JSPE

J Sheils Planning & Environmental Ltd

Clashford Recovery Facilities Ltd.

Naul Townland

Naul

Co. Meath

Waste Licence Application

W0265-01

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Environmental Impact Assessment Report

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1 INTRODUCTION

1.1 GENERAL BACKGROUND

Projects likely to have significant effects on the environment *by virtue of their nature, size and location* are subject to the requirement for an Environmental Impact Assessment (EIA), prior to gaining development consent. The EIA is a systematic process undertaken to identify and evaluate the potential environmental impact of proposed projects. The EIA also seeks to consider alternatives and propose mitigation measures to ensure the development is carried out within recognised and accepted standards. Thus, the EIA is a dynamic process in which environmental consideration delivers significantly improved project configurations in respect of environmental protection and sustainability. The Environmental Impact Assessment Report (EIAR), which replaces the previous Environmental Impact Statement (EIS), is the new formal statement or document produced as a result of that process.

This EIAR pertains to the continued operation of a Waste Recovery Facility (WRF) located at Clashford quarry in the Townland of Naul, Co. Meath. The lands have a history of sand and gravel working dating back to at least the early 1980's. These lands were worked under a succession of planning permissions. The quarry and WRF operate under the terms and conditions imposed under P. Ref. QY36, QC 17.QC 2085 and P. Ref. 85/512, PL.17/5/72181. Since 2001, the quarry site is being progressively restored in accordance with a Phased Restoration Scheme using imported soil and stone subject to successive Waste Management Permits granted by Meath County Council (e.g., Waste Permit Reg. No. WMP 2005/25).

The principal activity is Class R5 (recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials) of the Fourth Schedule of the Waste Management Act 1996, as amended. Other activities include Class R13 of the Fourth Schedule (storage of waste pending any of the operations numbered R 1 to R 12).

The nature of the development is the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert construction and demolition waste.

It is proposed in the Waste Licence Application that circa 40,000 to 70,000 cubic metres per annum of inert materials will be accepted to site (subject to market conditions) to complete the restoration of the lands to beneficial after use. It is estimated that c. 20,000 tonnes per annum of inert construction and demolition waste is to be recovered at the facility.

A total of c. 2,270,000 tonnes (1,135,000,000 m^3) has been received to data. It is estimated that 348,000 tonnes (174,000) tonnes is required to be complete the final restoration of the lands (Phase 3).

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A. Reg. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul, Co. Meath.

The development will consist of the recovery of construction and demolition waste to produce secondary aggregates. The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The total application area including the site infrastructure covers c. 0.8 ha of lands. The development will be subject to the requirements of the waste management licence (Reg. No. W0265_01) which is currently under consideration by the Environmental Protection Agency (EPA).

Any small quantities of timber, plastic, paper and steel will be separated for recovery and/or disposal offsite.

Changes in Waste Management legislation which came into effect in June 2008 (S.I. No. 821 of 2007, and S.I. No. 86 of 2008), now require a Waste Management Licence issued by the Environmental Protection Agency (EPA) in order to operate a waste recovery facility with a lifetime total intake volume in excess of 100,000 tonnes. The waste licence application (W0265-01) was submitted on 13/02/2009.

In accordance with Section 40 (2A)(C) of the Waste Management Acts (1996-2013), the Agency has assessed the information submitted and considers that the application must be made subject to an environmental impact assessment. As such the EIAR will be submitted to the Agency with the application.

Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive) came into effect on 16th May 2017. Circular Letter PL 1/2017, dated 15th May 2017 from the Department of Housing, Planning, Community & Local Government (DHPCLG), advises that competent authorities should consider "applying the requirements of Directive 2014/52/EU by way of administrative provision in advance of the transposition .... "

Having regard to the above advice the Agency are now seeking further information on the application and associated EIS and required that the applicant update the EIS in accordance with the requirements of the 2014 EIA Directive. This further information is sought in accordance with Article 16 (l) of the Waste Management (Licensing) Regulations 2004.

A copy of the application for a waste licence, EIAR and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application, will, as soon as practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Agency.

The EIAR has been prepared and compiled under the supervision of John Sheils, (B.Eng. (Mining), MSCS, MRICS) on behalf of the applicant, Clashford Recovery Facilities Ltd. John Sheils is the principal of "J Sheils Planning & Environmental Ltd", a company that provides planning, environmental services and specialises in the area of minerals extraction and inert waste management.

In addition to the studies within the EIAR carried out by J Sheils Planning & Environmental Ltd, some additional technical studies have been carried out by independent consultants. These studies are incorporated within the EIAR or are attached to the EIAR as appendices.

1.2 SITE LOCATION

The site is located within the Townland of Naul, c. 300m north of the village of Naul at Irish Grid Ref. E313399, N261545, on the east side of Regional Road R108 (Refer to Figure A1.0, Rev A *EIAR Section 6 Figures*). The R108 connects with the R122 in village of Naul, which connects with the M1 (Dublin-Drogheda-Dundalk) motorway c. 5km to the east, and to the town of Balbriggan c. 7km to the east. Dublin lies c. 25km to the south, whereas Drogheda lies c. 15 km to the north. The Delvin River flows roughly SW-NE and flanks the southern boundary of the site, whilst an unnamed tributary stream of the Delvin River flanks the northern boundary of the site and joins the river at the northeastern terminus of the quarry site. The western boundary of the quarry site is defined by the R108 and the party boundary with several residential properties on the east side of the R108.

The site is situated at approximately 60-80m AOD in a predominantly rural area of south County Meath, across the Delvin River immediately north of the village of Naul in north County Dublin. The surrounding landscape is defined by the valley of the Delvin River, known as Roche Valley (elev. c. 60-90m OAD), separating two sets of hills to the northwest (max. elev. 159m) and southeast (max. elev. 176m). The quarry has been developed on a c. 1km long mound of sand and gravel within a southwest-northeast oriented ribbon of glacial deposits that extends from the Townland of Tobeen (i.e. c. 2km further up valley) down the river valley to the coastal plain. The topography of the quarry site is thus elevated above the valley floor. The land-use in the area consists of a patchwork of agricultural fields that are classed as non-irrigated arable land and pasture, reflecting medium-high intensity agricultural. Outside of the immediate environs of the village of Naul, the settlement pattern can be described as low-intensity rural settlement.

The village of Naul is situated 300m south of the application site (Refer to Figure B 2.2 Rev C, *EIAR Section 6 Figures* for locations of residences). Residential property in the area typically comprises one-off single residences and farmsteads along public roads.

The quarry is not a skyline feature, occupying a low field of view from distant receptors; with field boundaries and trees forming the background. The views are mostly obscured by intervening topography, hedgerows and forestry (See EIAR Figure B 2.1 – Rev. C, *EIAR Section 6 Figures*).

In the vicinity of the Clashford, the WRF is well screened from public view on the R108 by existing hedgerow on the roadside and intervening boundaries of properties on the east side of the R108. Mature broadleaf woodland and hedgerow fringes the Delvin River to the south of the landholding, and along the tributary to the north of the landholding, whilst a broad swathe of planted mixed broadleaf forest fringes the eastern half of the quarry site.

The existing restored quarry lands to the west and Phase 1 to the south along the banks of the Delvin have significantly improved the visual amenity of the locality and also act as a substantial buffer to the current restoration works.

The site of the quarry and WRF is on a landholding of c. 33.4 ha, owned by the applicant Clashford Recovery Facilities Ltd. Although there are no residences within the landholding, there are several nearby residences within 50-100m on the R108. In addition, there are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A 1.0 *Rev A* and B 2.2 *Rev C* for site location details).

1.3 LEGISLATION

1.3.1 ENVIRONMENTAL AND PLANNING & DEVELOPMENT LEGISLATION

As a member State of the EU, Ireland is required to transpose EU directives into Irish Law within specified periods of their enactment. The EIA process is covered by the EIA Directive (85/337/EEC), which has been amended three times, and more recently consolidated in the Directive 2011/92/EU. In particular, Annex I of the directive specifies projects requiring an EIA, whilst Annex II specifies those projects where the Member state decides on the thresholds in terms of project scale, as to whether an EIA is required.

Prior to 2000, the rules in respect of EIA contained in the various EC directives were brought into force by the European Communities (EIA) Regulations 1989 and the EC (EIA) (Amendment) Regulations, 1999 and the Local Government (Planning & Development) Regulations 1999. These were largely consolidated within the terms of Part X of the Planning & Development 2000 Act, and Part 10 and Schedules 5, 6 and 7 of the 2001 Planning and Development Regulations, 2001. Therefore, under Irish Law, proposed developments are required to comply with the Planning and Development Acts, 2000 to 2017 and related secondary legislation in the form of Statutory Instruments or Regulations. These pieces of legislation require an EIA to be conducted, typically by specialist consultants on behalf of the developer, before consent is given for projects likely to have significant effects on the environment by reason of their size, nature or location.

The responsibility for the planning and environmental regulation of developments rests with the local authorities. These and An Bord Pleanála enforce compliance by attaching conditions relating to the environmental management of granted planning permissions. Licenses and permits may be required from local authorities, or EPA where discharges, emissions or waste activities occur.

In respect of the Planning & Development Regulations S.I. No. 600 of 2001, Schedule 5, Part 1 specifies projects requiring an EIA (reflecting Annex I of the EIA Directive), and Schedule 5, Part 2 specifies those projects where the Member State decides on the thresholds in terms of project scale, as to whether an EIA is required (reflecting Annex II of the EIA Directive). Schedule 6 specifies information to be contained in an EIA, whilst Schedule 7 specifies the criteria used for determining Sub-Threshold projects, which for reasons of location and characteristics of the development and related impacts, require an EIA.

A new EIA Directive 2014/52/EU came into effect in 2014, which each Member State was required to have transposed into law by May 16th 2017. However, Directive 2014/52/EU was

not transposed into Irish law by May 16th 2017, and was still awaiting transposition at the time of writing of this EIAR.

In accordance with Circular letter PL 1/2017 issued by the Department of Housing, Planning, Community and Local Government, in respect of applications for planning permission received on or after 16th May 2017 falling within the scope of Directive 2011/92/EU, or within the scope of Directive 2014/52/EU, competent authorities are advised to consider applying the requirements of Directive 2014/52/EU by way of administrative provisions in advance of the transposition of Directive 2014/52/EU into Irish law.

The amended Directive uses the term Environmental Impact Assessment Report (EIAR) for what was formerly referred to in Irish legislation as an Environmental Impact Statement (EIS).

In May 2017, the EPA published Draft Guidelines on the information to be contained in environmental impact assessment reports (EPA 2017). The Guidelines have been drafted with the primary objective of improving the quality of EIARs with a view to facilitating compliance (with the Directive). Due consideration of these draft guidelines has taken with respect to the preparation of the EIAR.

1.3.2 WASTE LEGISLATION

The Waste Framework Directive 2008/98/EC, which repealed previous Waste Directives 75/439/EEC, 91/689/EEC and 2006/12/EC, establishes a legal framework for the treatment of waste within the EU, excepting certain waste categories, such as radioactive elements, waste water, animal by-products, etc. The Directive seeks to protect the environment and human health through the prevention of the harmful effects of waste generation, and through waste management. Article 13 requires Member States to take measures to ensure that waste is managed while safeguarding human health and the environment, and in particular:

- without risk to water, air or soil or to plants or animals
- without causing a nuisance through noise or odour
- without adversely affecting the countryside or places of special interest

In order to address the whole waste cycle, Member States are required to implement legislation in accordance with a hierarchy for the treatment of waste, set out in Article 4, which ranges from prevention, reuse, recycle, energy recovery to disposal (i.e., analogous to Landlink's Ladder). The Directive also addresses issues of waste management, permits and registration, and the establishment of national waste management plans.

The management of waste in Irish Law is codified principally in the Waste Management (WM) Acts, 1996 and 2001, and Part 3 of the Protection of the Environment Act, 2003, which may be cited together as the Waste Management Acts, 1996 to 2003, or the Waste Management Act, 1996, as amended. The European Communities (Waste Directive) Regulations, 2011 (S.I. 126 of 2011) represents the transposition of the Waste Framework Directive, 2008 into Irish Law, and amends these Acts.

The 2011 Regulations apply the definition of 'waste' established in the 1996 WM Act as "any substance or object belonging to a category of waste specified in the First Schedule or for the time being included in the European Waste Catalogue (EWC) which the holder discards or

intends or is required to discard, and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved".

The Waste Management Acts, as amended, require that any person, with few exceptions, carrying out the recovery or disposal of waste shall hold a waste license, a waste facility permit or a certificate of registration, depending on the nature and extent of the activity. This requirement for waste disposal and recovery activities to be authorised is provided for in Part V, Section 39 of the Waste Management Acts. Sub-section 39(1) states that all such activities require a waste licence, except those classes of activities for which waste permit regulations have been provided under subsection 39(4). Sub-section 39(5) sets out that the waste permit regulations shall provide specifics on the quantities of waste that may be disposed or recovered under waste permits, and that waste permits or waste certificates, as opposed to waste licences, are obtained from the local authority, for privately operated waste facilities, or the Agency.

The Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. 821 of 2007), as amended (i.e., S.I. 86 of 2008), governs waste facility permits and certificates of registration. Schedule 3, Part I of the 2007 Regulations specifies the types of waste activities subject to a waste facility permit. Class 5 covers the recovery of excavation spoil, comprising natural materials (e.g., clay, gravel, etc.), and which constitutes inert waste, through deposition for the purposes of the improvement or development of land. This class of activity has a threshold of 100,000 tonnes for the total waste intake over the lifetime of the facility.

Where there are several classes of waste activities being undertaken within a facility, the quantity of waste for the purpose of the statutory thresholds refers to the total quantity of waste accepted at the facility (i.e., total of all classes of activity) and compared to the threshold for the principal class (EPA 2008). However, as Class 5 is the dominant class of activity at Clashford, and the expected lifetime intake volume exceeds the 100,000 tonnes threshold for a Waste Permit, the operator is required to apply for a Waste Management Licence.

In order to continue the phased restoration of the quarry, Clashford Recovery Facilities Ltd. therefore applied to the EPA for a Waste Management Licence to replace the existing Waste Management Permit granted by Meath County Council in 2005 (Reg. No. WMP 2005/25).

According to Article 3(4) of the 2007 Regulations, "A waste permit granted under the Regulations revoked in respect of an activity which does not fall within part I of the third schedule and which requires a waste licence in accordance with the Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004), as may be amended from time to time, shall remain valid if an application for a waste licence is made to the Agency within 180 working days of the coming into operation of these Regulations, until such time as a decision is taken to grant or to refuse a waste licence under article 34 of the Waste Management (Licensing) Regulations 2004, as may be amended from time to time, at which point the waste facility permit will lapse." The WRF at Clashford continued to operate under the conditions of the existing Waste Permit (Reg. No. WMP 2005/25), whilst the application for a Waste Management Licence remains undecided. The facility has remained closed since August 2017 and Meath County Council have informed our client that Environmental Order No. A02789/2017 (Section 55 Notice (WMA Act, 1996, as amended) is to remain in place until such time as the EPA reach a decision with respect to Waste Licence application.

Waste licenses are issued by the Environmental Protection Agency (EPA), while waste facility permits and certificates of registration are granted by the local authority in lieu of waste licenses for privately operated waste facilities.

The principal activity is Class R5 (recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials) of the Fourth Schedule of the Waste Management Act 1996, as amended. Other activities include Class R13 of the Fourth Schedule (storage of waste pending any of the operations numbered R 1 to R 12).

1.4 SCREENING

1.4.1 ENVIRONMENTAL IMPACT ASSESSMENT

An EIA is a systematic process to identify and evaluate the environmental impact of proposed projects, developments and programmes, and is a key environmental policy instrument of the European Union (EU). The process requires proposed developments likely to have a significant impact on the environment to gain consent from the competent authority prior to proceeding with the project.

As stated above, in Irish Law, the principal Acts under which EIA's are regulated are the Planning & Development Acts, 2000-2017. The Act consolidates previous Planning Acts and much of the Environmental Impact Assessment Regulations, where the latter is covered in Part 10 of the Act. In addition, secondary legislation consisting of Statutory Instruments or Regulations, made under the Planning & Development Act are also applicable.

Screening is the initial phase of the EIA process, whereby the proposed project is evaluated to determine if an EIA is required. Projects requiring EIA are listed in Part 1 and 2 of Schedule 5 of the Planning and Development Regulations (PDR) 2001 (S.I. No. 600 of 2001) as amended. Part 1 lists projects for which an EIA is obligatory under European law (specified in Annex 1 of the EIA Directive 2011/92/EU). In contrast, Part 2 lists projects for which an EIA is required, based on criteria and/or thresholds determined by the Member State, Ireland in this case (reflecting Annex II of the EIA Directive 2011/92/EU).

Any development which is seeking a waste licence which has not previously been subject to an Environmental Impact Assessment (EIA) is screened by the EPA to determine whether a waste licence application should be made subject to an EIA.

During the EPA waste licensing process, the legislation relating to EIA was revised subject to European Union (Environmental Impact Assessment) (Waste) Regulations 2012 (S.I. No. 283 of 2012). In accordance with Section 40(2A) of the Waste Management Act 1996, as amended, and with regard to Section 42(11) of the Act, as amended, the Agency has, as part of its consideration of the waste licence application determined that the application should be made subject to an Environmental Impact Assessment (EIA) as regards the matters that come within the functions of the Agency.

The EPA have determined that the activity to which the licence application relates exceeds the threshold under Section 11(b) of Part 2, of Schedule 5 of the Planning and Development

Regulations (PDR) 2001, namely “Installations for the disposal of waste with an annual intake greater than 25,000 tonnes not included in Part 1 of this Schedule.”

1.4.2 APPROPRIATE ASSESSMENT

Appropriate assessment was introduced by the EU Habitats Directive as a way of determining during the planning process whether a project is likely to have a significant effect on one of the Natura 2000 sites so far designated (i.e., the candidate SAC’s and SPA’s), or their conservation objectives.

Article 6(3) states:

“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives….”

In the Irish context this has been interpreted as a four-stage process. Firstly, a screening exercise (Stage 1) determines if a project could have significant effects on a Natura site. If it does or the situation is unclear a Natura Impact Statement (Stage 2) is provided to the planning or regulatory authority which then conducts an Assessment of the information supplied. Examples of significant effects are a loss of habitat area, fragmentation of the habitat, disturbance to species using the site and changes in water resources or quality. If such negative effects come to light in the assessment, alternative solutions are investigated by the proponent (Stage 3) and modifications made unless the project is deemed to be driven by ‘imperative reasons of overriding public interest’ in its current form. In this case Stage 4 then deals with compensatory action.

The quarry site at Clashford, which includes the application site, is not included in any area with an ecological designation (NHA, cSAC or SPA). The only Natura 2000 sites within 15km of Naul are the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), the River Nanny and Shore SPA (Site Code 4158) and the Skerries Island SPA (Site Code 4122).

Screening for Appropriate Assessment was carried out previously with respect to the EPA Waste Licence Application W0265-01. The findings of the assessment, were, in view of best scientific knowledge, it is concluded that the activity, individually or in combination with other plans or projects is not likely to have a significant effect on the Natura 2000 network, and the conservation objectives of the sites. In accordance with Regulation 42(8)(a) of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, a Stage 2 Appropriate Assessment is therefore not required.

Further information was also submitted to the EPA on 20/03/2016 in accordance with notice issued under Article 14(2)(b)(ii) of the Waste (Licensing) Regulations including the following statement by the appointed ecological consultants, Roger Goodwillie & Associates.

‘The recent monitoring of the Delvin River has shown that outflows from the site have not altered the condition of the river to any significant extent. EPA Q- values show that on all sampling occasions the river below the development site is in better condition than that above it. Invertebrates (what Q-values are based on) are more sensitive to substances in the water than birds, so if they are not affected then neither will the visiting birdlife which is the basis of

the SPA designation' of sites downstream. (Roger Goodwillie, Consulting Ecologist 2016, pers. comm., 22nd January 2016).

Further correspondence in the form of a letter from Hydro-Environmental Services (HES) to the EPA on 18th March 2016 confirms the lack of connectivity between the Natura 2000 sites and the Clashford WRF site.

"*There is a considerable distance between the Clashford site and any of the Natura 2000 sites. For all Natura 2000 sites sediment or surface water has to travel in the river and then the sea to get to any of the Natura 2000 sites. The shortest flowpath is to the River Nanny Estuary and Shore SPA (Site Code: 004158), and this is some 10.5kms (including 1.5kms of open sea water). Assuming an average near shore sea depth of 5m, and using the near shore 500m width (as a likely flow path from the Delvin estuary towards the SPA), the volume of this near shore body of water is some 3,750,000m^3 of sea water. The dilution available in the sea for any minor water quality issue in the Delvin River is significant and will buffer the SPA from any significant potential impact."*

As such the risk to surface water and to groundwater from the site is not significant. Given the separation distances, and the very unlikely scenario of significant pollution emerging or being discharged from the site, the risk to downstream Natura 2000 sites is not significant.

As such the risk to surface water and to groundwater from the site is not significant. Given the separation distances, and the very unlikely scenario of significant pollution emerging or being discharged from the site, the risk to downstream Natura 2000 sites is not significant.

1.5 SCOPING & CONSULTATION

Scoping should ensure that the constituent environmental studies of the EIA provide all of the relevant information, particularly with respect to: (1) significant impacts of the project; and (2) alternatives to the project. As such, the scoping process identifies the issues that are likely to be important during the EIA and eliminates those that are not. The information can be compiled through a formal process, whereby the competent authority is asked to consult with relevant agencies to draw up an opinion about the scope of the coverage required. More informal scoping can also be carried out to ensure that all relevant issues are identified and addressed to an appropriate level of detail.

A scoping exercise has been carried out in order to identify the range of impacts that may be associated with the proposed development, the likely concerns of local residents and landowners, and to assess the information and detail that is required to be included within the EIAR.

Consultation for the purpose of an EIA provides an opportunity to solicit expertise and advice from a wide range of organisations and interested parties. Consultation has also taken place with sub-consultants appointed to prepare studies on specialised subjects. These include hydrogeologists, geologists, ecologists, traffic and archaeological consultants. Consultations were held with professional staff from the EPA as part of the scoping process.

In particular, a meeting was held with Patrick Geoghean and Brian Meaney, Senior EPA Inspectors at the Agency headquarters on 12th May 2014. The inspectors outlined their requirements with respect to preparation of the EIS (now EIAR), and that the EIAR should be prepared in light of the Agency's guidance documents on EIAR (Refer to Section 1.6 below).

Given the level of discussion with the EPA, including identifying the issues and emphasis that are likely to be important during the EIA, it was not considered necessary to formally request a written opinion ("scoping") on the information to be contained in the EIS (now EIAR) in accordance with Section 173 of the Planning and Development Act 2000, as amended.

Following this scoping exercise, it is recognised that some issues have the potential for greater impact than others. Within the EIAR these impacts and their mitigation will be given priority.

1.6 FORMAT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The EIAR consists of a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment.

The format and scope of this document has been produced having regard to:

I. Schedule 6 and 7 of Planning & Development Regulation 2001 (S.I. No. 600 of 2001)
II. Meath County Development Plan (2013-2019).
III. Guidelines on the Information to be contained in Environmental Impact Statements, Environmental Protection Agency (EPA 2017).
IV. Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2015).
V. Waste Licensing: Application Guidance Notes for Waste Soils Recovery Facilities (EPA, 2012a).
VI. Waste Licensing: Application Guidance Notes (EPA, 2012b).

The EIAR takes into account these and other Government and commonly accepted standards and guidelines that affect various aspects of the proposed development. Although not yet transposed into Irish Law, the provisions of the revised EIA Directive 2014/52/EU, and the above revised draft guidance issued by the EPA, were taken into account during preparation of the EIAR.

Consideration has also been taken of EPA Licence Application Form Guidance with respect to Waste Licence Applications (EPA, 2017).

In order to ensure transparency and public awareness of the environmental implications of development decisions, an EIAR is required to contain a non-technical summary according to Article 94 of the PDR 2001 (S.I. No. 600 of 2001). Clause 94(C) specifies "a summary in non-technical language of the information" required to be contained in the EIAR by the preceding clauses 94(a) and 94(b). Thus, the non-technical summary includes descriptions of the project, existing environment, impacts and mitigation measures, as well as graphic elements such as location map, site layout plan, etc. Furthermore, the non-technical summary is written

in a format and language that can be understood by persons without the appropriate technical background.

In accordance with the guidance, the non-technical summary is provided as a separate, self-contained document, and is available to the public for inspection or purchase at the headquarters of the EPA.

1.7 OBJECTIVES OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Formal environmental assessment enables the environmental effects which may be caused by a development to be systematically identified and evaluated. The EIAR presents the results in a manner that enables the importance of the predicted effects, and the scope for modifying or mitigating these effects, to be properly evaluated by the relevant decision-making body prior to deciding with respect to development consent.

This EIAR seeks to provide an objective analysis of the possible environmental effects resulting from the continued operation of the Waste Recovery Facility at Clashford. These effects are assessed against a comprehensive checklist of relevant environmental criteria. The EIAR then systematically evaluates the positive and negative impacts of the project on both natural and human environments.

The overall aims of the Report are:

- To provide relevant and complete environmental information to all project stakeholders, including the general public, in a self-contained and comprehensive document.
- To identify and provide objective analysis of the potential effects of the proposed development on the existing environment, so as to inform the competent authority and other interested parties in the decision-making process.
- To describe available measures to mitigate, either by avoidance, reduction or remediation, any environmental effects that may be identified.
- To assess the likely effectiveness of the mitigation measures, and the acceptability of residual effects.
- To provide a framework for the ongoing monitoring of residual environmental effects.

The EIAR is intended to be a self-contained document which addresses all of the potential environmental issues that may arise as a result of the proposed development.

1.8 LAYOUT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The EIAR has been prepared in accordance with 'Draft Guidelines on the information to be contained in Environmental Impact Statements' published by the Environment Protection Agency. The draft version of these guidelines was published in 2017. The EIAR also takes into account 'Draft Advice Notes on Current Practice in the preparation of Environmental Impact Statements published in 2015. While the 2015 draft version of the guidance document was intended for consultation purposes only, the guidance documents do incorporate the

expected provisions of the new law and are thus being used as an interim measure until the new EIA Directive (2014/52/EU) is transposed into Irish Law. Practitioners are expected to adhere to the guidance while preparing EIARs, for applications made on or after May 16th 2017. In addition, the policies contained within the Meath County Development Plan (2013-2019) have been considered and taken into account.

The EIAR has been prepared using the "Grouped Format Structure", where each topic is examined as a separate section referring to the existing environment, the proposed development, impacts and mitigation measures.

The Report is sub-divided into four main sections:

Section 1 sets out general introductory comments concerning the project and a brief explanation of the aims and format of the EIAR. It also identifies the various consultees and professional consultants who have contributed to this EIAR and any difficulties encountered in preparation of the EIAR.

Section 2 describes reasonable alternative project locations, layouts, designs and processes that were considered with regards to their environmental effects.

Section 3 describes the details and nature of the proposed development and introduces some of the potential environmental effects that may result. It also provides details of any proposed or anticipated growth of the development and possible associated projects.

Section 4 provides detailed information on all aspects of the existing environment, identifies potential impacts on the environment by the proposed development, and recommends mitigation measures to avoid, reduce or remedy these impacts. They are grouped under the following sub-sections:

- Population & Human Health
- Biodiversity
- Land, Soils and Geology
- Water
- Climate
- Air
- Noise & Vibration
- Landscape
- Cultural Heritage
- Material Assets
- Roads & Traffic
- Interaction of the Foregoing (This section is an examination of any interaction between impacts identified in the previous sub-sections).

The associated references, plates and figures are provided either with the text, Section 6 Figures, or at the end of each sub-section for Section 4; while appendices are provided in Section 5.

1.9 THE PROJECT TEAM

The EIAR has been prepared by J Sheils Planning and Environmental Ltd. (JSPE). JSPE were commissioned on behalf of the client, Clashford Recovery Facilities Ltd., to prepare the EIAR for the waste recovery facility at Clashford. The principal J Sheils is a chartered minerals surveyor, mining engineer with a postgraduate diploma in environmental protection, and has considerable experience in the compilation of planning applications, waste licence applications for the recovery of soil and stones and restoration of quarry developments, and the preparation of Environmental Impact Assessment Reports (EIARs).

A list of the other experts who contributed to the individual sections of the EIAR is given in Table 1.1, which shows which factors and topics they covered. Their qualifications, experience and any other relevant credentials are provided below.

Raymond E. Healy B.Sc., M.Sc., Dip. GIS, Dip. Sust. Dev., Research Geologist, contributed to several sections of the EIAR. Mr. Healy formerly operated the consulting firm Minoretek in Winnipeg, Manitoba, Canada, where he held the professional designation of P.Geo. He has over twenty years' experience in applied mineralogy, mining and exploration geology. He holds an M.Sc. in geology (1991), a Diploma in GIS from DIT (2012) and a Specialist Diploma in Environmental Sustainability from NUIG (2013).

Roger Goodwillie, Ecologist, carried out the required surveys and analysis, and authored Section 4.2. Biodiversity. Roger Goodwillie is a member of the Chartered Institute of Ecology and Environmental Management.

Hydro-Environmental Services (HES) were commissioned to complete a hydrogeological / hydrological assessment of the proposed development, carried out the required surveys and analysis, and authored Section 4.4 Water. HES are a specialist hydrological, hydrogeological and environmental practice, which delivers a range of water and environmental management consultancy services to the private and public sectors.

Dermot Nelis, BA, ArchOxon, AIFA, MIAI carried out the required surveys and analysis, and authored Section 4.9 Cultural Heritage. Dermot graduated from Queen's University Belfast, and after gaining extensive fieldwork experience undertook postgraduate studies at the University of Oxford in archaeological consultancy and project management. Dermot has acted as Senior Archaeologist on several motorway schemes for various County Councils/National Roads Authority, and directed large-scale multi-period excavations associated with those developments. He has completed over 125 licensed fieldwork programmes and over 250 archaeological, architectural and cultural heritage desk-based reports and Environmental Impact Assessments.

The traffic section 4.11 was prepared by Tony J. McNulty BE. F.I.E.I, chartered engineer. Tony was previously a Mayo County Council senior engineer and has 40 years' experience in road design, construction & maintenance, preparation of traffic management and safety plans, and traffic sections of Environmental Impact Assessments.

Table 1.9-1 List of Expert Contributors by Section of the EIAR

Section	Contributing Experts
Section 1. Introduction	John Sheils & Raymond Healy
Section 2. Alternatives	John Sheils & Raymond Healy
Section 3. Description of Proposed Project	John Sheils
Section 4.1. Population & Human Health	John Sheils & Raymond Healy
Section 4.2. Biodiversity	Roger Goodwillie
Section 4.3. Land, Soils & Geology	Raymond Healy & John Sheils
Section 4.4. Water	Hydro-Environmental Services (HES)
Section 4.5. Climate	John Sheils & Raymond Healy
Section 4.6. Air	John Sheils
Section 4.7. Noise & Vibration	John Sheils
Section 4.8. Landscape	John Sheils & Raymond Healy
Section 4.9. Cultural Heritage	Dermot Nelis
Section 4.10. Material Assets	John Sheils & Raymond Healy
Section 4.11. Roads & Traffic	Tony McNulty
Section 4.12. Interactions of the Foregoing	John Sheils

1.10 APPLICANT

Clashford Recovery Facilities Ltd is an established small family run business based in Naul, Co Meath. Mr Larry Kiernan, Facility Manager, is responsible for the overall management of the facility. The facility manager has over 40 years experience including 17 years in operating & Managing the existing Waste Recovery Management Facility. Mr. Kiernan's wife Bernie is the administration and accounts manager for the facility.

Clashford Recovery Facilities Ltd employs four people directly and a number of others indirectly, with the majority of the employees being local people. An additional two temporary staff are hired occasionally.

The WRF will require one person operating a bull-dozer/back-hoe excavator, one general foreman to monitor and inspect the quality and suitability of imported materials being brought to the site for recovery, and two other general site operatives.

1.11 ANY DIFFICULTIES IN COMPILING SPECIFIED INFORMATION

No major difficulties arising from either deficiencies in technology, knowledge or expertise were encountered in the preparation of the EIAR. The EIAR has been prepared by consultants with considerable experience in the compilation of waste licence applications and the preparation of Environmental Impact Assessment Reports (EIAR's) for waste recovery facilities (Refer to Section 1.9).

A Waste Management Licence application for a Waste Recovery Facility at the Clashford quarry was submitted to the EPA in 2009 and ensured a considerable volume of relevant data was available.

1.12 REFERENCES

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http://www.meath.ie/CountyCouncil/Planning/ Planning Dept., Meath County Council

http://www.epa.ie/ Environmental Protection Agency

http://ec.europa.eu/environment/eia/index_en.htm European Commission, Environmental Impact Assessment

https://www.google.ie/maps Google Maps

http://www.irishstatutebook.ie/home.html Irish Statute Book, Office of the Attorney General

2 CONSIDERATION OF ALTERNATIVES

2.1 ALTERNATIVES EXAMINED

Schedule No. 6 of the Planning and Development Regulation 2001 (reflecting Annex IV of Directive 97/11/EC) specifies the information to be contained in an EIAR, and requires *"An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment"*.

One of the key changes between the EIA Directive 2011/92/EU and the revised Directive 2014/52/EU pertains to the "mandatory assessment of alternatives." The EIA Directive 2014/52/EU requires an EIAR to contain "A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."

The Directive had not been transposed into Irish law before the deadline of 16th May 2017 but is expected to be in force during the expected life of the proposed development. "In respect of applications for planning permission or other development consent received on or after 16 May 2017 falling within the scope of Directive 2011/92/EU, or within the scope of Directive 2014/52/EU, competent authorities are advised to consider applying the requirements of Directive 2014/52/EU by way of administrative provisions in advance of the transposition of Directive 2014/52/EU into Irish law". Consequently, the EPA has prepared several guidance documents in the interim that incorporate the expected provisions of the new law (EPA, 2015 and 2017). Practitioners are expected to adhere to the guidance while preparing EIARs, for applications made on or after May 16th 2017.

On the basis of the Draft Advice Notes on Current Practice for preparing Environmental Impact Statements (EPA, 2015), and Draft Guidelines on the Information to be contained in an Environmental Impact Assessment Report (EPA, 2017), which take account of the revised EIA Directive (2014/52/EU).

2.1.1 'DO-NOTHING' ALTERNATIVE

The lands at Clashford comprise a worked-out sand and gravel pit, which have been progressively restored subject to successive WMP's dating back to 2001. However, in order to continue to operate the WRF, with a lifetime total intake volume in excess of 100,000 tonnes, a Waste Management Licence issued by the EPA is required. Should the WRF not continue to operate, the planned restoration of the disturbed lands to beneficial after-use, through backfilling with recovered inert soil and stone would cease. Also, the reduced recycling and recovery of C&D waste of the 'Do Nothing' scenario would lead to increased resource utilisation and greater volumes of reusable inert waste directed to landfill.

Backfilling the site with inert material could be viewed as a good approach to increase the vulnerability rating, i.e., provide better aquifer protection in the long term, and proper landscaping and closure of the site will prevent dereliction and possible fly tipping. The

possible benefits to groundwater vulnerability from the deposition of inert infill material would not be realised under a 'do nothing' scenario.

2.1.2 ALTERNATIVE LOCATIONS

Environmentally beneficial site reinstatement, such as that proposed at the application site, can only be undertaken where previous land-use activities have created a disturbed landscape.

The existing quarry is being operated and restored using imported inert soils under the terms and conditions imposed under P. Ref. QY36, QC 17.QC2085 and P. Ref. 85/512, PL.17/5/72181 and as such it was not considered particularly relevant in this case for the applicant to identify and appraise the merits of alternative sites for the proposed material recovery activity. It is the existence of this requirement for reinstatement using inert materials, and the environmental gain derived therefrom, that constitutes the principal qualification of the application site.

Notwithstanding the foregoing, quarry restoration is typically ranked favourably in the hierarchy applied, for example by Kildare County Council (2005), to site selection for recovery of inert waste material:

- re-use of material where produced
- **quarry restoration**
- land reclamation
- agricultural/recreational use
- raising of development land
- raising of sites for one-off houses

Existing quarries and pits whether worked out or in operation are potentially useful sites for the management of Construction and Demolition (C&D) waste. The inert soil can be used to restore the topographical contours. It may be possible to use the same trucks to deliver aggregates / raw materials to building sites and remove soil, thereby reducing traffic impacts. With fewer of these sites, better regulation will be possible at a lower cost.

Local authorities should therefore encourage the use of quarries / pits for sustainable management of C&D waste as opposed to using agricultural land, with an emphasis on resource recovery. Local authorities should divert suitable C&D waste to relevant landfill sites where there is potential to use it for restoration and environmental protection.

Reclamation of the Clashford quarry will result in infilling of a large exposed void and restoration of the disturbed landscape to its original pre-extraction condition, with emplacement of soil cover to protect the underlying groundwater.

The fact that the location has operated as a waste recovery facility for a number of years means that the operator has built up a good business relationship with Civil Contractors/ haulage companies in the area. The proposed facility is well positioned with respect to diverting volumes of waste from disposal in landfill, as required under the Waste Framework

Directive 2008 (2008/98/EC), and its transposition into Irish Law, the European Communities (Waste Directive) Regulations, 2011 (S.I. 126 of 2011).

The site is also located directly adjoining Kilsaran concrete which was previously part of the quarry development. Kilsaran have expressed support for the application and consider the development as a positive option for Kilsaran for the future. Returned concrete loads could be directed to the C&D recovery facility at Clashford as opposed to transporting the material to more removed locations for recovery and/or disposal.

Many local authorities also encourage co-location of Material Recovery Facilities with quarries, because of the shared / complementary infrastructure, plant, processes, products and materials, as well as common environmental aspects.

The proposed development fully accords with the principles of sustainable development in that:-

- it reduces the negative environmental impacts of the proposed activity in that it is within an existing pit;
- it offers potential for reduced transport journeys to landfill / recovery sites further afield;
- it conserves limited void space within existing landfill sites.

2.1.3 ALTERNATIVE SITE LAYOUT

The layout relates to the logical placement of infrastructure and plant associated with the elements of the process within the area of the site. It is largely dictated by the commercial imperatives of process efficiency, operational efficiency and cost-efficiency, as well as environmental effects such as noise, dust, and visual impact.

The layout of the facility is driven by the basic processes of recovery of C&D waste with the recovery by backfilling of otherwise unusable materials to meet the requirement to reclaim the quarry back to beneficial after-use. Integration of the material recovery facility layout with that of the existing quarry is driven by the numerous common processes of sorting and separation, crushing, screening as well as backfilling of the quarry. In addition, there is a need to minimise any adverse impact, particularly visual impact, and to optimise the quarry for a restoration scheme to beneficial after-use. Because the material recovery facility will share much of the infrastructure and process plant of the quarry, layout alternatives are constrained by the layout of the existing facility and the imperative of achieving maximum synergy.

Allocation of areas for inspection of intake material, quarantine material, residual waste and placement of recovered material is an additional requirement of the material recovery facility. The layout and siting of these areas is driven by the need to maximise operational efficiencies, and offers the greatest latitude in designing the facility layout.

2.1.4 ALTERNATIVE DESIGNS

Design more closely relates to the visual aesthetics of the development, which is less of a consideration in impermanent and screened quarries and waste facilities as compared to enduring and visual imposing residential, retail and commercial developments, public buildings or major pieces of infrastructure. Nonetheless, as negative visual impact can be a

major environmental aspect associated with such developments, optimising the design alternatives is considered a priority.

Visual impacts can be resolved through a number of design solutions by varying key aspects such as the location, shape, size, orientation, colour, etc. of the facilities.

In this case the site is largely well screened by mature planting and other boundaries. Its location in a valley ensures that there are no significant outside views of the area to be restored by backfilling with inert soils and stone.

As the waste recovery facility will be using the existing infrastructure, plant and machinery currently on site, there are few alternatives with respect to these aspects of the design.

As a natural consequence of the planning and EIAR process, alternative schemes in terms of the layout and design of the inspection area, quarantine area and residual waste holding area, as well as the direction of working, and character of site restoration have been considered. By a process of examination and elimination the final scheme now proposed is considered to be the most appropriate. The detail with respect to the design of the soil recovery facility is described under Section 3 - A Description of the Proposed Project.

2.1.5 ALTERNATIVE PROCESSES

Waste recovery lies at the second lowest tier in the European Waste Hierarchy, and as such is the process of last resort prior to disposal. Process alternatives diminish as we descend the tiers of the hierarchy from the pinnacle of prevention to reduction, reuse, recycling, recovery and ultimately to disposal/landfill at the base. The inert soil and stone can be used for beneficial restoration purposes subject to basic characterisation, inspection and verification without the requirement for any secondary recovery operations.

The opportunities to exploit process alternatives lie further up the waste hierarchy with designers, producers, users and other participants in product lifecycles, and where adoption of the principles of product stewardship could significantly reduce the environmental impact of products, particularly resource utilisation. However, at this point in the product lifecycle, higher level alternatives are not necessary, and waste recovery by backfilling waste inert soils and stone and recovery of C&D waste represents the optimum economic utilisation of these materials. Diverting waste soil and stone for the improvement of land as part of the reinstatement of a quarry offer significant environmental gains.

While the process is largely determined by the principle of best available technology (BAT), process options can include such aspects as management of the process that affect the volumes and characteristics of emissions, residues, traffic and the use of natural resources. The precise working method and phasing to be implemented will be determined following a detailed examination of various environmental issues.

2.1.6 ALTERNATIVE MITIGATION MEASURES

The central purpose of an EIA is to identify potentially significant adverse impacts at the pre-consent stage and to propose measures to mitigate or ameliorate such impacts. There are three established strategies for impact mitigation - avoidance, reduction and remedy, and thus

it may be possible to mitigate effects in a number of different ways. The EIAR describes the various options and provide an indication of the main reasons for selecting the chosen options, including a comparison of the environmental effects.

2.1.7 CONSULTATION ABOUT CONSIDERATION OF ALTERNATIVES

Clashford Recovery Facilities Ltd have identified a need for the development of a waste recovery facility in the area. There is currently a lack of licensed inert soil recovery facilities in the north Dublin-Meath area. As the economy continues to recover there will be a need to provide additional void space for the recovery of soils, stone and C&D waste in the Dublin-Meath area. The following table provides a summary of alternative types of waste authorisations that are currently available.

