of the application area, in Area 2, all topsoil-stripping in this area should be monitored by a qualified archaeologist.

#### 15.5.4 Residual Impacts

No residual impacts have been identified.

### 15.6 Conclusions and Recommendations

There are no items of cultural heritage, monuments or buildings of heritage interest known from the application area. There are no direct or indirect impacts on any known items of cultural heritage, archaeology or buildings of heritage interest in the application area or the vicinity. Due to the possibility of the survival of previously unknown sub-surface archaeological deposits or finds within the un-extracted part of the application area, in Area 2, all topsoil-stripping in this area should be monitored by a qualified archaeologist.

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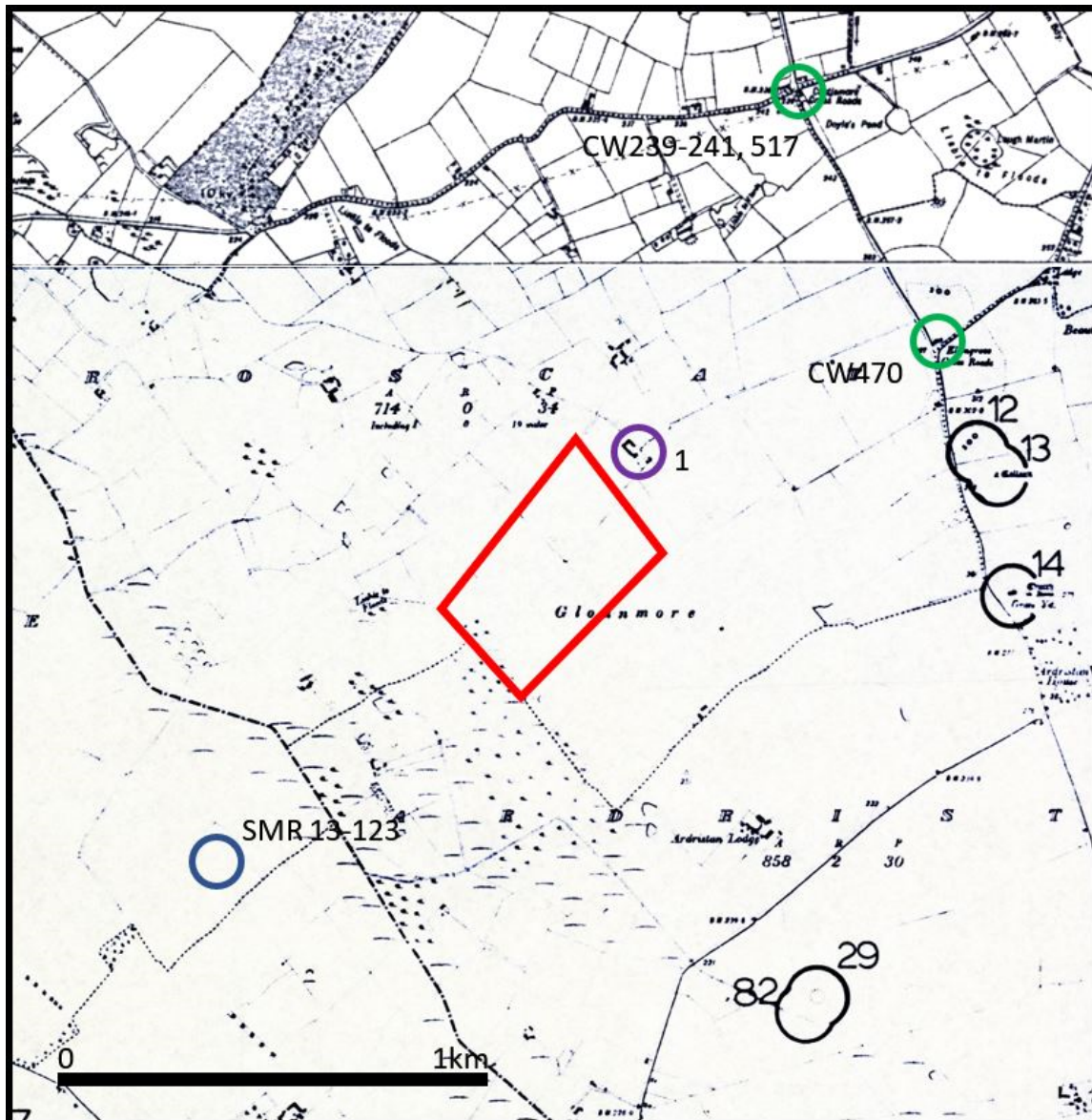
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## Figures







**Figure 15-1:** The assessment study area superimposed on the Record of Monuments for Co. Carlow. The application area is outlined in red. Recorded monuments are indicated with black circles. The site in the SMR is indicated with a blue circle. The structures in the Record of Protected Structures are indicated with green circles. The structures within 100m of the application area are indicated with a purple circle.



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## 16.0 INTERACTIONS

### 16.1 Introduction

This chapter addresses the potential cumulative effects, indirect effects and main interactions between different aspects of the environment that may be affected as a result of the proposed development. Only topics that could be logically linked to the development have been examined in detail. Accordingly, when a topic is not mentioned, it is concluded that no potential for conflict exists.

### 16.2 Interactions

Inter-relationships concern the interactions between potential effects within a project and the interactions between potential effects identified under one topic with effects identified under another topic. Each of the various environmental and related topics have been discussed separately in the preceding chapters of the EIAR and the major interactions between the recorded environmental impacts are assessed within the individual chapters of the EIAR. In examining the interactions of the potential effects of this development, one must investigate the combined physical, environmental, visual and socio-economic effects of the development on the receiving environment. Table 16-1 illustrates the interaction of effects assessed for this project.

**Table 16-1: Interactions of potential effects assessed for this project.**

Factors	Pop. and Human Health	Biodiversity	Land, Soils and Geology	Water	Climate	Air	Noise and Vibration	Traffic	Landscape and Restoration	Material Assets	Cultural Heritage
Pop. and Human Health											
Biodiversity											
Land, Soils and Geology		x									
Water	x	x	x								
Climate	x										
Air	x	x	x	x	x						
Noise and Vibration	x	x									
Traffic	x					x	x				
Landscape and Restoration	x	x	x								
Material Assets	x		x				x	x	x		
Cultural Heritage											

### 16.2.1 Population/Human Health and Water

Contaminants or leakages from plant and vehicles can potentially leak into groundwater which could impact on water quality. Procedures will be in place for dispensing fuel, servicing plant and equipment and for dealing with accidental spillages should they arise.

As such, there are no potential interactions between population and human health and water/hydrology as a result of the proposed development, which could cause significant effects on either of these environmental factors.

### 16.2.2 Population/Human Health and Climate

Plant associated with the operation of the development will result in emissions to air associated with the day to day operations undertaken at the pit which are difficult to eliminate. Measures in place will reduce emissions in so far as possible in order to reduce the effect on climate from day to day operations.

As such, there are no potential interactions between population and human health and climate as a result of the proposed development, which could cause significant effects on either of these environmental factors.

### 16.2.3 Population/Human Health and Air

The primary interaction between air and humans would relate to potential dust emissions associated with extraction, processing and transport of material around and off-site. Exhaust emissions from vehicles and plant are also a source of air pollutants. Dust deposition monitoring will be undertaken to ensure that levels are within the recommended guideline values. Provided that emission limits applied to the pit are adhered to no residual impacts to the air quality are envisaged.

As such, there are no potential interactions between population and human health and air as a result of the proposed development, which could cause significant effects on either of these environmental factors.

### 16.2.4 Population/Human Health and Noise/Vibration

Activities undertaken at the pit will generate noise and vibration associated with the extraction, occasional processing, loading of vehicles and transportation of material within and off site. Various measures are in place to ensure noise levels are not elevated.

A noise and vibration prediction modelling assessment undertaken of the pit showed that the operation of the development will not result in an increase in noise levels above recommended guideline values. Regular noise monitoring will be undertaken to ensure levels at noise sensitive locations are below recommended guideline values.