Table 2.1-1 Alternative Types of Waste Authorisations

Type of Waste Authorisation	Scale of activity to be authorised	Regulatory Body
Certificate of Registration	Activities involving a total fill of up to 25,000 tonnes	Local Authority
Waste Facility Permit	Activities involving a total fill of less than 100,000 tonnes	Local Authority
Waste Licence (Soil Recovery)	Activities involving a total fill of 100,000 tonnes or greater	EPA

Following pre-consultation with both the EPA and Meath County Council it is acknowledged that there is need for larger better regularised waste licenced waste recovery facilities in the region. The site has good access being located c. 300m north of the village of Naul on the east side of Regional Road R108, which connects with the R122 and in turn the M1 motorway c. 5km to the east and to the town of Balbriggan c. 7km to the east. Furthermore, Dublin lies c. 25km to the south, whereas Drogheda lies c. 15 km to the north, underpinning the strategic advantages of the location. The site also has the benefit of restoring an existing sand and gravel pit to beneficial after-use as opposed to backfilling more remote smaller and possibly greenfield sites through authorisation by the Local Authority under a Certificate of Registration or Waste Facility Permit. The site also benefits from economy of scale in terms of being a quarry with an established co-located WRF, and a full complement of site infrastructure and plant and machinery, as opposed to the alternative of developing a proliferation of smaller waste recovery facilities to meet demand. It is acknowledged that a licenced facility will benefit from having been subject to rigorous assessment by the Regulatory through the EIA process and Waste Licensing.

2.2 REFERENCES

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http://ec.europa.eu/environment/eia/index_en.htm European Commission, Environmental Impact Assessment

http://www.epa.ie/ Environmental Protection Agency (EPA)

http://www.irishstatutebook.ie/home.html Irish Statute Book, Office of the Attorney General

3 DESCRIPTION OF THE PROPOSED PROJECT

3.1 INTRODUCTION

In describing the proposed development, all relevant phases of the existence of the project from construction through existence and operation, to decommissioning and restoration may be relevant.

3.2 CHARACTERISTICS OF THE PROJECT

In providing a description of the physical characteristics of the project development, issues such as site layout, design and size/scale, as well as any existing development on the site may be relevant.

3.2.1 THE EXISTING SITE

3.2.1.1 General Site Description

The site is located within the Townland of Naul, c. 300m north of the village of Naul at Irish Grid Ref. E313399, N261545, on the east side of Regional Road R108 (Refer to Figure A 1.0 Rev A, *Section 6*). The R108 connects with the R122 in village of Naul, which connects with the M1 (Dublin-Drogheda-Dundalk) motorway c. 5km to the east, and to the town of Balbriggan c. 7km to the east. Dublin lies c. 25km to the south, whereas Drogheda lies c. 15 km to the north. The Delvin River flows roughly SW-NE and flanks the southern boundary of the site, whilst an unnamed tributary stream of the Delvin River flanks the northern boundary of the site, and joins the river at the northeastern terminus of the quarry site. The western boundary of the quarry site is defined by the R108 and the party boundary with several residential properties on the east side of the R108.

The site is situated at approximately 60-80m AOD in a predominantly rural area of south County Meath, across the Delvin River immediately north of the village of Naul in north County Dublin. The surrounding landscape is defined by the valley of the Delvin River, known as Roche Valley (elev. c. 60-90m OAD), separating two sets of hills to the northwest (max. elev. 159m) and southeast (max. elev. 176m). The quarry has been developed on a c. 1km long mound of sand and gravel within a southwest-northeast oriented ribbon of glacial deposits that extends from the Townland of Tobeen (i.e., c. 2km further up valley) down the river valley to the coastal plain. The topography of the quarry site is thus elevated above the valley floor. The land-use in the area consists of a patchwork of agricultural fields that are classed as non-irrigated arable land and pasture, reflecting medium-high intensity agricultural. Outside of the immediate environs of the village of Naul, the settlement pattern can be described as low-intensity rural settlement.

The village of Naul is situated 300m south of the application site (Refer to Figure B 2.2 Rev C, *Section 6* for locations of residences). Residential property in the area typically comprises one-off single residences and farmsteads along public roads.

The site of the quarry and WRF is on a landholding of c. 33.4 ha, owned by the applicant Clashford Recovery Facilities Ltd. Although there are no residences within the landholding, there are several nearby residences within 50-100m on the R108. In addition, there are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A 1.0 Rev A and B 2.2 Rev C *Section 6* for site location details).

3.2.1.1.1 Description of Site Layout

The proposed soil recovery facility including site infrastructure comprises c. 24.2 ha of the total landholding of 33.4 ha at Clashford, Naul, Co. Meath (Refer to Figure B 2.1 Rev C, *Section 6*). The lands have mostly been restored to beneficial after-use (agriculture and forestry) under successive waste permits. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use.

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A.Reg. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul, Co. Meath. The development will consist of the recovery of construction and demolition waste to produce secondary aggregates. The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered. Skips will be provided for removal of deleterious material (i.e. steel, timber, plastic). A hard standing area will be provided for stockpiling of processed secondary aggregates (Refer to Figure B 2.1 Rev C, *Section 6*).

3.2.1.2 Planning History

The lands have a history of sand and gravel working, which dates back to at least the early 1980's. These lands were worked under a succession of planning permissions.

The quarry and WRF operate under the terms and conditions imposed under P. Ref. QY36, QC 17.QC2085 and P. Ref. 85/512, PL.17/5/72181.

Meath County Council confirmed in a letter dated 16/10/17 that a restoration scheme for the quarry lands as submitted has been agreed with the Planning Authority. A copy of this letter was also forwarded to the EPA by Meath County Council.

Since 2001, the quarry site is being progressively restored in accordance with a phased restoration scheme using imported soil and stone subject to successive Waste Management Permits granted by Meath County Council (e.g., Waste Permit Reg. No. WMP 2005/25).

The WRF at Clashford continued to operate under the conditions of the existing Waste Permit (Reg. No. WMP 2005/25), whilst the application for a Waste Management Licence remains undecided.

Phase 3 of the area relating to Waste Permit (WMP 2005/25) is the only area remaining to be restored by importation of soils and stones. This area is also within the area relating to P.A. Reg. Ref. QY36, QC 17.QC2085.

A hay, straw and farm machinery storage shed, horse stables, dungstead and soiled water tank (P.A. Ref. AA161106) are currently being constructed on part of the lands restored under Phase 2.

The facility has remained closed since August 2017 and Meath County Council have informed our client that Environmental Order No. A02789/2017 (Section 55 Notice (WMA Act, 1996, as amended) is to remain in place until such time as the EPA reach a decision with respect to Waste Licence application.

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A.Reg. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul, Co. Meath. The development will consist of the recovery of construction and demolition waste to produce secondary aggregates.

3.2.2 PROPOSED DEVELOPMENT

3.2.2.1 Development Overview

Clashford Recovery Facilities Ltd., Ring Commons, Balbriggan, County Dublin has applied to the Environmental Protection Agency for a waste licence for the continued operation of its existing waste recovery facility on lands at Naul, Naul Townland, Co. Meath (National Grid Reference 313399E 261545N) (Refer to Figure A.1.0 Rev A). The lands have been progressively restored subject to successive WMP's dating back to 2001.

The principal activity is Class R5 (recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials) of the Fourth Schedule of the Waste Management Act 1996, as amended. Other activities include Class R13 of the Fourth Schedule (storage of waste pending any of the operations numbered R 1 to R 12).

The nature of the development is the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert C&D waste.

It is proposed that circa 40,000 to 70,000 cubic metres per annum of inert materials will be accepted to site (subject to market conditions) to complete the restoration of the lands to beneficial after use. It is estimated that c. 20,000 tonnes per annum of inert construction and demolition waste is to be recovered at the facility.

A total of c. 2,270,000 tonnes (1,135,000,000 m^3) has been received to data. It is estimated that 348,000 tonnes (174,000) tonnes is required to be complete the final restoration of the lands (Phase 3).

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A.Reg. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul,

Co. Meath. The development will consist of the recovery of construction and demolition waste to produce secondary aggregates.

Any small quantities of timber, plastic, paper and steel will be separated for recovery and/or disposal offsite.

Given the length of time since the submission of the original waste management licence application in February 2009 it has been considered necessary to update the survey plan and proposed restoration scheme. Meath County Council confirmed in a letter dated 16/10/17 that a restoration scheme for the quarry lands as submitted has been agreed with the Planning Authority. The existing site layout is shown by the revised site plan Figure B 2.1 Rev C, *Section 6*. This plan shows that Phase 1 is now completely restored, together with lands previously restored under previous waste permits for the site. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use. During the course of restoration of Phase 2, an additional small area of failed forestry (Refer to EIAR Section 3.4.1 below) has also now been restored, together with some lesser additions due to linking up agricultural tracks and temporary topsoil storage to the north east.

In order to better blend the landform with the existing landscape and to facilitate surface runoff, Phase 1 and 2 are in places 1 to 3 metres higher than envisaged in the original scheme. It is also proposed to slightly revise phase 3 to a more natural landform. Details with respect to the revised restoration scheme and volumes are provided in Table 3.2-3. The revised phased scheme for final restoration of the area is shown by Figure B.2.4 Rev. C, *Section 6*.

The intention is to develop the lands for agricultural use/woodland, and to this end, the lands previously restored including Phase 1 are now being grazed by sheep and horses.

Redundant structures, plant equipment and stockpiles will be removed from site on cessation of activity.

Clashford Recovery Facilities Ltd is an established small family run business based in Naul, Co Meath. Mr. Larry Kiernan, Facility Manager, is responsible for the overall management of the facility. Mr. Kiernan has over 40 years' experience in waste management, civil and construction, including 17 years in operating & Managing the existing Waste Recovery Management Facility. Mr. Kiernan's wife Bernie is the administration and accounts manager for the facility.

Clashford Recovery Facilities Ltd employs four people directly and a number of others indirectly, with the majority of the employees being local people. An additional two temporary staff are hired occasionally.

The WRF will require one person operating a bull-dozer/back-hoe excavator, one general foreman to monitor and inspect the quality and suitability of imported materials being brought to the site for recovery/sorting/transfer, and two other general site operatives.

Mitigation measures to alleviate any adverse impacts from the facility on the environment have been incorporated into the design to ensure that the facility can be operated within the accepted standards for this type of development.

3.2.2.2 Description of Design

Design more closely relates to the visual aesthetics of the development, which is less of a consideration in impermanent and screened quarries and waste facilities as compared to enduring and visually imposing residential, retail and commercial developments, public buildings or major pieces of infrastructure.

Visual impacts can be resolved through a number of design solutions by varying key aspects such as the location, shape, size, orientation, colour, etc. of the facilities.

In this case the site is largely well screened by mature planting and other boundaries. Its location in a valley ensures that there are no significant outside views of the area to be restored by backfilling with inert soils and stone.

As the waste recovery facility will be using the existing infrastructure, plant and machinery currently on site, there are few alternatives with respect to these aspects of the design.

As a natural consequence of the planning and EIAR process, alternative schemes in terms of the layout and design of the inspection area, quarantine area and residual waste holding area, as well as the direction of working, and character of site restoration have been considered. By a process of examination and elimination the final scheme now proposed is considered to be the most appropriate. The detail with respect to the design of the soil recovery facility is described under Section 3.3 below headed *'Existence of the Project'.*

3.2.2.3 Description of Size or Scale

The proposed soil recovery facility including site infrastructure comprises c. 24.2 ha of the total landholding of 33.4 ha at Clashford, Naul, Co. Meath (Refer to Figure B 2.1 Rev C, *Section 6*). The lands have mostly been restored to beneficial after-use (agriculture and forestry) under successive waste permits. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use.

It is proposed that circa 40,000 to 70,000 cubic metres per annum of inert materials will be accepted to site (subject to market conditions) to complete the restoration of the lands to beneficial after use. It is estimated that c. 20,000 tonnes per annum of inert construction and demolition waste is to be recovered at the facility.

A total of c. 2,270,000 tonnes (1,135,000,000 m^3) has been received to data. It is estimated that 348,000 tonnes (174,000) tonnes is required to be complete the final restoration of the lands (Phase 3).

The site is situated at approximately 60-80m AOD in a predominantly rural area of south County Meath, across the Delvin River immediately north of the village of Naul in north County Dublin. The quarry is being restored by backfilling up to 10m of inert soil and stone (average c. 5.4m). The area being restored is c. 750m long east to west and 530m wide north to south at its widest narrowing to c. 40m towards the east (Refer to Figure B 2.1 Rev C, *Section 6*).

The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and

separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered. Skips will be provided for removal of deleterious material (i.e. steel, timber, plastic). A hard standing area will be provided for stockpiling of processed secondary aggregates (Refer to Figure B 2.1 Rev C, *Section 6*). The Site infrastructure will occupy an area of c. 0.8 ha within the waste licence application area and it is proposed that the C&D recovery of secondary aggregates will continue beyond the life of the restoration operations (subject to planning permission).

3.2.2.4 Classes of Activity

The Class(es) of Activity at the site, as specified in the Fourth Schedule of the Waste Management Act, 1996 (as amended), are as follows:

Table 3.2-1 Class(es) of Activity at the site

Fourth Schedule	
Class	Description
R5 *(Principle Activity)*	Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials
R13	Storage of waste pending any of the operations numbered R1 to R12

A waste management licence application is required for recovery of inert soil, stone and C&D waste material for the purposes of the improvement or development of land, where the total quantity of waste recovered at the facility is greater than 100,000 tonnes.

3.2.2.5 Waste Categories & Quantities

It was proposed in the Waste Licence Application that circa 90,000 cubic metres (180,000 tonnes) per annum of inert materials will be accepted to site. It was estimated that c. 20,000 tonnes per annum of inert C&D waste was to be recovered at the facility.

The applicant considers based on more recent understanding of intake volumes and market considerations that 80,000 to 140,000 tonnes per annum of inert soil and stone will be imported to site for the duration of the restoration works.

The following Table 3.2-2 provides a summary of the proposed annual intake tonnage and relevant EWC codes.

Table 3.2-2 Waste Material & Recovery Rates

Waste material	EWC Code	Quantity Tonnes / annum	On-site recovery (Method & Location)
Concrete	17 01 01	20,000	Will be used to construct haul roads and hardstanding areas on site and/or processed for secondary aggregates
Bricks	17 01 02		As Above
Tiles & Ceramics	17 01 03		As Above
Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	17 01 07		As Above
Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04		As Above
Soil and stones other than those mentioned in 17 05 04	17 05 04	80,000 to 140,000	Used to restore sand & gravel pit workings

The following Table 3.2-3 provides a summary of the quantity (in tonnes) of soil and stone that has been placed in the quarry to date. The table also provides an estimate of the volume of void space remaining at Clashford Recovery Facility.

Table 3.2-3 Volume of Void Space at Clashford Recovery Facility

Phase	Void Space						Life Span *Remaining*
	Filled		Remaining		Totals		
	m^3	*tonnes*	*m^3*	*tonnes*	*m^3*	*tonnes*	
Restored Lands	*380,000*	*760,000*	*None*	*None*	*380,000*	*760,000*	Completed 2009
1	*210,000*	*420,000*	*None*	*None*	*210,000*	*420,000*	Completed 2011
2	*452,000*	*904,000*	*None*	*None*	*452,000*	*904,000*	*Restoration 6 to 12 months*
3	*93,000*	*186,000*	*174,000*	*348,000*	*267,000*	*534,000*	*3 to 5 Years*
Final Restoration	-	-	-	-	-	-	*1 year*
Totals	*1,135,000*	***2,270,000***	*174,000*	*348,000*	*1,309,000*	***2,618,000***	

Notes:

1. * Assumes 40,000 to 70,000 m^3 recovered per annum (subject to market conditions).
2. Assumes density of imported soil and stone as 2 tonnes/m^3

3.2.2.6 Duration of Permission

As detailed in the previous section it is estimated that the backfilling of the quarry will require three to five years with an additional year to complete the cultivation and final restoration of the lands.

It is proposed to import up to 20,000 tonnes per annum of inert construction and demolition waste for production of secondary aggregates (to be exported from the site). It is proposed that this activity will be extended beyond the life of the backfill operations to meet Clashford Recovery Facilities ongoing need for a facility to recover C&D waste for the production of secondary aggregates. The site is also located directly adjoining Kilsaran concrete which was previously part of the quarry development. Kilsaran have expressed support for the application and consider the development as a positive option for Kilsaran for the future. Returned concrete loads could be directed to the C&D recovery facility at Clashford as opposed to transporting the material to more removed locations for recovery and/or disposal.

Ultimately the life of the WRF will be determined by demand for recovery of inert C&D waste, and therefore be dependent on future market conditions.

3.2.2.7 Government Policy

Government Policy, in a National and Regional context, with respect to the proposed development is addressed in Appendix 5.1.

3.2.2.8 Planning & Development Control

The Meath County Development Plan (CPD) 2013-2019 outlines an overall strategy for the proper planning and sustainable development of County Meath over the timescale of the Plan. The following section details the relevant polices within the County Development Plan that are of relevance to the proposed development at Clashford. Consideration of the relevant policy statements has been given through preparation of the relevant sections of the EIAR.

3.2.2.8.1 County Development Plan 2013-2019

The aim of the Meath County Development Plan 2013-2019 is to drive the evolution of the county and to establish a framework for the coordinated and sustainable economic, social, cultural and environmental development of County Meath.

The development plan vision statement is for "*Meath to be a county that fosters sustainability throughout its vibrant communities, dynamic economy and unique cultural and natural heritage".*

The following policy statements in the Meath County Council Development Plan are considered relevant with respect to the Waste Recovery Facility at Clashford:

Waste Management (CDP Chapter 7.17)

WM POL 1	To adopt the provisions of the waste management hierarchy and implement policy in relation to the county's requirements under the current or any subsequent waste management plan. All prospective developments in the county will be expected to take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall also be taken of the proximity principle and the inter regional movement of waste as provided for under appropriate Minister Directives from time to time.
WM POL 3	To seek the provision of quality cost effective waste infrastructure and services, which reflect and meet the needs of the community.
WM POL 4	To seek in the Council's dealings with private companies that all waste shall be undertaken in compliance with the requirement of the EPA and relevant waste management legislation and policy,

WM POL 6	To encourage the development of waste infrastructure and associated developments in appropriate locations, as deemed necessary in accordance with the requirements of the Regional Waste Management Plan.

WM POL 7	To encourage the recycling of construction and demolition waste and the reuse of aggregate and other materials in future construction projects.

The following objectives in the Meath County Council Development Plan are considered relevant with respect to the Waste Recovery Facility at Clashford:

WM OBJ 1	To facilitate the provision of appropriate waste recovery and disposal facilities in accordance with the principles set out in the appropriate Waste Management Plan applicable from time to time made in accordance with the Waste Management Act 1996.
WM OBJ 7	To promote the implementation of Waste Management Activities in accordance with 'Best Practice' and national policy.
WM OBJ 8	To facilitate the implementation of national legislation and national and regional waste management policy.
WM OBJ 13	To support the development of facilities to cater for commercial waste not provided for in the kerbside collection system such as WEEE, C&D type waste and hazardous materials in accordance with the requirements of the North East Waste Management Plan.
WM OBJ 17	To require developers to prepare construction and demolition waste management plans for new construction projects over certain thresholds which shall meet the relevant recycling/recovery targets for such waste in accordance with the national legislation and national and regional waste management policy.
WM OBJ 18	To seek to ensure in cooperation with relevant authorities that waste management facilities are appropriately managed and monitored according to best practice to maximise efficiencies and to protect human health and the natural environment.

The proposed facility will involve the recovery/reuse of inert C&D waste, and inert soil and stone, and as such the recovery operations are further up the waste hierarchy, insofar as the wastes are prepared for re-use. Clean, uncontaminated soils are suitable for quarry restoration projects, whereas clean brick, block and concrete rubble are suitable for recovery/re-use as secondary aggregates and/or in the construction of hard standing areas, access roadways, drainage, etc. The facility will result in a reduction of quantities of such waste being sent to landfill sites in the region, displacing equivalent volumes of virgin material from extraction, and will also enable the lands to be restored to agricultural use in accordance with the restoration scheme proposed.

Cultural and Natural Assets (CDP Chapter 9)

Meath's wealth of built heritage makes it exceptional in Ireland. It includes the UNESCO World Heritage Site of Brú na Bóinne, the seat of the High Kings of Ireland at Tara, the passage tombs of Loughcrew, the largest Anglo- Norman castle in Europe at Trim, the historic towns of Navan, Trim and Kells, great country houses, demesne landscapes, and a significant industrial heritage of canals and mills.

Meath's natural heritage includes scenic river valleys, rolling farmland, a network of mature hedgerows and diverse coastal habitats.

It is the strategic policy of Meath County Council:

CSA SP 1	To ensure that the unique cultural heritage of Meath is protected, conserved and sensitively integrated into the sustainable development of the county for the benefit of present and future generations.
CSA SP 2	To ensure that features of Meath's natural heritage and green infrastructure that provide ecosystem services are protected; that biodiversity is conserved and where possible enhanced, and; that the character of landscapes are maintained and enriched, and that tourist and recreational uses are facilitated in a sensitive manner.
CSA SP 3	To promote the understanding of County Meath's landscape in terms of its inherent and unique character and to recognise what elements should be preserved, conserved or enhanced.
CSA SP 4	To implement, in partnership with the County Meath Heritage Forum, relevant stakeholders and the community, the County Meath Heritage Plan and any revisions thereof.

Archaeological Heritage (CDP Chapter 9.6.9)

Meath County Council recognises the value and significance of the county's archaeological Heritage. It is the policy of Meath County Council:

CH POL 7	To ensure that development in the immediate vicinity of a recorded monument is sensitively sited and designed so that it does not significantly detract from the monument. Where upstanding remains exist, a visual impact assessment may be required.
CH POL 9	To inform and seek guidance from the National Museum of Ireland if an unrecorded archaeological object is discovered, or the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht in the case of the discovery of an unrecorded archaeological site, in accordance with National Monuments legislation.

It is an objective of Meath County Council:

CH OBJ 7	To protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process.
CH OBJ 8	To seek to protect important archaeological landscapes from inappropriate development.

The site of an unclassified megalithic tomb (RMP ME034-012) is recorded within the proposed development area. This monument no longer survives due to previous quarrying on the site.

Architectural Heritage – Record of Protected Structures (CDP Chapter 9.6.10)

The Planning and Development Acts place an onus on owners and occupiers of Protected Structures to ensure that the structure, or any element of the structure which contributes to its special interest, is not endangered either through neglect, or by inappropriate works.

It is the policy of Meath County Council:

CH POL 10	To conserve and protect the architectural heritage of Meath.

It is an objective of Meath County Council:

CH OBJ 13	To protect all structures (or, where appropriate, parts of structures) within the county which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest and which are included in the Record of Protected Structures (See Appendix 8).

Part of the 1km study area extends in to County Dublin, and as a result the Fingal Development Plan (2017-2023) was assessed to look for the presence of any statutorily protected archaeological, architectural or cultural heritage features within the study area.

It is an Objective (CH03) of Fingal County Council to:

"Protect all archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places and all sites and features of archaeological and historic interest discovered subsequent to the publication of the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process." (Fingal County Council 2017, 346).

It is an Objective (CH19) of Fingal County Council to:

> "*Review the Record of Protected Structures on an on-going basis and add structures of special interest as appropriate, including significant elements of industrial, maritime or vernacular heritage and any twentieth century structures of merit*" (*ibid*., 350).

Consideration has been given to the above policy provisions and objective in the County Development Plans for Meath and Fingal through the assessment of the continued operation of the WRF at Naul on the archaeological, architectural and cultural heritage resource (Refer to EIAR Section 4.9).

Natural Heritage (CDP Chapter 9.7)

Biodiversity Action Plan (CDP Chapter 9.7.1)

Meath County Council adopted its first Biodiversity Action Plan in April 2010 in accordance with the first National Biodiversity Plan. The plan provides a framework for the conservation of biodiversity and natural heritage at a local level.

It is the policy of Meath County Council:

NH POL 1	To protect, conserve, and seek to enhance the County's biodiversity.

NH POL 2	To promote measures to protect biodiversity in the development management process by creating and improving habitats, where possible.

European Sites (Natura 2000) – (CDP Chapter 9.7.2.1)

Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are being, or have been, designated to conserve habitats and species of European importance pursuant to the EU Habitats and Birds Directives. Such sites form part of an EU network of ecologically important sites known as Natura 2000.

Appropriate assessment was introduced by the EU Habitats Directive as a way of determining if a planned project is likely to have a significant effect on one of the Natura 2000 sites so far designated (i.e., the candidate SAC's and SPA's), or their conservation objectives.

Natural Heritage Areas (CDP Chapter 9.7.2.2)

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are designated under the Wildlife (Amendment) Act (2000) and encompass nationally important semi-natural and natural habitats, landforms and geomorphological features. It is important that the conservation value of these areas be maintained as they contribute to the county's green infrastructure.

It is the policy of Meath County Council:

NH POL 5	To permit development on or adjacent to designated Special Areas of Conservation, Special Protection Areas, National Heritage Area or those proposed to be designated over the period of the plan, only where an assessment carried out to the satisfaction of the Meath County Council, in consultation with National Parks and Wildlife Service, indicates that it will have no significant adverse effect on the integrity of the site.
NH POL 6	To have regard to the views and guidance of the National Parks and Wildlife Service in respect of proposed development where there is a possibility that such development may have an impact on a designated European or National site or a site proposed for such designation.

It is an objective of Meath County Council:

NH OBJ 2	To ensure an Appropriate Assessment in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, and in accordance with the Department of Environment, Heritage and Local Government Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and relevant EPA and European Commission guidance documents, is carried out in respect of any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect on a Natura 2000 site(s), either individually or in combination with other plans or projects, in view of the site's conservation objectives.

NH OBJ 3	To protect and conserve the conservation value of candidate Special Areas of Conservation, Special Protection Areas, National Heritage Areas and proposed Natural Heritage Areas as identified by the Minister for the Department of Arts, Heritage and the Gaeltacht and any other sites that may be proposed for designation during the lifetime of this Plan.

The quarry site at Clashford, which includes the application site, is not included in any area with an ecological designation (NHA, cSAC or SPA).

The only Natura 2000 sites within 15km of Naul are the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), the River Nanny and Shore SPA (Site Code 4158) and the Skerries Island SPA (Site Code 4122).

Screening for Appropriate Assessment was carried out previously with respect to the EPA Waste Licence Application W0265-01. The findings of the assessment, were, in view of best scientific knowledge, it is concluded that the activity, individually or in combination with other plans or projects is not likely to have a significant effect on the Natura 2000 network, and the conservation objectives of the sites. In accordance with Regulation 42(8)(a) of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, a Stage 2 Appropriate Assessment is therefore not required.

The nearest pNHA site is the Bog of the Ring (Site Code 001204), Ring Commons, Co. Dublin at c. 3km, whilst Cromwell's Bush Fen pNHA (Side Code 001576), Greenanstown, Co. Meath is c. 4.5 km. There will no direct or indirect impact on these sites as a result of the continued operation of the WRF at Clashford.

Invasive Species (CDP Chapter 9.7.5)

Invasive non-native plant and animal species are a major threat to biodiversity (www.invasivespeciesireland.com). They can negatively impact on native species, can transform habitats and threaten whole ecosystems causing serious problems to the environment and the economy. There is potential for the spread of invasive species during excavation and construction works.

It is the policy of Meath County Council:

NH POL 10	To promote best practice in the control of invasive species in the carrying out of development.

Geological Heritage (CDP Section 9.7.7)

Meath County Council recognises areas of conservation value, which include twenty eight geological sites.

It is the policy of Meath County Council:

NH POL 12	To have regard to the geological and geomorphological heritage values of County Geological Sites listed in Appendix 13 and avoid inappropriate development, through consultation with the Geological Survey of Ireland.

A search of the GSI Geological Heritage Database indicates that there are no sites of geological heritage within or near the site of the WRF (Refer to EIAR Section 4.3.3.4 below).

Landscape (CDP Chapter 9.8)

The following development plan policies and objectives are considered relevant with respect to the landscape.

It is the strategic policy of Meath County Council:

LC SP 1	To protect the landscape character, quality, and local distinctiveness of County Meath in accordance with relevant government policy and guidelines and the recommendations included in Meath Landscape Character Assessment (2007) in Appendix 7.

It is the policy of Meath County Council:

LC POL 1	To support and implement the provisions of the National Landscape Strategy.
LC POL 2	To require that any necessary assessments, including landscape and visual impact assessments, are provided when undertaking, authorising, or approving development.

It is an objective of Meath County Council:

LC OBJ 1	To seek to ensure the preservation of the uniqueness of all landscape character types, and to maintain the visual integrity of areas of exceptional value and high sensitivity.
LC OBJ 2	To assess development proposals having regard to the recommendations contained in the Meath Landscape Character Assessment 2007.

LC OBJ 3	To work in partnership with key stakeholders to promote County Meath as a centre for cultural heritage education and learning.

Views and Prospects (CDP Chapter 9.10)

County Meath contains many vantage points from which views and prospects of great natural beauty may be enjoyed.

It is an objective of Meath County Council:

LC OBJ 5	To preserve the views and prospects and the amenity of places and features of natural beauty or interest listed in Appendix 12 and shown on Map 9.5.1 from development that would interfere with the character and visual amenity of the landscape.

Rural Development (CDP Chapter 10)

Insofar as the current regime of landscaping, screening and phased restoration at the quarry site, which encloses the WRF site, is being operated and restored using imported inert soils in accordance with the terms and conditions imposed under P. Ref. QY36, QC 17.QC2085 and P. Ref. 85/512, PL.17/5/72181, sections of Parts 10 and 11 of the CDP dealing with extractive industries are relevant.

Part 10 of the Meath CDP sets out the rural settlement strategy that will be applied by Meath County Council to ensure the continued vitality and viability of the rural area. The Council's goal in terms of Rural Development is "to encourage the continued sustainable development of rural communities without compromising the physical, environmental, natural and heritage resources of the County". In section 10.12, the Council acknowledges the need for extractive industries, but also notes that the industry can cause detrimental environmental and residential amenity effects including traffic generation, vibration, dust, noise, water pollution, visual intrusion and loss of ground water supplies. The goal in respect of extractive industries and building materials production is:

To facilitate adequate supplies of aggregate resources to meet the future growth needs of the County and the wider region while addressing key environmental, traffic and social impacts and details of rehabilitation.

It is a strategic objective of Meath County Council:

RUR DEV SO 3	To identify and protect known or potential aggregate resources, where feasible, from development which would prejudice their sustainable future usage.

Extractive Industry and Building Materials Production (CDP Chapter 10.12)

It is the policy of Meath County Council:

RD POL 22	To facilitate the exploitation of the county's natural resources and to exercise appropriate control over the types of development taking place in areas containing proven deposits, whilst also ensuring that such developments are carried out in a manner which would not unduly impinge on the visual amenity or environmental quality in the area.
RD POL 23	To support the extractive industry where it would not unduly compromise the environmental quality of the county and where detailed rehabilitation proposals are provided.
RD POL 24	To seek to ensure that the extraction of minerals and aggregates minimise the detraction from the visual quality of the landscape and do not adversely affect the environment or adjoining existing land uses.
RD POL 25	To ensure that the extractive industry and associated development minimises adverse impacts on the road network in the area and that the full cost of road improvements, including during operations and at time of closure, which are necessary to facilitate those industries, are borne by the industry itself.
RD POL 26	To ensure that all existing workings shall be rehabilitated to suitable land uses and that all future extraction activities will allow for the rehabilitation of pits and proper land use management. The biodiversity value of the site should be considered in the first instance when preparing restoration plans. Where land filling is proposed, inert material is the preferred method. Each planning application shall be considered on a case by case basis and, where relevant, will be dealt with under the relevant regional Waste Management Plan.

RD POL 27	To ensure that development or aggregates / mineral extraction, processing and associated processes does not significantly impact in the following areas: i. Existing & Proposed Special Areas of Conservation (SACs); ii. Special Protection Areas (SPAs); iii. Natural Heritage Areas and Proposed Natural Heritage Areas; iv. Other areas of importance for the conservation of flora and fauna; v. Areas of significant archaeological potential; vi. In the vicinity of a recorded monument; vii. Sensitive landscapes, and; viii. World Heritage Sites.

Extractive Industry and Building Materials (CDP Chapter 11.14)

Worked-out pits should be rehabilitated to suitable land uses and screened appropriately as part of an aftercare programme.

3.2.2.8.2 Other Relevant Guidelines

Best Practice Guidelines on the preparation of Waste Management Plans for Construction and Demolition Projects have been produced by DoEHLG (2006). These provide guidance on the preparation of construction and demolition Waste Management Plans and provide local authorities, engineers and developers with an agreed basis for the content of C&D Waste Management Plans. Coinciding with these draft guidelines, the National Construction and Demolition Waste Council (NCDWC) launched their Voluntary Construction Industry Initiative in October 2004. This initiative places responsibility on each participant in the construction industry to encourage best practice in waste management by promoting waste prevention, reduction and reuse of materials and recycling and waste management plans will be required for all projects with a floor area in excess of 500m^2, all civil engineering projects in excess of 25,000m^3 excavated materials and for all demolition work in excess of 100m^3 (National Construction and Demolition Waste Council, 2004).

Soil and stone, the largest fraction of C&D waste, is currently deposited on agricultural land under Waste Permit, the activity being classified as 'waste recovery'. Nominally the soil is being used to improve agricultural land, but this may not be the main objective in many cases. While the current practice is a relative low-cost option for the building industry, there are some concerns over current practice:

- Regulating a large number of small sites is more challenging and costlier for the local authority, and the risk of illegal disposal at these sites is potentially higher,
- There is a risk that 'marginal land' high in biodiversity and ecological value (but low in economic value) will be damaged in a piecemeal fashion (wetlands, marshy land, hedgerows, natural grasslands) and

- The opportunity to re-instate existing quarries, landfills and other 'brownfield' sites is being lost.

Existing quarries and pits whether worked out or in operation are potentially useful sites for the management of C&D waste - rubble, stones, and other recyclables could be screened from the waste for re-use. The inert soil can be used to restore the topographical contours. It may be possible to use the same trucks to deliver aggregates / raw materials to building sites and remove soil, thereby reducing traffic impacts. With fewer of these sites, better regulation will be possible at a lower cost.

Local authorities should therefore encourage the use of quarries / pits for sustainable management of C&D waste as opposed to using agricultural land, with an emphasis on resource recovery. Local authorities should divert suitable C&D waste to relevant landfill sites where there is potential to use it for restoration and environmental protection. Local authorities in the region are in general working both together and with the private sector to develop C&D waste recycling facilities.

Applications for waste permits for deposit of soil on agricultural land should be closely inspected, with a view to potential environmental impacts. Where alternative regulated sites are available the use of virgin land for C&D waste should be discouraged.

The Dept. of the Environment, Heritage & Local Government (DoEHLG) has published “Quarries & Ancillary Activities – Guidelines for Planning Authorities” in April 2004. In this publication it is stated that as part of best practice

- the availability of a choice of raw aggregates and C&D waste-derived aggregates for the purposes of new construction would serve to limit the depletion of natural resources.
- Quarries should consider using inert C&D waste arisings, which do not have the potential to displace natural aggregates, for reinstatement and restoration purposes on the quarry site.

3.3 EXISTENCE OF THE PROJECT

The description of the existence of the project considers all aspects of the project lifecycle from construction to decommissioning. These include the following:

- Construction
- Commissioning
- Operation
- Changes to the project
- Decommissioning

3.3.1 DESCRIPTION OF CONSTRUCTION

The nature of the development is the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert construction and demolition waste. As such most of the necessary infrastructure in relation to the operation of the WRF is in place. The location of all activities, buildings and facilities at the Recovery Facility are shown on the Site Plan Figure B 2.1 - Rev C, *Section 6.*

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A. Reg. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul, Co. Meath. The development will consist of the recovery of construction and demolition waste to produce secondary aggregates. The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered. Skips will be provided for removal of deleterious material (i.e. steel, timber, plastic). A hard standing area will be provided for stockpiling of processed secondary aggregates (Refer to Figure B 2.1 Rev C, *Section 6*).

3.3.1.1 Land-Use

The proposed soil recovery facility including site infrastructure comprises c. 24.2 ha of the total landholding of 33.4 ha at Clashford, Naul, Co. Meath (Refer to Figure B 2.1 Rev C, *Section 6*). The lands have mostly been restored to beneficial after-use (agriculture and forestry) under successive waste permits. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use.

The quarry is being restored by backfilling up to 10m of inert soil and stone (average c. 5.4m). The area being restored is c. 750m long east to west and 530m wide north to south at its widest narrowing to c. 40m towards the east (Refer to Figure B 2.1 Rev C, *Section 6*).

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3.3.1.2 Preliminary Development Works

The lands have mostly been restored to beneficial after-use (agriculture and forestry) under successive waste permits. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use.

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3.3.2 DESCRIPTION OF COMMISSIONING

On some large projects there is a considerable time delay between the end of construction and the commencement of full operation.

In this case the Waste Recovery Facility at Clashford is an established operation with the necessary plant and machinery, site infrastructure and experienced workforce in place to facilitate the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert C&D waste. As such there will be no expected delay between the end of construction and the commencement of full operation.

3.3.3 OPERATION OF THE PROJECT

3.3.3.1 Management of the Facility

3.3.3.1.1 Technical Competences & Site Management

Clashford Recovery Facilities Ltd is an established small family run business based in Naul, Co Meath. Mr Larry Kiernan, Facility Manager, is responsible for the overall management of the facility. The facility manager has over 40 years' experience including 17 years in operating & Managing the existing Waste Recovery Management Facility. Mr. Kiernan's wife Bernie is the administration and accounts manager for the facility. The organisational structure is shown by the following organogram.

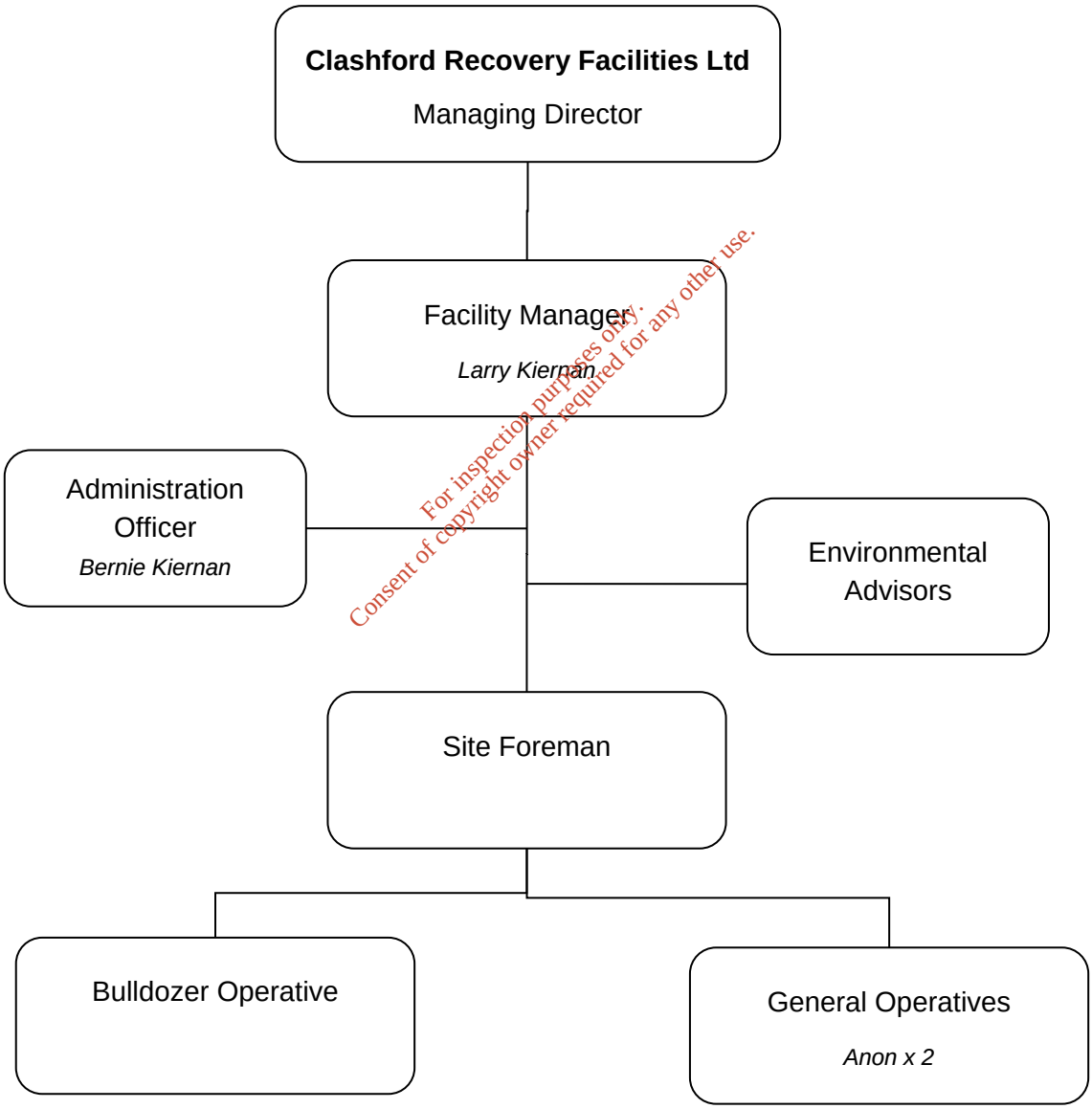


Figure 3.3-1 Organisation Structure

3.3.3.1.2 Environmental Management & Monitoring

Clashford Recovery Facilities Ltd will implement an EMS for the facility subject to granting of the Waste Licence.

Mr. Larry Kiernan of Clashford Recovery Facilities Ltd is also responsible for the 'Environmental Management' of the facility. In this role, he has responsibility to ensure that the proposed Environmental Management System, Environmental Objectives & Targets and the Environmental Monitoring Plan are fully implemented.

The EMS will include an 'Environmental Monitoring Programme' for the monitoring of water, dust and noise, and will be subject to compliance with any conditions attached to any decision to grant a Waste Licence for the facility. The monitoring programme results will be submitted to relevant regulatory authority on a regular basis, and therefore made available for inspection by interested parties.

3.3.3.1.3 Record Keeping

In compliance with Condition No. 3.1 of Meath County Council Waste Management Permit No. 2005/25, the following documents are required to be maintained in the site office and are made available for inspection by Meath County Council, or other authorised persons:

- The quantities and types of waste received at the site.
- The quantities and type of waste not accepted at the site, and details of where these wastes were sent.
- The dates and times of all waste deliveries to the site.
- The names of the carriers and the vehicle registration numbers.
- The origin of each delivery of waste.