As such, there are no potential interactions between population and human health and noise/vibration as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.5 Population/Human Health and Traffic**

The transport of pit aggregate to market generates a number of traffic movements on the local road infrastructure. The current proposal will not result in an increase in traffic associated with the pit as it is not proposed to increase the level of traffic above that which was experienced in the past.

As such, there are no potential interactions between population and human health and traffic as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.6 Population/Human Health and Landscape/Restoration**

The extraction of material at the application site has resulted in the creation of a void which will be extended as sand and gravel extraction progresses. This will be restored once extraction activity ceases.

The existing extensively flat topography and vegetation aid in screening the pit. The proposed landscape and restoration plan which proposes the construction of berms along the south-eastern and eastern boundaries will further aid in screening the pit. The proposed berm will be planted with native trees and shrubs.

As such, there are no potential interactions between population and human health and landscape/restoration as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.7 Population/Human Health and Material Assets**

Extraction of sand and gravel has and will result in the loss of a geological resource which cannot be replaced. The proposed landscape and restoration plan will aid in reducing the impact associated with extraction activity. The operation of the pit will not impact on other material assets in the vicinity.

As such, there are no potential interactions between population and human health and material assets as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.8 Biodiversity and Land/Soils/Geology**

The continued operation of the pit will result in the agricultural tillage land of the application site being stripped of overburden and extracted down to the proposed pit floor level. This will result in the direct loss of the agricultural land habitat to a sand and gravel pit. This habitat present on site

is of low ecological value. The proposed restoration plan will offset to a certain extent the impact associated with excavation activity and has the potential to increase the biodiversity of the site.

As such, there are no potential interactions between biodiversity and land, soils and geology as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.9 Biodiversity and Water**

Contaminants or leakages from plant and vehicles can potentially leak into groundwater which could impact on water quality. Procedures are in place for dispensing fuel, servicing plant and equipment and for dealing with accidental spillages should they arise.

As such, there are no potential interactions between biodiversity and water as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.10 Biodiversity and Air**

Activities undertaken at the pit have the potential to create windblown dust which has the potential to affect the biodiversity of the local area. Mitigation and management measures are in place at the pit to prevent dust blow. No significant effects were identified during survey work undertaken onsite. Furthermore, monitoring is undertaken on a regular basis to ensure levels of dust deposition are within the recommended guideline values.

As such, there are no potential interactions between biodiversity and air as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.11 Biodiversity and Noise/Vibration**

Extraction of the resource material and related traffic can lead to noise emissions. Noise levels at sand and gravel pits may affect some bird species and mammals particularly those sensitive to noise.

No significant impact was identified by the Project Ecologist. It is unlikely that continued extraction activity will lead to a negative impact on the biodiversity in the vicinity of the application site and working quarry. Noise and vibration emissions will be monitored and maintained within the parameters specified.

As such, there are no potential interactions between biodiversity and noise/vibration as a result of the proposed development, which could cause significant effects on either of these environmental factors.



#### 16.2.12 Biodiversity and Landscape/Restoration

A landscape and restoration plan is proposed, which includes the construction of a berm along the south-eastern and eastern boundaries. These berms will be planted with native trees and shrubs. This will lead to a positive impact on the biodiversity of the area. Procedures are in place for berm construction and landscaping areas which include assessing areas by an Ecologist prior to removing overburden from extraction areas and placing in areas proposed for landscaping or berm construction. The final restoration of the site will enhance the biodiversity of the area generating a positive effect.

As such, there are no potential interactions between biodiversity and landscape/restoration as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### 16.2.13 Land/Soils/Geology and Water

The removal of overburden and sand & gravel can increase the risk of contamination of groundwater in the event of accidental spillages occurring. Procedures will be in place for overburden removal, landscaping, berm construction, dispensing fuel and servicing plant and equipment. All fuel will be stored in bunded fuel tanks which will contain any leaks from tanks. A buffer layer will be left between the finished floor level and the groundwater table.

As such, there are no potential interactions between land, soils, geology and water/hydrology as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### 16.2.14 Land/Soils/Geology and Air

Overburden removal and berm construction can give rise to windblown dust. This activity will be undertaken during periods of dry weather with some moisture and little or no wind to prevent dust blow. Areas will be dampened down where required and berms will be vegetated.

As such, there are no potential interactions between land, soils, geology and air as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### 16.2.15 Land/Soils/Geology and Landscape

Extraction to date at the application area has resulted in the removal of overburden and sand and gravel resulting in the creation of a void and this will be extended into the adjoining agricultural area. It is proposed to construct a berm along the south-eastern and eastern boundaries of the application area which will be vegetated. Existing stockpiled material will be used for restoring the pit. The impact on the geology and landscape will be mitigated in the longer term by the proposed landscape and restoration plan.

As such, there are no potential interactions between land, soils, geology and landscape as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.16 Land/Soils/Geology and Material Assets**

The geological resource extracted from the application site will result in a void. Sand and gravel extracted from the pit is used as a raw material in the construction industry which is seen as a beneficial use.

As such, there are no potential interactions between land, soils, geology and material assets as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.17 Water and Air**

Dust associated with sand and gravel extraction activities has the potential to contaminate surface water and groundwater if appropriate measures are not in place. Proposed mitigation measures will ensure that potential sources of dust emissions are managed to ensure that they do not give rise to dust emissions such as employing dust suppression on processing equipment and dampening down haul roads during dry windy conditions.

As such, there are no potential interactions between water and air as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.18 Climate and Air**

Plant and machinery operating at the pit will result in emissions to air and climate associated with the operation which is difficult to mitigate against. Energy conservation measures and good management practices will serve to reduce the emissions in so far as is possible.

As such, there are no potential interactions between climate and air as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### **16.2.19 Air and Traffic**

There will be no increase in levels of traffic and air emissions as it is not proposed to increase traffic levels above that conditioned on the pit which is 20 loads per day. Proposed mitigation measures will mitigate against windblown dust particles generated by traffic.

As such, there are no potential interactions between air and traffic as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### 16.2.20 Noise/Vibration and Traffic

Traffic associated with the development generates noise and a minor source of vibration. The development will not result in an increase in pit traffic on the local road infrastructure as the pit proposes to continue in line with the 20 loads per day.

As such, there are no potential interactions between noise/vibration and traffic as a result of the proposed development, which could cause significant effects on either of these environmental factors.

#### 16.2.21 Landscape/Restoration and Material Assets

The visual impact assessment undertaken shows that the existing sand and gravel pit is not visible from any of the surrounding vantage point locations. The pit will be restored to agricultural land which will offset the impact to a certain extent associated with extraction of the available resource.

As such, there are no potential interactions between landscape and restoration and material assets as a result of the proposed development, which could cause significant effects on either of these environmental factors.

### 16.3 'Do Nothing' Scenario

If the proposed development does not proceed, there will be no cumulative impacts or interactions arising.

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## 17.0 MITIGATION AND MONITORING SUMMARY

### 17.1 Introduction

This chapter of the EIAR provides a summary of the mitigation measures proposed in order to avoid, reduce or remedy the potential impacts identified and a summary of monitoring proposed to ensure that mitigation measures are effective.

### 17.2 Population and Human Health

#### 17.2.1 Mitigation Measures

No mitigation measures other than those detailed elsewhere in this EIA Report, are required in relation to population and human health.

Chapter 8.0 – Water

Chapter 9.0 – Climate

Chapter 10.0 – Air

Chapter 11.0 – Noise and Vibration

Chapter 12.0 – Traffic

Chapter 13.0 – Landscape and Restoration

#### 17.2.2 Monitoring

Environmental monitoring will be carried out in accordance with the requirements of the conditions attached to the grant of planning permission.

### 17.3 Biodiversity

#### 17.3.1 Mitigation Measures

##### *17.3.1.1 Disturbance/displacement of breeding Sand Martin*

The following mitigation measures will ensure that the operational quarry activities will not result in significant effects on breeding Sand Martin:

- Should Sand Martins be found to be nesting in any of the stockpiles, then no excavation activities will be undertaken within that stockpile during the Sand Martin breeding season (March-September incl.).
- In order to deter Sand Martin from nesting within the active extraction area of the pit, the degree of the side slopes will be constructed to approximately 60°, which is not suitable for breeding Sand Martin. Stockpiles will also be kept to a minimum.
- Alternative breeding sites in the form of stockpiles following standard published best practice guidance (Rodriguez, 2016) will be created in a disused area within the gravel pit site.