Site records are available for inspection by the Local Authority at all times. An annual report is prepared by the site manager and submitted to the Local Authority not later than the 28th February of each year in accordance with the requirements of Waste Management Permit No. 2005/25.

The record keeping will be revised in order to achieve compliance with any conditions attached to any decision to grant permission for a Waste Licence for the facility.

3.3.3.1.4 Working Hours & Employment

It is proposed that working hours at the application site will be that waste is only accepted at the site between the hours of 08:00 hours to 18:00 hours Monday to Friday inclusive (excluding Bank and National Holidays) and between 08:00 hours to 14:00 hours on Saturday. No waste shall be accepted on Sundays. These hours of operation are as stipulated in the existing Waste Management Permit No. 2005/25 and in compliance with conditions imposed under P. Ref. QY36, QC 17.QC2085.

Clashford Recovery Facilities Ltd employs four people directly and a number of others indirectly, with the majority of the employees being local people. An additional two temporary staff are hired occasionally. The WRF will require one person operating a bull-dozer/back-hoe excavator, one general foreman to monitor and inspect the quality and suitability of

imported materials being brought to the site for recovery/sorting/transfer, and two other general site operatives.

3.3.3.2 Site Infrastructure

3.3.3.2.1 Introduction

In this case the Waste Recovery Facility at Clashford is an established operation with the necessary plant and machinery, site infrastructure in place to facilitate the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert C&D waste.

The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered. The proposed facility site layout is shown by EIAR Figures D.1.1 & D.1.2 – Rev C, *Section 6*.

3.3.3.2.2 Site Security

The boundaries of the site are secure being established hedgerows and stock proof fencing.

The site also benefits from being bounded to the north by a small stream and deep ditch, with the Delvin River forming a natural barrier to the south and east of the site. The site entrance gates remain locked outside of normal working hours and public warning notices are posted at appropriate locations along the site boundary. The site is also monitored with CCTV at the entrance.

3.3.3.2.3 Design of Site Roads

Access to the site will be gained through the existing entrance onto the Regional R108 Naul to Drogheda Road. The site entrance has been adequately set-back and splayed in accordance with P. Reg. 86/349 to the satisfaction of the Planning Authority. All materials will be transported the site using heavy goods vehicles (HGV's).

The site access road between the site entrance and wheelwash has been provided with an asphalt surface. Imported clean construction and demolition waste (concrete and brick) is used to construct internal haul roads as required.

3.3.3.2.4 Design of Hard Standing Areas

Hard standing areas, surfaced with asphalt or concrete, currently exist around the site entrance area.

A gradient of at least 1 in 60 is provided to ensure the water drains quickly from the surface. The edge of the pavement is finished above or flush with the surrounding ground to allow the water to run-off. The surrounding ground being sand and gravel has adequate soakage capacity to allow for infiltration of surface run-off.

The main site area is of a compacted in-situ gravel surface with the effect that there will effectively be no surface run-off at the site and allows the return of runoff to the natural drainage system as soon as possible.

A hard standing area with drainage to oil interceptor will be provided for quarantine/inspection of the incoming C&D waste to be recovered to produce secondary aggregates. The proposed facility site layout is shown by EIAR Figures D.1.1 & D.1.2 – Rev C, *Section 6*.

3.3.3.2.5 Plant

Plant on site comprises a bulldozer, excavator, loading shovel, tractor, yard sweeper, quad bike. 4wd jeeps are also used intermittently on site.

A mobile crushing and screening plant will be used to process the inert C&D material to produce secondary aggregates (Refer to EIAR Figures D.1.1 & D.1.2 – Rev C, *Section 6).*

3.3.3.2.6 Weighbridge

A weighbridge is to be provided on site. Trucks entering the site are typically 4 axle 9 cu.m capacity rigid bodied tippers. Details with respect to truck loads and volume of inert materials received are recorded in a log book at the site inspection office.

3.3.3.2.7 Wheel-wash

The existing wheelwash will be upgraded and relocated towards the site entrance.

As trucks enter the wheelwash a number or shaker bars will aid the release of mud from tyre grooves. The wheelwash will also incorporate underfloor, vertical and horizontal spray bars that will be activated by sensor. The wash water will be recycled through a system of settlement chambers with provision for discharge to the existing settlement ponds on site.

Water supply is stored in a large steel tank which is sourced from an on-site bored well. The wash-water is discharged through a system of silt lagoons with overflow to a surface water outlet. The settlement tanks will be periodically cleaned and the silt used within the restoration of the site.

3.3.3.2.8 Laboratory Facilities

Laboratory facilities on site will not be required as the services of an external accredited lab will be used as required.

3.3.3.2.9 Fuel & Oil Storage

Diesel Plant on site will be refuelled using a mobile fuel bowser or double skinned road tanker. This is due to the fact that the bunded fuel storage tank which has been removed was subject to burglary.

Refuelling will take place on the hard standing area to be provided at the C&D Recovery area with drainage to oil interceptor.

The following measures will also be implemented with respect to refuelling.

- Supervision of all fuel refilling works by the Manager or other authorised member of staff;

- The placement of a clean drum/bucket under the refuelling point, during refuelling operation, to collect any spillages that may occur;
- The storage of 'Spill Kits' close to the refuelling point to soak up any spillages which may occur immediately.
- All plant/machinery will be inspected regularly to ensure that there are no leakages of fuel or hydraulic fluid and all plant/machinery will be serviced regularly.

Oil and Waste oil products are stored under cover. All oil barrels and lubricants are stored on spill pallets/ spill trays.

Spill kits are also maintained on site and the Company will put in place an emergency response procedure for hydrocarbon spills, and appropriate training of site staff in its implementation.

Waste oils are disposed of by a licensed waste contractor and removed off site.

3.3.3.2.10 Waste Quarantine Areas

The site has a designated area for the quarantine of any inappropriate materials which may be found within loads accepted at the site. Skips have been provided within the designated quarantine area for the temporary storage of any inappropriate materials discovered (e.g., glass, plastic, timber, steel, etc.). The materials are routinely removed by a licensed waste disposal contractor to an appropriate disposal facility.

3.3.3.2.11 Waste Inspection Areas

All truck loads entering the site are given a preliminary inspection on entering the site.

Secondary inspection will be carried out after each load is tipped at the restoration infill area within the site and/or hardstanding. Should a load of material indicate contamination of non-inert material on inspection, the material is reloaded and the driver instructed to remove the load offsite to an approved facility.

Occasionally a load will contain minor contaminants (e.g., plastics, rebar, wood and paper). These items are removed on inspection by a site operative and stored in skips in a designated quarantine area pending removal offsite by a licensed waste disposal contractor to an appropriate disposal facility.

3.3.3.2.12 Traffic Control

Car parking including visitors parking will be provided at the site office. Trucks entering the site report to the site office where each load will be inspected as to its suitability to be recovered on site.

The site entrance has also been designed to ensure that queuing for vehicles entering the site is accommodated within the curtilage of the site entrance.

All trucks exiting the site leave through the wheelwash facility.

Traffic direction signs, warning signs, speed limit signs are established throughout the site.

3.3.3.2.13 Sewerage and Surface Water Infrastructure

The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area (Refer to EIAR Figure D.1.1 – Rev C, *Section 6*).

The result of the site characterisation has shown that the site is suitable for a septic tank system (septic tank and percolation area).

The installation and of the septic tank and percolation area will be in compliance with the EPA (2010), COP: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. < 10).

In accordance with the EPA Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels (EPA 1999) the recommended waste loading for an office and/or factory without canteen is 30 litres/per person. For a workforce of 4 employees plus visitor this equates to 150 litres per day (i.e. Population Equivalent of 1 p.e.) one 18m percolation trench per person (p.e.) is recommended as per EPA COP 2010. It is proposed to provide at least 2 x 18m percolation trenches which is sufficient contingency for double the projected workforce.

The natural drainage pattern existing on site means that rain water falling on the site percolates through the existing soil strata (sand and gravel) to the underlying bedrock.

A hard standing area with drainage to oil interceptor will be provided for quarantine/inspection of the incoming C&D waste to be recovered to produce secondary aggregates. The proposed facility site layout is shown by EIAR Figures D.1.1 & D.1.2 – Rev C, *Section 6*.

The existing wheelwash will be upgraded and relocated towards the site entrance. The wash water will be recycled through a system of settlement chambers with overflow to a surface water outlet.

The only discharge from site will be surface water run-off. As only inert materials are to be imported to site, these do not represent a source of possible contamination of surface waters. The reclamation scheme has been designed so that surface water will drain to the stream at the north eastern boundary.

A temporary settlement facility has been provided at the northeast boundary for the collection and settlement of suspended solids prior to the water entering the surface drainage course (Refer to Figure B 2.1 – Rev C, *Section 6*). Water quality monitoring of the outflow can be carried out in accordance with any monitoring programme agreed with the EPA.

3.3.3.2.14 All Other Services

The water supply for the site office and wheelwash is met by an existing borehole on site. Potable water is brought to the site daily. An existing single-phase overhead electricity supply provides for lighting and heating of the office. An overhead telephone line also serves the site office.

For the short periods when the operation will be working into darkness (i.e., over winter months), the operators will ensure that sufficient lighting is provided to ensure safe operations. As waste recovery activity will be screened from public view, light pollution from site activity will be minimal.

3.3.3.2.15 Plant Sheds, Garages and Equipment Compound

No major vehicle servicing/repairs are carried out on site. All oil barrels and lubricants will be stored under cover on spill pallets/ spill trays.

Plant and machinery used on site will be parked on the hard standing at the site entrance outside of normal operating hours.

3.3.3.2.16 Site Accommodation

The existing site office accommodation comprises of a large portacabin (approx. 10m x 3m). This is to be replaced by a similar structure (3.6mx 12.65m) comprising an office, toilets and canteen (sink and water heater only).

3.3.3.3 Construction and Demolition Waste Infrastructure

Recovery and re-cycling activities at the application site will involve tipping of previously stockpiled 'unprocessed' material into a mobile crushing & processing plant using a front-end loader. Material produced by the plant will then be transported by front-end loader to 'processed' stockpiles. Recycled material is used for internal haul roads and/or will be dispatched offsite.

No sorting of materials other than separation of rebar from concrete will be undertaken on site as all material will be sorted and segregated at source before being brought to the application site. Rebar (reinforced steel) separated from concrete will be stored in the designated quarantine area awaiting removal off-site by a licensed scrap merchant.

3.3.3.4 Facility Operation

3.3.3.4.1 Unit Operations

The Site Infrastructure Plan (Refer to Figure D.1.1 – Rev C, *Section 6*) indicates the location of all activities and identifies all buildings and facilities at the Recovery Facility.

3.3.3.4.1.1 Delivery, Inspection & Acceptance

A flow diagram of the delivery, inspection & acceptance procedure is provided in Figure 3.3-2 below.

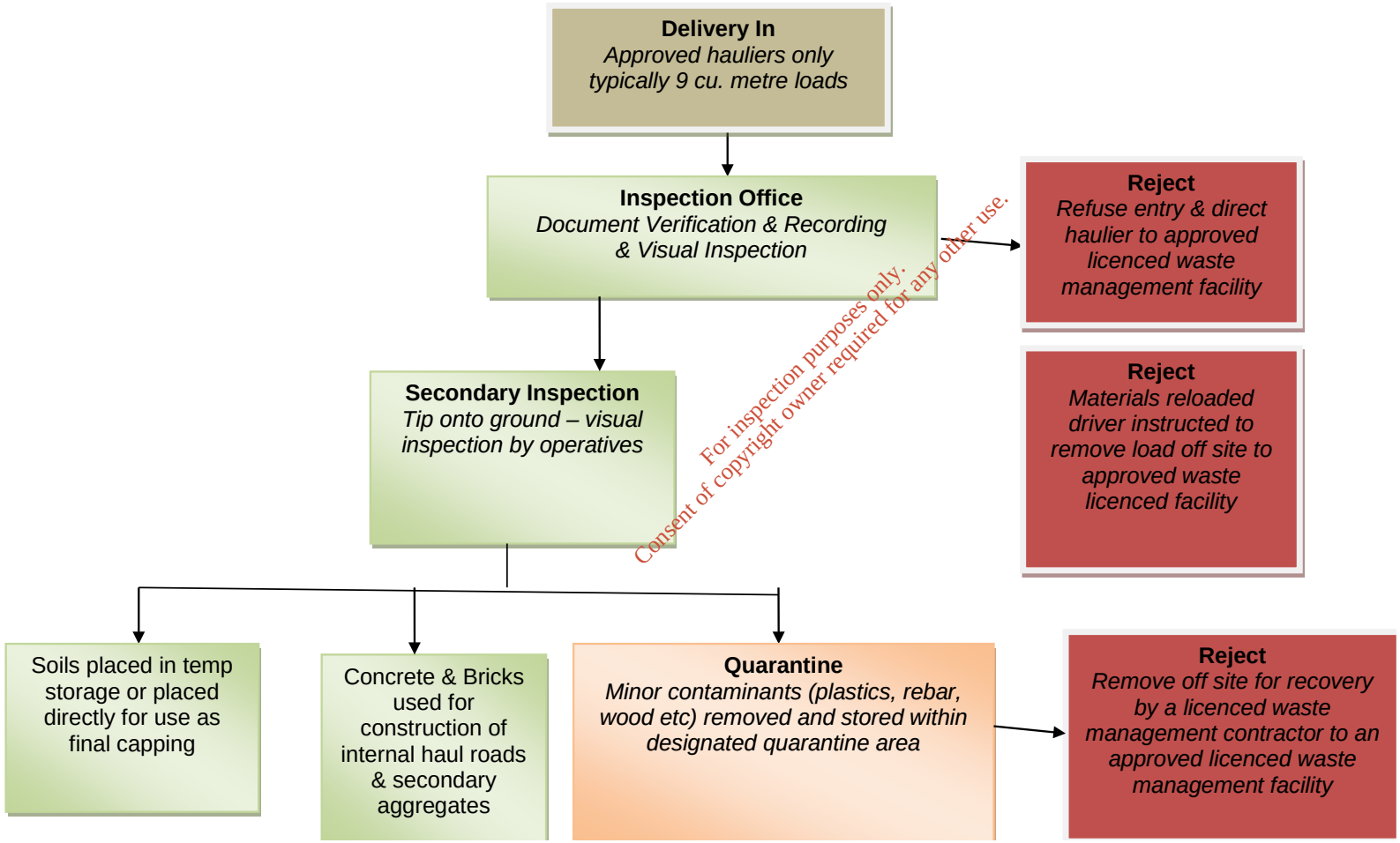
Materials to be recovered will only be accepted from approved Contractors who are aware of the need for, and who undertake, strict segregation and sorting of waste prior to transporting it to the application site.

Waste Acceptance and Characterisation procedures include the following:

- The applicant will endeavour to visit the construction sites to ensure materials are being properly sorted and segregated at source.
- Typically loads of up to 9 cu.m will be imported to site. Only hauliers with the appropriate Waste Collection Permits will be accepted.

- All truck loads entering the site will be given a preliminary visual inspection at the site office. If the material is not considered acceptable the haulier will be refused entry and directed to an appropriate Waste Management Facility.
- Any Contractor who persistently carries unacceptable waste to the application site will be denied further use of the facility.
- Details of all truckloads entering the site are entered into a logbook maintained by the operator. A designated internal haul road will be maintained to direct site traffic to the tipping area.
- Accepted materials will be subject to Secondary inspection after each load is tipped at the restoration infill area within the site, and/or hardstanding. Should a load of material indicate contamination of non-inert material on inspection, the material is reloaded and the driver instructed to remove the load offsite to an approved facility.

Figure 3.3-2 Flow diagram of the whole process, along with a brief description (italics) detailing its management and maintenance plans



3.3.3.4.1.2 Quarantine

Should a load of material indicate contamination of non-inert material on inspection, the material will either be reloaded and the driver instructed to remove the load offsite to an approved facility; and/or the material will be stored in the quarantine area awaiting removal to an approved facility.

Occasionally a load will contain minor contaminants (e.g., plastics, rebar, wood and paper). These items will be removed on inspection by a site operative and stored in a designated quarantine area pending removal offsite by a licensed waste disposal contractor to an appropriate recovery/disposal facility.

3.3.3.4.1.3 Recovery of Soils

Following the second inspection the material will be accepted and placed (placement by bulldozer) within the restoration area or in the case of topsoil placed in temporary storage awaiting final placement.

The lands are to be restored to agricultural use by importation and recovery of inert materials in accordance with a phased restoration scheme.

3.3.3.4.1.4 Recovery of Construction Materials

It is estimated that c. 20,000 tonnes per annum of inert construction and demolition waste will be recovered at the facility.

Clean construction and demolition waste will be placed in temporary storage awaiting recovery.

Recovery and re-cycling activities at the application site involves tipping of previously stockpiled ‘unprocessed’ material into a crushing & processing plant using a front-end loader (Refer to EIAR Figures D.1.1 & D.1.2 – Rev C, *Section 6*).

The processing is undertaken periodically as materials are required using semi mobile crushing and screening plant on site. Material produced by the plant is then transported by front-end loader from production stockpiles around the plant to ‘processed’ stockpiles. Recovered material is to be used for internal haul roads and/or will be dispatched offsite as secondary aggregates

No sorting of materials other than separation of rebar from concrete will be undertaken on site as all material will be sorted and segregated at source before being brought to the application site. Rebar (reinforced steel) separated from concrete will be stored in a skip prior in the designated quarantine area awaiting removal off-site by a licensed scrap merchant.

3.3.3.4.1.5 Exceptional Operations

There will be no major servicing of plant and machinery carried out on site apart from routine maintenance and running repairs.

3.3.3.4.1.6 Accident Prevention and Emergency Response

As outlined in Section 3.3.3.1.2 above the operator will put in place an Environmental Management System (EMS) which addresses such matters as Emergency Preparedness & Response in dealing with accident and emergency situations resulting in effects on the environment.

An emergency telephone contact list will be maintained at the site office. This contact list shall include details with respect to the emergency services, Doctor, relevant agencies (including EPA, Meath County Council) and management (including out of hours) for dealing with emergency response.

An emergency contact number for out of hours will be prominently displayed at the site entrance and staff members will be available in the event of an emergency call-out.

3.3.3.4.1.7 Emergency/Spill Response Procedures

It is considered that accidents and emergency situations resulting in effects on the environment is confined to possible emissions to groundwater in the event of a fuel spillage. As such the following Emergency/Spill Response Procedures will be put in place.

In the unlikely event of a spillage the following procedure will be followed:

The facility manager, or appointed nominee, is responsible for carrying out the following procedure in the event of a spillage.

1. **It is the responsibility of the person who discovers the spill to:-**
    - Immediately contain the spill (*Only if possible and safe to do so*).
    - Inform the Facility Manager or appointed nominee.

2. **The Facility Manager, or appointed nominee shall:-**
    - Ensure all sources of ignition are extinguished
    - In the event of a fire follow the Fire Safety Procedure
    - Contact the appropriate emergency services if necessary
    - Keep the area well ventilated if the spill is in a confined space
    - Ensure that all unnecessary untrained personnel are kept well away from the scene
    - Identify the material spilled and obtain the MSDS to ensure that handling and PPE requirements are clearly understood and that those containing the spill are wearing the appropriate PPE.
    - Stop the spill and contain it as much as possible, use the materials provided in the Environmental Spill Kits.
    - Notify the EPA, Co. Council, Fisheries Board, if necessary.

- Carryout any necessary remediation works/ and or seek appropriate professional advice.
- Any waste or contaminate materials generated during the clean-up of the spill, shall be disposed of by an appropriate licensed waste collection contractor.
- Complete an incident report

It should be noted that significant emphasis has been placed on control and abatement measures to ensure there is no risk to surface and /or groundwater (Refer to EIAR Section 3.3.3.2.9 above).

3.3.3.5 Environmental Treatment, Abatement and Control Systems

The main potential source of emissions from an inert WRF is noise and dust associated with movement, handling and placement of materials. Other possible emissions to the atmosphere are from machinery exhaust fumes, and possible emissions to surface and/or groundwater in the event of fuel or oil spillage. These are discussed in more detail in the next section (Section 4), which deals with distinct environmental topics.

3.3.3.5.1 Emissions to Atmosphere

The following section details the techniques for preventing, or reducing the emissions from the WRF, including treatment/abatement systems as necessary. The following activities may give rise to potential fugitive dust emissions.

- Internal movement of vehicles
- Tipping and levelling
- Loading and unloading vehicles
- Processing area

The materials to be recovered are principally “soil and stone” and inert construction and demolition waste. Any dust generated by the operation will comprise inert particulate matter.

There will also be emissions to air from the exhaust of the site plant & machinery, and the haulage trucks; arriving/departing the site.

Experience of inert Waste Recovery Facilities indicates that mechanical activity is the most significant factor in material erosion and dust generation. Dust emanates from the placement of materials, the movement of vehicles on internal roads and loading and processing operations. However, the effect of wind is also an important factor in dust generation and problems may arise at reclamation workings when both factors arise simultaneously.

The impacts of any dust deposition from the operations will be direct, of short duration, temporary and largely confined to the site area.

The principal measures employed to control fugitive (ground) dust emissions from general site activity, internal haulage and tipping operations are:

- During dry weather the haul roads and stockpiles are sprayed with water to dampen any likely dust blows.

- A mobile water browser is provided in periods of dry or windy weather to cover locations where it is impractical or inappropriate to use a fixed water spray system.
- Consideration will be given to location of mobile plant so as to ensure that any principle dust sources cannot adversely affect sensitive off-site locations.
- Static and mobile wet dust suppression systems will be located at strategic points in the process if required.
- Drop heights are kept to a minimum by using short conveyors and maintaining stocks under the head drum load out points.
- A wheel wash facility has been installed on site and all vehicles are required to pass through the wheel wash on exiting the site.
- A sprinkler system has been installed on the site access road and is in operation during periods of dry weather.
- Main site haulage routes within the site shall be maintained with a good temporary surface, as is the case at present.
- All internal roadways will be adequately drained, to prevent ponding.
- A road sweeper is available for use on site and adjacent sections of the R108 at least on a weekly basis and/or if a spillage occurs onto the public roadway.
- Suitable vegetation is to be provided on restored areas at the earliest opportunity.
- Ongoing dust monitoring to ensure threshold limits are not exceeded.

Dust emissions from the facility will be controlled and monitored. Dust emissions and their management will be addressed in the 'Environmental Management System' (EMS) for the Clashford site.

Regular servicing of facility plant & machinery will ensure that exhaust emissions are kept to a minimum.

3.3.3.5.2 Emissions to Surface Water and Groundwater

As the only material to be imported to site is “soil and stone” and inert construction and demolition waste there will be no source of possible contamination of surface and/or ground waters. The reclamation scheme has been designed so that surface water will drain to the stream at the north eastern boundary.

To mitigate against the risk of pollution to groundwater and surface water occurring during operation of the site, the following management measures will be included:

- all plant will be regularly maintained and inspected daily for leaks of fuels, lubricating oil or other contaminating liquids/liquors;
- Diesel Plant on site will be refuelled using a mobile fuel bowser or double skinned road tanker.
- Refuelling will take place on the hard standing area to be provided at the C&D Recovery area with drainage to oil interceptor.

- Oil and Waste oil products are stored under cover. All oil barrels and lubricants are stored on spill pallets/ spill trays. Waste oils are disposed of by a licensed waste contractor and removed off site.
- Spill kits will also be maintained on site and the Company will put in place an emergency response procedure for hydrocarbon spills and appropriate training of site staff in its implementation.
- The wash-water from the wheel-wash is recycled through a system of silt lagoons with overflow to a surface water outlet. The lagoons are periodically cleaned and the silt is used within the restoration of the site.
- A temporary settlement facility has been provided at the northeast boundary for the collection and settlement of suspended solids prior to the water entering the surface drainage course. (Refer to Figure D.1.2 – Rev C, *Section 6*).
- A surface water and groundwater monitoring programme has been put in place to ensure that there is no impact on water quality because of the recovery operations.

There are no significant residual impacts with respect to groundwater and/or surface water provided the appropriate mitigation measures are implemented.

3.3.3.5.3 Emissions to Sewers

The existing welfare facilities will be replaced including provision of septic tank and percolation area. The installation and of the septic tank and percolation area will be in compliance with the EPA (2010), COP: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. < 10).

3.3.3.5.4 Noise Emissions

The main source of noise and vibration will be from the movement of trucks on internal haul roads, the tipping of material, placing and grading the infill material, and from the processing plant.

Given the nature of the development the location of the above will vary dependent on area of site being restored (Refer to Figure B.2.1 – Rev C, *Section 6*).

The type of mitigation techniques implemented to reduce noise are detailed below:

- The provision of temporary peripheral screen banks to screen site activities from outside views.
- General site activity will be within the existing pit and below the level of the nearest residences.
- The use of designated haul roads to ensure that site traffic is removed from nearest noise sensitive receptors.
- Regular maintenance of all plant and machinery is an integral part of site management and is important in helping to minimise noise impact.
- All plant and equipment will conform to noise emission limits set out in Statutory Instrument No. 320 of 1998 European Communities Construction Plant and

Equipment-Permissible Noise Levels (Regulations, 1998) and amendment set out in Statutory Instrument No. 359 of 1996.

- Noise monitoring can be carried out at four noise monitoring stations (N4-N7) in the vicinity of the nearest noise sensitive properties (Refer to Figure F 1.0 – Rev C, Section 6) in accordance with any monitoring programme agreed with the EPA.

The results of monitoring to date shows that the development complies with the noise level threshold as specified, and as a consequence the development will have no significant effects regards noise levels in the area. Noise emissions and their management will be addressed in the 'Environmental Management System' (EMS) for the Clashford site. The issue of noise and the mitigation measures available to reduce noise to acceptable levels is dealt with in detail in EIAR Section 4.7 - Noise.

3.3.3.5.5 Environmental Nuisances

3.3.3.5.5.1 Litter Control

The only waste to be accepted at the facility for recovery comprises inert soils and stone, and inert construction and demolition waste. As such it is not expected that the site activities concerned are likely to give rise to litter.

The site entrance gates remain locked outside of normal working hours and public warning notices are posted at appropriate locations along the site boundary. The site is also monitored with CCTV at the entrance. These measures are to ensure that there is no unauthorised dumping of unacceptable wastes outside of operating hours likely to give rise to nuisance.

A daily site inspection including site boundaries adjoining public roads shall be carried out. Any litter observed will be removed as soon as possible and disposed of to a suitable Waste Management Facility.

Waste oils, batteries, scrap metal, etc. will be removed from site for recycling by approved licensed contractors. A licensed waste collection contractor will remove any domestic waste requiring disposal to a licensed waste management facility.

Occasionally a load will contain minor contaminants (e.g., plastics, rebar, wood and paper). These items are removed on inspection by a site operative and stored in skips in a designated quarantine area pending removal offsite by a licensed waste disposal contractor to an appropriate disposal facility.

3.3.3.5.5.2 Bird & Vermin Control

As the site is not a landfill, and the only material imported into the facility is inert soil and stone, and inert construction and demolition waste, and not domestic or municipal waste, the potential of attracting large numbers of birds and vermin is very low.

Litter, especially foodstuffs brought on site by employees, will be disposed of properly, and adequate facility for such will be maintained. Litter control as an integral element of vermin control, will be monitored as part of the Environmental Management System. It is considered that the site activities concerned will not give cause to introduce any specific controls for birds and vermin.

3.3.3.5.5.3 Fire Control

As the waste to be accepted at the facility for recovery comprises inert soil and stones, and inert construction and demolition waste, it is unlikely that the site activities are likely to give rise to any significant risk of fire.

3.3.3.5.5.4 Traffic Control

Car parking including visitors parking will be provided at the site office. Trucks entering the site report to the site office where each load is inspected as to its suitability to be recovered on site.

The site entrance has also been designed to ensure that queuing for vehicles entering the site is accommodated within the curtilage of the site entrance.

All trucks exiting the site leave through the existing wheelwash facility.

Traffic direction signs, warning signs, speed limit signs are established throughout the site.

3.3.3.5.5.5 Road Cleaning

The site access road between the site entrance and wheelwash has been provided with an asphalt surface. Imported clean construction and demolition waste (concrete) is used to construct internal haul roads as required.

The existing wheelwash will be upgraded and relocated towards the site entrance.

As trucks enter the wheelwash a number or shaker bars will aid the release of mud from tyre grooves. The wheelwash will also incorporate underfloor, vertical and horizontal spray bars that will be activated by sensor. The wash water will be recycled through a system of settlement chambers with provision for discharge to the existing settlement ponds on site.

A road sweeper is available for use on site and adjacent sections of the R108 at least on a weekly basis and/or if a spillage occurs onto the public roadway.

3.3.3.5.6 Environmental Monitoring

An environmental monitoring programme is already in place at the quarry for the monitoring of water, dust and noise. The location of Environmental Monitoring locations (Water, Dust and Noise) are shown on Environmental Monitoring Plan F 1.0 – Rev C, *Section 6*.

The environmental programme is discussed under Section 4 – “Environmental Factors” of this report.

The future monitoring programme will be revised accordingly, subject to compliance with any conditions attached to any decision to grant a Waste Management Licence.

3.3.3.5.6.1 Air – Dust

The existing waste management permit (WMP 2005/25) states that "*dust deposition shall not exceed 350mg/sq.m/day, average over 30 days, when measured at site boundaries. The developer shall carryout twice-yearly dust monitoring at the locations indicated in the application".*

The operator has set up a dust monitoring programme using Bergerhoff Dust Gauges for the overall Clashford site. Details with respect to dust monitoring for the site are provided in EIAR Section 4.6. The locations for dust monitoring are shown on Environmental Monitoring Plan F 1.0 – Rev C*, Section 6*.

Dust fall is measured using the Bergerhoff method as set out in German Standard VDI 2119. The normal recommended standard for dust emissions for this type of development is that "dust deposition shall not exceed 350 mg/m^2/day measured at the site boundaries and averaged over 30 days". This limit refers to total dust (using DIN method).

The above standard is also in accordance with guidance issued by both the Department of the Environment and the EPA in relation to dust deposition monitoring for these types of developments and will continue to be applied.

This programme will allow on-going monitoring of fugitive dust emissions from the site, and ensures that dust threshold limits are not exceeded, and that dust emissions are compliant with any future requirements or regulations.

3.3.3.5.6.2 Surface Water

The nearest watercourse to the application site is the Delvin River, which forms the southern boundary of the site, whilst a smaller tributary (tributary 1) of this river forms the northern boundary of the landholding.

It is proposed that the Tributary and the Delvin River should be monitored frequently during the on-going site works in Phase 2 and future site works planned in Phase 3, in order to ensure that the water quality is not adversely affected by on-site activities.

Discharge monitoring will continue to be undertaken at the discharge monitoring point to Tributary 1 on a quarterly basis for the following parameters: BOD, COD, Suspended Solids, Total Petroleum Hydrocarbons and Fats, Oils and Grease, in order to ensure that the quarry discharge is not impacting negatively on the Tributary and the Delvin River (Refer to EIAR Section 4.4).

3.3.3.5.6.3 Groundwater

There are a number of water wells located within the site boundary. Well GW1, located near the site entrance from the R108, is intended as a water supply source for the office, canteen and toilet facilities within the site.

Well GW2, located in the south of the Clashford WRF site is used as a water source for the site sprinkler system and farmland area.

The other wells on site (GW3, GW4, and GW5) are groundwater monitoring wells, and are not used for groundwater abstraction. (Refer to Environmental Monitoring Plan Figure F 1.0 – Rev. C*, Section 6*).

It is proposed that groundwater monitoring be carried out biannually. This is recommended to ensure that the restoration of the site is not impacting on the groundwater beneath the site and to establish on-going trends in the groundwater monitoring boreholes.

3.3.3.5.6.4 Noise

Noise monitoring is carried out at nearby residences and site boundaries adjoining same (Refer to Environmental Monitoring Plan Figure F 1 – Rev C, *Section 6*). Details with respect to noise monitoring for the site are provided in EIAR Section 4.7.

The noise levels measured are in compliance with conditions imposed under P. Ref. QY/36 (17.QC.2085) i.e., Condition No.7 - *"the noise levels associated with day to day activity, when measured from any house in the vicinity of the quarry, shall not exceed 55 dB (a) leq over a measured time interval of one hour by day time and shall not exceed 45 dB (A) leq over a measured time of 15 minutes by night time. These levels may be exceeded to allow temporary but exceptionally noisy phases in the extraction process or for short term construction activity which is required to bring long-term environmental benefits following written consent by Meath County Council"*.

The results of monitoring to date shows that the development can comply with the noise level threshold as specified and as a consequence the development will have no significant effects regards noise levels in the area. Noise emissions and their management will be addressed in the 'Environmental Management System' (EMS) for the Clashford site.

This programme will allow on-going monitoring of noise emissions from the site, thereby assisting in ensuring compliance with any future requirements or regulations.

3.3.3.5.7 Resources Use & Energy Efficiency

The only waste to be accepted at the facility for recovery comprises inert soils and stone, and inert construction and demolition waste. As such the material does not undergo any form of processing involving the use of chemicals or additives.

An existing single phase overhead electricity supply provides for lighting and heating of the office. An overhead telephone line also serves the site office. Energy requirements are low equivalent to a small domestic property.

The water supply for the site office and wheelwash is met by existing boreholes on site. The potable water supply for the site office will be met by bottled water.

There are two water wells at the southwestern part of the site, GW1 and GW2. Well GW1 is located near the western site boundary to the north side of the site entrance. Well GW2 is located in the southern part of the site. GW1 supplies water for the office, canteen and toilet facilities. GW2 supplies the site sprinkler system and farmland areas and livestock. It is understood that that the average abstraction is approximately 450l/day.

The only raw materials used on site are diesel, hydraulic oil and engine oil, which are used to operate diesel powered plant on site. The overall fuel use by on-site plant will amount to about 30,000 litres/annum. All refuelling of site plant will take place on a concrete hardstanding area. Surface runoff from the hard standing will be directed to a silt trap with discharge to ground via a Class I Full retention separator. Diesel Plant on site will be refuelled using a mobile fuel bowser or double skinned road tanker. As such there is no fuel storage on site.

Electricity will be used on site to power the site office, on site lighting and security camera. Energy requirements are low equivalent to a small domestic property. Energy awareness notices will be posted around the site to ensure employees are aware of the need to conserve energy.

Energy efficiencies will be achieved by using modern plant and equipment and servicing the equipment on a scheduled basis. Plant and equipment not in use will be shut off.

3.3.3.5.8 Waste Arisings

The applicant will endeavour to visit the construction sites to ensure materials are being properly sorted and segregated at source.

The facility generates small volumes of office and canteen wastes which are stored in wheelie bins awaiting collection. A licensed waste collection contractor has been appointed to remove any canteen waste requiring recovery/disposal to a licensed waste management facility.

Occasionally a load will contain minor contaminants (e.g., plastics, metal, wood and paper). These items are removed on inspection by a site operative and stored in skips in a designated quarantine area pending removal offsite by a licensed waste disposal contractor to an appropriate recovery/disposal facility.

Waste oil products are stored within the existing container on site. Waste oils are disposed of by a licensed waste contractor and removed off site. All oil barrels and lubricants are stored on spill pallets/ spill trays. Spill kits are also maintained on site and the Company will put in place an emergency response procedure for hydrocarbon spills, and appropriate training of site staff in its implementation.

Details are maintained with respect to the appointed waste recovery/ disposal contractor, including waste collection permit number and destination (waste licence/permit register number, licensing/permitting authority).

3.4 SITE RESTORATION, DECOMMISSIONING & AFTERCARE

3.4.1 PHASING OF RESTORATION WORKS

The nature of the development is the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert construction and demolition waste. The lands have been progressively restored subject to successive Waste Management Permits (WMP's) dating back to 2001.

It was proposed in the Waste Licence Application that circa 90,000 cubic metres (180,000 tonnes) per annum of inert materials will be accepted to site.

It is now proposed that circa 40,000 to 70,000 cubic metres per annum of inert materials will be accepted to site (subject to market conditions) to complete the restoration of the lands to beneficial after use.

A total of c. 2,270,000 tonnes (1,135,000,000 m^3) has been received to data. It is estimated that 348,000 tonnes (174,000) tonnes is required to be complete the final restoration of the lands (Phase 3).

Phase 3 of the area relating to Waste Permit (WMP 2005/25) is the only area remaining to be restored by importation of soils and stones. This area is also within the area relating to P.A. Reg. Ref. QY36, QC 17.QC2085.

It is estimated that the backfilling of the quarry will require three to five years with an additional year to complete the cultivation and final restoration of the lands. Details with respect to volumes received to date, void space and life span remaining are provided in Table 3.2-3 above.

It is proposed to import up to 20,000 tonnes per annum of inert construction and demolition waste for production of secondary aggregates (to be exported from the site). It is proposed that this activity will be extended beyond the life of the backfill operations to meet Clashford Recovery Facilities ongoing need for a facility to recover C&D waste for the production of secondary aggregates.

Given the length of time since the submission of the original waste management licence application in February 2009 it has been considered necessary to update the survey plan and proposed restoration scheme. Meath County Council confirmed in a letter dated 16/10/17 that a restoration scheme for the quarry lands as submitted has been agreed with the Planning Authority. The existing site layout is shown by the revised site plan Figure B 2.1 Rev C, *Section 6*. This plan shows that Phase 1 is now completely restored, together with lands previously restored under previous waste permits for the site. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use. During the course of restoration of Phase 2, an additional small area of failed forestry has also now been restored, together with some lesser additions due to linking up agricultural tracks and temporary topsoil storage to the north east.

In order to better blend the landform with the existing landscape and to facilitate surface runoff, Phase 1 and 2 are in places 1 to 3 metres higher than envisaged in the original scheme. It is

also proposed to slightly revise phase 3 to a more natural landform. Details with respect to the revised restoration scheme and volumes are provided in Table 3.2-3. The revised phased scheme for final restoration of the area is shown by Figure B.2.4 Rev. C, *Section 6*.

The intention is to develop the lands for agricultural use/woodland, and to this end, the lands previously restored including Phase 1 are now being grazed by sheep and horses.

Redundant structures, plant equipment and stockpiles will be removed from site on cessation of activity.

A bulldozer is used to appropriately grade and compact the material to the desired profile as shown by the detailed plans and sections (Refer to Figures B.2.4 - Rev. C and B.2.5 - Rev. C, *Section 6*). Typically the soil is placed in 2-3 metre lifts with fill slopes of a safe angle of repose of 1:2.

It is proposed to reclaim the lands to a condition / gradient suitable for agricultural. Good quality imported soil will be conserved wherever possible to provide the subsoil/top-soil capping. These topsoil's/subsoil's will be handled under dry conditions to minimise compaction. For the purpose of restoration to agricultural the restored soil profile (capping) shall comprise 300mm topsoil over 1200-1350mm of subsoil.

The applicant is an experienced earthmoving contractor. Soils will be handled in accordance with accepted guidelines and good practice.

Good quality soil material for final capping will be placed in temporary storage areas. Topsoil and subsoil will be stockpiled separately to maintain the integrity of the soil.

To ensure that damage to these materials is kept to a minimum, movement and placement of topsoil and subsoil for final restoration will only take place during appropriate weather conditions and when the soils are in the optimum condition. This optimum soil condition may be described as moist but friable. No soils will be moved when they are too dry or when there are unusually windy weather conditions. This will help to prevent erosion and any consequential creation of dust. Conversely, soils will not be handled in wet conditions or when the moisture content of the soils is too high. This will ensure that smearing of the soils does not take place and that the soil retains its structure.

Progressive restoration involving grass seeding of restored area's shall be carried out on a staged basis in order to reduce the effects of soil erosion, windblown dust, to aid ground stabilisation, and as an effective means of weed control. On completion of each phase of development final restoration including grading, seeding and landscaping will be carried out. Final restoration is dependent on the availability of good topsoil/subsoil and subject to suitable weather conditions. In order to allow for continuity of operations it is necessary to have a certain overlap between phases. The final contours and topography for the site are shown by the Site Restoration Plan Figure B.2.4 – Rev C and Site Cross Sections B.2.5 – Rev C, *Section 6*.

Once the topsoil is re-instated, it will be seeded with a mix of grasses suitable for pasture in order to quickly stabilise the topsoil. Once the grass sward has become established the restored farmland can be kept either as pasture, hay meadow or arable land. Part of the area has already been restored to pasture.

Phase 1

Phase 1 is now completely restored together with lands previously restored under previous waste permits for the site. Phase 1 is now being grazed by sheep and horses. Hedgerows have also been established with transplanting of trees from areas of failed forestry planting.

Phase 2

Phase 2 relates to an area of failed forestry. There have been two attempts to date to restore these lands to forestry under "The Afforestation Grant Scheme". Following an inspection by the Forestry inspector, the Department of Agriculture & Food, in a letter dated 20th November 2007 (Refer to Waste Licence application Attachment D.2.(a).1), agreed to exclude this area from the Afforestation grant scheme as the Ash plantation had failed "*due to problems associated with poor soil conditions*".

Teagasc has also confirmed in a letter dated 5th March 2008 (Refer to Waste Licence application Attachment D.2.(a).2) that "*the majority of the plantation subsequently failed with the result that it has left the site in a very poor condition both environmentally and aesthetically. It was obvious that there is a minimum of top-soil on the land and drainage was quite poor". The Teagasc inspector considers that "this land would benefit from being reclaimed and rehabilitated*" by importation of top-soil and sub-soil so as to increase the agricultural productivity of the land.

During the course of restoration of Phase 2, an additional small area of failed forestry was included together with some lesser additions due to linking up agricultural tracks and temporary topsoil storage to the north east. It was also agreed with the respective parties to remove the failed alder crop in this area.

The Phase 2 lands were assessed as part of the detailed ground investigation (Refer to Waste Licence application Attachment I.5.1) by Consultant Geologist (EurGeol. Dr. Robert T. Meehan, PGeo). It was noted that the forestry failed to a much greater degree in the westernmost portion of the field, but did take along the easternmost boundary of the field. Rushes are common across the site, as are other weeds and rough grasses. The ground is generally flat to gently sloping, and is hard and compact underfoot, with patches of ponding following recent rains showing that infiltration rates are low on the site.

The material within the failed forestry area contains a relatively thin topsoil cover, with heavily consolidated subsoil, which is either naturally stiff in the case of the in-situ Irish Sea Till, or has been compacted by machinery in the western area. As well as this, the pH of this subsoil material is likely to be high (>8.0, see soil descriptions of Soil Association 40 derived from Irish Sea Till, in Gardiner & Radford 1980).