#### 17.3.1.2 *Disturbance/displacement of General Breeding Birds*

The following mitigation measure will ensure that the vegetation clearance, should it be required, will not result in significant effects on the general breeding bird species within scrub and hedgerow habitats:

- No vegetation clearance will be undertaken onsite between 1<sup>st</sup> March and 31<sup>st</sup> August (incl).

#### 17.3.1.3 *Protection of water quality and aquatic ecology*

The following mitigation measures will ensure that the operational sand and gravel extraction activities will not result in significant effects on the local surface and groundwater environment and the subsequent aquatic ecology:

- Runoff passes through a series of settlement ponds which have been shown to clarify the water prior to it crossing the site boundary.
- Compacted areas of the pit floor will be broken up using a ripper.
- Stockpiles will be vegetated to enhance stability. Establishment of rooting restricts surface erosion.
- Stockpiled material will be re-used in the restoration process.
- Potentially contaminating substances will not be stored on site. However, should this be required they will be stored in sealed containers in designated areas isolated from surface water drains or open waters.
- Refuelling will be carried out by a licensed third party using a mobile bunded bowser. Haulage vehicles will be refuelled off-site.
- Refuelling and parking shall be on the existing hardstanding pad. All runoff from the hardstanding pad shall pass through a newly installed hydrocarbon interceptor.
- A layer of overburden will be spread on the pit floor as part of the restoration plan which will provide a layer of protection to groundwater.
- Refuelling and parking will be on the existing hardstanding pad.

### 17.3.2 **Monitoring**

It is recommended that the proposed operational works are monitored periodically, particularly during the bird breeding season to ensure that the mitigation proposed is implemented and that the conservation interests within the receiving environment are effectively protected. Ongoing monitoring of water quality will also be undertaken on a biannual basis during the operation of the pit.

#### 17.3.2.1 *Monitoring Sand Martins*

- Should Sand Martins be found to be nesting in any of the stockpiles, then no excavation activities will be undertaken within that stockpile during the Sand Martin breeding season (March-September incl.).

- In order to deter Sand Martin from nesting within the active extraction area of the pit, the degree of the side slopes will be constructed to approximately 60°, which is not suitable for breeding Sand Martin.
- Alternative breeding sites in the form of stockpiles following standard published best practice guidance (Rodriguez, 2016) will be created in a disused area within the gravel pit site.

#### *17.3.2.2 Monitoring Water Quality*

A designated person from the project management team will have overall responsibility for ensuring that all operations are carried out in such a way as to minimise potential impacts to hydrological and hydrogeological receptors. This person will also have responsibility of monitoring the performances of any pollution control measures adopted.

### **17.4 Land, Soils and Geology**

#### **17.4.1 Mitigation Measures**

The following mitigation measures are proposed as part of the quarry preparation phase and operational phase in relation to Land, Soils and Geology.

##### *17.4.1.1 Enabling Phase*

The following mitigation measures are proposed as part of the enabling phase:

- In order to reduce potential for widespread compaction traffic movements will be restricted to define internal haul routes insofar as possible.
- Works shall not be carried out during excessively dry or wet weather. Dust monitoring shall be carried on a prescribed basis.
- Dust suppression to be employed as necessary.
- Slope stability of any retained perimeter berms should prevent slippage, and berms should be to establish vegetation which will strengthen soil cohesion and mitigate against sediment losses.
- Excavated topsoil will be used as part of site rehabilitation. The site will be capped with a layer of topsoil in order to restore the back to agricultural use.

##### *17.4.1.2 Operational Phase*

The following mitigation measures will be implemented during the operational phase:

- Works shall not be carried out during excessively dry or wet weather.
- Dust monitoring shall be carried on a prescribed basis. Dust suppression to be employed as necessary.
- Stockpiled screenings will be retained on site and used for contouring/landscaping as part of rehabilitation. Such works shall not be carried out during excessively dry or wet weather.

- Dust monitoring shall be carried on a prescribed basis.
- Dust suppression to be employed as necessary.
- There will be no storage of fuels on site. Refuelling shall be carried out by an external fuel supplier at a designated area or where possible off-site.
- Fuelling and servicing of plant (where required) will be in a designated area, not within 30m of drainage ditches or surface waters.
- Drip trays will be used during refuelling.
- An adequate supply of spill kits and hydrocarbon absorbent packs shall be stored on site and staff shall be trained in the appropriate use of same.
- No waste containers shall be stored on-site and shall be removed from the site by fitters undertaking work.

Further measures will be implemented where required in response to any change in guidance notes, legislation or planning conditions in relation to quarrying activity.

#### 17.4.1 Monitoring

A designated person from the project management team will have overall responsibility for ensuring that all operations are carried out in such a way as to minimise potential impacts to soils and geological receptors. This person will also have responsibility of monitoring the performances of any pollution control measures adopted.

A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractor during all phases of work. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures during a site induction meeting.

#### 17.5 Water

##### 17.5.1 Mitigation Measures

The following mitigation measures will be implemented onsite at all times:

- Compacted areas of the pit floor will be broken up using a ripper.
- Stockpiles will be vegetated to enhance stability. Establishment of rooting restricts surface erosion.
- Stockpiled material shall be re-used in the restoration process.
- Potentially contaminating substances will not be stored on site. However, should this be required they will be stored in sealed containers in designated areas isolated from surface water drains or open waters.
- Fuelling, lubrication and storage areas will be in a designated area, not within 30 m of drainage ditches or surface waters.
- Refuelling will be carried out by a licensed third party using a mobile bunded bowser. Haulage vehicles will be refuelled off-site.



- Refuelling and parking shall be on the existing hardstanding pad. All runoff from the hardstanding pad shall pass through a newly installed hydrocarbon interceptor.
- Excavated topsoil will be used as part of site rehabilitation. The site will be capped with a layer of topsoil in order to restore the back to agricultural use.
- Compacted areas of pit floor will be ripped to a depth of 0.5 m to restore original permeability.
- Natural attenuation deemed to be provided by settlement ponds and Ardristan Fen.

### 17.5.2 Monitoring

A designated person from the project management team will have overall responsibility for ensuring that all operations are carried out in such a way as to minimise potential impacts to hydrological and hydrogeological receptors. This person will also have responsibility of monitoring the performances of any pollution control measures adopted.

A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractor during all phases of work. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures during a site induction meeting.

## 17.6 Climate

### 17.6.1 Mitigation Measures

The following mitigation measures will be practiced in order to limit the effects of the development on the local and regional climate:

- Strict adherence to 'good site/engineering practices' (e.g. all vehicles and plant will be switched off when not in use) should minimise the generation of any unnecessary air emissions.
- Plant will be serviced regularly to ensure efficient fuel consumption.
- Energy consumption and emission volumes will be considered when purchasing new plant or vehicles.
- Energy audits will be undertaken at the quarry in order to reduce energy requirements.
- When purchasing plant, preference will be given to plant which have low emissions.

### 17.6.2 Monitoring

No monitoring is proposed.

## 17.7 Air

### 17.7.1 Mitigation Measures

#### 17.7.1.1 Enabling Phase

The following mitigation measures are proposed as part of the enabling phase:

- Imposition and enforcement of an appropriate speed limit on haul roads to prevent unnecessary generation of fugitive dust emissions.
- Inspection of the work area to be undertaken on a daily basis to ensure that there is no dust blow.
- Stockpiles were sprayed with water to reduce dust blow where required.

#### 17.7.1.2 Operational Phase

The following mitigation measures are practiced at the existing working quarry and these will be practiced going forward in order to limit the effects of quarrying activity on air quality:

- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 30 kph, and on hard surfaced roads as site management dictates.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- The access road will be inspected regularly and kept in good condition.
- During very dry periods, dust emissions from heavily trafficked locations will be controlled by spraying surfaces with water.
- Stockpiles we will be re sprayed with water to reduce dust blow where required.
- Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Inspection of the work area to be undertaken on a daily basis to ensure that there is no dust blow.