The fact that the topsoil was unevenly and thinly spread across this area of the site is the foremost reason for the poor quality of the land in the northeastern extreme of the Clashford site. This factor alone would probably prohibit grass productivity on the site and would encourage more vigorous weeds to flourish in the area (it is notable that this has already occurred in the forestry area). From this, further reclamation of this area is recommended in order to improve drainage across the site, to maintain a deeper and more consistent topsoil cover, and to better merge this relatively low area into the landscape with the higher, ridge area infilled and reclaimed to the immediate west of the forestry parcel.

The optimum approach to remediation of the site is to import well drained subsoil and topsoil across the site. The land should be graded and built up to a similar height as the ground in the reclaimed field to the west, in order to merge with existing ground contours. The subsoil and topsoil material should be well aerated and well drained and should tend towards the sandy loam/sandy clay loam/silt loam grade to avoid structure and poor drainage characteristics. The material should be laid in 1m lifts. The final topsoil cap should be at least 0.3m deep.

The surface of the final slope should be moderately roughened to help in establishing vegetation: use of tracking machines is therefore optimal. The gentle slope will promote runoff and prohibit ponding.

Phase 2 is currently undergoing final landscaping and cultivation to agricultural use.

Phase 3

Phase 3 of the area relating to Waste Permit (WMP 2005/25) is the only area remaining to be restored by importation of soils and stones. This area is also within the area relating to P.A. Reg. Ref. QY36, QC 17.QC2085.

This area also contains the necessary site infrastructure including site office, waste quarantine and inspection area, wheelwash, etc. The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered. The proposed facility site layout is shown by EIAR Figures D.1.1 & D.1.2 – Rev C, *Section 6*.

It is proposed that the C&D recovery of secondary aggregates will continue beyond the life of the restoration operations (subject to planning permission).

3.4.2 FINAL SITE RESTORATION SCHEME

As discussed in previous sections, restoration of the quarry will be carried out in a progressive fashion over the life of the operation (Refer to Section 3.4.1 above). EIAR Site Restoration Plan Figure B.2.4 – Rev C, *Section 6* shows the final layout of the restoration scheme.

In this case only inert soils and stones is to be accepted at the facility for recovery and phased restoration of a sand and gravel pit to a contoured landform that will be in keeping with the surrounding landscape.

The proposed development will be subject to an EPA Waste Management Licence. As such a Closure and Restoration/After Care Management Plan (CRAMP) may be required as a condition of the Waste Licence. A separate Closure and Restoration/After Care Management Plan (CRAMP) has been prepared in support of the Waste Licence Application.

Clean closure is envisaged such that all plant is safely removed for reuse or recycling, and all wastes are removed off site at the time of closure for appropriate recovery or disposal.

Monitoring undertaken should demonstrate that there are no outstanding environmental issues.

An Environmental Validation Audit of the site will be carried out following the announcement of closure and prior to actual decommissioning and closure operations taking place. The audit will devise an accurate inventory of all plant, equipment and wastes on the site. This inventory will be used as a benchmark against which successful decommissioning will be assessed.

It is proposed that the Environmental Validation Audit will be undertaken by JSPE and/or other independent Auditor to be agreed with EPA prior to the validation commencing.

The scope of the validation audit will be agreed in advance with the EPA and following approval, the chosen independent auditor will complete the validation audit. The completed validation audit report will be submitted to the EPA for approval.

The Environmental Management System including environmental monitoring (Surface & Groundwater only) shall remain in place and will continue to be actively implemented during the closure period.

The licence holder shall carry out such tests, investigation or submit certification, as requested by EPA in accordance with the waste licence to confirm that there is no risk to the environment.

It is anticipated that final restoration will be achieved within one year of completion of backfill operations. Final restoration will be to agriculture/forestry.

It is proposed that the C&D recovery of secondary aggregates will continue beyond the life of the restoration operations (subject to planning permission).

3.4.3 DECOMMISSIONING

Redundant structures, plant equipment and stockpiles will be removed from site on cessation of the Waste Recovery Activity.

Plant and machinery will either be utilised by the operators on other sites, or be sold as working machinery or scrap. In the case of machinery to be scrapped all contaminants will be removed, drained or flushed from all plant, tanks and pipelines. All residues containing fuels, oils and other contaminants will be removed off site by a a licensed waste contractor for recovery or disposal. Therefore, there will be no potential for fuel, or oil to cause long-term water pollution following cessation of soil recovery activities.

Any hard-standing areas will be broken up and the material recovered at an appropriate Material Recovery Facility for use as secondary aggregates. The site access will be retained as agricultural access to the restored lands.

The proposed Environmental Management System shall remain in place and will continue to be actively implemented during the closure period.

3.4.4 AFTERCARE & MONITORING

There will be no on-going requirement for environmental monitoring after recovery operations have ceased.

An aftercare scheme will be implemented with the aim of bringing the restored soils (and hence land) into a condition which does not need to be treated differently from undisturbed land in the same use. The final restoration of the site will facilitate an agricultural after-use like that which existed prior to quarry works.

A final site inspection 6 months after site closure will be carried out to ensure that the final site restoration scheme implemented is functioning and progressing as required.

It is evident from the above description given the relatively short-term measures necessary to close the site satisfactorily, that there will be no environmental liabilities once closure, decommissioning and residuals management are completed.

3.4.5 CLOSURE PLAN COSTING

Clean closure is envisaged and the site will be restored in a progressive manner.

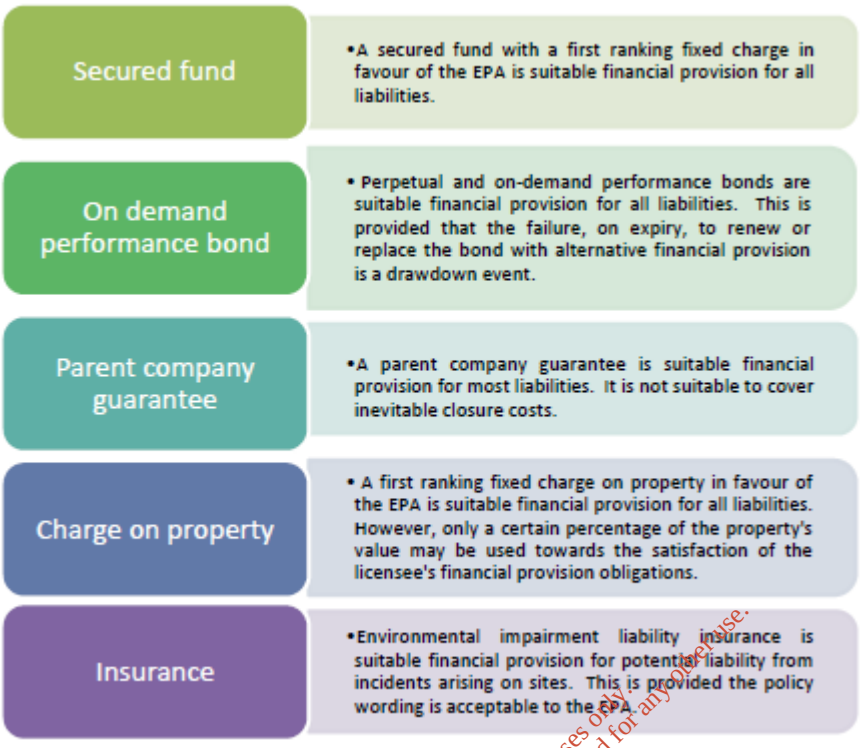
The document *Guidance on Financial Provision for Environmental Liabilities, Environmental Protection Agency (EPA) 2015* sets out broad guidance in relation to how the Environmental Protection Agency (EPA) anticipates it will approach financial provisions.

Financial provisions are, in broad terms, required to cover environmental liabilities that may occur during the operating life of a licensed facility or that may arise from or following the closure of a licensed facility.

The EPA's preference is for the use of established and low risk financial instruments, which are in line with the principles of being secure, sufficient and available when required. The type of financial instrument(s) accepted by the EPA will depend on the nature of the risk being covered.

The following forms of financial instrument are, in principle, acceptable to the EPA:

Figure 3.4-1 Forms of Financial Instruments acceptable to EPA



It is acknowledged that as a typical condition of any waste licence that the Agency may amend the licence at any time in certain circumstances in accordance with section 42B of the Waste Management Act 1996 as amended, to require, or not require as the case may be, the putting in place of a financial provision to incorporate costings for CRAMP and/or Environmental Liabilities Risk Assessment. This amendment may be implemented by the Agency in the event of an incident that creates a significant residual environmental liability or where the environmental risk profile changes on site.

Clashford Recovery Facilities Ltd will make the necessary financial provision to cover the closure and restoration/ aftercare requirements. The form and value of the financial provision will be subject to agreement with the EPA following grant of the Licence.

Closure and restoration/aftercare costs will be reviewed annually, and any proposed amendments thereto notified to the EPA for agreement.

3.5 CHANGES TO THE PROJECT

3.5.1 GROWTH – POTENTIAL FOR FUTURE EXPANSION

Continuation of waste recovery operations in accordance with the scheme proposed will provide for the security of the existing business of the Applicant for the foreseeable future. The client owns the land and as such has a direct interest in ensuring the lands are returned to a beneficial after-use at the earliest opportunity in accordance with the progressive restoration scheme proposed.

It is proposed that the C&D recovery of secondary aggregates will continue beyond the life of the restoration operations (subject to planning permission). Continuation of waste recovery operations in accordance with the scheme proposed will provide for the security of the existing business and workforce for the foreseeable future.

It should also be noted that the scale of operation (c. 20,000 tonnes per annum) going forward will be significantly less following cessation of the backfilling of the quarry in 3 to 5 years. As such traffic volumes on the local roads will be significantly reduced with respect to the future operation of the inert C&D WRF at this location.

3.5.2 DESCRIPTION OF RELATED PROJECTS

Many local authorities encourage co-location of Waste Recovery Facilities with quarries because of the shared / complementary infrastructure, plant, processes and materials, as well as common environmental aspects. There are no required or apparent opportunities for any further associated developments at this time.

The restoration works using imported “soil and stones” are no different from normal quarry restoration operations. There are no other major quarries or waste recovery facilities in the locality, and as such there is no cumulative impact with respect to the movement and placement of materials during the progressive restoration of the quarry development.

Indirect or cumulative impacts associated with other similar developments within the area are dealt with where necessary under the relevant environmental topic in Section 4 of this EIAR.

The proposed development will also be operated within acceptable standards for this type of development. Clashford Recovery Facilities Ltd will put in place an Environmental Management System (EMS) to ensure that all activities are carried out in compliance with the relevant Planning Permissions and any grant of a Waste Licence. As part of the EMS environmental monitoring (water, noise and dust) will continue to be carried out to ensure that the site activities are carried out within acceptable standards for these types of developments and that there is no significant cumulative impact with respect to the operation of their developments.

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4 ENVIRONMENTAL FACTORS

All projects and developments that require EIA by virtue of their nature, size and location, have the potential to have an impact on the environment. The following sub-sections are intended to assess and describe specific areas of the existing baseline environment, to identify potentially significant impacts of the proposed development in respect of these areas, and to detail any proposed mitigation measures and on-going monitoring programmes, where appropriate.

4.1 POPULATION & HUMAN HEALTH

4.1.1 INTRODUCTION

The impact of proposed developments on human's beings forms one of the most important aspects to be considered in an EIAR. Any likely significant impact on human beings, including their community and activities, must therefore be comprehensively addressed. The principal concern in respect to this proposed development is that human beings should experience no significant unacceptable diminution in an aspect, or aspects of 'quality of life' as a consequence of the construction and operation of the proposed development.

This section of the EIAR has been prepared in order to establish the human environment in the vicinity, and to assess the potential impact, if any, arising from the continued operation of a Waste Recovery Facility (WRF) at Clashford quarry, on the existing environment in respect of human beings. Matters related to water, air quality, noise, landscape and other such environmental impacts are not considered here, as these are more appropriately dealt with in their respective sections of the EIAR. Thus, the impacts of the proposed continuation of operations at the WRF on human beings in relation to particular issues are addressed in the following sections:

- Land, Soils & Geology – Section 4.3
- Water – Section 4.4
- Air – Section 4.6
- Noise & Vibration – Section 4.7
- The Landscape – Section 4.8
- Cultural Heritage – Section 4.9
- Material Assets – Sections 4.10
- Roads & Traffic – 4.11

The issues considered here include, land use, population, economy & employment, social infrastructure, amenity, tourism and recreation and health and safety. The potential impact on human beings resulting from the proposed development is assessed, and possible mitigation measures proposed to reduce any significant impacts.

4.1.2 METHODOLOGY

The human environment was assessed by undertaking a desktop study and conducting visits to the site and the area. The desktop study was undertaken to compile, review and interpret available information and data pertaining to the human environment of the site and area.

The desktop study involved the assessment of all relevant demographic and socio-economic data for the area, much of which was sourced from the Central Statistics Office (CSO). The Meath County Development Plan (2013 – 2019) and the Fingal County Development Plan (2017 - 2022) were also reviewed, whilst there are no plans for towns, villages or local areas relevant to the proposed development site. In addition, the desktop study used: (a) maps and site layout plans of the existing quarry development; (b) a copy of the conditions imposed on the quarry development under (P. Ref. QY36 QC 17.QC2085); (c) copy of the waste management permit for the WRF (WMP 2005/25); (e) Greater Dublin Area Regional Planning Guidelines 2010-2022 2022 (DMERA, 2010); (f) the National Spatial Strategy 2000-2020; and (e) Infrastructure and Capital Investment 2016-2021 (DoPER 2015), which replaced the National Development Plan 2007-2013. The National Spatial Strategy was revoked in 2013, as it had failed to meet its objectives, but its legacy persists having been incorporated into the current RPGs, CPDs and LAPs.

In early, 2018, the government published “Project Ireland 2040”, the new overarching public policy initiative, which consists of the National Planning Framework to 2040 and the National Development Plan 2018-2027 (DoHPLG, 2018), which will replace the revoked NSS and the Infrastructure and Capital Investment Plan 2016-2021, respectively. This represents an alignment of the investment strategy with the strategic planning policy, to create a unified and coherent plan, which will drive the long-term economic, environmental and social progress across all parts of the country over the next ten years. This will ultimately feed into the new Regional Spatial and Economic Strategies (RSES) that will replace the Regional Planning Guidelines in early 2019 (Refer to Appendix 5.1 for details).

In preparing this section, regard was given to the relevant guidelines and recommendations set out in the ‘Draft Guidelines on the Information to be contained in Environmental Impact Statements’, Draft, (EPA 2017) and ‘Advice Notes on Current Practice in the preparation of Environmental Impact Statements’, Draft (EPA 2015).

It is considered that there is a wealth of available data and information, which is sufficient to adequately assess the local environment with respect to human beings.

The assessment of impacts on the human environment were considered using criteria such as: (a) location of nearest sensitive receptors; (b) disturbance to the general amenity of the local environment; and (c) pre-existing use of the land and area. The construction and operational phases of the proposal were both considered. In carrying out the assessment both positive and negative impacts were considered, and the significance of the impacts are rated as being either: imperceptible; not significant; slight; moderate; significant; very significant or profound (See Appendix 5.2).

4.1.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

In this section, land use, recent demographic trends, economic activity, social consideration, amenity and tourism, and health are examined.

4.1.3.1 Land Use

The Clashford site is located on the east side of Regional Road R108 in the Townland of Naul, County Meath, c. 300m north of the village of Naul, across the Delvin River in County Dublin (Refer to Figure A 1.0 Rev A, *Section 6)*. The R108 connects with the R122 in village of Naul, which connects with the M1 (Dublin-Drogheda-Dundalk) motorway at junction 6 c. 5km to the east, and to the town of Balbriggan c. 7km to the east. Dublin lies c. 25km to the south, whereas Drogheda lies c. 15 km to the north. The Delvin River flows roughly SW-NE and flanks the southern boundary of the site, whilst an unnamed tributary stream of the Delvin River flanks the northern boundary of the site, and joins the river at the northeastern terminus of the quarry site. The western boundary of the quarry site is defined by the R108 and the party boundary with several residential properties on the east side of the R108.

The surrounding landscape is defined by the valley of the Delvin River, known as Roche Valley (elev. c. 60-90m OAD), separating two sets of hills to the northwest (max. elev. 159m) and southeast (max. elev. 176m). The quarry has been developed on a c. 1km long mound of sand and gravel within a southwest-northeast oriented ribbon of glacial deposits that extends from the Townland of Tobeen (i.e., c. 2km further up valley) down the river valley to the coastal plain. The predominant land use within the application site, which is co-located within the quarry site, is by definition that of quarrying activities related to the extraction of sand and gravel and associated operations such as placement of soil and stone in quarry restoration. Prior to the commencement of quarrying in the 1980s, the lands had been kept in medium intensity agriculture. The land-use in the area consists of a patchwork of agricultural fields that are designated as non-irrigated arable land and pasture, reflecting medium-high intensity agricultural, with very low levels of forest cover, restricted largely to river valleys and hedgerows. Outside of the immediate environs of the village of Naul, the settlement pattern can be described as low-intensity rural settlement.

The proposed soil recovery facility including site infrastructure comprises c. 24.2 ha of the total landholding of 33.4 ha at Clashford, Naul, Co. Meath (Refer to Figure B 2.1 Rev C, *Section 6*). The lands have mostly been restored to beneficial after-use (agriculture and forestry) under successive waste permits. .The northeastern (Restored Lands) and the south central (P1) sectors of the quarry site have been restored to agricultural use, and are currently supporting livestock, while a plantation of broadleaf forest fringes much of the eastern half of the quarry site. Only phase 3 of the site remains to be backfilled using imported soil and stone whilst Phase 2 is currently undergoing final landscaping and cultivation to agricultural use.

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul, Co. Meath. The development will consist of the recovery of construction and demolition waste to produce secondary aggregates. The existing site office including welfare facilities will be

replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered.

There are numerous established individual residences within a 500m radius of the site, particularly in the village of Naul, as shown on EIAR Figures B 2.1 – Rev C and B 2.2 – Rev C, *Section 6.* There are no dwellings on the site or landholding, although several dwellings are located to the immediate west of the site on the R108, and across the Delvin River on the R122.

4.1.3.2 Population

The complete list of reports from Census 2016 has now been published, such that the data presented below are based on the 2016 census data published by the Central Statistics Office (CSO). As the 2011-2016 inter-censal period records the changes since the depths of the recent catastrophic economic crisis, commonly called the "Great Recession", which bottomed-out in the middle of 2011, it is more perceptive to examine a longer period, such as the 2002-2016 period, in order to discern more meaningful long-term trends in the censal population data. Thus, trends in the population will be discussed here typically by reference to censal data spanning the 15 year period 2002-2016.

Analysis of the 2016 Census indicated that in the 2002–2016 period, Meath experienced one of the highest population increases amongst the 26 counties (i.e., 45.6%), and at 195,044 eclipsed the pre-Famine population of 183,828 in 1841. Meath is the third most populace county in Leinster after Dublin (i.e., 1,347,359) and Kildare (i.e., 222,504). A population of 134,005 was recorded in 2002, 162,831 in 2006, 184,135 in 2011, and 195,044 in 2016, representing increases of 17.7%, 13.1% and 5.97%, respectively, for the three inter-censal periods. The average inter-censal increase in population is 15.2%, whilst annual rate of population growth in the period was 3.04%. Births far outpace deaths, which for example were 2,805 versus 866 in 2016, adding 1,939 annually to the population. Thus, the increase in the population of Meath between 2002 and 2016 (i.e., 61,039) is comprised of comparable components due to natural increase (births over deaths) and net migration (i.e., both approximately 2,000–2,500 annually over the period).

Since 2002, the population of Leinster increased by 25.1%, while the population of the State increased by 21.6%. Thus, despite this significant population growth in both the Province and State, the population growth of Meath (45.6%) was the highest in the period, followed by Laois (i.e., 44,1%) and Kildare (i.e., 35.7%). Consequently, Meath's share of the provincial population grew from 6.36% in 2002 to 7.40% in 2016. Meath, along with Dublin, Louth, Kildare and Wicklow, comprise the "Functional Area of the Dublin City Region" (FADCR; Walsh & McNicholas 2009), and with a population of c. 2.0 million, accounts for 42.8% of the population of the State. The latter authors noted a contrast between areas of population decline in the inner suburbs of Dublin and various rural parts, compared to areas of high increase in southeast Meath, northeast Kildare and Fingal. This is reflected in County Dublin

having the lowest population growth rate (i.e., 20%) in Leinster over the 2002-2016 period, whilst the population of the FADCR increased by 24.4% in the same period. Meath's population represents an increasing proportion of the population of the FADCR from 8.19% in 2002 to 9.58% in 2016. Similarly, Meath's population as a percentage of the population of the Greater Dublin Area (GDA – includes Dublin, Meath, Kildare and Wicklow, but excludes Louth), also increased to 10.2% in 2016.

There are numerous large to medium towns with legally defined boundaries in Co. Meath, namely Navan (pop. 30,173), Ashbourne (pop. 12,679), Laytown-Bettystown-Mornington (pop. 11,872), Ratoath (pop. 9,533), Trim (pop. 9,194), Dunboyne (pop. 7,272), Kells (pop. 6,135), Duleek (pop. 4,219), and Dunshaughlin (pop. 4,035). There are several other census towns (pop . > 1,500), including the *census towns* of Southern Environs of Drogheda (i.e., 5,000), and a host of smaller towns and villages, including Stamullen, Enfield, Athboy, Oldcastle, Slane, Ballivor and Longwood. Although Drogheda is in Co. Louth, and hence in the Border Region, its development is strongly influenced by its relative proximity to Dublin, and it along with Balbriggan are proximate to Clashford, and are thus also considered here. Notably, the nearest town to the Clashford site is Balbriggan, Co. Dublin (pop. 21,722), and the Dublin Regional and Mid-East Regional Authorities (2010) designate it a Large Growth Town II in their settlement hierarchy (Greater Dublin Area Regional Planning Guidelines 2010).

The Dublin Regional and Mid-East Regional Authorities designate Navan and Dunboyne as Large Growth Towns I and II, respectively, whilst Ashbourne, Dunshaughlin, Kells and Trim are designated as Moderate Sustainable Growth Towns. Because of differences in the way boundaries between urban and rural areas are incorporated into the 2006 and 2011 censuses, it is difficult to give a consistent statement on the population growth of these towns. However, by including both urban and rural components in the comparisons, it is apparent that the population growth in the 2002-2016 period for Navan was 55.4%, compared to Ashbourne at 99.3%, Laytown-Bettystown-Mornington at 112%, Ratoath at 151%, Trim at 535%, Dunboyne at 35.6%, and Kells at 143%. It is apparent from the data that the population growth of the towns generally peaks in the 30-60km range from Dublin City Centre, reflecting a doughnut pattern of development around Dublin, albeit skewed particularly by the Dublin-Belfast corridor.

The National Spatial Strategy (NSS) recognises the strong functional interrelationships between the Dublin and the Mid-East regions as the GDA (DOELG, 2002). There are a large number of towns in the GDA, and these are largely located on the main transport corridors radiating out from Dublin, such as the M1 (Swords, Balbriggan, Laytown-Bettystown-Mornington and Drogheda), N2 (Ashbourne, Ratoath, Duleek and Slane), and the M3 (Dunboyne, Dunshaughlin, Navan and Kells).

The NSS also identifies Dublin as the only Gateway within the Dublin and Mid-East Region or GDA, and does not identify any Hubs. Within the north central sector, which includes all of Meath and the wider area around Clashford and Naul, there are three Primary Development Centres identified, namely Drogheda and Balbriggan on the M1, and Navan on the M3, and the County Town of Meath. These centres are strategically placed, strong and dynamic urban centres, located on major transport corridors, where development in the hinterland of Dublin

should be concentrated. However, because of proximity and the anisotropic connectivity of the transport network in the area, Clashford only falls within the natural catchment of Balbriggan and Drogheda. Clashford falls within the large swathe of southeastern Meath that is designated as a *Rural Area under Strong Urban Influence* (Meath County Council, 2013), and represents an unsustainable trend away from the principle of building critical mass in the Primary Development Centres and larger towns in order to facilitate balanced regional development.

The proposed development is located in the townland of Naul within the civil parish of Clonalvy, and the Electoral Division (ED) of Stamullin, (Refer to Figure 4.1-1). The surrounding electoral divisions include Julianstown, Ardcath, Garristown, Hollywood, Balscadden and Balbriggan Rural. Although, the Clashford area is located in a relatively sparsely populated rural area of south Meath, it includes the town of Stamullin (pop. 3,360). Thus, the Stamullin ED, an area of 37.68 km^2, has a population of 4,696 persons, which translates into a relatively high population density of 132.9 persons per km^2. This compares to the population densities of 83.3 and 67.8 persons per km^2 for County Meath and the State, respectively, which themselves constitute low population densities relative to those in neighbouring UK and Europe (i.e., 255 and 112 persons per km^2, respectively).

The sex ratio for Meath is 0.985 (i.e., more females than males), and is comparable to that for the Stamullin ED is 0.988 (i.e., 2,489 males versus 2,520 females), with females preferentially migrating to the towns, resulting in this characteristic pattern for urban and peri-urban areas throughout Ireland. The average age of the population in Meath is 35.2, which is significantly below the national average of 37.4, and is the second youngest in the State after Kildare (i.e., 34.9), albeit Fingal local authority has the youngest population (i.e., 34.3). The average age in the Stamullin ED in 2016 is approximately 33.1 (See Figure 4.1-2), and is thus markedly younger than Meath in general. This reflects Stamullin's high population growth rate, which was 543% in the 2002-2016 period and 60.3% in the 2011-2016 inter-censal period.

Age dependency shows the ratio of the old and young segments of the population to that of working age. Notably, the total age dependency ratio in the State increased by 3.4% from 49.3% in 2011 to 52.7% in 2016, whilst the ratio in Meath increased by 3.9% from 51.7% to 55.6% in the same period. The young dependency ratio is the number of young people aged 0-14 as a percentage of the population of working age. In 2016, the ratio was 31.9% for the State overall, whilst Meath had the highest ratio at 39.0%, reflecting its very young and fast growing population. In contrast, the old dependency ratio is the number of people aged 65 and older as a percentage of the population of working age. In 2016, the old dependency ratio in the State was 20.4%, whilst the ratio in Meath was 16.6%, which is the second lowest county after Kildare (15.0%), albeit the local authority of Fingal has the lowest ratio at 13.8%. Thus, while Meath has a moderately high total age dependency ratio, it reflects a very young, growing population versus an ageing population.

Table 4.1-1 gives population data for the electoral divisions in the vicinity of Clashford, as well as for County Meath, the GDA, and the State from 2002-2016 (CSO, 2018). Notably, the populations of the seven electoral divisions that comprise the local area showed widely differing growth rates between 2002-2011, although together the population has more than doubled in the decade. Much of this growth is related to the burgeoning population of

Balbriggan and urban sprawl into rural Balbriggan, where the population of the latter electoral division accounts for half of the local area. In contrast, the strongly rural electoral divisions of Ardcath and Balscadden exhibit populations that are comparatively stagnant, with growth rates of 2.2% and 22.5%, respectively. Meath's population grew at the rate of 45.5% between 2002-2016, significantly higher than the more modest growth rates of 24.4% and 21.6% for the GDA and the State, respectively. It is noteworthy, that the population of the GDA did not grow at a substantially more accelerated pace than that of the State (24.4% versus 21.6%).

There are several large residential settlements close to the site, with the village of Naul c. 300m to the south, Stamullin c. 5km to the northeast, Balbriggan c. 7km to the east, Ashbourne c. 11km to the southwest, Lusk c. 11km to the southeast, and Skerries C. 11km to the east. There are numerous residences in the immediate area. Notably, there is a suburban style graig or hamlet on Moonlone Lane off the R122, c. 1.5km east of Naul. However, residential development predominantly consists of isolated farm dwellings and of owner occupied bungalow/houses along public roads (Refer to EIAR Figures B 2.1 – Rev C and B 2.2 – Rev C, *EIAR Section 6*).

Table 4.1-1 Population in the Local Area 2002-2016

District	2002	2006	2011	2016	%Change 2002-2016
Julianstown	5,806	8,289	9,606	10,176	+65.4
Ardcath	1,907	1,873	1,911	1,949	+0.2
Garristown	1,162	1,182	1,438	1,628	+23.8
Hollywood	952	998	1,259	1,397	+32.2
Balscadden	573	653	667	707	+15.6
Balbriggan Rural	4,501	9,615	15,140	16,495	+236.4
Stamullin	779	2,487	3,130	5,009	+301.8
Total Local Area	15,684	25,097	33,151	37,361	111.4
County Meath	134,005	162,831	184,135	195,044	+37.4
Dublin & Mid-East	1,535,446	1,662,536	1,804,156	1,907,332	+17.5
State	3,917,203	4,239,848	4,588,252	4,761,865	+17.1

Note: Data from CSO (2018).

4.1.3.3 Economy & Employment

Historically, Meath's location within the Pale, access to the ports of Dublin and Drogheda, and abundance of productive agricultural land bestowed great advantage on Meath. Today Meath's strategic advantage is its proximity to Dublin and location within the capital city region or GDA, which is the most economically dynamic and progressive area of the country. Meath benefits from this proximity to Ireland's primary economic hub and National Gateway, and the

largest market in the State. Meath also benefits from its strategic location on the Dublin-Belfast international corridor linking both capital cities and international airports. The excellent, multi-modal transport infrastructure which provides ready access to Dublin Airport and Dublin Port also delivers strong connectivity throughout the county with four national primary routes, three of which are motorway (i.e., M1, M3 and M4). The fertile soils of Meath also provide the basis for a thriving agricultural and food sector that can support the rural economy and communities.

With its rich array of cultural and heritage assets, such as the World Heritage Site of *Bru Na Boinne*, *Hill of Tara*, the seat of the High Kings, *Loughcrew Cairns*, the *Battle of the Boyne* site, *King John's Castle,* Trim, *Bective Abbey*, and the *Kells Crosses*, Meath has positioned itself as the *'The Heritage Capital'* of Ireland. Cultural tourism has been identified as a potentially significant driver of the county's modern economy. Meath County Council (2013) recognises that the sustainable development of green infrastructure and natural heritage and the maintenance and improvement of the unique rural and urban built heritage present strong attractions.

Meath is the second most affluent local authority area in the Mid-East Region, and sixth most in the State, and in general is not characterised by particular extremes of affluence or deprivation (Haase, 2007). The most affluent areas are situated in the South East of the county, including Clashford, which lie within easy commuting distance to Dublin.

Although urban areas of Meath are home to a greater fraction of the population of Meath (i.e., 115,2298 or 59.1% in 2016), rural areas are home to a substantial population (i.e., 79,746 or 40.9% in 2016). This urban/rural split of near-parity in Meath (i.e., 1.45) contrasts with that in the State, the GDA and County Dublin (i.e., 1.68, 7.16, and 37.8, respectively). Although rural areas of Meath account for 40.9% of the population, only 7.37% are employed in agriculture, forestry and fishing in 2016. Nonetheless, agriculture is the primary land-use in the county and the economy benefits significantly from the sector. The rural areas are also the location of major natural resources as well as major recreational, amenity, tourist and archaeological resources.

Examination of the Central Statistics Office (CSO) Live Register figures for County Meath during the recession shows that unemployment levels rose dramatically from the end of 2007 to 2010 and remained a factor of about 3 times the pre-recession levels at c. 12,000 during 2010 and 2011 (See Figure 4.1-3). In the 2011 census, unemployment stood at 18% in Meath compared to 19% nationally. The dramatic increase in unemployment had been largely associated with the collapse of the construction industry and the associated service industries. The unemployment level in Meath began to fall gradually from early 2012, and fell below the 10,000 mark in late 2013. In May 2014, the figure stood at 9,775, which equates to an unemployment rate of 9.9%, whereas the national rate was 11.8%.

In February 2018, the live register figures for the Meath and the State were 5,376 and 235,344, respectively, and equate to comparable unemployment levels of 6.0%. Thus, the unemployment rate in County Meath is comparable to that in the State. The improving unemployment figures initially reflected stabilisation of job losses combined with the historical pressure valve of emigration, whereas more recently, it reflects a broad and sustained economic recovery with forecasts of strong growth rates in the medium-term.

From Table 4.1-2, it is apparent that the dominant employment sectors in Meath are commerce and trade (26%), professional services (24.2%), and manufacturing (14.2%). Commerce and trade, which includes wholesale and retail trade, banking and financial services, real estate, renting and business activities, is the single largest employer in the Stamullin ED. Given that approximately half the workforce in Meath work outside of Meath, and given the proximity of the Stamullin ED to Dublin, it is probable that the dominance of commerce and trade reflects the large fraction of the workforce in the Stamullin ED that works outside both the electoral division and county, in Dublin City. Professional services followed by transport and communications are the next largest employers for the population of the Stamullin ED, although similarly these are probably located in Dublin City. Although a largely rural electoral district, agriculture, forestry and fishing represents the smallest employment category for the workforce in Stamullin ED (See Table 4.1-2).

Table 4.1-2 Employment by Industry in County Meath and Stamullin ED in 2016

Industry	County Meath		Stamullin ED	
Agriculture, forestry and fishing	3,734	4.48%	94	4.35%
Building and construction	6,147	7.38%	128	5.92%
Manufacturing	9,568	11.5%	204	9.43%
Commerce and trade	20,332	24.4%	498	23.0%
Transport and communications	7,975	9.58%	317	14.7%
Public administration	4,776	5.74%	129	5.96%
Professional services	17,895	21.5%	486	22.5%
Other	12,832	15.4%	307	14.2%
Total	83,259	100.0%	2,163	100.0%

Historically, agriculture and businesses supporting agricultural production would have been the main source of employment in Naul village and its environs. Employment in the village is very limited, focused on small scale/family run local commercial businesses, mostly retail shops, a sales/service garage and the Seamus Ennis Cultural Centre. Naul and Stamullin offer few employment opportunities, with the nearest major commercial and industrial centre being the Stephenstown industrial estate in Balbriggan. There are some employment opportunities related to the M1, including the M1 business park at junction 5, near Balrothery, and at the City North hotel and business park at junction 7, near Stamullin. However, the major employment opportunities for the workforce resident in the Stamullin ED are in Dublin. Despite proximity to the Dublin-Belfast M1 road and rail corridor, east Meath, including the Stamullin ED, recorded very high transport energy consumption (Walsh & McNicholas 2009),

and is most probably related to commuting to work in Dublin. This is consistent with the average journey times to work, school or college of c. 37 minutes for the Stamullin ED in 2016.

Clashford Recovery Facilities Ltd is an established small family run business based in Naul, Co Meath. Clashford Recovery Facilities Ltd employs four people directly and a number of others indirectly, with the majority of the employees being local people. An additional two temporary staff are hired occasionally. The WRF will require one person operating a bull-dozer/back-hoe excavator, one general foreman to monitor and inspect the quality and suitability of imported materials being brought to the site for recovery/sorting/transfer, and two other general site operatives.

The WRF will help sustain employment in the local area while beneficially restoring the quarry back to agricultural use.

4.1.3.4 Social Consideration

Clashford and Naul are located in a rural area, which is under strong development pressure for residential and economic uses associated with its proximity to Dublin. Residential development consists of isolated farm dwellings and of owner occupied bungalow/houses along public roads (Refer to EIAR Figures B 2.1 – Rev C and B 2.2 – Rev C, *Section 6)*. The picturesque village of Naul lies c. 300m to the south of Clashford, and acts as a local centre servicing the agricultural hinterland. The Square and Main Street provide the focus of the built form of the village. The Square contains a range of 19th and early 20th century buildings, including the re-thatched Seamus Ennis Cultural Centre, which is an important focal point for the community in the in the village and wider area. The village has a population of c. 200.

Beyond the village of Naul, there are no large residential settlements close to the site with Stamullin c. 5km to the northeast, Balbriggan c. 7km to the east, Garristown C. 7km to the west, Oldtown c. 7.5 km to the south southwest, Ballyboughal c. 7.5km to the south, Ashbourne c. 11km to the southwest, Lusk c. 11km to the southeast, and Skerries C. 11km to the east. With exception of the N-S oriented R108 and the E-W oriented R122 Secondary National Road, the roads in the area are of a local character and typical of a rural location. The M1 motorway lies c. 5km to the east, whilst the Dublin-Belfast mainline railway runs along the coast at Balbriggan c. 7.5km to the east.

The nearest Post Office is in the town of Balbriggan or Garristown (i.e., both c. 7km), where the former also has a large range of shops available. A Postpoint electronic payment service is available in Reilly's Daybreak shop in Naul. The nearest bank is also located in Balbriggan.

The Naul National School caters for the primary education of over a 100 pupils, whilst secondary schools are available in Balbriggan (i.e., Ardgillan Community College, Balbriggan Community College, Coláiste Chlor na Mara and Loreto Secondary School), Swords (i.e., Fingal Community College, St. Finnians Community College, Loreto College Swords, and Coláiste Choilm C.B.S.), and Ashbourne (i.e., Ashbourne community school, and the new Meath VEC Secondary School.

The nearest third level Institutions are located in Blanchardstown (i.e., Blanchardstown Institute of Technology or BIT), Tallaght (i.e., Institute Technology Tallaght or ITT), Dublin (i.e., Dublin Institute of Technology or DIT), and Dun Laoghaire (i.e., Dun Laoghaire Institute of Art,

Design & Technology or IADT), whereas the nearest universities are Dublin City University (DCU) in Glasnevin, University College Dublin (UCD) in Belfield, and Trinity College Dublin (TCD) in the city centre.

The nearest church to Clashford is the Nativity of Our Lady in the village of Naul. Other churches in the region include: St. Peter and St. Paul, Balbriggan; Church of the Assumption, Garristown; St. Mary's Church, Ardcath; St. John the Baptist, Clonalvy; St. Patrick's Church, Stamullin; Assumption of Our Lady, Ballyboughal; and St. Mary's Church, Oldtown. The nearest houses of worship of other major denominations are: Church of Ireland: St. Georges, Balbriggan; Presbyterian: Donabate Presbyterian Church; Baptist: the Balbriggan Baptist Church; and Pentecostal: the Redeemed Christian Church of God, Balbriggan.

The Health Centre at Clonmethan, Oldtown has been designated as the Primary Care Centre for the villages in north county Dublin (or Fingal), including Naul, Garristown and Ballyboughal. The nearest hospital is Highfield Private Hospital, Swords, whereas the nearest public hospital is Our Lady of Lourdes Hospital, Drogheda, followed by Beaumont Hospital, Beaumont, Dublin 9, and Connolly Hospital, Blanchardstown, Dublin 15.

The nearest Fire Station is located in Balbriggan, with next closest located in Ashbourne, Skerries and Swords, all but the last of which are retained services. The Dublin Fire Brigade is headquartered at Townsend Street, Dublin 2, whilst the Meath Fire Brigade is headquartered in Navan. The nearest Garda Station to Clashford is located in Balbriggan and falls within the Dublin Metropolitan Region of An Garda Síochána, whereas the Garda Station at Ashbourne falls within the Meath Region.

Other facilities in the wider area, include the Community Centre and Seamus Ennis Cultural Centre in Naul, and community centres in Balbriggan, Garristown, Stamullin, Skerries, Oldtown, Ballyboughal and Lusk.

Power to local residences is provided by over-head lines. The mains water supply for Naul and its surroundings is served by a 4 inch concrete water main from the Hollywood Reservoir. There are also houses in the area served by bored wells. Most rural houses are serviced by septic tank systems and proprietary effluent treatment systems.

4.1.3.5 Tourism & Amenity

Meath is named after the ancient Kingdom of Meath, and is also known colloquially as the "Royal County", because of its history as the seat of the High King of Ireland. It was also part of the area known as "The Pale", which was under the direct control of the English establishment during the Middle Ages. The area of County Meath is very much defined by the Boyne River Catchment, and it is the Boyne Valley which is home to the megalithic tumuluses of Dowth, Knowth and Newgrange at Brú na Bóinne, the Hill of Tara, and the source of the ABradan Feasa@ or ASalmon of Knowledge@ of Cú Chulainn mythology. With its numerous ancient monuments, ruins, castles, battlefields and Landed Estates (or Demesnes) with their Great Houses, Meath is a county steeped in history.

Clashford is located in County Meath c. 300m north of the village of Naul. There are community and recreational facilities in the village of Naul, which include the Nativity of Our Lady Church, Community Centre, Seamus Ennis Cultural Centre, Naul National School, and

the Clann Mhuire GGA club. Sports are actively pursued in the wider area and include soccer, golfing, hillwalking, fishing, horse riding and swimming. The Delvin River is popular with anglers. The Square in the village is used for the Fingal Traditional Music Festival held annually in October.

Naul village and its environs are steeped in history and have a wealth of historical and archaeological sites. In particular, the passage graves at Four Knocks c. 2km northeast of Naul date back 5,000 years. Within the village, there are also the ruins of a stone tower known as Black Castle on the cliff overlooking the Delvin River; the ruins of the Church of Ireland Chapel with Cross; the restored Mill House, and the distinctive estate houses on Main Street, reflecting the village origins as a manorial village.

Naul sits on the border of Meath and north County Dublin (or Fingal), and is c. 7km from Balbriggan, c. 20km from Dublin Airport, and c. 25 km from Dublin Port. Naul benefits from the myriad amenities and attractions located within both of these local authority areas, as well as being within easy reach of the vibrant Capital City of Dublin.

Heritage attractions in Fingal include: castles at Ardgillan, Malahide, Swords and Howth; a Round Tower at Swords; the 12th Century St. Doulagh's Church, Kinsealy; Newbridge House, and numerous Martello Towers along the coastline. Parks and gardens are available at Ardgillan Castle Demesne, Malahide Castle Demesne, Howth Castle Demesne, Newbridge House Demesne, and Ward River Valley. Other visitor attractions include: the National Transport Museum, Howth; Dunsink Observatory; Draoícht Arts Centre, Blanchardstown; National Aquatic Centre, Blanchardstown; Newbridge Farm Museum, Donabate; and the Skerries Mill, a complex of water and wind powered mills.

There are numerous walking and cycling trails, including several on Howth Head, and "Slí na Sláinte" in Swords, whilst boat trips and cruises of Fingal coastline and islands are available. There are also many prime locations for sea angling along the coast from Howth to Balbriggan and around Dublin Bay, whilst fresh water angling is concentrated on the Liffey and Tolka Rivers and the Royal Canal. Courtlough Shooting Grounds, Balbriggan is Ireland's premier shooting grounds, and provides all weather facilities where several shooting disciplines, such as Clay Pigeon and Target, as well as archery, can be enjoyed.