### 17.7.2 Monitoring

Dust deposition monitoring will continue to be undertaken at the quarry.

## 17.8 Noise and Vibration

### 17.8.1 Mitigation Measures

The following mitigation measures will be practiced to ensure that activities associated with the development do not generate excessive noise and vibration levels above the recommended guideline value during day to day activities:

- Reversing beeper on mobile plant can be replaced with 'white noise beepers' which is not audible to any receptors.
- Acoustic berms of minimum 3m height will be constructed along the north-east extraction boundary of the site.
- The mobile crushing and screening plant will be located in the concrete laydown area of the existing sand and gravel pit
- Rubber lining will be installed on crusher / screener systems
- All motors and pulleys will be maintained to a high standard with regular maintenance so as to avoid any tonal or impulsive components in the emission.
- All mobile plant on site will have well maintained silencers.
- Machinery will be throttled down or turned off when not in use.
- A noise reduction will be considered where any replacement of mobile plant will have noise characteristics considered.

### 17.8.2 Monitoring

Monitoring of noise levels will continue at 3 locations as shown on Figure 11.1 on a quarterly basis to ensure that noise levels are below the recommended guideline values

## 17.9 Traffic

### 17.9.1 Mitigation Measures

The following measures will be implemented in order to minimise the impact of the proposed development in relation to traffic:

- Improvements to the existing junction that will provide access to the Proposed Development, as set out in Section 12.6.2 and Figure 12.13, including junction markings and signage in accordance with the Traffic Signs Manual,
- Vehicle washing facilities will be provided as part of the Proposed Development in order to prevent mud and debris on the local road network.
- Road sweeping equipment will be available on the site in the event material is transported and deposited on public roads.

### 17.9.2 Monitoring

No monitoring is proposed.

## 17.10 Landscape and Restoration

### 17.10.1 Mitigation Measures

The perimeter vegetation around the proposed application area will be retained. Landscape work and planting as part of the restoration process will serve to reduce the long-term visual impact of the development. The landscaping measures have been designed to conceal the site, as much as possible, screening it from outside views. Mitigation measures will reduce as much as possible, any visual impact resulting from ongoing development of the site.

As part of the proposed application, measures will be put in place to reduce loss of biodiversity and enhance the conservation value of the area and reduce environmental impacts of extraction activity on the surrounding area. These include the following:

- Reshaping overburden stockpiles and vegetating these.
- Provision of berms which will be planted and allowed to develop with the natural seed bank in the soil to create ecosystems and to provide corridors of natural habitat which connect existing natural areas around the quarry.
- The use of native species will support a wider range of insects and animals and will contribute more to the ecology of the region.
- This added vegetation will also enhance the local wildlife corridor, connecting the site with the surrounding landscape.
- Using plants adapted to or tolerant of the existing site conditions will reduce the need for expensive remedial measures (such as replacing failed plants).
- Hedgerows and tree lines along the site perimeter will be retained on closure of the pit.
- All planting of trees and shrubs will take place during the dormant seasons. Bare-rooted plants transplant most successfully during their dormant season, this is usually between November and March/April. Avoiding times when the ground is actually frozen, this will mean either autumn or spring planting.
- Planting areas will be suitably fenced to exclude farm stock, rabbits, sheep and other browsing animals. It may be more economical to protect each tree individually rather than fence the whole area.
- No herbicides, pesticides or fertiliser will be applied to the berm.
- Ensuring the site perimeter side slopes remain in a condition suitable for breeding Sand Martin as outlined above in Section 13.6.2.

### 17.10.2 Monitoring

- Ensuring the perimeter side slopes remain in a condition suitable for breeding Sand Martin.

## 17.11 Material Assets

### 17.11.1 Mitigation Measures

Mitigation measures are discussed in the relevant chapters where required to ameliorate any impacts identified.

### 17.11.2 Monitoring

No monitoring is proposed.

## 17.12 Cultural Heritage

### 17.12.1 Mitigation Measures

No direct or indirect effects warranting specific remedial measures were identified during the course of the cultural heritage assessment and no mitigation measures are required.

### 17.12.2 Monitoring

No monitoring is proposed.