Heritage attractions in east Meath include: the World Heritage Site and visitor centre at Bru na Boinne; Hill of Tara; Loughcrew Cairns; Kells Round Tower and High Crosses; King John's Castle, Trim; Battle of the Boyne Site, Oldbridge; Slane Castle; Ardbraccan House; and many more. Meath also offers many other tourist attractions, including: Tower of Lloyd, Kells; 8 heritage trails; numerous walking and hiking trails; water sports at Rathbeggan Lakes and on the miles of sandy beaches at Bettystown-Laytown; adventure centre at Loughcrew, Oldcastle; angling on the famous Boyne and Blackwater Rivers; golfing; horse racing; and numerous festivals such as Moynalty Steam Threshing; Tattersalls International Horse Trials and County Fair; and the Slane Castle Music Festival.

The main local GAA clubs in the area are: Clann Mhuire GAA, Naul; St. Patrick's Stamullin; St. Vincent's Ardcath; Garristown GAA, Garristown; O'Dwyer's GGA, Balbriggan; Wild Geese GAA, Oldtown; and Man O'War GAA, Lusk. Additional sports facilities are scattered around the region, such as outdoor soccer pitches at Balbriggan, Balrothery, Skerries, Ashbourne,

and indoor soccer at Santry, Dublin 9. Rugby clubs are located at Balbriggan, Skerries, Swords, Malahide and Sutton.

Golf enthusiasts visiting the area can enjoy a wide choice of excellent golf courses within short driving distance, including numerous links and heathland courses. Golf courses abound in the region, with twenty six courses within Fingal alone. The nearest course is at Hollywood (c. 4km to the south), whilst others are located in Balbriggan, Ballyboughal, Gormanstown, Ashbourne, Bellewstown, Skerries, Swords, Rush, Donabate, Malahide, Howth, and the fabled Championship Course at Portmarnock. Slightly further afield is the championship links course at County Louth Golf Club, Baltray, just north of the mouth of the Boyne River.

Located c. 7.5 km from the east coast, water sports are also popular in the region, such as swimming, windsurfing and sailing, where the latter is served by several yacht / sailing clubs in Skerries, Malahide, Sutton and Clontarf. Horse racing is also popular at the annual Laytown Beach Races in September, at the Bellewstown racecourse, and at Fairyhouse, the home of the Irish Grand National. There are equestrian activities at nearby equestrian centres at: Broadmeadows and Curragha, Ashbourne; Thornton Park, Kilsallaghan; Kilronan, Swords; Castlehill, Julianstown; Copperfield, Skerries; and Broadmeadow, Donabate.

4.1.3.6 Human Health

This section describes the existing human environment in terms of the health and safety of the receiving population, as well as that of the workforce of the application site, which are protected by employment legislation, including principally the provisions of the “Safety, Health and Welfare at Work Act, 2005”, and amendments and regulations made thereunder.

The constitution of the World Health Organization (WHO) defines health as ‘a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’ (WHO, 2018). Thus, any assessment of a proposed development should consider the potential impacts on physical, mental, and social health (IPH, 2009). Public health pertains to the promotion and protection of health and well-being, prevention of ill-health, and prolongation of life, and emphasises a collective responsibility for the health of the population.

Health is determined by access to quality healthcare services, lifestyle choices, and the socioeconomic conditions in which people live (IPH, 2009). The latter include many factors that lie outside the healthcare sector, such as housing, education, employment, transport, drinking water and sanitation, and access to high quality food. Thus, policies in ostensibly non-healthcare sectors can have a significant impact on the health and well-being of a population. There may also be significant health inequalities within a population, in that there are arbitrary disparities in health outcomes depending on socio-economic status. Individuals in higher socioeconomic groups are more likely to live longer and to experience good health longer than those in lower socioeconomic groups, while men and women experience notable differences in health outcomes. From a public policy perspective, addressing the social determinants of health can have positive impacts on health inequalities, and thus should inform the planning and development process.

Common concerns in terms of human health, particularly to vulnerable sections of the receiving population, with respect to developments such as the proposed project, are

generally associated with noise, air quality, water contamination, traffic safety, and accidents and disasters. Consequently, human health impacts are assessed through these environmental factors, such that the human health of the receiving environment is primarily addressed here under the individual chapters dedicated to each of the relevant factors. Thus, in respect of human health, the baseline conditions associated with soil and land are described in Section 4.3, with surface and groundwater in Section 4.4, with dust and air quality in Section 4.6, with noise and vibration in Section 4.7, and with roads & traffic in Section 4.11.

The European Communities (Control of Major Accident Hazards involving Dangerous substances) Regulations, 2000 (S.I. No. 476 of 2000) do not apply as the proposed development will only accept inert material for recovery. Details with respect accident and emergency response are addressed in EIAR Section 3.3.3.4.1.6 above and mitigation measures are proposed (Refer to EIAR Section 4.1.5 below).

The primary residential and commercial receptors have been outlined in preceding sections. The immediate receptors were identified to determine the number of residential and commercial addresses within the vicinity of the proposed development. Although there are several established individual residences abutting the boundaries of the site of the proposed WRF, there are only 10 residences, two businesses (Kilsaran and Whyte Bros.) and several farms, north of the river (in Co. Meath) and within c. 250m of the site. South of the river in Co Dublin, most of the village of Naul is within 500m of the proposed WRF site, while the entire village extending south along the R108 lies within 1km of the site, as shown on EIAR Figures B 2.1 Rev C and B 2.2 Rev C, *Section 6*. There are therefore numerous residences and commercial addresses within 1km, including shops, restaurants, pubs, and numerous farms. These also include community facilities, such as the community centre, national school, church, and the Seamus Ennis Cultural Centre, not to mention the playing fields and clubhouse of the Clann Mhuire GAA club c. 250 southwest of the site. The local farms are significant environmental receptors, not simply by way of being local residents, but also as land uses/economic enterprises.

In order to ascertain the socio-economic and health status of the population in the local area around Clashford, relevant statistics from the 2016 census have been compiled in Table 4.1-3 and Table 4.1-4. The socioeconomic group of the reference person per household in the Stamullin ED and County Meath have been compiled in Table 4.1-3. It is apparent that the employer, managerial and professional classes represent 37.9% of the population in the Stamullin ED, which compares favourably with 36.0% in County Meath. The non-manual class also represents an additional 20.8% and 18.3% in Stamullin ED and County Meath, respectively. Thus, the population of the Stamullin ED is predominantly from socioeconomic classes which are typically advantaged in terms of education, housing, diet, lifestyle and access to healthcare services. In view of the well-established correlation between socioeconomic status and good health, it would be expected that the population of the Stamullin ED would have reasonably good health.

Table 4.1-3 Socioeconomic Group of Reference Person in Household

Socio-Economic Group	Stamullin ED	%	County Meath	%
Employers and managers	978	20.1	36,270	18.7
Higher professional	303	6.2	12,085	6.2
Lower professional	563	11.6	21,671	11.1
Non-manual	1,012	20.8	35,489	18.3
Manual Skilled	582	12.0	21,187	10.9
Semi-skilled	355	7.3	16,473	8.5
Unskilled	109	2.2	6,539	3.4
Own account workers	303	6.2	11,979	6.2
Farmers	170	3.5	8,192	4.2
Agricultural workers	57	1.2	1,490	0.8
All others gainfully occupied and unknown	425	8.8	23,025	11.8
Total	4,857	100.0	194,400	100.0

From Table 4.1-4, it is apparent that persons with either good or very good health comprise 89.9% of the population in the Stamullin ED, which is comparable to the 89.6% in County Meath. In addition, the very high young age dependency ratio of 46.5 and average age of 33.1 (national average is 37.4) indicate a very young population. Indeed, the population of the Stamulin ED has more than sextupled from 779 in 2002 to 5,009 in 2016. Thus, the population of Stamullin ED is very young, healthy and therefore likely to be more resilient by comparison with County Meath, and the national populations.

Table 4.1-4 Populations by General Health and Age Dependency

Health	Stamullin ED	(%)	County Meath	(%)
Very Good	3,285	65.6	123,170	63.1
Good	1,215	24.3	51,649	26.5
Fair	308	6.1	13,037	6.7
Bad	41	0.8	2,019	1.0
Very Bad	9	0.2	395	0.2
Not Stated	151	3.0	4,774	2.4
Total	5,009	100.0	195,044	100.0
Average Age	33.1		35.2	
Young Dependency	46.5		39.0	
Old Dependency	14.8		16.6	
Total Age Dependency	61.3		55.6	

The receiving environment of the proposed development is therefore characterised by a rapidly growing population with a higher proportion of younger age cohorts than the county and national averages, and who are also in better health. It can be assumed that this population is both active and resilient, has a high demand for active outdoor recreational amenities, and would be sensitive to any diminution in recreational amenity of the local area.

4.1.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.1-5 Population & Human Health - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	●	●	X
Indirect Impacts	●	●	X
Cumulative Impacts	●	●	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	●	X

None/imperceptible: **X**; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

The proposed continued operation of the WRF at Clashford arises from: (1) the continued demand of human beings to have their buildings, roads and structures, modified and improved, resulting in the generation of large volumes of inert C&D waste, principally soil and stone; and (2) the requirement to restore land, previously disturbed by sand and gravel extraction at the Clashford quarry, through backfilling with recovered inert soil and stone. The recycling and recovery of C&D waste is essential to reduce resource utilisation and divert reusable inert waste from landfill.

The strategic location of Clashford with access directly onto regional road R108, and c. 5km from junction 6 on the M1, and c. 7km from Balbriggan, via the R122, renders the WRF well positioned to deliver recovery of inert soil and stone and C&D waste from a large catchment area. This will contribute to the diversion of greater volumes of waste from disposal in landfill, as required under the Waste Framework Directive 2008 (2008/98/EC), and the European Communities (Waste Directive) Regulations, 2011 (S.I. 126 of 2011). There is also a preference for the deposition of soil and stone to be underpinned by a beneficial use in order to be considered waste recovery. Consequently, co-location of a waste recovery facility at Clashford quarry has significant positive impacts, and is thus environmentally preferred.

The impact on human beings resulting from the proposed continued use of the WRF is assessed here, and possible mitigation measures proposed to reduce any significant impacts. The table describing significance of effects in Appendix 5.2 were used here to evaluate the significance of potential impacts resulting from the proposed development. These impact

ratings are in accordance with impact assessment criteria provided in EPA's "Advice Notes for preparing Environmental Impact Statements" (2015).

It is expected that the potential negative impacts on human beings and amenity of the area arising from the WRF relate mainly to nuisance from noise, dust and traffic.

There are a number of potential environmental impacts associated with the WRF that may directly, or indirectly, affect the local “human” environment. These potential impacts and the mitigation measures proposed are described in the following sections of this report under the headings detailed below:

- Biodiversity – Section 4.2
- Land, Soils & Geology – Section 4.3
- Water – Section 4.4
- Air Quality – Section 4.6
- Noise & Vibration – Section 4.7
- Landscape – Section 4.8
- Cultural Heritage – Section 4.9
- Material Assets – Sections 4.10
- Roads & Traffic – 4.11

4.1.4.1 ‘Do-Nothing’ Impacts

If the proposed continuation of the WRF did not proceed, the recovery of inert soil and stone and inert C&D waste at the WRF would not occur, and result in the failure to divert these volumes from disposal in landfill, as required under the Waste Framework Directive 2008. Furthermore, the Clashford site would be unable to complete the phased restoration of the quarry void and the reinstatement of the land to its former topographic profile. Additionally, the existing WRF would be forced to cease operations resulting in the loss of employment. This would have a significant and direct negative impact on the local human environment.

4.1.4.2 Direct Impacts

4.1.4.2.1 Construction

The nature of the development is the continued phased restoration of a sand and gravel pit using imported inert soil and stone, and recovery of inert construction and demolition waste. As such most of the necessary infrastructure in relation to the operation of the WRF is in place. The location of all activities, buildings and facilities at the Recovery Facility are shown on the Site Plan Figure B 2.1 - Rev C, *Section 6)*.

Clashford Recovery Facilities Ltd has recently submitted a planning application (P.A.Reg. Ref. AA180893) for permission for development at this site, within part of a sand and gravel pit (P.A. Reg. Ref. QY36, QC 17.QC2085) which is currently under restoration at Clashford, Naul, Co. Meath. The development will consist of the recovery of construction and demolition waste

to produce secondary aggregates. The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance. The existing palisade fence at the entrance is to be replaced with a stone wall and separate entrance gate provided for access to the site office. A weighbridge, hard standing area with drainage to oil interceptor, semi-mobile crushing and screening plant and other ancillaries will be provided. The hard standing area will be used for quarantine/inspection of the incoming C&D waste to be recovered. Skips will be provided for removal of deleterious material (i.e. steel, timber, plastic). A hard standing area will be provided for stockpiling of processed secondary aggregates (Refer to Figure B 2.1 Rev C, *Section 6*).

These construction activities are relatively minor and occur within the footprint of the established WRF at Clashford. They are concerned with the upgrade of the existing site infrastructure and there will be an imperceptible impact on the human environment associated with construction activities. Such impacts are assessed within the relevant sections of this EIAR.

4.1.4.2.2 Land Use

The existing quarry development has been undergoing progressive reinstatement to agricultural/woodland using imported material for at least 17 years. A waste licence is now required to complete the final stages of the restoration programme. The impact of the restoration works to date has had a positive impact on the environment in returning these lands to beneficial use including establishing new woodland habitat along the Delvin River valley. The visual amenity of the locality has also benefited from the restoration works being undertaken.

The quarry has put in place a number of mitigation measures with respect to environmental management and monitoring to ensure that operations do not result in significant impacts on the surroundings, including the human environment.

The area has an established history of sand and gravel working, and these activities have co-existed with other land uses in the area, particularly medium to high intensity agriculture. On completion of site activities, the site of the quarry and WRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the phased restoration scheme for the quarry, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

4.1.4.2.3 Population

It is not anticipated that the proposed development will result in any change in population. However, by supporting and maintaining the workforce living in the area, it is considered that the proposed WRF will have a slight positive impact on sustaining the population.

4.1.4.2.4 Economy & Employment

Clashford Recovery Facilities Ltd is an established small family run business based in Naul, Co Meath. Clashford Recovery Facilities Ltd employs four people directly and a number of others indirectly, with the majority of the employees being local people. An additional two

temporary staff are hired occasionally. The WRF will help sustain employment in the local area while beneficially restoring the quarry back to agricultural use.

The quarry has contributed indirectly to sustaining and developing the local and regional economy through the supply of building products, recovery of inert C&D waste, mainly soil and stone, and has provided employment for local people, both directly and indirectly.

The WRF will require one person operating a bull-dozer/back-hoe excavator, one general foreman to monitor and inspect the quality and suitability of imported materials being brought to the site for recovery and two other general site operatives.

4.1.4.2.5 Social Consideration

The proposed continuation of the WRF would provide a valuable and necessary resource to the county and wider region, providing a beneficial use for the recovery of inert soil and stone and C&D waste as an alternative to landfill. The WRF already exists and has an established record of meeting its regulatory obligations and current environmental standards.

There are no community facilities within close proximity of the WRF. The church, national school and community and cultural centres are located in Naul village, greater than 300m from the site, which constitutes a significant standoff distance. Thus, it is expected that there will be imperceptible impact on local community facilities as a result of the continued use of the WRF at Clashford.

4.1.4.2.6 Tourism & Amenity

There are no major tourism attractions in the immediate vicinity of the WRF, with the exception of Seamus Ennis Cultural Centre and the annual Fingal Traditional Music Festival, in Naul village. Given the history of quarrying and waste material recovery at this location it is expected that there will be imperceptible impact on local tourism as a result of the continued use of the WRF at Clashford. There are numerous other attractions in east Meath and Fingal, however all of these are relatively remote to the WRF and therefore will be not be impacted upon.

Tourists visiting the Four Knocks Passage Graves, may pass the site location while travelling on the R108, and may notice some site activity, but this will be both limited and transient. Existing landscaping to the front of the site already acts as a buffer, such that the impact of the WRF on the landscape will be minimal. It is considered that adequate screening is provided by berms, hedgerows and intervening topography, coupled with the positive impact associated with the respect to the restoration completed to date including woodland.

Traffic entering and leaving the site will use the existing established quarry site access. The road servicing the site is generally in good condition. The site entrance has been adequately set-back and splayed in accordance with P. Reg. 86/349 to the satisfaction of the Planning Authority. Further details with respect to the impact and mitigation of traffic are contained within this report (Refer to Section 4.11).

As the WRF is co-located within the existing quarry, there is negligible additional visual intrusion. Nonetheless, there is a Protected View and Prospect, designated as 71, on a county road off the R108 at Snowtown north of the site (Meath County Council 2013). The view is to

the South East and is described as “at gate along hedgerow of extensive tillage landscape, visible settlement and infrastructure”. The visual impact of the WRF is discussed in more detail in Section 4.8 - Landscape. Upon decommissioning, the site will be restored in accordance with the approved restoration scheme for the quarry. Therefore in the long term, the site will be assimilated back into the landscape in a planned manner.

4.1.4.2.7 Human Health

Common concerns in terms of human health, particularly to vulnerable sections of the receiving population, with respect to developments such as the proposed project, are generally associated with noise, air quality, water contamination, traffic safety, and accidents and disasters. Any impacts arising with respect to these environmental factors are addressed under the relevant chapters where relevant. i.e.

- Land, Soils & Geology – Section 4.3
- Water – Section 4.4
- Air – Section 4.6
- Noise & Vibration – Section 4.7
- The Landscape – Section 4.8
- Cultural Heritage – Section 4.9
- Material Assets – Sections 4.10
- Roads & Traffic – 4.11

The receiving environment of the proposed development is characterised by a rapidly growing population with a higher proportion of younger age cohorts than the county and national averages, and who are also in better health. It can be assumed that this population is both active and resilient, has a high demand for active outdoor recreational amenities, and would be sensitive to any diminution in both the visual or recreational amenity of the local area.

The European Communities (Control of Major Accident Hazards involving Dangerous substances) Regulations, 2000 (S.I. No. 476 of 2000) do not apply as the proposed development will only accept inert material for recovery. Details with respect accident and emergency response are addressed in EIAR Section 3.3.3.4.1.6 above and mitigation measures are proposed (Refer to EIAR Section 4.1.5 below).

The design, construction and operation of the proposed development, will be carried out in accordance all relevant Irish and European legislation/regulations governing safety in the work place. In particular, specific regard will be given to the regulations implemented under the Safety, Health & Welfare at Work Act 2005 and amendments and regulations made thereunder, including the Safety, Health & Welfare at Work Construction) Regulations 2013 (S.I. No. 291 of 2013), as amended. A ‘Health & Safety Plan’ will be implemented for the development in accordance with the regulations.

On completion of site activities, the site of the quarry and WRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the approved

quarry restoration scheme, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Human Health. The restoration of the site to beneficial after-use will result in a moderate positive effect in the medium term.

4.1.4.2.8 Other

The site of an unclassified megalithic tomb (RMP ME034-012) is recorded within the proposed development area. This monument or possible associated archaeological features no longer survives above or below ground. There are no Protected Structures, Architectural Conservation Areas, NIAH structures or NIAH historic gardens or designed landscapes within the proposed development area. As a result there will be no direct or indirect construction impact on the recorded or unrecorded archaeological, architectural or cultural heritage resource.

There will be no construction or operational visual impact on the archaeological, architectural or cultural heritage resource. There will be no construction noise impact on the archaeological, architectural or cultural heritage resource. There will be a negligible operational noise impact on the archaeological and architectural resource.

The impact of inert waste recovery on this site will be considerable in local terms but will not result in any loss of heritage values in the locality. The changes will be both positive (gain of woodland) and negative (loss of open habitats).

The surrounding habitat has a low level of ecological interest except in the valley of the Delvin River and the continuance of infill and re-afforestation will have a significant positive impact on it. Sediment control measures will prevent any impact on the nearby river.

4.1.4.3 Indirect Impacts

The main indirect impact will be an increase in traffic locally. This has been studied in detail in Section 4.11.

4.1.4.4 Cumulative Impacts

The restoration works using imported “soil and stones” are no different from normal quarry restoration operations. There are no other major quarries or waste recovery facilities in the locality. There are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A1.0 Rev A and B2.2 Rev C for site location details). Environmental monitoring (Noise, Dust, Water,) and an assessment of traffic volumes on the R108 (Refer to EIAR Sections 4.4,4,6, 4,7 & 4.11) has shown that the WRF can be operated within acceptable standards for these types of developments and as such there is no significant cumulative impact with respect to the continued operation of the WRF.

Clashford Recovery Facilities Ltd will put in place an Environmental Management System (EMS) to ensure that all activities are carried out in compliance with the relevant Planning Permissions and any grant of a Waste Licence.

As part of the EMS environmental monitoring (water, noise and dust) will continue to be carried out to ensure that the site activities are carried out within acceptable standards for these types of developments and that there is no significant cumulative impact with respect to the operation of their developments.

Mitigation measures are already in place at the site. Continual monitoring and measurement will ensure the effective application of these mitigation measures an ensure that activity at the WRF will not result in any significant environmental impact.

4.1.4.5 Residual Impacts

It is considered that following the restoration and mitigation measures incorporated in the design of the WRF, that there will be no significant residual impacts from the proposed continued operation of the WRF in terms of Population and Human Health.

4.1.4.6 'Worst Case' Impact

Although there are no residences within the landholding, there are several nearby residences within 50-100m on the R108. It should be noted that the predominant impact on the residences is due noise associated with passing traffic on the R108 Primary Road.

It is expected that in the absence of mitigation measures (primarily noise and dust) that there will be slight negative effects with respect to local amenity and residential receptors as a result of the continued operation of the WRF at Clashford.

4.1.5 MITIGATION & MONITORING

Proposed mitigation measures with regard to environmental issues such as air quality, noise, traffic and visual impacts are provided for and are described in detail under the relevant sections (See above list in Section 4.1.4 above). Any impact on the natural environment will be mitigated against to the greatest degree practical, thereby minimising any associated impact on the "human" environment.

The Clashford Recovery Facility has established an on-going environmental monitoring programme for the quarry and WRF site. The programme will allow on-going monitoring of environmental emissions (e.g., noise, dust, water) from the site, thereby assisting in ensuring compliance with any future requirements or regulations. The results of this monitoring will be made available to the EPA and the Local Authority on a regular basis, where members of the public may examine it. The future monitoring programme will be revised accordingly, subject to compliance with any conditions attached to a decision to grant a Waste Management License.

Clashford Recovery Facilities Ltd will put in place an Environmental Management System (EMS) to ensure that all activities are carried out in compliance with the relevant Planning Permissions and any grant of a Waste Licence.

Operations within the quarry site, which includes the WRF, are carried out in accordance with all relevant legislation / regulations and with the best work practices for the industry. The policy of the operator is to ensure the health and welfare of its employees by maintaining a

safe, clean and tidy working environment, and employing safe working procedures. The policy has been extended to include the WRF, and is in accordance with the requirements of employment legislation, including the provisions of the “Safety, Health and Welfare at Work Act, 2005”, and the relevant Regulations.

The wearing of protective clothing such as footwear, helmets and high visibility clothing is mandatory in operational areas. Careful attention is paid to safe practices when carrying out machinery maintenance and ensuring appropriate guarding of moving parts.

The boundaries of the site are secure being established hedgerows and stock proof fencing. The site also benefits from being bounded to the north by a small stream and deep ditch, with the Delvin River forming a natural barrier to the south and east of the site. The site entrance gates remain locked outside of normal working hours and public warning notices are posted at appropriate locations along the site boundary. The site is also monitored with CCTV at the entrance.

The development can be controlled and regularised in accordance with the scheme as outlined in this document, through continued environmental monitoring and by conditions imposed by the EPA. The proposal will have no major and/or long-term effect on the human environment.

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4.1.7 FIGURES

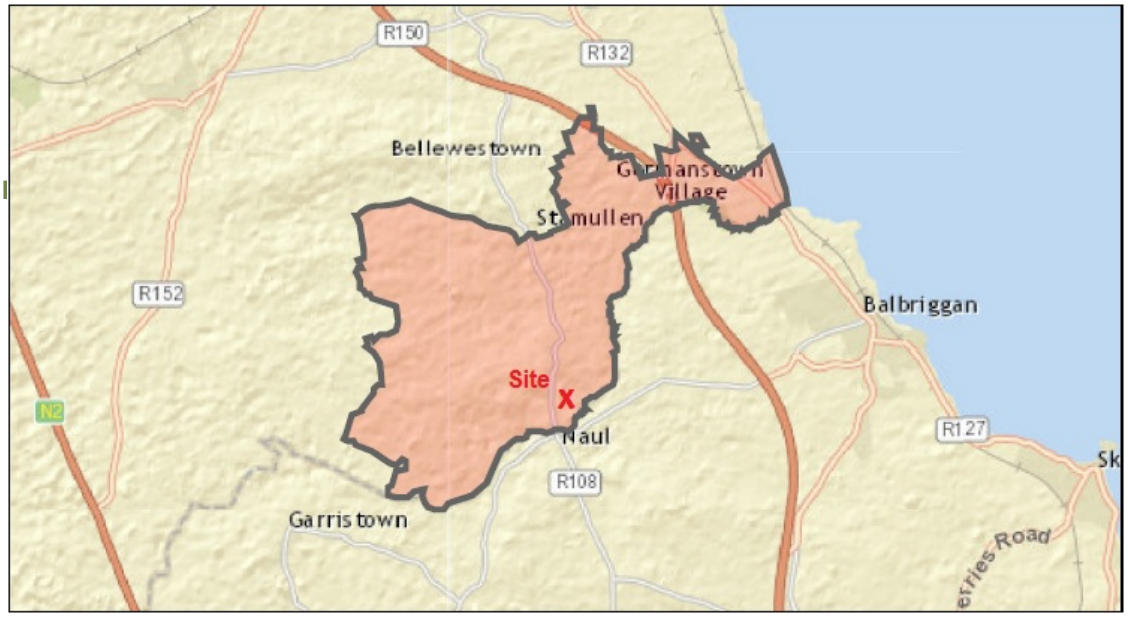

Figure 4.1-1 Map of Electoral Division of Stamullin,

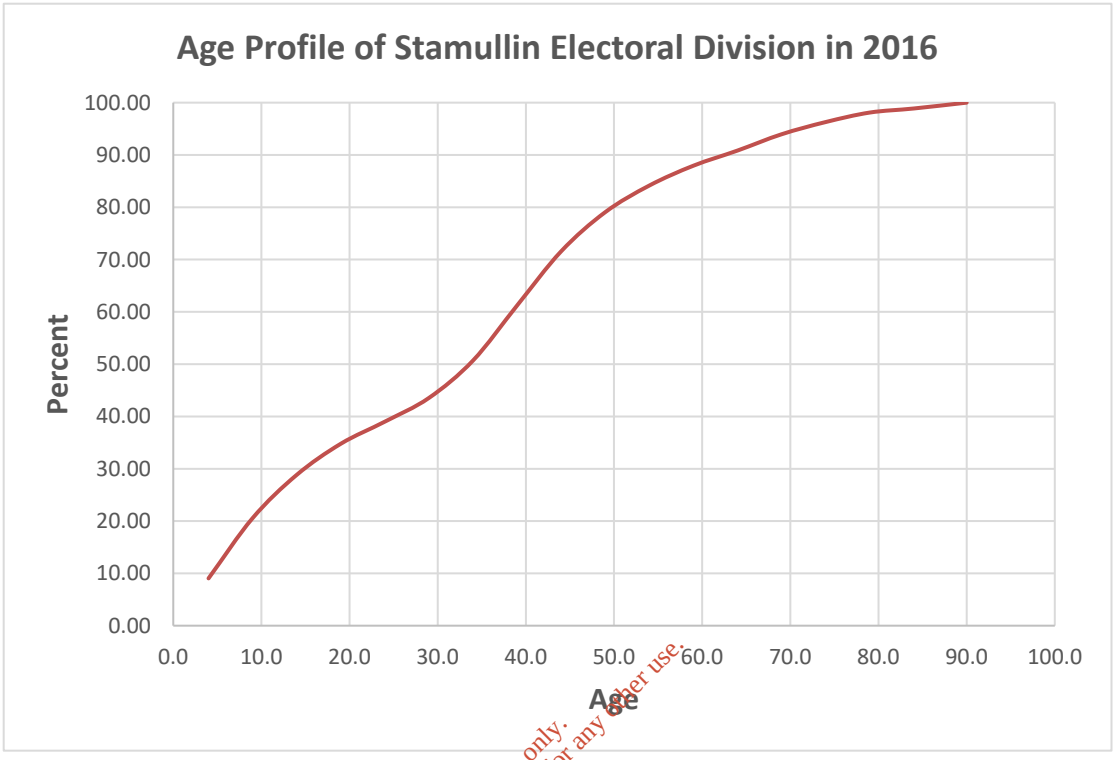

Figure 4.1-2 Age profile of population in the Stamullin Electoral Division in 2016.

Note average age is approximately 33 years. The Census 2016 data was sourced from the CSO (2018).

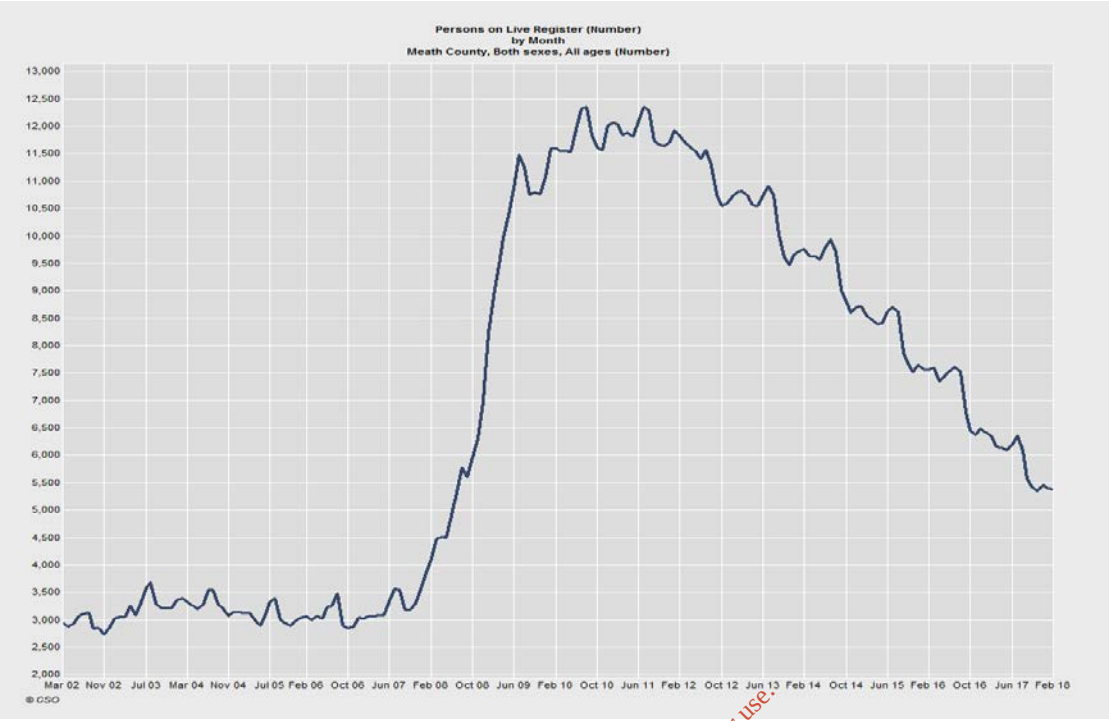

Figure 4.1-3 Chart Showing profile of Live Register for Meath

Data from CSO (2018).

4.2 BIODIVERSITY

4.2.1 INTRODUCTION

The purpose of this section is to assess the ecological effects of the development and to describe the mitigation measures that have or will be undertaken.

4.2.2 METHODOLOGY

A preliminary desk-top study was undertaken of all data in the NPWS files relating to this area and the nearest Natura 2000 sites. In addition, the local flora of county Dublin (Doogue 1998) was consulted for nearby records as well as national atlases of flora, mammals, birds, dragonflies and butterflies.

The account is based on two site visits, in April 2014 and June 2018, and a study of existing aerial photographs. The field investigation followed the methodology of the Heritage Council guidelines (Smith et al 2011). Mapping was not digitized in the field and depends partly on the air photos. Habitats are classified as in Fossitt (2000). Signs of mammals and birds were searched for at all times.

Once the habitat had been examined, on-line sources of biodiversity data were consulted for evaluation purposes.

4.2.2.1 Policy & Legislation

The Meath County Development Plan (2013-2019) contains policies and objectives concerning conservation. For European sites (Natura 2000) and Natural Heritage Areas:

It is the policy of Meath County Council:

NH POL 5	To permit development on or adjacent to designated Special Areas of Conservation, Special Protection Areas, National Heritage Area or those proposed to be designated over the period of the plan, only where an assessment carried out to the satisfaction of the Meath County Council, in consultation with National Parks and Wildlife Service, indicates that it will have no significant adverse effect on the integrity of the site
NH POL 6	To have regard to the views and guidance of the National Parks and Wildlife Service in respect of proposed development where there is a possibility that such development may have an impact on a designated European or National site or a site proposed for such designation

It is an objective of Meath County Council:

NH OBJ 2	To ensure an Appropriate Assessment in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, and in accordance with the Department of Environment, Heritage and Local Government Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and relevant EPA and European Commission guidance documents, is carried out in respect of any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect on a Natura 2000 site(s), either individually or in combination with other plans or projects, in view of the site's conservation objectives.
NH OBJ 3	To protect and conserve the conservation value of candidate Special Areas of Conservation, Special Protection Areas, National Heritage Areas and proposed Natural Heritage Areas as identified by the Minister for the Department of Arts, Heritage and the Gaeltacht and any other sites that may be proposed for designation during the lifetime of this Plan.

4.2.2.2 Designations

The quarry site at Clashford, which includes the application site, is not included in any area with an ecological designation (NHA, cSAC or SPA). The only Natura 2000 sites within 15km of Naul are the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), the River Nanny and Shore SPA (Site Code 4158) and the Skerries Island SPA (Site Code 4122).

The nearest pNHA site is the Bog of the Ring (Site Code 001204), Ring Commons, Co. Dublin at c. 3km, whilst Cromwell's Bush Fen pNHA (Side Code 001576), Greenanstown, Co. Meath is at c. 4.5 km.

Screening for Appropriate Assessment was carried out with respect to the proposed development and a copy of this was submitted to the EPA on 11/04/2014. The findings of the screening for Appropriate Assessment were that in view of best scientific knowledge, it is concluded that the activity, individually or in combination with other plans or projects is not likely to have a significant effect on the Natura 2000 network, and the conservation objectives of the sites. A Stage 2 Appropriate Assessment is therefore not required.

Therefore, there will no direct or indirect impact on these sites as a result of the continued operation of the WRF at Clashford. The Delvin River which borders the site discharges to the sea 2km south of the Laytown Dunes, below Julianstown.

4.2.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

The proposal is to continue the phased restoration of a sand and gravel pit using imported inert soils, stone and the import of inert Construction and Demolition waste to produce secondary aggregates (to be exported from the site).

4.2.3.1 Habitats

The site is an extensive sand and gravel quarry dug in glacial material on the northern side of the Delvin River, northeast of Naul village. It is partly reclaimed to agricultural or forestry land so has some improved agricultural grassland (GA1 in Fossitt 2000) and broad-leaved woodland (WD1) as well as the more typical quarry habitats of spoil and bare ground (ED2) and recolonising bare ground (ED3). To the south the land falls into the Delvin valley which carries an eroding upland river (FW1) with artificial margins. The slope above supports dry meadows and grassy verges (GS2) with incipient scrub while the fields are edged by young treelines/hedgerows of planted alder and hawthorn. An older treeline defines the northern boundary which is a small tributary of the Delvin River.

The grassland occurs between the Delvin River and the NW corner of the site. Much of it is level and sown with a mix of ryegrass *Lolium perenne*, meadowgrass *Poa* sp and crested dogstail *Cynosurus cristatus* but on the SE slope it is damper and contains more moss, especially *Brachythecium rutabulum* and *Calliergonella cuspidata*. There are also a few small plants of hard rush *Juncus inflexus* and dandelion *Taraxacum* agg. here.

Woodland has been planted in the NE corner. It is all ash *Fraxinus excelsior* and the trees are 12-15m tall and growing well. Underneath is some grass *Poa* sp. as well as scattered figwort *Scrophularia nodosa* and hogweed *Heracleum sphondylium*.

Disturbed ground remains inside the site entrance and also at the NE end, north of the planted woodland.

The following Figure 4.2.1 shows the habitats and vegetation relating to the site.

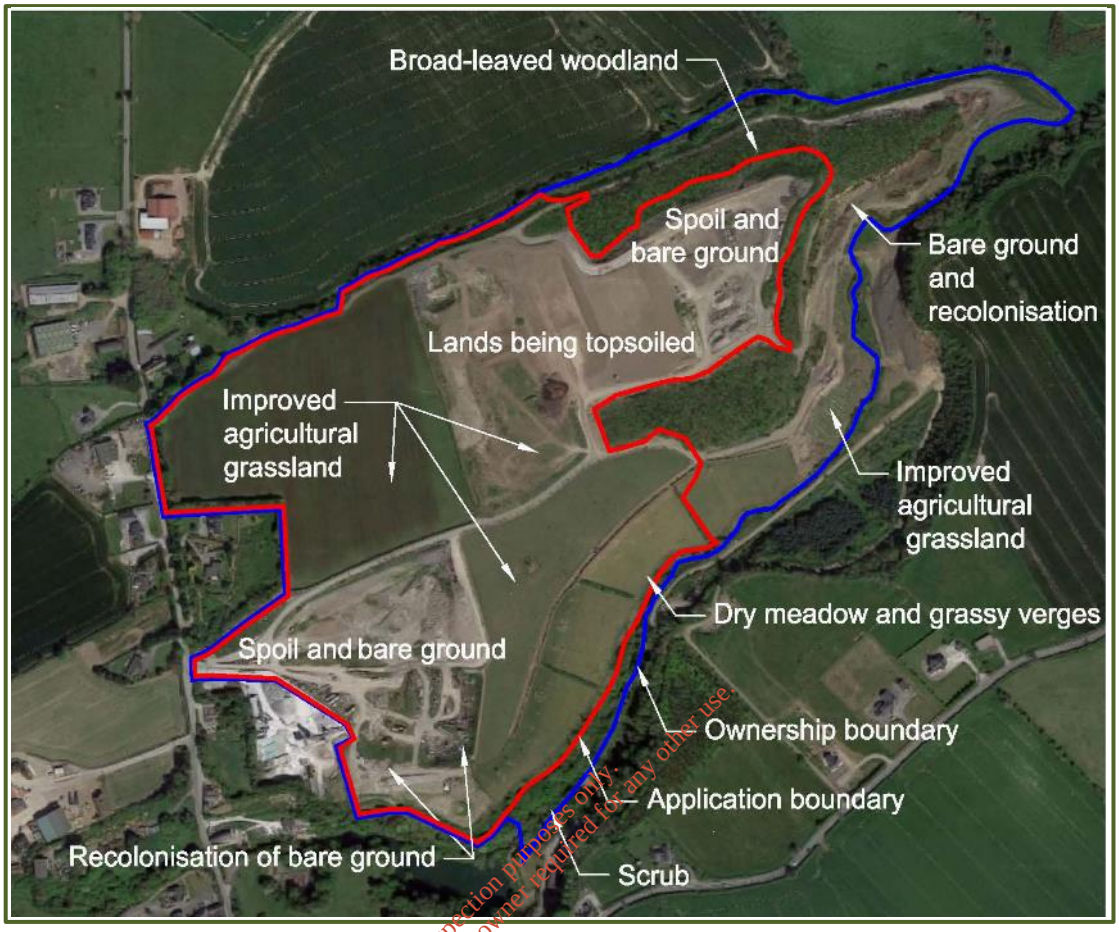

Figure 4.2-1 Habitats & Vegetation

4.2.3.2 Flora

The habitats of disturbed ground in the former quarry, as well as areas beside trackways and under reclamation, support many more species than the fields, if not a complete cover of vegetation. The plants that first appear are widespread grasses such as annual meadowgrass *Poa annua* and common bent *Agrostis capillaris* and broad-leaved plants with windblown seeds – coltsfoot *Tussilago farfara*, American willowherb *Epilobium ciliatum* and sow-thistle *Sonchus oleraceus.* Other species include

Medicago lupulina	black medick
Veronica persica	field speedwell
Senecio vulgaris	groundsel
S.jacobaea	ragwort
Geranium dissectum	cut-leaved cranesbill
Euphorbia peplus	petty spurge
Galium aparine	goosegrass
Cerastium glomeratum	sticky mouse-ear
Malva sylvestris	common mallow
Sisymbrium officinale	hedge mustard

A suite of introduced species is also notable in the section close to the gate. It includes

Rapistrum rugosum	bastard cabbage
Conyza cf *floribunda*	Bilbao fleabane
Polypogon viridis	water bent
Melilotus officinalis	common melilot
Helminthotheca echioides	bristly ox-tongue
Lactuca serriola	prickly lettuce
Senecio inaequidens	narrow-leaved ragwort
Echium pininana	giant viper's bugloss

Given time and stability, as on piles of material away from the trackways, grasses become taller, especially false oat *Arrhenatherum elatius*, Yorkshire fog *Holcus lanatus* and scutch *Elytrigia repens.* Mixed in are

Chamerion angustifolium	rose-bay
Cirsium arvense	creeping thistle
Urtica dioica	nettle
Centranthus ruber	wall valerian
Achillea millefolium	yarrow
Buddleja davidii	butterfly bush
Artemisia vulgare	mugwort
Tripleurospermum inodorum	scentless mayweed
Lapsana communis	nipplewort
Raphanus raphanistrum	wild radish
Papaver somniferum	opium poppy
Silene latifolia	white campion

This list suggests some content of agricultural or garden soil in places and their occasional piles which add the deadnettles *Lamium purpureum*, *L.hybridum*, self-heal *Prunella vulgaris* and the small nettle *Urtica urens*.

A grassy mound in the south centre has several colonies of Japanese knotweed *Fallopia japonica* growing amongst tall grasses.

Water accumulates at the base of the quarry void and flows towards the NE corner from where it is piped to the stream. Ponding and general dampness creates marshy communities on the base, most of them close to the northern and eastern sides. Jointed rush *Juncus articulatus* and hard rush *J.inflexus* and obvious species along with creeping bent *Agrostis stolonifera* and a little sweet grass *Glyceria fluitans*. In addition there is

Epilobium parviflorum	hoary willowherb
E.hirsutum	great willowherb
Carex pendula	pendulous sedge
C.flacca	glaucous sedge
Typha latifolia	bulrush
Rumex crispus	curled dock
Ranunculus repens	creeping buttercup
Scrophularia auriculata	water figwort
Bellis perennis	daisy
Salix cinerea	grey willow
Calliergonella cuspidata	a moss

The last habitat to be described is the valley side between the Delvin River and the sheep-grazed pastures above. Although partly sown as part of the reclamation, red fescue *Festuca rubra* is an important grass along with cocksfoot *Dactylis glomerata*, ryegrass *Lolium perenne* and scutch *Elytrigia repens*. Greater burnet *Sanguisorba officinalis* is a feature of this area, along with

Potentilla reptans	creeping cinquefoil
Plantago lanceolata	ribwort plantain
Vicia sepium	bush vetch
Vicia sativa	early vetch
Lathyrus pratensis	meadow vetchling
Odontites vernus	red bartsia
Crepis vesicaria	beaked hawksbeard
Origanum vulgare	marjoram
Daucus carota	wild carrot
Echium vulgare (on path)	viper's bugloss

Parts of this valley side carry blackthorn *Prunus spinosa* and gorse *Ulex europaeus* scrub with scattered trees of sycamore *Acer pseudoplatanus* and also, close to the river, grey willow *Salix cinerea* and goat willow *S.caprea*. This sort of scrub is also found at the eastern end of the site, adjoining the ash woodland.

A damp section of the valley supports abundant great horsetail *Equisetum telmateia* along with pendulous sedge *Carex pendula*, osier *Salix viminalis* and winter heliotrope *Petasites fragrans*. There is also a patch of teasel *Dipsacus fullonum.*

4.2.3.3 Fauna

There were few signs of wild mammals present in the quarry area and only rabbit tracks were at all common. Otherwise the site is probably visited by scavenging foxes and occasionally badgers though there were no overt signs of this species. Bats are likely to be seen along the river valley as there is good habitat on the southern side. A few would be found in the ash woodlands but these would develop more significant populations as they mature.

The birds seen were those of open habitats, in particular rook and jackdaw, 200 of which were feeding in one of the recently-topped fields. There were also pied wagtail and linnet, both of which would feed within the quarry to some extent. Other species in the surrounding area which could make some use of the habitat were woodpigeon, magpie, hooded crow and pheasant. The gorse areas are likely to hold stonechat in some years while chiffchaffs were heard in the river area. Grey wagtail and dipper would also be expected here. There were no sand martin burrows in the remaining side walls and this species does not seem to occur.

The vegetation is diverse enough to support a good range of insects and there were a number of bumble bees (*Bombus terrestris, B.pascuorum, B.hortorum*) flying during the site visit. The common blue, small tortoiseshell, speckled wood, ringlet and meadow brown butterflies were seen on the June visit.

4.2.3.4 Other Considerations

4.2.3.4.1 Relationship with Appropriate Assessment

The quarry site at Clashford, which includes the application site, is not included in any area with an ecological designation (NHA, cSAC or SPA). The only Natura 2000 sites within 15km of Naul are the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), the River Nanny and Shore SPA (Site Code 4158) and the Skerries Island SPA (Site Code 4122).

Screening for Appropriate Assessment was carried out with respect to the proposed development and a copy of this was submitted to the EPA on 11/04/2014. The findings of the screening were that in view of best scientific knowledge, the activity, individually or in combination with other plans or projects is not likely to have a significant effect on the Natura 2000 network, or the conservation objectives of the sites. A Stage 2 Appropriate Assessment is therefore not required.

Further information was also submitted to the EPA on 20/03/2016 in accordance with notice issued under Article 14(2)(b)(ii) of the Waste (Licensing) Regulations including the following statement by the appointed ecological consultants, Roger Goodwillie & Associates.

'The recent monitoring of the Delvin River has shown that outflows from the site have not altered the condition of the river to any significant extent. EPA Q- values show that on all sampling occasions the river below the development site is in better condition than that above it. Invertebrates (what Q-values are based on) are more sensitive to substances in the water than birds, so if they are not affected then neither will the visiting birdlife which is the basis of the SPA designation' of sites downstream. (Roger Goodwillie, Consulting Ecologist 2016, pers. comm., 22nd January 2016).

In order for any of these Natura 2000 sites to be affected by the proposed development there has to be a connection between them and the Clashford Site. The only potential pathway is the hydrological one, via surface water or groundwater flows.

Groundwater at the Clashford site discharges to the Delvin River, therefore any wider discharge of groundwater is not considered further, as groundwater pathways to the Nanny River, the Boyne or south to the Rogerstown Estuary cannot physically exist.

Therefore the only conceivable pathway for contact/potential impact with any of the Natura 2000 sites listed above is via the water flow provided in the Delvin River, i.e. sediment or contaminated surface water is transmitted by the Delvin River to any of the Natura 2000 sites listed above.

There is a considerable distance between the Clashford site and any of the Natura 2000 sites. Sediment or surface water would have to travel in the river and then the sea to get to any of the Natura 2000 sites. The shortest flowpath is to the River Nanny Estuary and Shore SPA (Site Code: 004158), and this is some 10.5kms (including 1.5kms of open sea water). Assuming an average near shore sea depth of 5m and using the near shore 500m width (as a likely flow path from the Delvin estuary towards the SPA), the volume of this near shore body of water is some 3,750,000m^3 of sea water. The dilution available in the sea for any minor water quality issue in the Delvin River is so large that it will buffer the SPA from any significant potential impact.

Furthermore, the proposed facility is for soil and stone, and no contaminated material has or will be deposited at the site. As such the risk to surface water and to groundwater from the site is not significant. Given the separation distances, and the very unlikely scenario of significant pollution emerging or being discharged from the site, the risk to downstream Natura 2000 sites is not significant.

4.2.3.4.2 Relationship with Other Consent Procedures Relevant to Biodiversity

There are no species on site that would require special consent procedures prior to development.

4.2.3.5 Significance (Evaluation)

The overall site is relatively diverse having typical quarry habitats as well as restored land. The species list is similarly varied, though it is much longer in the disturbed ground than in the newly-created habitats, both grassland and woodland. A few unusual plants occur in the grassy bank above the river (Preston *et al* 2002) – greater burnet *Sanguisorba major*, viper's bugloss *Echium vulgare* and marjoram *Origanum vulgare* – but the former at least may have been derived from a wildflower sowing. Elsewhere the plants and animals are typical of gravel and sand quarries in the Dublin/Meath area with the added variety of many introduced plants.

There is no feature of the fauna that is of significant interest as far as is known (e.g. Balmer *et al.* 2012, Nash *et al.*; 2012).

4.2.4 ASESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.2-1 Biodiversity - Impact Matrix

'Do Nothing' Impacts			
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	●	●	**X**
Indirect Impacts	X	X	**X**
Cumulative Impacts	X	X	**X**
Residual Impacts	X	X	**X**
`Worst Case' Impacts	X	●	●

None: **X**; Slight: ●; Moderate: ●; Significant: ●. (Negative) ●. (Positive)

4.2.4.1 'Do Nothing' Impacts

The Clashford site would remain as an unrestored quarry site, without the backfilling generated by the proposed continued operation of the WRF. Habitat development would occur slowly and lead to a general increase in biodiversity as the plant cover became more varied. The final stage would stabilise at a woodland/scrubland community with periodic tree falls on the steeper slopes. However, the Japanese knotweed would spread to cover an increasing area each year unless shaded out by the trees. This spread is purely by vegetative means and would be at a rate of less than a metre a year for each clump.

The site does not contain items of particular ecological interest but the successional stage of open herbaceous that occurs in the worked-out areas of the quarry has a positive biodiversity value, particularly in such agricultural surroundings.

4.2.4.2 Direct Impacts

The impact of the continued recovery of inert waste in the quarry is considerable in local terms as it will lead to the disappearance of a good part of the existing flora (with its dependent insects) – those species that require open soils and disturbance to grow. However, the development of woodland elsewhere on site will tend to diversify the larger fauna such as birds and mammals so that there will be gains as well as losses. At a landscape scale the restoration will be beneficial as it is creating a nucleus of woodland with links to the existing

similar habitat in the Delvin River valley. There will be no disruption to animal pathways or ecological corridors from the proposals.

Furthermore, the site will be reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape.

As well as the physical impacts there is the potential for sediment and/or chemical loss to surface waters, but this will be minimised by the existing and planned control measures, by the local drainage gradient and by the distance to surface waters. The restoration of the site will result in a moderate positive effect in the medium term.

4.2.4.3 Indirect Impacts

The quarry site at Clashford, which includes the application site, is not included in any area with an ecological designation (NHA, cSAC or SPA). The only Natura 2000 sites within 15km of Naul are the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), the River Nanny and Shore SPA (Site Code 4158) and the Skerries Island SPA (Site Code 4122).

The nearest pNHA site is the Bog of the Ring (Site Code 001204), Ring Commons, Co. Dublin at c. 3km, whilst Cromwell's Bush Fen pNHA (Side Code 001576), Greenanstown, Co. Meath is c. 4.5 km.

Due to the distances involved and the nature of the infill proposal no significant impacts are anticipated.

Dust pollution, if any, is unlikely to cause ecological change in the surroundings.

4.2.4.4 Cumulative Impacts

The other land use activities visible in the area include farming operations, horticultural and agricultural storage facilities, a concrete batching plant, Fingal waste water treatment plant and single dwelling houses. There will be no significant in combination impacts on Biodiversity resulting from this project, and other local existing developments, projects and plans.

Mitigation measures are already in place at the site and the site is being progressively restored to agriculture and forestry. Continual monitoring and measurement will ensure the effective application of these mitigation measures an ensure that activity at the WRF will not result in any significant environmental impact.

4.2.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of the biodiversity of the county.

As a result of the proposed mitigation and enhancement measures, no residual significant adverse impacts are predicted for the ecological receptors in the long-term. Indeed, as a result of the proposed project and habitats features to be created, some beneficial impacts are predicted for the biodiversity of the area.

4.2.4.6 'Worst Case' Impact

The worst-case impact would result if the site was restored to intensive agricultural use with no consideration given through the land reclamation scheme to planting of native trees, woodland copses and hedgerows as proposed by the applicants.

4.2.5 MITIGATION & MONITORING

The existing quarry includes several mitigation measures which will remove or reduce the impact of its use for waste recovery in the future. There is a wheel wash facility in which all waters are recycled through a system of silt lagoons which overflow to surface waters. The lagoons are cleaned on a periodic basis, with the silt used within the restoration of the site.

This surplus and site run-off currently pass through a temporary settlement area and sump before discharge northwards to the tributary of the Delvin. The reclamation scheme has been designed to drain surface water run-off in a similar direction to the northern boundary of the site. A little ground drainage is currently discharged from the eastern end of the site into the Delvin River.

A programme of eradication of Japanese knotweed is to be implemented on site. The categories of waste material to be used are unlikely to be contaminated by further Japanese knotweed or other invasive species. In addition the supplier of the fill is responsible for the control of the plant on his site. The applicant as part of their Site Pre-Approval Procedure will only accept material from pre-approved sites where an appropriate invasive species risk assessment has been carried out by a qualified person.

Restoration will include the removal of all machinery and structures and the smoothing of the contours to facilitate the establishment of grassland and grazing animals.

The proposed development will be subject to an EPA Waste Management Licence. As such a Closure and Restoration/After Care Management Plan (CRAMP) may be required as a condition of the Waste Licence.

The impact of inert waste recovery on this site will be considerable in local terms but will not result in any loss of heritage values in the locality. The changes will be both positive (gain of woodland) and negative (loss of open habitats).

The surrounding habitat has a low level of ecological interest except in the valley of the Delvin River and the continuance of infill and re-afforestation will have a significant positive impact on it.

4.2.7 REFERENCES

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4.3 LAND, SOILS & GEOLOGY

4.3.1 INTRODUCTION

This section of the EIAR has been compiled in order to establish both the regional and local geological setting of the Waste Recovery Facility (WRF) with respect to the land, soil, subsoil and geological bedrock environment. The potential impact on the geological environment resulting from the proposed development is assessed and possible mitigation measures proposed to reduce any significant impacts. An assessment of the hydrological and hydrogeological impacts relating to the proposed development is detailed in *Section 4.4* of the EIAR.

4.3.2 METHODOLOGY

4.3.2.1 Desk Study

The desktop study was undertaken to compile, review and interpret available information, data and literature pertaining to the natural environment of the site, its immediate environs and regional setting.

In the preparation of this geological assessment, all available regional and site-specific information was compiled, assessed and interpreted. The geological maps and literature provide the regional geological context of the site, whilst prior Planning and Environmental Reports provide site-specific information. The geological assessment of the site is considered sufficiently detailed to adequately characterise the geological setting of the site and its environs.

The section was prepared following a desk study, which included research of relevant maps and data on the Geological Survey of Ireland (GSI) online mapping website (GSI 2018), and on the Environmental Protection Agency (EPA) Envision geoportal website (EPA 2018). Additional documents that were researched comprised geological maps and bulletins published by the GSI (McConnell et al. 2001), the Geology of Ireland monograph edited by Holland & Sanders (2009), a prior EIS on the Clashford Pit (JSPE, 2014), as well as other miscellaneous publications.

4.3.2.1.1 Sources of Information

The following relevant sources of information were referenced in undertaking the study.

- Examination of physiographic and other maps, and aerial photography (e.g., Google Images (Google, 2018), and EPA Ortho Photos 1995-2005: (EPA, 2018));
- Examination of the GSI datasets and maps pertaining to geological bedrock, soil and subsoil maps (GSI, 2018);
- Examination of EPA soil and subsoil maps (EPA, 2018);
- Observations made during the site walkover.
- GSI/ICF (2008). Geological Heritage Guidelines for the Extractive Industry. Geological Survey of Ireland (GSI) and Irish Concrete Federation (ICF), Dublin.

- IGI (2007). Recommended Collection, Presentation and Interpretation of Geological and Hydrogeological Information for Quarry Development. Institute of Geologists of Ireland (IGI), UCD, Dublin.
- IGI (2013). Updated IGI Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Institute of Geologists of Ireland (IGI), UCD, Dublin.
- Environmental Protection Agency (2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (2017): Draft – Guidelines on the Information to be Contained in Environmental Impact Assessment Reports; Also, data was sourced online from the following websites:
- http://gis.epa.ie/Envision Envision Geoportal, Environmental Protection Agency (EPA).
- https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 Public Map Viewer, Geological Survey of Ireland (GSI).

Refer also to References (EIAR Section 4.3.6 below).

4.3.2.1.2 Policy & Legislation

The Eastern-Midlands Regional Waste Management Plan 2015-2021 (EMWMP 16.4.4) recognises that Backfilling activities (of inert waste), which meet the recovery definition and are in compliance with Articles 4 and 13 of the Waste Framework Directive (WFD), sit on the other recovery tier of the waste hierarchy (Eastern-Midlands Waste Region, 2015). Local authorities authorise such activities using Waste Facility Permits (WFPs) and Certificates of Registration (CORs), while EPA authorisations cover more substantial operations with a longer lifetime capacity.

4.3.2.1.3 Designations

The proposed site is not within a European Site, including Special Protection Area (SAC) and Special Protection Areas (SPA). Appropriate Assessment Screening has been carried out with respect to the proposed development. There is no likelihood of significant ecological effects from this development on any of the sites in the Natura 2000 network or on their conservation objectives.

The Council will encourage the reuse of brownfield land where possible in preference to developing green field sites, in order to reduce the loss of the county's more agriculturally productive soils. The council states that "d*evelopment should generally be encouraged in established centres promoting concepts of brownfield redevelopment, sequential approach and ensuring efficient use of urban lands*" (Meath County Council, 2013). The existing site comprises a worked-out sand and gravel pit with some steep residual faces. Importation of inert soil and stones will allow the existing disturbed ground to be restored to beneficial agricultural lands.

It is a policy (NH POL 12) of the CDP to "*have regard to the geological and geomorphological heritage values of County Geological Sites listed in Appendix 13 and avoid inappropriate development, through consultation with the Geological Survey of Ireland*" (Meath County

Council, 2013). A search of the GSI Geological Heritage Database indicates that there are no sites of geological heritage within or near the site of the quarry and proposed co-located WRF at Clashford (Refer to EIAR Section 4.3.3.4 below).

4.3.2.2 Field Study

The desktop study was followed by a site walkover as part of this geological assessment. Geological fieldwork comprising ground investigations were carried out in 2009 and 2018 (Refer to EIAR Section 4.3.3 below).

As part of the Hydrogeological Assessment (Refer to EIAR Section 4.4) groundwater monitoring wells (5 no. in total) were drilled up-gradient and down-gradient of the proposed site. A description of the geology encountered during the drilling is provided below (Refer to EIAR Sections 4.3.3.3 & 4.4.3.7.1.4 below).

4.3.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.3.3.1 Land

4.3.3.1.1 Site Location

The site is located within the Townland of Naul in south County Meath, across the Delvin River and c. 300m north of the village of Naul in north County Dublin. The site lies on the east side of Regional Road R108 (Refer to Figure A1.0, Rev A, *Section 6*). The R108 connects with the R122 in village of Naul, which connects with the M1 (Dublin-Drogheda-Dundalk) motorway c. 5km to the east, and to the town of Balbriggan c. 7km to the east. Dublin lies c. 25km to the south, whereas Drogheda lies c. 15 km to the north. The Delvin River flows roughly SW-NE and flanks the southern boundary of the site, whilst an unnamed tributary stream of the Delvin River flanks the northern boundary of the site, and joins the river at the northeastern terminus of the quarry site. The western boundary of the quarry site is defined by the R108 and the party boundary with several residential properties on the east side of the R108.

4.3.3.1.2 Topography

The site covers an area of 24.2 ha on a larger landholding of 33.4 ha, and has been actively quarried since the 1980's. The shape of the landholding is broadly triangular (Opposite: R108; Hypotenuse: Delvin River; and Adjacent: tributary stream). It has an approximate length of c. 800m along a SW-NE axis, and a maximum width of c. 550m along a NW-SE axis.

The quarry has been developed on a c. 1km long mound of sand and gravel within a southwest-northeast oriented ribbon of glaciofluvial outwash deposits, and extends from the Townland of Tobeen (i.e., c. 2km further up valley) down the river valley to the coastal plain. The topography of the quarry site is thus slightly elevated (≤ 80m AOD) above the valley floor (elev. c. 60-70m). Nonetheless, the quarry is not a skyline feature, occupying a low field of view from distant receptors.

Both the soils and bedrock geology have an important role in determining the environmental characteristics of an area. The underlying bedrock has a major influence on the landform that develops, and the constituent rocks provide the parent material from which the soils are

derived. The natural characteristics of the rock help determine the nature of the derived soil, as well as the rate at which it forms, whilst the soil strongly affects both the natural vegetation that emerges, and the type of agriculture that can be sustained.

As stated above, the topography is partly a reflection of the underlying geology, which is described in the succeeding subsections. The Clashford and Naul area lies in the valley of the Delvin River, known as Roche Valley, which features steep rocky outcrops carved by glacial meltwaters (Fingal County Council, 2011; McConnell et al., 2001). The area occurs in the Roche Valley, but is classified as occurring in the Coastal Plains (Meath County Council, 2007). However, the area appears to have greater affinity to the adjacent Bellewstown Hills to the west and northwest. The Delvin River rises to the southwest of Naul and flows northeastwards in the area, descending onto the coastal plain and draining into the Irish Sea near Balbriggan. The valley of the Delvin River separates two sets of hills to the southeast on Late Visean siliciclastics and limestones of the Walshestown Formation (max. elev. 176m), and to the northwest on an Ordovician volcanic arc sequence of the Balbriggan inlier (max. elev. 159m). Indeed, the terrain of southeast County Meath is characterised by limestone lowlands with Ordovician volcanics and Late Visean siliciclastics forming the hills.

The wider local landscape around Clashford is generally of steeply rolling hills with intensively managed agricultural lands with well wooded hedgerows, creating a closed landscape. The landscape changes to the northeast to the flat topography of the coastal plain, but with dense hedgerows also creating a closed landscape.

Forest cover is very limited, with copses and larger stands and woods of trees in river valleys and estuaries. The land use in the area is classed as roughly evenly divided between pasture and non-irrigated arable land, with a few minor areas of complex cultivation patterns. This pattern transitions to significantly less pasture with an increase in complex cultivation patterns to the east in north County Dublin.

The sand and gravel extraction at Clashford had exploited a glacial feature, and the underlying sand and gravel would had provided the land good drainage when previously used for agriculture. The land of the quarry site had been used for pasture and arable production, according to the 1990 Corine Map (See EPA, 2018). The existing topographical contours are shown in EIAR Figure B 2.1 Rev C - Site Plan, *Section 6*.

4.3.3.1.3 Land Use & Land Cover

The unrestored quarry area is dominated by bare, exposed ground and scrub with fragments of grassland and scrub at the edges and undeveloped areas. The lands have been progressively backfilled and restored to improved agricultural land under progressive waste permits since 2001. Planted mixed broadleaf forest fringe the eastern half of the quarry site, while the other boundaries are largely maintained with hedgerows and stock fencing.

Hedgerows are a characteristic feature of the Meath landscape and provide valuable refuges for biodiversity in a landscape dominated by large tracts of intensive agriculture. Hedgerows also tend to create enclosed landscapes, where views are restricted. In the vicinity of the Clashford, the WRF is well screened from public view on the R108 by existing hedgerow on the roadside and intervening boundaries of properties on the east side of the R108. Mature

broadleaf woodland and hedgerow fringes the Delvin River to the south of the landholding, and along the tributary to the north of the landholding, whilst a broad swathe of planted mixed broadleaf forest fringes the eastern half of the quarry site.

The 2012 Corine Map shows that land use in the area is dominated by agriculture, with some urban fabric due to residential development, as well as an area of mineral extraction at the quarry. Land-use in the Clashford area is characterised by a patchwork of agricultural fields that are designated in roughly equal measure as non-irrigated arable land and pasture, reflecting medium-high intensity agricultural, with some areas of complex cultivation patterns and very low levels of forest cover, restricted largely to river valleys and hedgerows (Refer EIAR Figure 4.8.4). These agricultural lands are characterised in general by well managed mature hawthorn hedges with some deciduous trees. There are no significant areas of afforestation established in the area, except for the broadleaf forest plantings associated with the quarry restoration.

On completion of site activities, the site of the quarry and WRF will be decommissioned and reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape. The Applicant, Clashford Recovery Facilities Ltd, who operated the sand and gravel pit at Clashford, owns the land and has a personal interest in its complete and appropriate restoration.

The settlement pattern is concentrated along the road network in the area, with residential properties typically comprising one-off single residences and farmsteads along public roads or along and at the end of lanes off the public roads. There are fifteen established individual residences, two businesses and several farms north of the river and within c. 500m of the proposed WRF site, and several of these abut the boundaries of the site of the proposed WRF co-located within the quarry. The Kilsaran concrete plant abuts the southeastern boundary of the site and shares the same entranceway onto the R108.

South of the river, the core of the village of Naul lies within 500m of the proposed WRF site, while the entire village as it extends south along the R108, lies within 1km of the site, as shown on EIAR Figures A 1.0 and B 2.1, *Section 6*. The next nearest small settlement to the site is village of Clonalvy c. 3.5km to the west and Stamullin 4.5km to the north, while the nearest large population centre is the town of Ballbriggan, c. 7km to the east.

4.3.3.1.4 Land Take

The area of the application site is 24.2 ha and comprises an open pit that has been partly backfilled. The site is part of a worked-out sand and gravel pit on a total landholding area of 33.4ha. The application site encompasses much of the landholding, excluding areas that have been previously restored as broadleaf forest on the perimeter at the eastern end of the landholding, and as pasture on the steep slope down to the Delvin River along the southern perimeter of the landholding and northwest corner of the site. Large sections of the application site have been restored, such that the proposed areas for backfilling using imported inert soil and stone are located in the central and southwestern sections of the proposed site. The site is approximately 700m in length and 350m in width with maximum depths of up to ~ 9m below the local natural ground level. Extraction was above the groundwater table, and thus the floor of the pit is permanently dry.

4.3.3.2 Soils

Soil is an essential natural resource and is intrinsically valuable to the environment, and all life within it. Soil encompasses topsoil and subsoil, which together provide for several important functions, including:

- Contributes to the hydrological cycle in the filtration/recharge, storage and discharge of rainwater;
- Supports all terrestrial ecology, including all flora and fauna;
- Protects and enhances biodiversity;

Topsoil and subsoil may derive from parent geological material and organic matter under the influence of numerous processes, including weathering and erosion. In terms of subsoil, the profound influence of glaciation in Ireland is seen in the glacial till, which blankets much of the underlying rocks.

4.3.3.2.1 Topsoil

The 2nd Edition of the General Soil Map of Ireland with accompanying Soil Survey Bulletin No. 36 was published by Gardiner & Radford (1980). The map has a publication scale of 1:575,000, which results in generalised features that provide inadequate geographic reference to allow useful spatial data on the scale of the property. The soil map of Co. Meath with accompanying Soil Survey Bulletin No. 37 was published by Finch et al . (1983), and was similarly compiled by surveying and mapping using direct visual inspection, profile pits and laboratory analysis. The soil map was developed on a nominal working scale of 1:10,560, condensed down to a publication scale of 1:126,720, and maps the distribution of soil types based on the classification of the Great Soil Groups of Ireland.

Teagasc and the EPA initiated a nationwide Soil and Subsoil Mapping Project, the final report for which was published by Fealy & Green (2009). The soil map of every county in Ireland were compiled by a remote sensing and GIS-based methodology. Soil type was predicted using key soil factors (e.g., vegetation) and geology (e.g., parent material) and topography (e.g., slope), and using a qualitative, expert-based classification system. In order to map all the soil variants in a single national soil map, the classification system of soil types had to be simplified relative to previous soil surveys but retain a close relationship to the Great Soil Groups in Ireland. Although the maps have a maximum online scale of 1:2,000 (See EPA, 2014), the nominal working scale of 1:100,000-150,000 was used during map preparation. Although the Teagasc/EPA Soil Maps are categorically simplified, they are cartographically detailed, and thus offer superior spatial definition. The distribution of the soil types at Clashford is assessed by reference to Teagasc/EPA Soil/Subsoil Maps, with supplementary interpretation based on the Soil Map of Meath (Finch et al. 1983).

The general soil map of Ireland by Gardiner & Radford (1980) shows that the predominant topsoil or soil type across the Clashford site is Grey Brown Podzolics (38), which has associated soils of Gleys (25). The soil map of County Meath by Finch et al. (1983) also indicates the predominant soil type is Grey Brown Podzolics of the Dunboyne Shaley Phase soil series (i.e., 218sy) derived from limestone and shale, and possibly also Dunboyne-Ashbourne Shaley Phase (i.e., 224sy).

The soil types occurring at the site and in the wider area were also assessed by reference to the Teagasc/EPA subsoil map (EPA, 2014). The dominant subsoil occurring at the Clashford quarry site are designated as:

1. AminSW - Lithosol / Regosol derived mainly from non-calcareous parent material, dominates the quarry site (i.e., c. 75%)
2. AminSP - Surface water Gleys / Ground water Gleys derived mainly from non-calcareous parent material
3. BminSW - Rendzinas / lithosols derived mainly from calcareous parent material
4. AlluvMIN - Mineral Alluvium

where the latter two subsoils only occur on the banks of the river. Other subsoils in the wider area are:

1. AminPD - Surface water Gleys / Ground water Gleys derived mainly from non-calcareous parent material, in the wider Delvin River valley, lowlands and coastal plain
2. AminDW - Acid Brown Earths and Brown Podzolics derived mainly from non-calcareous parent material, mainly on medium elevated ground in hills over Balbriggan Inlier to NW and Namurian sediments to SE
3. AminSRPT – Podzols (Peaty) / Lithososls / Peats derived from non-calcareous parent material
4. Lac - Lacustrine-type deposits, immediately west of the site
5. Made - Made/built ground, in the village of Naul

Grey Brown Podzolics are usually derived from a calcareous parent material, which counteracts the effects of leaching. These contrast with Podzols, which are heavily eluviated by heavy rainfall leaching through the organic layer in a process known as podzolisation. Lithosols are predominantly shallow soils derived from calcareous rocks or gravels with/without peaty surface horizons and tend to be stony mineral soils. These soils are usually overlying solid or broken bedrock and are in the early stages of being formed. Regosols show no distinct layer development, and the texture may vary between sands and clays, and be acid or alkaline.

It is considered that the lithosols / regosols designated in the Teasgasc/EPA maps correspond to the Grey Brown Podzolic soils of Finch et al. (1983). In that Finch et al. (1983) determined soil type at a finer working scale, and by mapping using direct visual inspection, profile pits and laboratory analysis, it is considered that the designation of the soil as Grey Brown Podzolics as the dominant soil type on site prior to quarrying operations is valid. There were also occurrence of minor amounts of Gleys, and of Redzinas / Lithosols and Alluvium on site. The soil map of the area including the site is shown in Figure 4.3-1.

The quarry resource has been worked-out, and the quarry void is in the process of being backfilled with imported soil and stone, capped with topsoil, as per the phased restoration scheme. Most of the original topsoil has already been utilised together with imported topsoil to restore previous sections of the site.

4.3.3.2.2 Subsoil – Quaternary Geology

The subsoil types occurring at the site and in the wider area were determined by reference to the EPA subsoil map (EPA, 2014). The dominant subsoil occurring at the Clashford quarry site is described as Lower Palaeozoic sandstone and shale sands and gravels (i.e., designated GLPSsS), and prior to quarrying operations covered the entire application site. Within the wider quarry site, there are also minor occurrences of undifferentiated gravelly alluvium (i.e., A) and exposed rock (i.e., Rck), including karstified rock (i.e., KaRck), outcropping along the banks of the Delvin River. Other subsoil types in the wider area include: (1) till from Devonian/ Carboniferous sandstone and shale (TLPSsS) covering much of the elevated area overlying the Ordovician sediments and volcanics of the Balbriggan Inlier to the NW; (2) Irish Sea till from Palaeozoic sandstone and shale (IrSTLPSsS) covering ground with medium elevations in the wider Delvin River valley and extending across the coastal plain around Balbriggan; (3) till from Namurian sandstone and shale (TNSSs) covering Namurian sediments to the SE; and (4) made ground (i.e., Made) in village of Naul.

The last Ice Age, known as the Late Midlandian or Devensian, peaked at approximately 20-25,000 years ago with total deglaciation of Ireland around 13,000 years ago. The origin of the subsoil is associated with deposition related to ice movement, specifically glacial retreat and melting during deglaciation. Soils would have begun to develop after deglaciation, around the beginning of Holocene epoch at 12,000 years ago.

Sands and gravel dominate the subsoil of the Clashford quarry site, and represent unconsolidated glacial sediments deposited during the retreat of the ice sheet that once covered Ireland. Ice sheets grind and pulverise the underlying bedrock, reducing it to fragments ranging from boulders to clay particles. Sediments and features formed during the glaciation are commonly treated under the general term Quaternary Geology. The subsoil map of the area including the site is shown in Figure 4.3-2 below.

Site investigation work carried out on Clashford quarry site allows for a more accurate understanding of the current site subsoil. An assessment was carried out by Dr. Robert Meehan on behalf of JSPE on 6th January and 21st January 2009[1]. In this investigation, the general site area included various depths of topsoil, and this was underlain by unmottled SILT/CLAY. In some poorly drained areas (not now part of Phase 2) the subsoil material was found to be heavily consolidated, either naturally stiff or over-compacted.

Site investigations in 2018, undertaken by Hydro-Environmental Services (HES), have identified similar soils and subsoils geology. In addition, a number of the completed boreholes penetrated deep enough to encounter the underlying natural ground. This confirms that subsoils below the fill material comprises sand and gravels and some silts. The underlying natural material was generally found to be clean and dry, with no evidence of leaching or contamination.

The majority of the fill material encountered in the 2018 site investigation comprised of SILT and CLAY consistent with the glacial deposits found in Meath and North County Dublin (glacial tills and boulder clays).

This area of County Meath was completely overlain by a thick ice sheet (up to 1 km thick), which moved in a general south-easterly direction. The powerful erosive force of the ice sheet is considered to have sculpted the landscape in the region, as evidenced by many preserved glacial features. As the ice sheet melted, the meltwaters sorted and deposited sands and gravels in the form of characteristic glacial features. As stated earlier, the valley of the Delvin River features rocky outcrops on the steep sided channels carved by the glacial meltwaters (Fingal County Council, 2011; McConnell et al., 2001). The Clashford quarry is situated on, and extracts sand and gravel from a deposit of well sorted, fluvioglacial sand and gravel, which was deposited by these glacial meltwaters.

The GSI Groundwater Protection Scheme maps for Co. Meath and the borehole database GSI (2018) indicate subsoil depths of up to 18 m (200 m to the east of the site) and up to 42.5 m (100 m to the southeast of the site). Observations from site visits and information obtained from the facility operators, indicate that there is approximately 8 m of boulder clay overlying the bedrock in the quarry site. The quarry pit excavations extend to approximately 10m to 15m below the surrounding ground level, and thus indicate substantial thickness of subsoils/soils, sand and gravel, and boulder clay overlying the bedrock in the quarry site. The following approximate thicknesses of the overburden on the quarry site prior to operations are indicated: 0.5-1m of topsoil, 10-15m of sand and gravel, and 8m of boulder clay at the base.

4.3.3.3 Bedrock Geology

This subsection is based largely on McConnell et al. (2001), Graham & Stillman (2009) and Sevastopulo & Wyse Jackson (2009), but without explicit individual references in the text. The 1:100,000 scale map of the Geology of Meath: Sheet 13 (McConnell et al., 2001) and online mapping (GSI, 2018) indicates all of the rock units within c.1km of the site, which are given in approximate chronological order in Table 4.3-1.

Table 4.3-1 Bedrock Units of the Clashford Area

North Dublin Basin	Thickness (m)	Mississippian Substage
Walshestown Formation (WL)	>200m	Pendleian-Arnsbergian
Balrickard Formation (BC)	75-100m	Pendleian
Mudbank Limestone Lithology (Mk)	Not Available (na)	Asbian (Probable)
Loughshinny Formation (LO)	<150m	Brigantian
Naul Formation (NA)	<100m	Asbian
Holmpatrick Formation (HO)	90-200m	Arundian to Holkerian

Northern Sector of the Balbriggan Inlier	**Thickness (m)**	**Silurian Substage**
Denhamstown Formation (DD)	na	Wenlock
Southern Sector of the Balbriggan Inlier	**Thickness (m)**	**Ordovician Substage**
Clashford House Formation (CF)	100m	Mid-Caradoc
Herbertsown Formation (HB)	250-430m	Caradoc
Snowtown Formation (SW)	200m	Arenig
Fournocks Formation (FK)	na	Arenig-Llanvirn

During the Ordovician and Silurian Periods (c. 490-415Ma), the Iapetus Ocean closed bringing Laurentia (including northwest Ireland) and Avalonia (including southwest Ireland) into collision and culminating in the Caledonian Orogeny c. 425-395Ma. During the Devonian Period (c. 417-354Ma) Ireland was part of the Laurasian super continent, also known as the Old Red Sandstone continent. The latter underwent extensive subaerial erosion, whilst laying in arid southern subtropical latitudes, giving rise to the characteristic red coloured, continental facies sandstones. During the early Carboniferous (c. 354-327Ma), a marine transgression advanced northward across the eroded and flat-lying continent (i.e., peneplain), and deposited a sequence of carbonate rocks that cover much of the Irish Midlands.

The rocks of the Clashford area belong to: (1) the Lower Palaeozoics of the Balbriggan Inlier; or (2) the Mississippian (Lr. Carboniferous) marine sequence of the North Dublin Basin. The Balbriggan inlier is composed of the northern sector representing the Bellewstown Arc Terrane, and the southern sector representing the Avalonia Terrane, and are separated by the Lowther Lodge Fault. The two terranes were accreted to one another at the end of the Ordovician, prior to the final closure of the Iapetus Ocean at the end of the Silurian. Silurian rocks then formed an overstep sequence on the Ordovician rocks of both the northern and southern sectors. The rocks of the North Dublin Basin are dated from the Tournaisian, Visean and earliest Namurian of the Mississipian Epoch (c. 358-318Ma), and were laid down as a retrograding sequence due to a northward advancing marine transgression.

Numerous faults have been identified within 1km of the site, and many of the contacts between the major stratigraphic units are faulted contacts. These would have been initiated during the Caledonian Orogeny, and reactivated during the crustal extension associated with subsidence and 'block and basin' development during the Carboniferous. Crustal compression during the Variscan Orogeny around the end of the Carboniferous (c. 299Ma) also reactivated the faults, and was associated with uplift and gentle folding of Carboniferous rocks.

Palaeozic Rocks of the Balbriggan Inlier

The base of the Ordovician sequence in the area is the Fournocks Fm. (FK), which consists of red and green banded mudstones and siltstones. This is conformably overlain by the Snowtown Fm. (SW), which consists of a 200m thick unit of banded grey mudstones and

siltstones. These are unconformably overlain by the Herbertsown Fm. (HB), a unit of andesitic volcanics and mudstones.

The Herbertstown Fm. is conformably overlain by the Clashford House Fm. (CF), which underlies much of the site. It consists of 100m thick sequence of micaceous green- to brown-grey mudstones and siltstones with interfingering sheets of andesite. The unit is fossiliferous, containing a shelly fauna of Avalonian affinities, consistent with a position on the northernmost margin of the Leinster Terrane. The Clashford House Fm. represents marine sedimentary rocks associated with a fore arc / volcanic arc on the continental margin of Avalonia on the southern side of the Iapetus Ocean. The Denhamstown Fm. forms the base of the Silurian overstep sequence, which was deposited over the accreted Bellewstown-Arc and Avalonia Terranes. The Lowther Lodge Fault has brought the Denhamstown Fm. into contact with the Clashford House Fm. c. 750m north of the site.

Carboniferous Rocks of the North Dublin Basin

By the start of the Visean, basin development was more advanced, and strata are identifiable as forming in shelf/platform (e.g., pale grey limestones), shelf edge (e.g., Waulsortian) or basin (e.g., dark micritic limestones and black shales). The base of the Carboniferous sequence in the area is marked by the Holmpatrick Fm. (HO), which consists of a 90-200m thick sequence limestones. The formation belongs to the Milverton Group, which includes all shelf/platform formations in the northeast.

The next youngest unit is the Naul Fm. (NA), which has been brought into contact with the Balbriggan Inlier through faulting. The Naul Fm. is similar to the Lucan Fm., except the limestones are paler and less argillaceous, and consist largely of calcarenite and calcsiltite with minor chert and shale (i.e., higher on ramp - less basinal). It outcrops on the banks of the Delvin River at Naul, and has been interpreted as the lateral equivalent of the upper part of the Lucan Fm., which is widespread in north County Dublin. The formation varies widely in thickness up to 100m.

Overlying the Naul Fm., is the Loughshinny Formation (LO), which has been brought into contact with the Naul Fm. in the Naul area by a major SW-NE fault. The formation consists of up to 150m of laminated to thinly bedded, argillaceous, pyritic, locally cherty limestones, interbedded with dark grey to black shales. The Naul and Loughshinny Fms. are lithologically very similar, and were formerly grouped together as the Calp Limestone, but have been divided into separate formations within the Fingal Group of predominantly basinal facies.

The Loughshinny is conformably overlain by the Balrickard Fm. (BC), which is Namurian in age, and consists of 75-100m deltaic sandstone interbedded with shale and argillaceous micrite. This is conformably overlain by the Walshestown Fm. (WL), which is also Namurian in age, and consists of >200m of black shales, with siltstone, fine sandstone, and calcareous mudstone. The Balrickard and Walshestown formations belong to the Knockbrack Group, which straddles the Visean-Namurian boundary. It heralds an abrupt change in depositional environments from that of limestones and shales in shallow tropical seas during the Tournaisian-Visean to sandstones and shales in quiescent, deep waters during the Namurian.

An additional lithology known as the Mudbank Limestone Lithology (Mk) is also recognised, and occurs in several fault blocks adjacent to the Balbriggan Inlier. The lithology consists of

massive, unbedded, grey micritic (fine-grained) limestones and represent a complex lime mud mound facies rich in bryozoa and brachiopods, similar to the Waulsortian, which interdigitates with the Asbian shelf limestones (MEIL, 2004). These limestones pass laterally into calcarenites and calcsilicates with shale partings, probably indicating local basin development.

The quarry site straddles the faulted contact between the Balbriggan Inlier and the North Dublin Basin, and is predominantly underlain by the Clashford House Fm. (70%), with minor Mudbank Limestone (20%) and Naul Fm. (10%) in the southwest corner. Two faults traverse the site: (1) a roughly ENE-WSW oriented fault brings a triangular sliver of the Mudbank Limestone lithology into contact with the Clashford House Fm.; and (2) an E-W oriented fault brings the Mudbank Limestone into contact with the Naul Fm. Whilst the area is heavily faulted, a major NE-SW oriented fault with substantial vertical displacement, traverses c. 500m east of the site. The bedrock of the area including the site, is shown in Figure 4.3-3.

Bedrock was not found to be outcropping in the application area due to the advanced state of the phased restoration of the quarry (i.e., restored lands in northeast section, and Phases 1 and 2 are complete or near-complete, respectively), as well as the presence of deep overlying subsoil deposits in, the unrestored, worked-out area (i.e., Phase 3).

4.3.3.4 Geological Heritage

The Irish Geological Heritage (IGH) programme identifies and selects a complete range of sites that represent Ireland's geological heritage. The programme is operated by the GSI and the National Parks and Wildlife Service (NPWS). Some of these sites may be designated in due course, as Natural Heritage Areas (NHAs) because of their geological interest from a national perspective.

In its 2013-2019 County Development Plan (CPD), Meath County Council recognises areas of conservation value, which include twenty eight geological sites. A search of the GSI Geological Heritage Database indicates that there are no sites of geological heritage within or near the site of the WRF.

The nearest site occurs c. 3.5km to the NNE at Laytown-Gormanstown:

1. Laytown-Gormanstown (Site Code: MH008; Theme: IGH 7)

   Irish National Grid: 316500, 269300

   Location: County: Meath; Area: Laytown to Gormanstown

   Critical Feature: Flat to gently undulating glacial outwash plain of sand or gravel

There is a cluster of three sites occurs c. 4 to 4.5km to the SE:

2. Nag's Head Quarry (Site Code: DF016; Theme: IGH 8)

   Irish National Grid: 315500, 257910

   Location: County: Fingal; Townland: Hollywood Great

   Critical Feature: Exposed faces of limestone, shale and sandstone displaying structural deformation (chevron folds)

3. Balrickard Quarry (Site Code: DF017; Theme: IGH 9)

   Irish National Grid: 317720, 259690

Location: County: Fingal; Townland: Balrickard

Critical Feature: Exposed faces of Upper Carboniferous sandstone and shale

4. Walshestown Stream Section (Site Code: DF018; Theme: IGH 9)

Irish National Grid: 317300, 258300

Location: County: Fingal; Townland: Walshestown

Critical Feature: Exposure Upper Carboniferous (Namurian) shale, sandstone and limestone

An additional, sites is located c. 7km to the NW:

5. Bellewstown (Site Code: MH003; Theme: IGH 2)

Irish National Grid: 307870, 267130

Location: County: Meath; Townland: Bellewstown

Critical Feature: Fossiliferous exposures of volcanic and sedimentary rocks

4.3.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.3-2 Land, Soils & Geology - Impact Matrix

'Do Nothing' Impacts	🟡		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	X	🟢	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	🟢	X

None/imperceptible: X; Slight: 🟢; Moderate: 🟡; Significant/Very significant: 🔴.
Refer to Appendix 5.2 for definition of Significance

4.3.4.1 'Do Nothing' Impacts

The WRF recovers significant quantities of inert soil and stone through backfilling in the quarry void. If the WRF is not licensed to continue recovery operations, recovery of inert waste at the WRF would not occur and possibly result in the failure to divert these volumes from disposal in landfill, as required under the Waste Framework Directive 2008 (2008/98/EC). Alternatively, the inert soils and stone and C&D waste materials may have to be transported further afield with a consequential impact in terms of increased exhaust emissions for transport of materials to more removed WRF facilities.

The proposed continued operation of the WRF will have a positive impact, as recovery of soil and stone for land improvement, specifically reinstatement of a quarry, is considered a beneficial use.

If the proposed development did not proceed, the Clashford site would remain as a partially restored, degraded quarry site, without the backfilling generated by the proposed WRF, thus rendering the groundwater vulnerable to potential contamination by infiltration. Thus, it is considered that the proposed development of an WRF will have a positive impact.

4.3.4.2 Direct Impacts

The nature of the WRF involves the importation and placement of inert soil and stone as backfill in the quarry void. The application site for the WRF occupies the unrestored areas, or areas containing failed forestry within the worked-out quarry area, and as such will have no impact on virgin soils, sands and gravels, which have already been stripped, disturbed or extracted. As a result of backfilling using inert soils and stones, the WRF will continue to progress the reinstatement of the quarry back to land suitable for agricultural and silviculture, and thus will have a positive impact.

It is considered that as the proposed development is within an existing quarry that there will be an imperceptible impact on Land, Soils and Geology associated with construction activities. In terms of impacting on the groundwater vulnerability of the site, the importing of the inert fill will have a positive effect on the site in that the groundwater vulnerability rating will be lower.

Consideration has been given to soil and overburden management. For the placement of subsoil and topsoil, the machinery will work from the haulage track or the exposed subsoil surface and away from the reinstated part of the site.

Soils will only be handled in dry weather conditions. Soils will not be placed when the moisture content is high, such as after heavy rainfall. Soils will not be moved in unusually dry and windy weather conditions. All temporary storage mounds will have slope angles not greater than 1:1.5 and will be re-vegetated as quickly as possible to avoid soil erosion by air and water. Further details with respect to the management of topsoil and overburden soils are outlined in EIAR Section 3.4.1.

On completion of site activities, the site of the quarry and WRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Land, Soils and Geology. The restoration of the site to beneficial after-use will result in a permanent significant positive effect in the medium term.

4.3.4.3 Indirect Impacts

The WRF will have no indirect impact on the local or regional geology, as placement of the inert soil and stone will not release contaminants onto the lands, whilst dust from the WRF will be tightly controlled (Refer to EIAR Section 4.6).

4.3.4.4 Cumulative Impacts

The interaction of the quarry and proposed WRF is seen as ‘symbiotic’ and positive, with no negative cumulative impacts on the geological environment identified.

4.3.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Land, Soils and Geology.

4.3.4.6 'Worst Case' Impact

The worst case scenario would be an impact on groundwater quality resulting from importation of contaminated soil and stones were waste acceptance procedures not to be followed. Worst case impacts are only likely to be a slightly alteration of the groundwater quality locally. These minor local effects are not expected to compromise groundwater quality with respect to groundwater or drinking water regulations. Impact on groundwater is addressed in EIAR Section 4.4. Mitigation measures with respect to waste acceptance, emergency response procedures and soils management are provided below.

4.3.5 MITIGATION & MONITORING

There is no bedrock exposed within the site of the WRF, and as such no impact on bedrock geology as a result of the WRF is expected. The WRF is also not expected to have any significant negative impact on the surficial geology of the site or surrounding area, and thus no mitigation measures are proposed. Ultimately, after final land reclamation of the quarry site, with the land restored principally to agricultural use and forestry, there will be no residual impact on the surrounding environment from the WRF.

Safeguards to ensure that only suitable material is received on site will include, but are not limited to:

- The facility will maintain full and complete records, including a gate logbook (e.g., log of intake and deliveries), documentation relating to planning, health and safety, environmental monitoring, the environmental management system (EMS), etc.
- The WRF will have designated areas for the quarantine of any inappropriate materials which may be found within loads accepted at the site. Skips will be provided within the designated quarantine areas for the temporary storage of any inappropriate materials discovered (e.g., glass, plastic, timber, steel, etc.). The materials will be routinely removed by a licensed waste disposal contractor to an appropriate recovery and/or disposal facility.
- Should a load of material indicate contamination of non-inert material on inspection, the material will either be reloaded and the driver instructed to remove the load offsite to an approved facility; and/or the material will be stored in a quarantine area awaiting removal to an approved facility.
- Materials to be recovered will only be accepted from approved contractors who are aware of the need for and who undertake strict segregation and sorting of waste prior to transporting it to the application site;
- Only hauliers with the appropriate Waste Collection Permits will be accepted.
- A designated internal haul road will be maintained to direct site traffic to the WRF.

- All material arriving on site will be subject to a visual inspection on site prior to and during unloading;
- Any contractor who persistently carries unacceptable waste to the application site will be refused further use of the facility.
- Good quality indigenous or imported soil will be conserved wherever possible to provide the subsoil/top-soil capping.
- To ensure that damage to these materials is kept to a minimum, movement and placement of topsoil and subsoil for final restoration will only take place during appropriate weather conditions and when the soils are in the optimum condition. This optimum soil condition may be described as moist but friable. No soils will be moved when they are too dry or when there are unusually windy weather conditions. This will help to prevent erosion and any consequential creation of dust. Conversely, soils will not be handled in wet conditions or when the moisture content of the soils is too high. This will ensure that smearing of the soils does not take place and that the soil retains its structure.
- Progressive restoration involving grass seeding of restored area's will be carried out on a staged basis to reduce the effects of soil erosion and windblown dust, to aid ground stabilisation, and as an effective means of weed control. Final restoration is dependent on the availability of good topsoil/subsoil and subject to suitable weather conditions. The final contours and topography for the site is shown by the Restoration Plan Figure B 2.4 - Rev C and Figure B 2.5 - Rev C (Cross Sections).
- Once the topsoil is re-instated it will be seeded with a suitable mix of grasses suitable for pasture in order to quickly stabilise the topsoil. Once the grass sward has become established the restored farmland can be kept either as pasture or hay meadow.
- Environmental monitoring, including local groundwater and surface water monitoring will be implemented during the construction, operational, closure ad decommissioning phases of the development.

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4.3.7 FIGURES

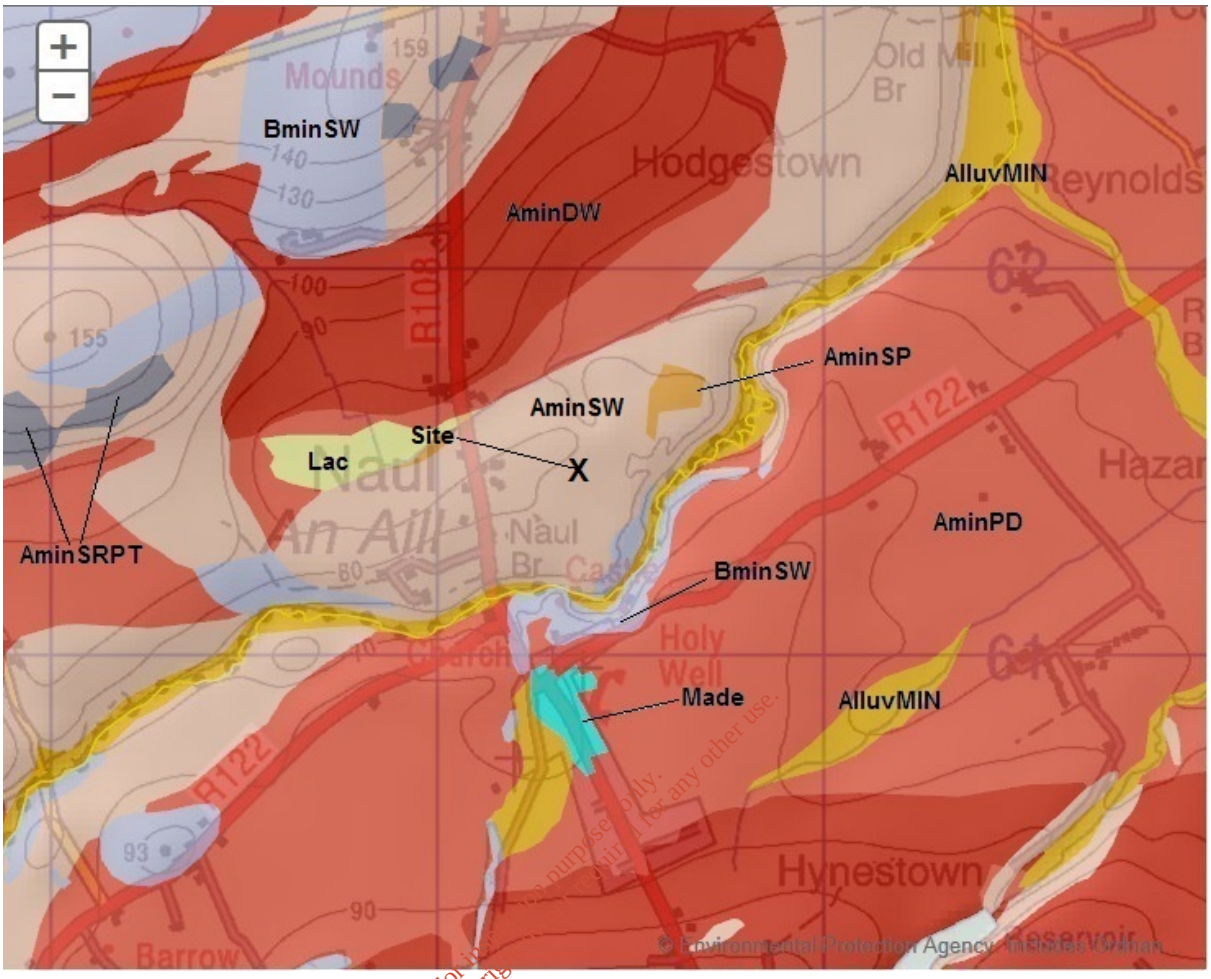


Figure 4.3-1 Soil Map of Clashford Area

Redrawn extracts from EPA Envision online mapping website at http://gis.epa.ie/Envision. Scale: Grid Spacing = 1km.

Soil Map Legend:

Pink: AminSW - Lithosol / Regosol derived mainly from non-calcareous parent material, dominates the quarry (i.e., c. 75%)

Orange: AminSP - Surface water Gleys / Ground water Gleys (Shallow) derived mainly from non-calcareous parent material

Blue: BminSW - Rendzinas / lithosols derived mainly from calcareous parent material

Light Orange: AlluvMIN - Mineral Alluvium

Light Red: AminPD - Surface water Gleys / Ground water Gleys (Deep) derived mainly from non-calcareous parent material, in the wider Delvin River valley, lowlands and coastal plain

Dark Red: AminDW - Acid Brown Earths and Brown Podzolics derived mainly from non-calcareous parent material, mainly on medium elevated ground in hills over Balbriggan Inlier to NW and Namurian sediments to SE

Yellow: Lac - Lacustrine-type deposits, immediately west of the site

Grey Blue – AminSRPT – Podzols (Peaty) / Lithososls/ Peats derived from non-calcareous parent material

Turquoise: Made - Made/built ground, in the village of Naul

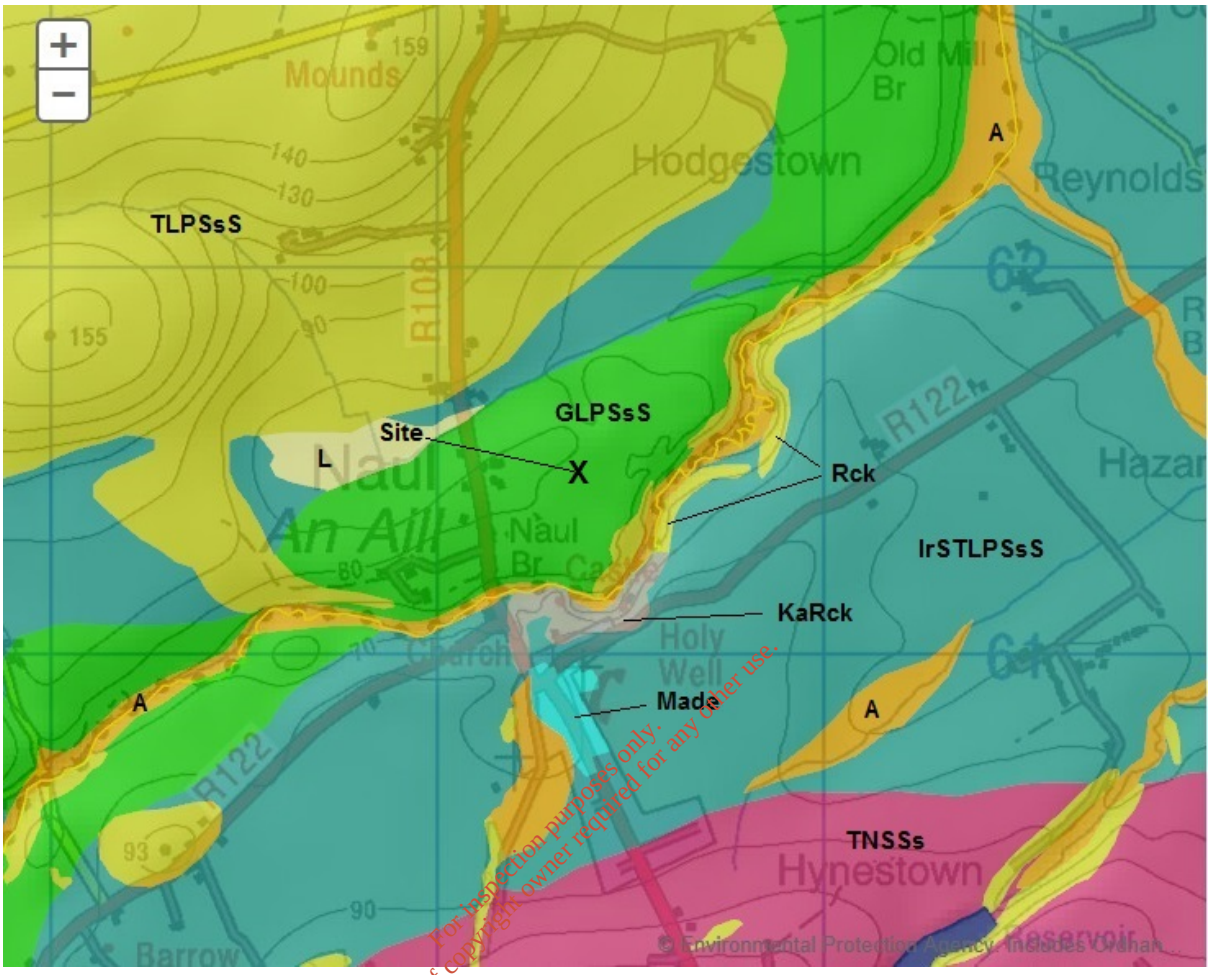


Figure 4.3-2 Subsoil Map of Clashford Area

Redrawn extracts from EPA Envision online mapping website at http://gis.epa.ie/Envision. Scale: Grid Spacing = 1km.

Subsoil Map Legend:

Green: GLPSsS - Lower Palaeozoic sandstone and shale sands and gravels

Orange: A – Alluvium (gravelly)

Yellow: Rck – Exposed Rock

Mauve: KaRck – Karstified Rock

Blue: IrSTLPSsS - Irish Sea Till derived from Palaeozoic sandstone and shale, surrounding the site

Beige/Yellow: TLPSsS - Till derived from Devonian/ Carboniferous sandstone and shale, northwest of site

Purple: TNSSs - Till derived from Namurian sandstone and shale, southeast of site

Light Beige: L – Lake Sediments – undifferentiated, west of site

Turquoise: Made - Made Ground in village of Naul, south of site

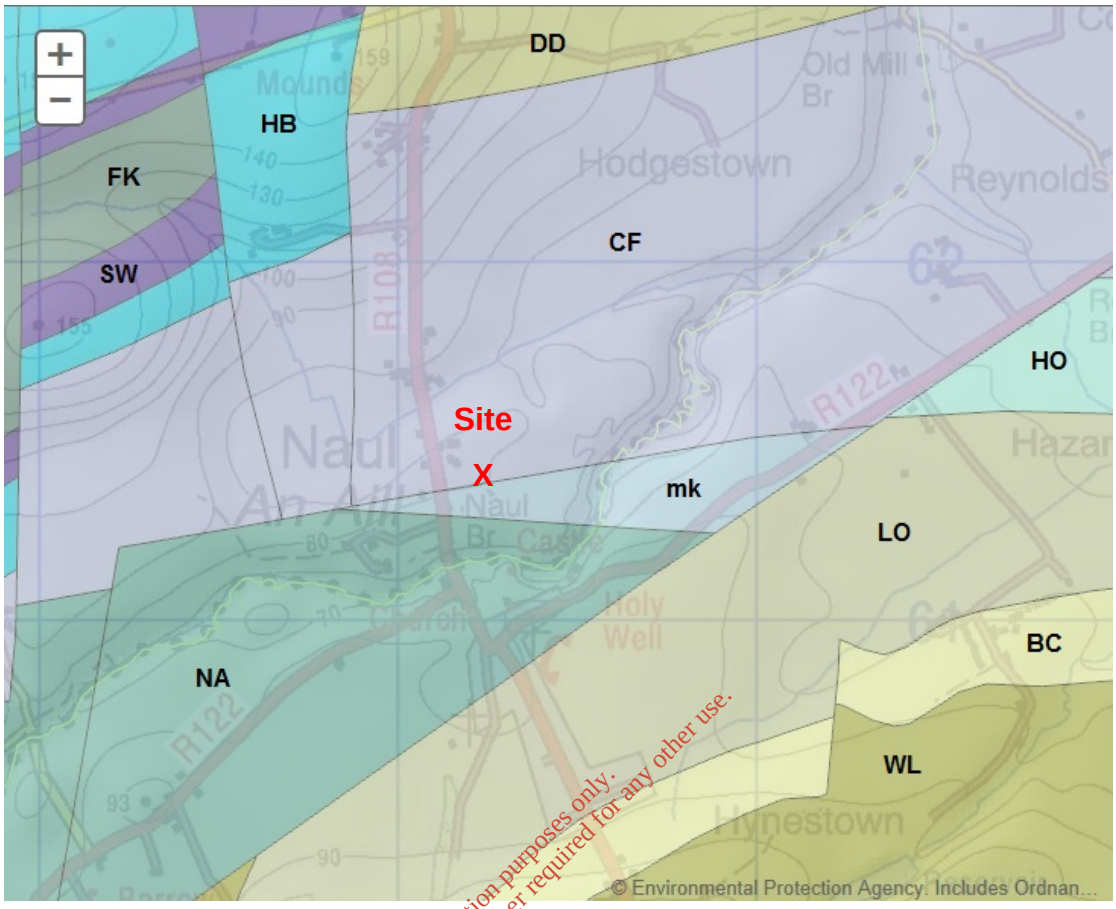


Figure 4.3-3 Geological Bedrock Map of the Clashford Area

Redrawn extracts from EPA Envision online mapping website at http://gis.epa.ie/Envision. Scale: Grid Spacing = 1km.

The Clashford quarry site straddles the Clashford House Fm. (CF), Mudbank Limestone Lithology (mk), and Naul Fm. (NA). Other bedrock units in the wider area include the Lower Palaeozoic Fournocks Fm. (FK), Snowtown Fm. (SW), Herbertstown Fm. (HB) and the Denhamstown Fm. (DD), as well as the Mississippian Holmpatrick Fm. (HO), Loughshinny Fm. (LO), Balrickard Fm. (BC), and Walshestown Fm. (WL).

4.4 WATER

4.4.1 INTRODUCTION

Hydro-Environmental Services (HES) were engaged by J Sheils Planning & Environmental Ltd., on behalf of Clashford Recovery Facilities Ltd., to assess hydrological and hydrogeological impacts relating to the on-going phased restoration of a sand and gravel pit using imported inert soils, stone and the import of inert Construction and Demolition waste to produce secondary aggregates (to be exported from the site), at Naul townland, Naul, Co Meath.

This assessment has been undertaken as part of the Water Section of an Environmental Impact Assessment Report (EIAR), which will be submitted with a waste licence application and incorporates available background information and site-specific information.

4.4.1.1 Objectives

The primary objective of the hydrogeological assessment is to assess the impact posed to surface water and groundwater by the on-going waste recovery of inert material and by the infilling and restoration of an area of the existing quarry using inert waste. Where appropriate, mitigation measures are recommended. The objectives of the assessment are:

- Produce a baseline study of the existing water environment (surface water and groundwater) in the area of the proposed infilling site;
- Identify likely negative impacts of the proposed development on surface water and groundwater;
- Identify mitigation measures to avoid, remediate or reduce significant negative impacts (if any); and,
- Assess hydrological cumulative impacts of the proposed development along with other activities and developments in the local area.

4.4.2 METHODOLOGY

4.4.2.1 Desk Study

The desk study involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area. As part of the desk study assessment, the following organisations were consulted for information pertaining to the site hydrology and hydrogeology e.g., databases, studies, etc.:

- Geological Survey of Ireland;
- National Parks and Wildlife Service;
- Environmental Protection Agency;
- Met Éireann;
- Teagasc.

Ultimately, preparation of a hydrogeological report integrated the research undertaken in the desktop and field studies.

4.4.2.1.1 Sources of Information

Information and data were secured from the following sources:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive website (www.catchments.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 13 (Geology of Meath). Geological Survey of Ireland (GSI, 1999);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- OPW Indicative Flood Maps (www.floodmaps.ie);
- Environmental Protection Agency – "Hydrotool" Map Viewer (www.epa.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie); and,
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).

4.4.2.1.2 Policy & Legislation

The EIAR is carried out in accordance with the follow Irish legislation:

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001), S.I. No. 30 of 2000, the Planning and Development Act, and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/337/EEC (EIA Directive) and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Acts 2000-2017;
- Planning and Development Regulations, 2001-2018;
- S.I. No. 94 of 1997: European Communities (Natural Habitats) Regulations, resulting from EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);
- S.I. No. 293 of 1988: Quality of Salmon Water Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;

- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC). Since 2000 water management in the EU has been directed by the Water Framework Directive (WFD). The key objectives of the WFD are that all water bodies in member states achieve (or retain) at least 'good' status by 2015. Water bodies comprise both surface and groundwater bodies, and the achievement of 'Good' status for these depends also on the achievement of 'good' status by dependent ecosystems. Phases of characterisation, risk assessment, monitoring and the design of programmes of measures to achieve the objectives of the WFD have either been completed or are ongoing. In 2015 it will fully replace a number of existing water related directives, which are successively being repealed, while implementation of other Directives (such as the Habitats Directive 92/43/EEC) will form part of the achievement of implementation of the objectives of the WFD;
- S.I. No. 41 of 1999: Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 249 of 1989: Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
- S.I. No. 439 of 2000: Quality of Water intended for Human Consumption Regulations and S.I. No. 278 of 2007 European Communities (Drinking Water No. 2) Regulations, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and WFD 2000/60/EC (the Water Framework Directive);
- S.I. No. 821 of 2007: Waste Management (Facility and Registration) Regulations 2007;
- S.I. No. 86 of 2008: Waste Management (Facility and Registration) Amendment Regulations 2008;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009;
- S.I. No. 296 of 2009: European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010.

The assessment was also carried out in accordance with guidance contained in the following:

- Department of the Environment, Heritage and Local Government (2004) "*Quarries and Ancillary Activities – Guidelines for Planning Authorities*".
- Environmental Protection Agency (1992) "*BATNEEC Guidance Notes for the Extraction of Minerals*".

- Environmental Protection Agency (2006) "*Environmental Management in the Extractive Industry (Non-scheduled minerals)*".
- Environmental Protection Agency (2015) Advice Notes on Current Practice (in the preparation on Environmental Impact Statements), Draft.
- Environmental Protection Agency (2017) Guidelines on the Information to be Contained in Environmental Impact Statements, Draft.
- Institute of Geologists of Ireland (2007) "*Recommended Collection, Presentation and Interpretation of Geological Hydrogeological Information for Quarry Development*".
- Institute of Geologists of Ireland (2013) "*Guidelines in the Preparation of the Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements"*.

4.4.2.1.3 Designations

The quarry site at Clashford, which includes the application site, is not included in any area with an ecological designation (NHA, cSAC or SPA). The only Natura 2000 sites within 15km of Naul are the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), the River Nanny and Shore SPA (Site Code 4158) and the Skerries Island SPA (Site Code 4122).

The nearest pNHA site is the Bog of the Ring (Site Code 001204), Ring Commons, Co. Dublin at c. 3km, whilst Cromwell's Bush Fen pNHA (Side Code 001576), Greenanstown, Co. Meath is c. 4.5 km.

Screening for Appropriate Assessment was carried out with respect to the proposed development and a copy of this was submitted to the EPA on 11/04/2014. The findings of the screening for Appropriate Assessment were that in view of best scientific knowledge, it is concluded that the activity, individually or in combination with other plans or projects is not likely to have a significant effect on the Natura 2000 network, and the conservation objectives of the sites. A Stage 2 Appropriate Assessment is therefore not required.

As outlined in correspondence from HES to the EPA on 18th March 2016[2] the lack of connectivity between the Natura 2000 sites and the Clashford sites is detailed:

> "*There is a considerable distance between the Clashford site and any of the Natura 2000 sites. For all Natura 2000 sites sediment or surface water has to travel in the river and then the sea to get to any of the Natura 2000 sites. The shortest flowpath is to the River Nanny Estuary and Shore SPA (Site Code: 004158), and this is some 10.5kms (including 1.5kms of open sea water). Assuming an average near shore sea depth of 5m, and using the near shore 500m width (as a likely flow path from the Delvin estuary towards the SPA), the volume of this near shore body of water is some 3,750,000m^3 of sea water. The dilution available in the sea for any minor water quality issue in the Delvin River is significant and will buffer the SPA from any significant potential impact."*

[2] P1317-0_001 Letter to Inspector Babiarczyk, Environmental Licencing Program, Office of Climate, Licencing, Resources & Research, EPA regarding Clashford Recovery Facility licence W0265-01

In the interest of clarity and completeness, we have attached a copy of an Environmental Assessment and Risk Assessment Report of Phase 2 Restoration Area (Refer to Appendix 5.3.1). The submitted letter is included as Appendix I of this report.

In summary, the distances involved and the dilution available imply that any discharges from the Clashford WRF site cannot concievably impact on these downstream designated sites.

Therefore, there will no direct or indirect impact on these sites as a result of the continued operation of the WRF at Clashford. The Delvin River discharges to the sea south of the Laytown Dunes, below Julianstown.

4.4.2.2 Field Survey

- Site walkover survey and water level monitoring, September/October 2016;
- Surface water and groundwater sampling was completed by Hydro-Environmental Services (HES) on 12th September 2017;
- Site investigation work, including water sampling from the existing monitoring wells and surface water monitoring points, was completed by Hydro-Environmental Services (HES) on 13th March 2018;
- Borehole drillings was completed by Ground Investigation Ireland between 23rd April 2018 and 27th April 2018. HES collected soil samples from these boreholes for laboratory analysis;
- 18 no. trial pits were excavated at the site between 23rd April 2018 and 25th April 2018. HES collected soil samples from these trial pits for laboratory analysis; and,
- Site investigation work was conducted by HES on 23rd April 2018 through to 1st May 2018. This included groundwater sampling, drilling supervision and soil sampling from boreholes and trial pits.
- Site walkover conducted by IE Consulting on 01st July 2014 to review site water management practices;
- IE Consulting supervision of downgradient monitoring well (2 No) drilling, on the 28th and 29th July 2014;
- IE Consulting Groundwater monitoring of existing boreholes (GW1 and GW2) and the two new downgradient monitoring wells (GW3 and GW4) on the 05th and 11th August 2014;
- IE Consulting Surface water sampling of the river and tributary stream near the quarry site on 05th August 2014.

4.4.2.3 Impact Assessment Methodology

The Water Section of the EIAR is carried out in accordance with guidance contained in the following:

- Department of the Environment, Heritage and Local Government (2004) "*Quarries and Ancillary Activities – Guidelines for Planning Authorities*".

- Environmental Protection Agency (August 2017): Draft – Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements;
- Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-scheduled minerals);
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (2002): Guidelines on the Information to be Contained in Environmental Impact Statements;
- Environmental Protection Agency (1992): BATNEEC Guidance Notes for the Extraction of Minerals;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- Institute of Geologists of Ireland (2007): Recommended Collection, Presentation and Interpretation of Geological Hydrogeological Information for Quarry Development;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Environmental Protection Agency (2017): Draft Waste Acceptance Criteria and Development of Soil Trigger Values for EPA - Licensed Soil Recovery Facilities.
- Environmental Protection Agency (2011): BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities; and,
- Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2001.

4.4.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.4.3.1 Site Location

The existing sand and gravel pit is located in the townland of Naul, County Meath, approximately 0.3 km north of Naul village, at an elevation of approximately 60-80 mAOD. The regional R108 road between Ballyboghill and Drogheda passes near the western boundary of the site. The site includes an area of restored agricultural lands, reclaimed agricultural grassland used for grazing sheep - Phase 1 (P1), an area currently (2018) being restored Phase 2 (P2), the existing pit area Phase 3 (P3), and an area of reclaimed forestry along the northwestern boundaries of site (Refer to EIAR Figure B.2.1 – Rev C).

The site is surrounded by lands which are primarily used for agricultural activities. According to the EPA Corine Land use Map 2012, land use in the area has been classified as 'Pastures and Non-irrigated land`.

There are a number of residences in the vicinity of the site located along the public roads; as one-off rural dwellings and also associated with farm holdings. The closest residential property is located along the public road immediately west of the site.

Kilsaran concrete batching plant is located to the southwest of the site and is outside the boundary of the site. The Fingal Waste Water Treatment Plant (WWTP) is located on the southern flanks of the Delvin River approximately (Refer to EIAR Figure B.2.1 – Rev C).

4.4.3.2 Topography

In a regional setting, the village of Naul is located approximately 7 km east of the Irish Sea in a valley area associated with the River Delvin. According to the 1 in 50,000 Discovery Series Map, the nearest topographical high is located approximately 1.61 km to the south at Cabinhill (i.e., elevation of 143 mAOD), whilst the next nearest is located approximately 1.87 km northwest to the site at Fourknocks Hill (i.e., elevation of 156 mAOD (Refer to EIAR Figure A 1.0 – Rev A).

Based on a site survey undertaken by J Sheils Planning & Environmental Ltd in August 2014, the highest elevation recorded on-site is 79.91 mAOD located inside the site entrance. The site area consists of a central elevated east-west aligned ridge (with the exception of the existing pit area). The land slopes to the north and south from this ridge. The land slopes gently northwards towards Tributary 1 (approximately 65 mAOD) and steeper towards the southeast, north of the Delvin embankment (to approximately 50 mAOD). The approximate topographic gradient across the site is 0.03-0.05 in the direction of the Delvin River (Refer to EIAR Figure B.2.1 – Rev C).

4.4.3.3 Existing Activities on the Proposed Site

The nature of the development is the continued phased restoration of a sand and gravel pit using imported inert soils, stone and the import of inert Construction and Demolition (C&D) waste to produce secondary aggregates.

The existing site infrastructure includes an office, a toilet, and a wheel wash. Wastewater from the toilet is discharged to an adjacent site (Kilsaran Concrete) and is currently not treated within the site boundary (Refer to EIAR Figure B.2.1 – Rev C). It is proposed that the existing site office including welfare facilities will be replaced including provision of septic tank and percolation area.

The washwater from the wheel wash facility is recycled through a system of two silt lagoons which overflow to a surface water outlet. The lagoons are cleaned periodically, and the settled silt is used as part of the site restoration. The wheelwash will be upgraded and relocated towards the site entrance.

The only other discharge from the site area is surface water run-off. The reclamation scheme has been designed to drain surface water run-off to the northern boundary area of the site.

Currently all surface water runoff from the pit/recovery area of the site passes through two settlement lagoons prior to discharge to the tributary of the Delvin River.

Surface water drainage from the restored farmland to the south of the site is discharged to the Delvin River through a land drain at three locations as shown on Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C.

4.4.3.4 Meteorology & Water Balance

Long Rainfall data for the area was obtained from Met Eireann. The SAAR (Standard Average Annual Rainfall) recorded at Bellewstown (Collierstown) (~5km northwest) is 838mm (www.met.ie).

Long term Potential Evaporation (P.E.) data was obtained for the closest synoptic station at Dublin Airport, 14km south of the quarry. The average P.E. for this synoptic station (based on 1961-1990 average monthly data) is 560 mm/year. The Actual Evaporation (A.E.) is taken to be 0.95 of P.E. Therefore, the A.E. at the quarry is estimated at 532mm/yr.

The effective precipitation (EP) is the amount of precipitation that is available to form recharge or runoff. The effective precipitation in the vicinity of the site boundary is estimated as follows:

$$EP = AAR - AE$$

$$= 838\,mm/yr - 532mm/yr$$

$$EP = 306mm/yr$$

An average surface water balance for the total application area of 24.2 ha (excavation and restored area) is presented in Table 4.4-1 below. This calculation assumes that site area is bunded so that water ingress from outside of the existing quarry footprint does not enter the quarry area.

Existing Quarry Area (m^2)	Average Annual Rainfall (mm)	Mean Annual Potential Evaporation (mm)	Actual Evaporation (mm)	Effective Annual Precipitation (mm)	Annual Volume of Water Available for Recharge or Runoff (m^3)	Annual Volume of Water Available for Recharge or Runoff (m^3/day)
242,000	853	560	532	306	74,052	203

Table 4.4-1 Mean Water Balance for the Existing Excavation Area and Ancillary Activities Area

All effective precipitation formed within the quarry area recharges into the ground, is discharged to the surface water drain which discharges to Tributary 1 or is discharged via stormwater drains to the Delvin River. The existing site water management is discussed in further detail in *Section 4.4.3.11 below.*

The GSI National Recharge maps indicate the average recharge beneath the unit and surrounding area is 474 mm/yr. This figure is greater than the calculated effective rainfall for the site.

The hydrogeological controls determining the rate of groundwater recharge as indicated by the Geological Survey of Ireland (GSI) are provided in Table 4.4-2 & Table 4.4-3 below.

4.4.3.5 Hydrology

In a regional context, the site is situated in the Eastern River Basin District (ERBD). The Delvin River, which forms the southern and south eastern boundaries of the site, flows in a north-easterly direction to its discharge point to the Irish Sea, approximately 7 km north-east of the site. An un-named tributary of the Delvin River forms the northern boundary of the site (referred to as Tributary 1). The source of this stream is a spring located approximately 1.2 km to the north-west. Tributary 1 discharges to the Delvin River at the most north eastern point of the site (Refer to Figure 4.4-1).

Hydrogeological Controls	
Hydrogeological Setting:	2.ii *(source: GWWG, 2005)*
Hydrogeological Setting Description:	Sand & gravels subsoil overlain by well drained soil
Soil Drainage:	DRY
Subsoil Type:	GLPSsS
Subsoil Description:	Sandstone and shale sands and gravels Lower Palaeozoic
Subsoil Permeability:	H
Subsoil Permeability Description:	High
GW Vulnerability:	H
GW Vulnerability Description:	High
Aquifer Category:	Pl
Aquifer Category Description:	Poor Aquifer – Bedrock that is generally unproductive except for local zones
Recharge Coefficient (%):	85
Maximum Recharge Capacity (mm/yr):	100
Average Recharge (mm/yr):	474 (This is higher than the calculated effective rainfall for the site)

Table 4.4-2 Hydrogeological Control Determining Groundwater Recharge for the north of the Site

Hydrogeological Controls	
Hydrogeological Setting:	2.iii *(source: GWWG, 2005)*
Hydrogeological Setting Description:	Sand & gravels subsoil overlain by well drained soil
Soil Drainage:	DRY
Subsoil Type:	GLPSsS
Subsoil Description:	Sandstone and shale sands and gravels Lower Palaeozoic
Subsoil Permeability:	H
Subsoil Permeability Description:	High
GW Vulnerability:	H
GW Vulnerability Description:	High
Aquifer Category:	Ll
Aquifer Category Description:	Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
Recharge Coefficient (%):	85
Maximum Recharge Capacity (mm/yr):	200
Average Recharge (mm/yr):	474 (This is higher than the calculated effective rainfall figure for the site).

Table 4.4-3 Hydrogeological Control Determining Groundwater Recharge beneath the Centre of the Site.

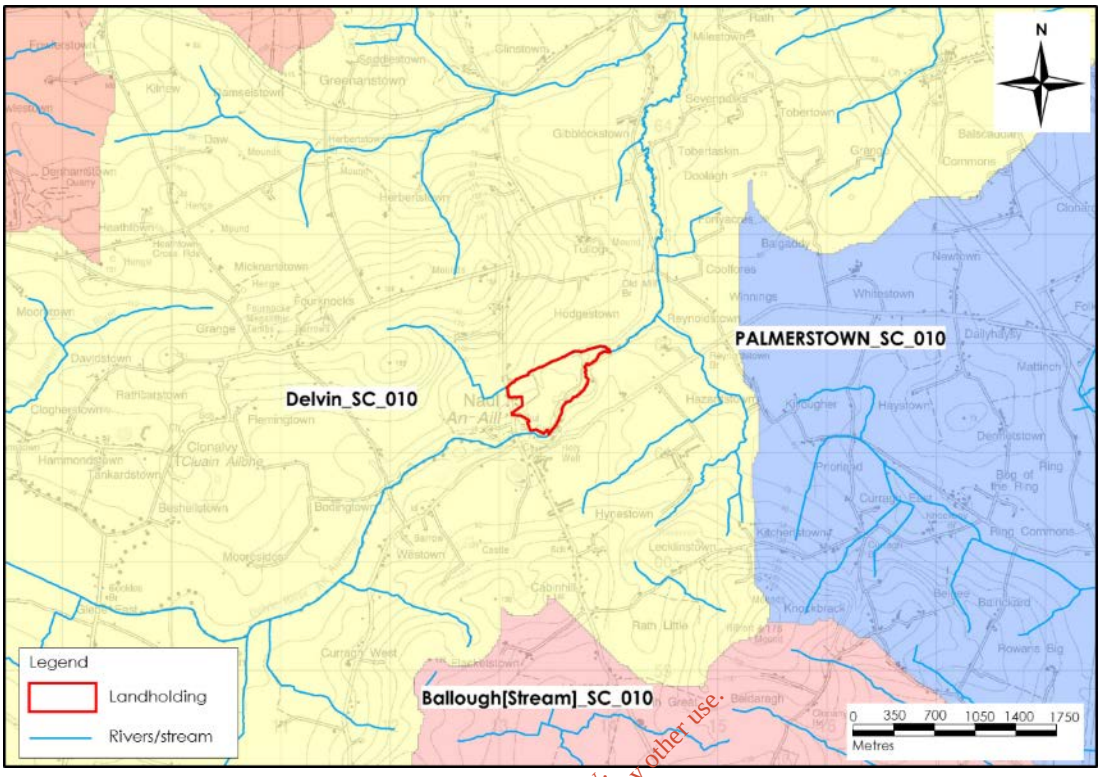


Figure 4.4-1 Local Hydrology Map

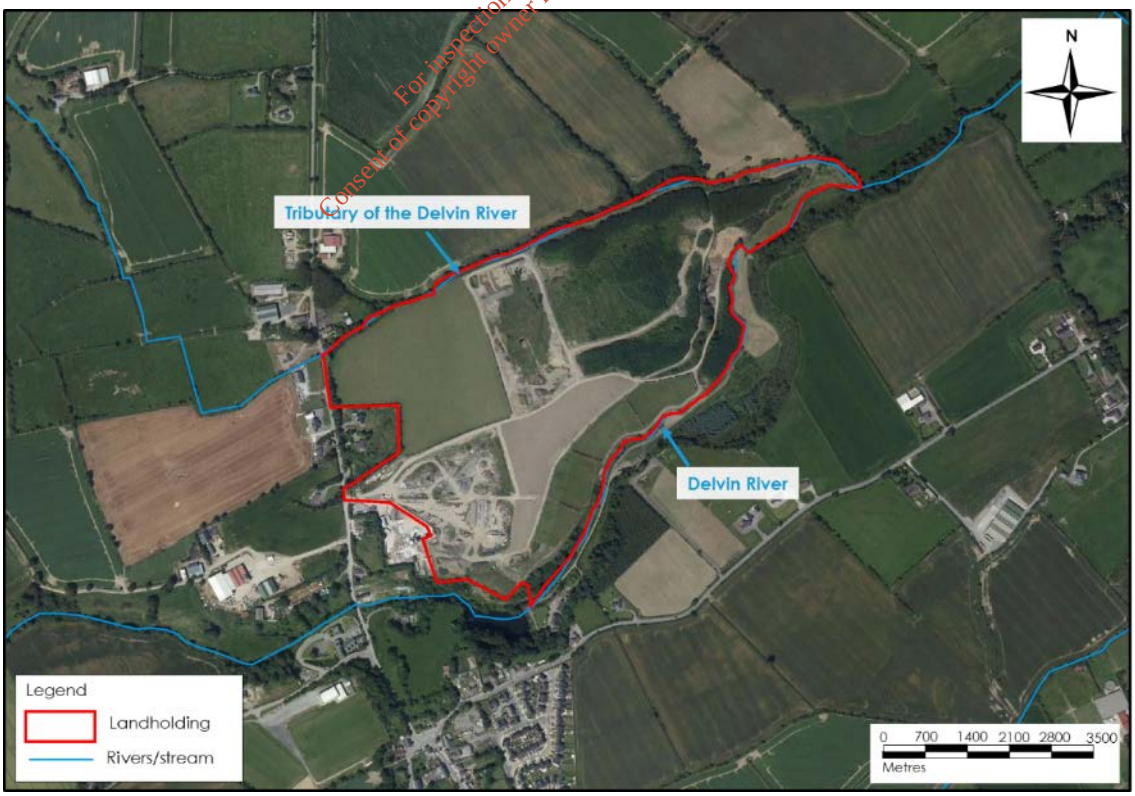


Figure 4.4-2 Local Drainage Map

Surface water runoff from the existing pit area is directed via the surface water management system to Tributary 1 to the north of the site. Surface water runoff from the current restoration area recharges to ground or runs off towards Tributary 1.

During the site walkover on the 01st August 2014, groundwater was observed to flow from a fracture in the outcrop exposed north of the Delvin River, outside the application area, within the applicant's land ownership boundary. The flow was very minor and appeared to drain towards the nearby River Delvin (Refer to Figure 4.4-2).

4.4.3.6 Flood Risk Assessment

To identify those areas as being at risk of flooding, OPW's indicative river and coastal flood map (www.floodmaps.ie), CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie), and historical mapping (i.e. 6" and 25" base maps) were consulted.

There is a recorded recurring flood incident in the area of the proposed site identified from OPW's indicative river and coastal flood map which is shown on Figure 4.4-3 below.

Where complete the CFRAM OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the PFRA maps. However, CFRAM mapping has not been completed for the area of the Clashford WRF site. As such PFRA mapping is the most accurate interpretation of flood risk that is currently available at the site (refer to Figure 4.4-4). The PFRA mapping shows that the proposed development site is adjacent to the 100-year fluvial flood zone along the Delvin River. There is no risk of fluvial flooding as the land rises steeply from the northern bank of the Delvin River. Small areas of 100-year pluvial flood zone within the site are not representative of the current site elevation and topography. There is no risk of pluvial flooding at the site as the majority of rainfall landing in the site percolates through the site surface into the underlying fill or is held in the topsoil cover in the site.

There is no text on local available historical 6" or 25" mapping for the proposed site that identify areas that are "prone to flooding" within the site boundary, or downstream of the site.

A detailed walkover survey of the site and the surrounding area was undertaken by HES 2017. The purpose of the site survey was to determine the topographic layout of the site, to investigate the hydrological regime of the area and also to assess flood risk (if any).

The tributary of the Delvin River which flows along the northern boundary of the site is at a significantly lower elevation than the quarry site. Similarly, the northern bank of the Delvin River, where the site is located, is at a higher elevation than the watercourse itself and as such the risk posed to the Clashford WRF site from fluvial flooding is low.

Any local pluvial ponding resulting from heavy rainfall infiltrates into the underlying fill.

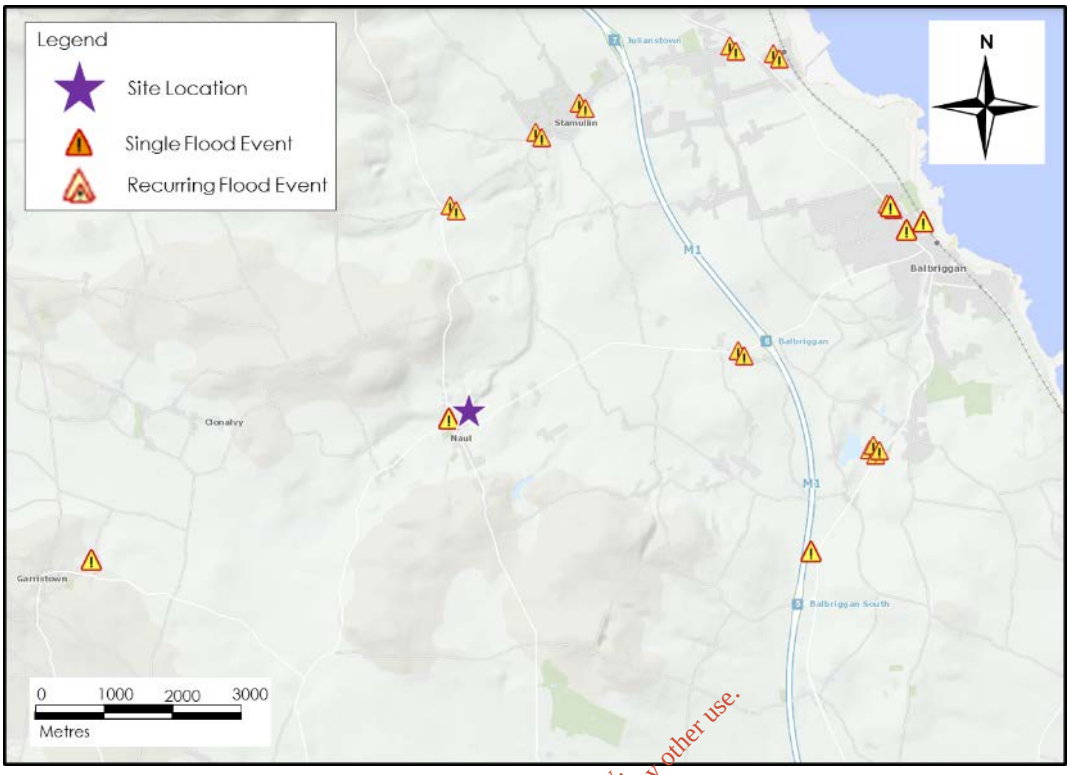


Figure 4.4.3 OPW's Indicative River and Coastal Flood Map

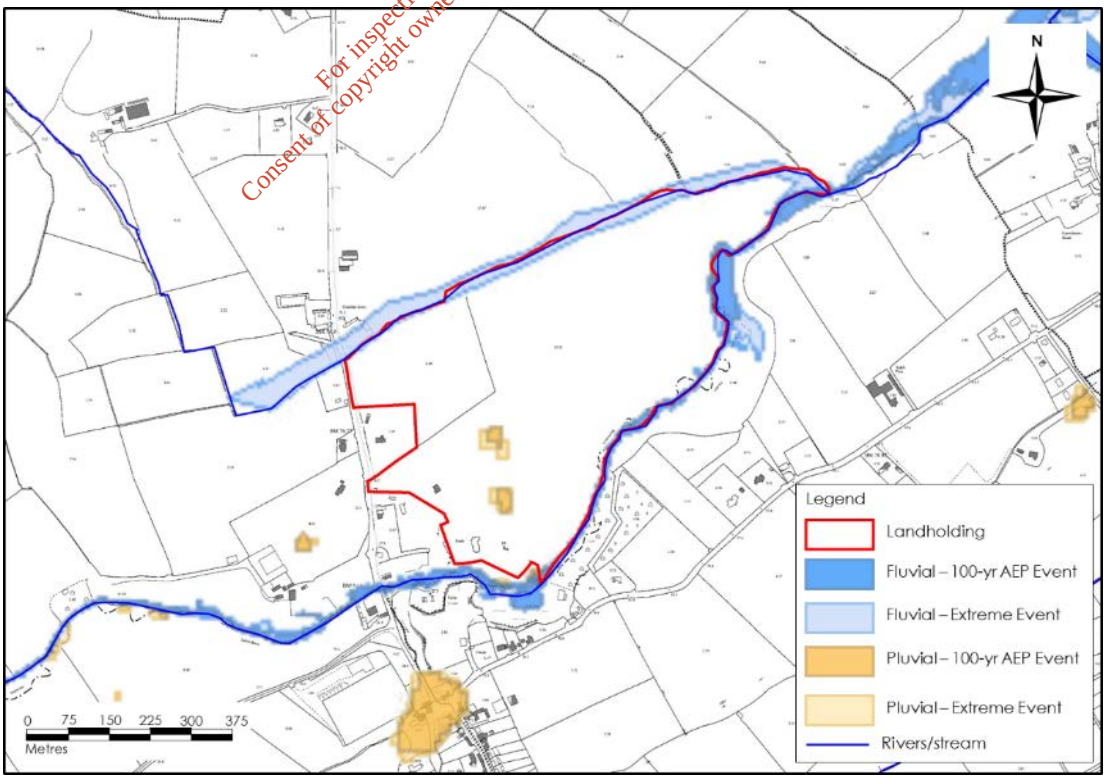


Figure 4.4-4 PFRA Flood Risk Assessment Map no 274

4.4.3.7 Hydrogeological Setting

A brief review of the local geology is provided in this section in order to put the description of the local hydrological and hydrogeological regime into perspective. Please refer to Chapter 4.3 (Land, Soils and Geology) for a detailed review of the site geology and the extraction history.

4.4.3.7.1 Geological Setting

A brief review of the local geology is provided in this section in order to put the description of the local hydrogeological regime into perspective. Please refer to Section 4.3 (Land, Soils and Geology Section) for a detailed review of the site geology and the site history.

Two water supply bores (GW1, GW2) and 3 no. monitoring wells (GW3, GW4, GW5) were installed within the landholding. A description of the geology encountered during the drilling is also provided below. Drilling logs for the GW3, GW4 and GW5 are included in Appendix 5.3.1 *(Appendix IV*). The locations of the on-site monitoring wells are shown on Figure 4.4-5.

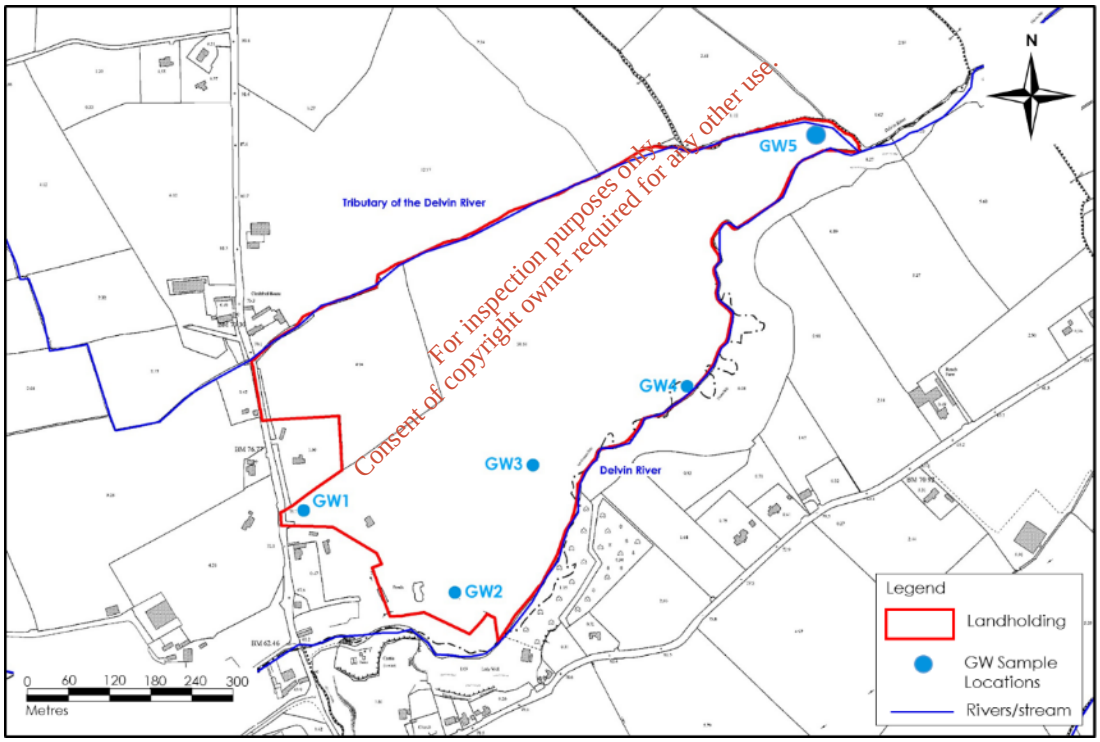


Figure 4.4-5 Monitoring Well Locations

4.4.3.7.1.1 Soils & Subsoils

The Teagasc/EPA soils map (2006) describes the soils underlying the majority of the site as AminSW, comprising Lithosols/Regosols. Two other types of soil are located along the Delvin River banks and are mapped on Figure 4.4-6. Mineral alluvium soil (AlluvMIN) is mapped along the Delvin River bank with a small mapped section of Renzinas/Lithosols mapped along the bank to the southeast of the site. Both the AlluvMIN and BminSW, Rendzinas/lithosols derived mainly from calcareous parent material, are outside the application area but within the applicant's ownership (See Figure 4.4-6).

The Teagasc/GSI ERBD Subsoil Map (Figure 4.4-6) describes the natural subsoil material at the site as Glaciofluvial Sands and Gravels (GLPSsS); the majority of this subsoil cover has been excavated at the site to date. Karstified limestone bedrock outcrop is mapped along the Delvin river bed.

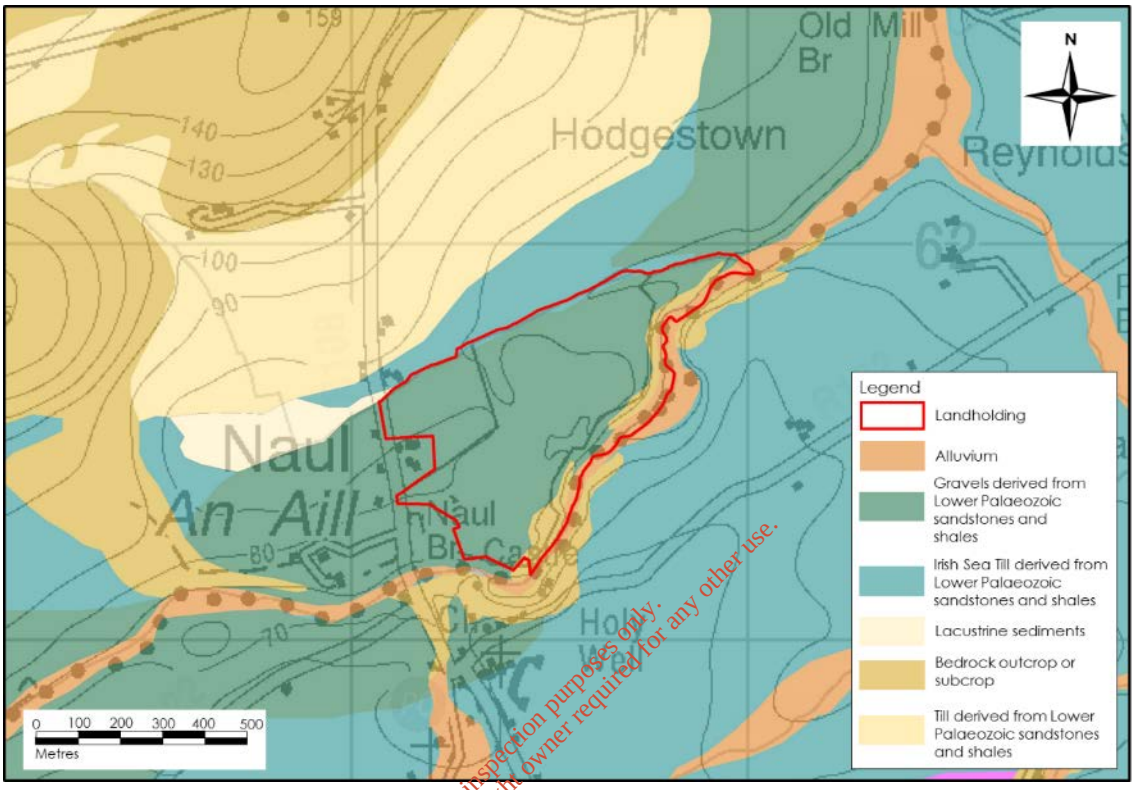


Figure 4.4-6 Local Subsoils Map

4.4.3.7.1.2 Bedrock Geology

The rock units within c.1km of the site were identified from the 1:100,000 scale map of the Geology of Meath: Sheet 13 (GSI, 2001) and online mapping (GSI, 2014). The rocks belong to: (1) the Lower Palaeozoics of the Balbriggan Inlier; or (2) the Mississippian (Lr. Carboniferous) marine sequence of the North Dublin Basin.

The base of the Ordovician sequence in the area is the Fournocks Fm. (FK), which consists of red and green banded mudstones and siltstones. This is conformably overlain by the Snowtown Fm. (SW), which consists of a 200m thick unit of banded grey mudstones and siltstones. These are unconformably overlain by the Herbertsown Fm. (HB), a unit of andesitic volcanics and mudstones.

The Herbertstown Fm. is conformably overlain by the Clashford House Fm. (CF), which underlies much of the site. It consists of 100m thick sequence of micaceous green- to brown-grey mudstones and siltstones with interfingering sheets of andesite. The unit is fossiliferous, containing a shelly fauna of Avalonian affinities, consistent with a position on the northernmost margin of the Leinster Terrane. The Clashford House Fm. represents marine sedimentary rocks associated with a fore arc/volcanic arc on the continental margin of Avalonia on the

southern side of the Iapetus Ocean, prior its closure culminating in the Caledonian Orogeny c. 425-394Ma.

The Denhamstown Fm. forms the base of the Silurian overstep sequence, which was deposited over the accreted Avalonia and Bellewstown-Arc Terranes of the Balbriggan Inlier. The Lowther Lodge Fault has brought the Denhamstown Fm. into contact with the Clashford House Fm. c. 750m north of the site.

The base of the Carboniferous sequence in the area is marked by the Holmpatrick Fm. (HO), which consists of a 90-200m thick sequence of platform limestones. The next youngest unit is the Naul Fm. (NA), which has been brought into contact with the Balbriggan Inlier through faulting. The Naul Fm. is similar to the Lucan Fm., except the limestones are paler and less argillaceous, and consist largely of calcarenite and calcsiltite with minor chert and shale (i.e., higher on ramp, and less basinal). It outcrops on the banks of the Delvin River at Naul, and has been interpreted as the lateral equivalent of the upper part of the Lucan Fm. The formation varies widely in thickness up to 100m.

Overlying the Naul Fm., is the Loughshinny Formation (LO), which has been brought into contact with the Naul Fm. in the Naul area by a major SW-NE fault. The formation consists of up to 150m of laminated to thinly bedded, argillaceous, pyritic, locally cherty limestones, interbedded with dark grey to black shales. The Naul and Loughshinny Fms. are lithologically very similar and belong to the Fingal Group of predominantly basinal facies.

The Loughshinny is conformably overlain by the Balrickard Fm. (BC), and consists of 75-100m deltaic sandstone interbedded with shale and argillaceous micrite. This is conformably overlain by the Walshestown Fm. (WL), which consists of >200m of black shales, with siltstone, fine sandstone, and calcareous mudstone. The latter two units are Namurian in age and belong to the Knockbrack Group, which straddles the Visean-Namurian boundary. It heralds an abrupt change in depositional environments from that of limestones and shales in shallow tropical seas during the Visean to sandstones and shales in quiescent, deep waters during the Namurian.

An additional lithology known as the Mudbank Limestone Lithology (Mk) occurs in several fault blocks adjacent to the Balbriggan Inlier. The lithology consists of massive, unbedded, grey micritic (fine-grained) limestones and represent a complex lime mud mound facies rich in bryozoa and brachiopods, similar to the Waulsortian, which interdigitates with Asbian shelf limestones (MEIL, 2004). These limestones pass laterally into calcarenites and calcsilicates with shale partings, probably indicating local basin development.

Numerous faults are located within 1km of the site, and many of the contacts between the major stratigraphic units are faulted contacts. The quarry site straddles the faulted contact between the Balbriggan Inlier and the North Dublin Basin, and is predominantly underlain by the Clashford House Fm. (70%), with minor Mudbank Limestone (20%) and Naul Fm. (10%) in the southwest corner. Two faults traverse the site: (1) a roughly ENE-WSW oriented fault brings a triangular sliver of the Mudbank Limestone lithology into contact with the Clashford House Fm.; and (2) an E-W oriented fault brings the Mudbank Limestone into contact with the Naul Fm. A major NE-SW oriented fault with substantial vertical displacement, traverses c. 500m east of the site. The bedrock of the Clashford area is shown in Figure 4.4-7: Bedrock Geological Map of Clashford Area. The bedrock geology is described in detail in Chapter 4.3.

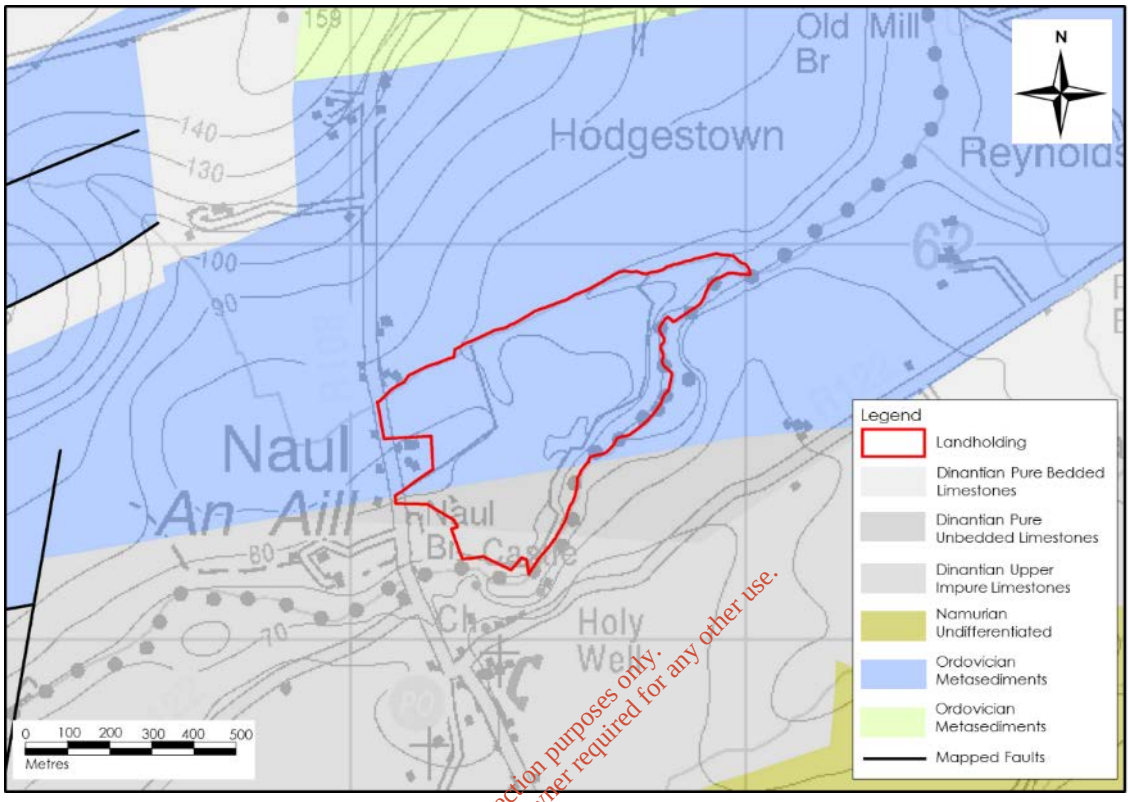


Figure 4.4-7 Local Bedrock Geology Map

4.4.3.7.1.3 Depth to Bedrock

The groundwater vulnerability map (Figure 4.4-10) suggest that the depth to bedrock within the area of investigation is >3m below ground level. This is based on a High (H) vulnerability classification and high permeability subsoil (DoELG/EPA/GSI 1999). Extreme vulnerability is mapped along the southern boundary of the site.

The borehole records from the monitoring well drilling works indicate that the depth to bedrock within the southern area of the site ranges from 6.8 m (GW4) to 14 m below ground level (GW3) (See Appendix 5.3.1 (*Appendix IV*)). The depth to bedrock is shallower at the base of the embankment beside the Delvin River with higher subsoil thicknesses associated with the elevated restored areas of the site. The newest monitoring well (GW5) encountered siltstone bedrock at 11.5mbgl.

4.4.3.7.1.4 Borehole Drilling

In 2014 two downgradient boreholes were installed on-site to serve as long-term groundwater monitoring points in addition to the existing site wells, GW1 and GW2. These additional boreholes are labelled GW3 and GW4 (Appendix 5.3.1 (*Appendix IV*)). Borehole logs for GW1 and GW2 were not available. GW5 was also added in August 2017.

The boreholes were drilled using compressed air boring methods: the drilling rig created a 150 mm diameter borehole to house a 50 mm diameter piezometer. The borehole drilling indicated significant subsoil and upper bedrock instability and it was necessary to install permanent steel casing in order to house the piezometers, otherwise borehole collapse would have necessitated re-drilling of the bore. Each borehole was covered at ground level with a lockable well cap set in a concrete plinth.

GW3 was drilled to a depth of 30.9 mbgl. A saturated weathered limestone bedrock zone was encountered from 14 -18 mbgl. Competent limestone bedrock was encountered to the final drilled depth (end of hole). The weathered bedrock zone was saturated and a minor water strike was recorded within the competent limestone at approximately 20.5 mbgl.

GW4 was drilled to a depth of 24.5 mbgl. A saturated weathered limestone bedrock zone was encountered at 6.8 mbgl. Competent limestone bedrock was encountered at 8.3 mbgl to the final drilled depth (end of hole). No significant water strikes were recorded in the competent limestone.

A further borehole, GW5, was installed as a groundwater monitoring point in August 2017. The drilling log for GW5 shows that clay was recorded to 11.5mbgl and siltstone bedrock was encountered from 11.5 to 30.48mbgl. The total depth of the well is 30.48m. A water strike was recorded at 13.5mbgl.

4.4.3.7.2 Aquifer Classification

The rock underlying the northern and principal area of the site is mapped as part of the Duleek groundwater body (GWB) (EU_CD:IE_EA_G_012) and classified as a **poorly productive bedrock**. The southern tip of the site is mapped as part of the Lusk-Bog of the Ring (GWB EU_CD:IE_EA_G_014), which extends as far west as Garristown and is classified as a **productive fissured bedrock**. (A narrow strip of the extensive Lusk-Bog of the Ring GWB includes an area to the north of the Delvin River adjacent to the site).

The key characteristics of the Duleek groundwater body have been identified as follows:

- This aquifer is comprised of Lower Palaeozoic rocks, which are commonly considered to be poor aquifers, and transmissivities are presumed to be generally low (<10m^2/d).
- The majority of groundwater flow in this groundwater body is considered to take place in the upper weathered zone of the aquifer (~10 m). However, deep water strikes in more isolated faults/fractures can be encountered at 30-50 mbgl.
- Groundwater will flow from the recharge mounds in the north and south of the body towards the east and west of the area.
- This aquifer will discharge to the overlying rivers and streams in the area as baseflow.

- Flow paths are not considered to extend further than the nearest surface water feature and will generally not be greater than 500 m.

The key characteristics of the Lusk-Bog of the Ring groundwater body have been identified as follows:

- This groundwater body is composed of moderate permeability limestone which in some places is karstified.
- Transmissivity and storativity values in the aquifer appear to be better than is normal for the Calp limestone.
- Very small areas of low permeability impure limestones are incorporated with this GWB, however, since they are isolated and do not alter significantly the flow system.
- The aquifers within the GWB are generally unconfined but may become locally confined where the subsoil is thicker and/or lower permeability and where the aquifer is overlain by Namurian Strata.
- In general, the majority of groundwater flow occurs in the upper 30 m, comprising a weathered zone of a few metres and a connected fractured zone below this.
- Flow path lengths are variable. From examining the drainage density, it is clear that, in some instances, groundwater flow paths of up to a couple of kilometres may exist, although distances of a few hundred metres area more likely.
- The groundwater discharges directly to the Irish Sea in the east and also to the north and south via baseflow to rivers.

The majority of groundwater flow in this area is considered to take place in the upper weathered zone of the aquifer.

4.4.3.7.3 Karst Features

Reference to the Geological Survey of Ireland karst database indicates that a cave is located approximately 152 m to the southwest from the southern boundary of the site. No karst features have been mapped within the site perimeter.

4.4.3.7.4 Groundwater Wells

There are a number of water wells located within the site boundary. Well GW1, located near the site entrance from the R108, is intended as a water supply source for the office, canteen and toilet facilities within the site. At the time of the site inspection, the pump for this well was out of operation.

Well GW2, located in the south of the Clashford WRF site is used as a water source for the site sprinkler system and farmland area.

Please note that other wells on site (GW3, GW4, and GW5) are groundwater monitoring wells, and are not used for groundwater abstraction.

The GSI wells database identifies the closest well (with a high degree of accuracy) to the subject site as a public water supply borehole (2925NEW094) that is located ~1.1km east-northeast of the site.

3 no. other public water supply wells, with a lesser degree of locational accuracy in the GSI wells database, that are located further from the site are also indicated on Figure 4.4-8. The Outer Protection Zone (OPZ) for public water supply well 2925NEW093 is within ~300m of the Clashford WRF site but is separated from the site by the Delvin River. As groundwater flows from the Clashford WRF site discharge to the Delvin River, groundwater from the site is not considered to be hydraulically connected to this OPZ.

The GSI database does not identify other private groundwater wells within 1km of the subject site.

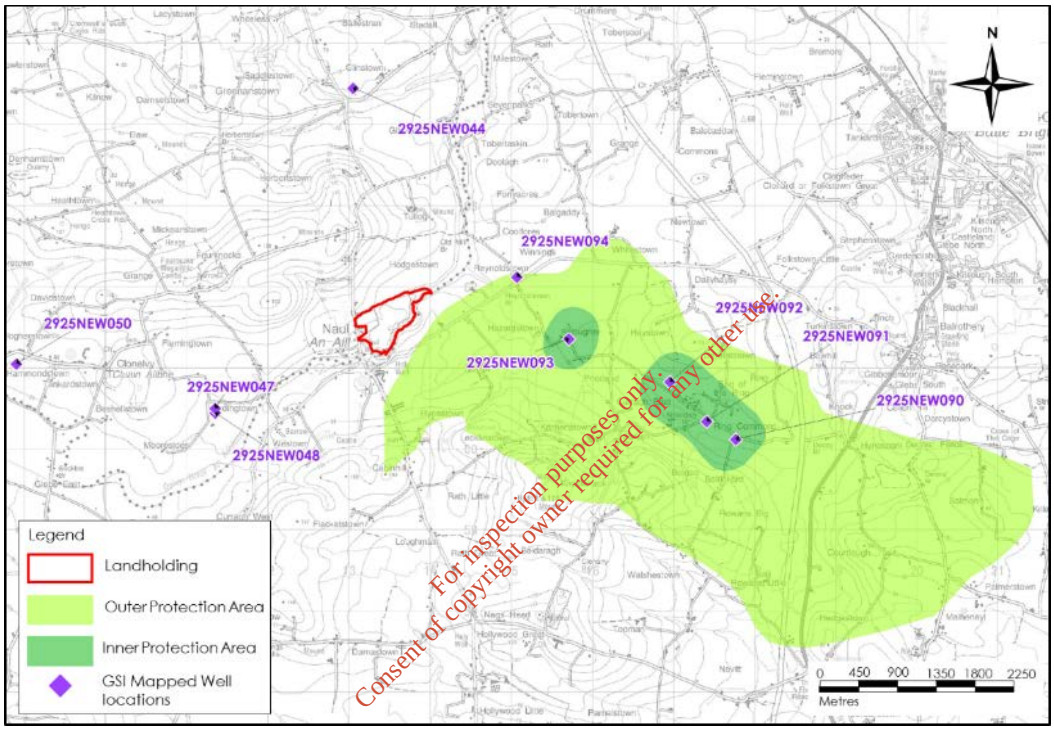


Figure 4.4-8 GSI Mapped Groundwater Wells

4.4.3.7.5 Groundwater Levels & Flow Direction

Static (non-pumping) groundwater levels in all monitoring wells, were measured at each sampling event in order to establish groundwater flow direction. The results of this are shown below in Table 4.4-4.

Well ID	Type	Water levels (mOD)				
		08/01/2009	11/08/2014	04/08/2017	12/09/2017	13/03/2018
GW1	6" supply well	68.45	67.27	67.25	67.30	67.63
GW2	6" supply well	54.37	54.19	52.50	52.70	53.56
GW3	Monitoring well	-	55.68	56.96	56.81	57.44
GW4	Monitoring well	-	44.55	43.90	43.95	44.56
GW5	Monitoring well	-	-	47.23	47.29	47.92

Table 4.4-4 Groundwater levels for supply and monitoring wells

Groundwater levels (from the underlying bedrock aquifer) have been recorded at each monitoring well prior to water sampling (*c.f.* Table 4.4-4) Water levels taken before sampling in May 2018 have been used to draw a groundwater contour map for the site (refer to Figure 4.4-9). These data indicate groundwater flow at the site is to the east-southeast towards the Delvin River. Groundwater gradient is low at 0.054. Groundwater level recorded during 2017 and 2018 are similar to those reported in 2009 and 2014.

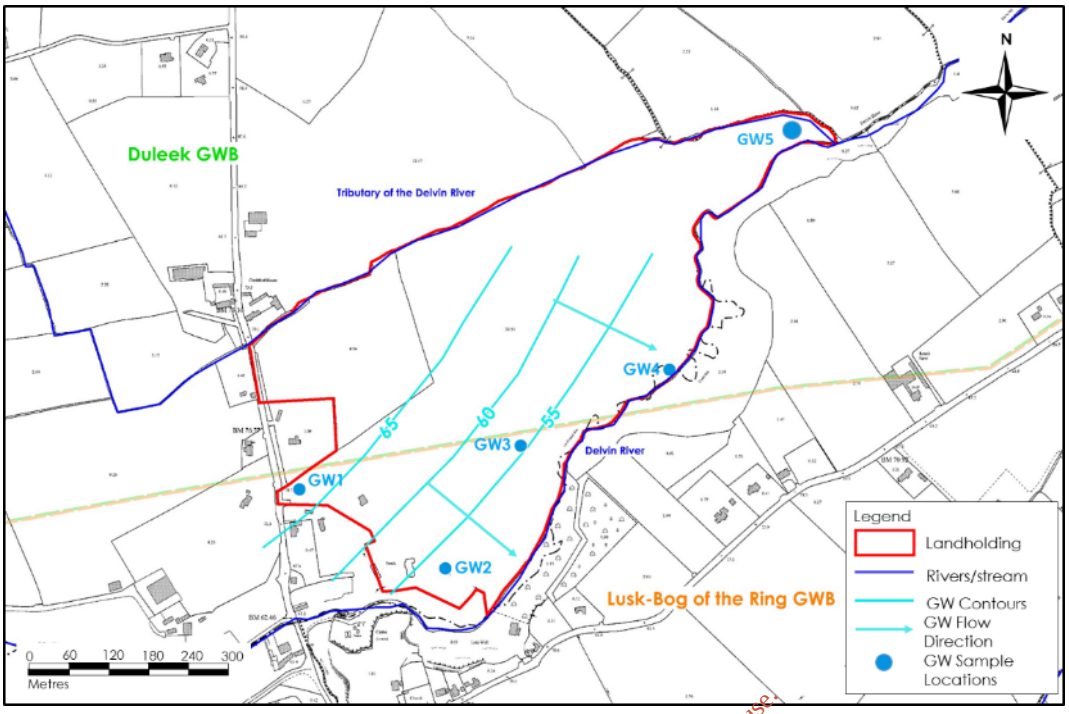


Figure 4.4-9 Groundwater Levels and Flow Direction

4.4.3.7.6 Groundwater Vulnerability

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Where the subsoil thickness is <3m, the vulnerability is rated as Extreme (the highest risk situation). Where the subsoil thickness is >3m, the vulnerability is rated as High, Moderate or Low (depending on the nature and thickness of the subsoil).

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Table 4.4-5 GSI Groundwater Vulnerability (GSI, 1999)

The vulnerability rating for the site is based on the depth of overburden, which has varied over the years once backfilling commenced. The mapped groundwater vulnerability rating for the

majority of the subject site (Figure 4.4-10) is classified as 'High (H)' by the GSI. An area along the southern boundary of the site is mapped as 'Extreme (E)' and 'Rock at or near surface (X)'.

The groundwater vulnerability map suggests that the depth to bedrock within the area of investigation is >3m below ground level.

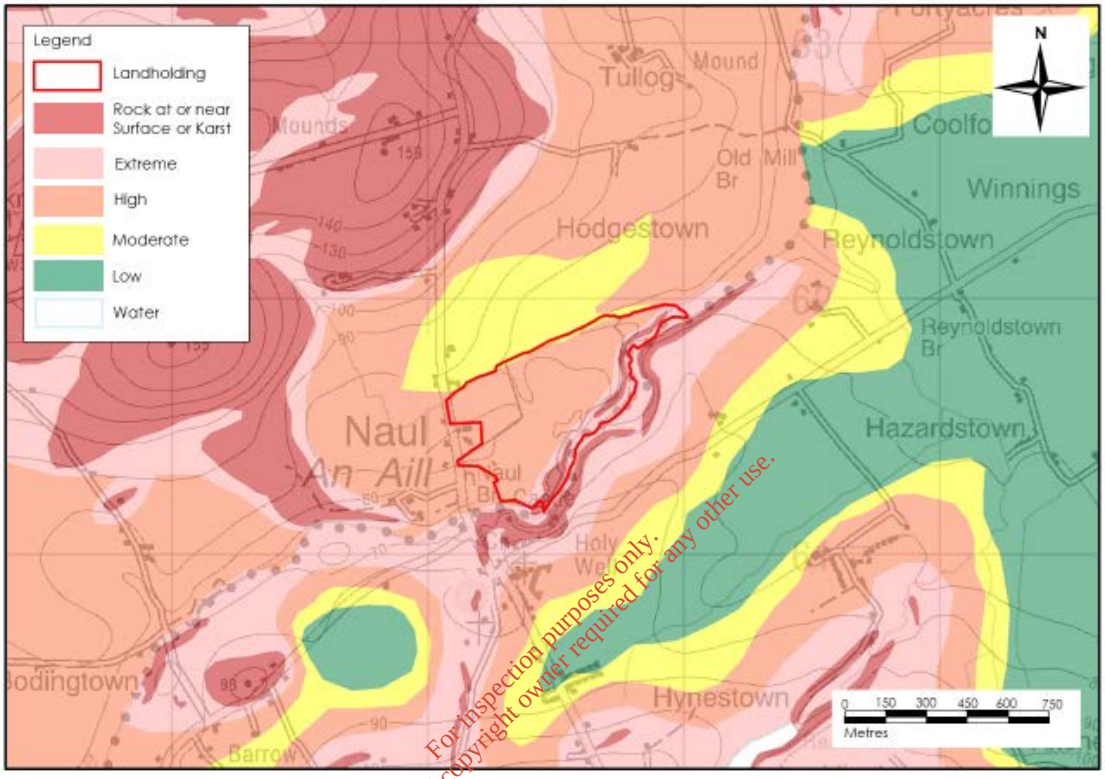


Figure 4.4-10 GSI Groundwater Vulnerability

However, the imported boulder clay/till cover over the regionally important aquifer will provide a degree of protection to the underlying aquifer, thus reducing the vulnerability rating for the aquifer below the site.

The results of the site investigation indicate that the depth to bedrock within the southern area of investigation ranges from 14 m (GW3) to 6.8 m below ground level (GW4) (See Appendix 5.3.1 (*Appendix IV*)). The depth to bedrock is shallower at the base of the embankment beside the Delvin River with higher subsoil thicknesses associated with the restored areas of the site.

Based on the site-specific information on depth to bedrock and subsoil type, the groundwater vulnerability is High beneath the southern section of the site.

4.4.3.7.7 Water Framework Directive

The River Basin Management Plan for Ireland (2018-2021), adopted in 2018, has consolidated the previous regional river basin districts into a single district and single plan for the second planning cycle. The objectives of this plan include the following:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration;
- Meet the objectives for designated protected areas; and
- Protect high-status waters.

Our understanding of these objectives is that surface waters, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed, i.e. there should be no negative change in status at all.

However, there are no proposed discharges from development and therefore there is no potential to impact directly on the status of any local surface water bodies.

4.4.3.7.7.1 Groundwater Body Status

Local Groundwater Body (GWB) and Surface water Body (SWB) status reports are available for download from www.wfdireland.ie.

Both the Duleek GWB (IE_EA_G_012) and Lusk GWB (IE_EA_G_014) which underlie the site are assigned "Good Status"., which is defined based on the quantitative status and chemical status of the GWB.

4.4.3.7.7.2 Surface Water Body Status

The proposed development site is located adjacent to the Delvin River (IE_EA_08D010250) surface water body (Refer to Figure 4.4-1 above) and it is assigned an overall 'Moderate Status' with an overall risk result of 'At Risk'.

4.4.3.7.8 Groundwater Protection Schemes

Based on the GSI mapping, the Outer Protection Zone (OPZ) for public water supply well 2925NEW093 is within ~300m of the Clashford WRF site but is separated from the site by the Delvin River. As groundwater flows from the Clashford WRF site discharge to the Delvin River, groundwater from the site is not considered to be hydraulically connected to this OPZ.

4.4.3.7.9 Water Supply Schemes

4.4.3.8 Water Quality

Under the Water Framework Directive (Directive 2000/60/EC) groundwater bodies and surface water bodies were assigned a status rating (Bad – Poor – Moderate – Good – High) based on chemical and ecological status.

GWB status is defined based on the quantitative status and chemical status of the GWB. Both the Duleek GWB and Lusk GWB which underlie the site are assigned "Good Status".

Surface water and groundwater quality data was obtained from sampling on 5th August 2014, 12th September 2017, 13th March 2018 and an additional sample from GW5 on 01st May 2018. The Certificates of Analysis are presented in *Appendix 5.3.1 (Appendix III).* The sampling locations are presented in Figure 4.4-11 and are summarised as follows:

- Groundwater quality
  - GW1, GW2, GW3, GW4 & GW5
- Surface water quality
  - Delvin River: upstream (SW1), downstream of Kilsaran Concrete Batching Plant (SW2) and downstream of the site (SW3);
  - Tributary 1: upstream (SW4A) of site discharge point and downstream (SW5) of site.

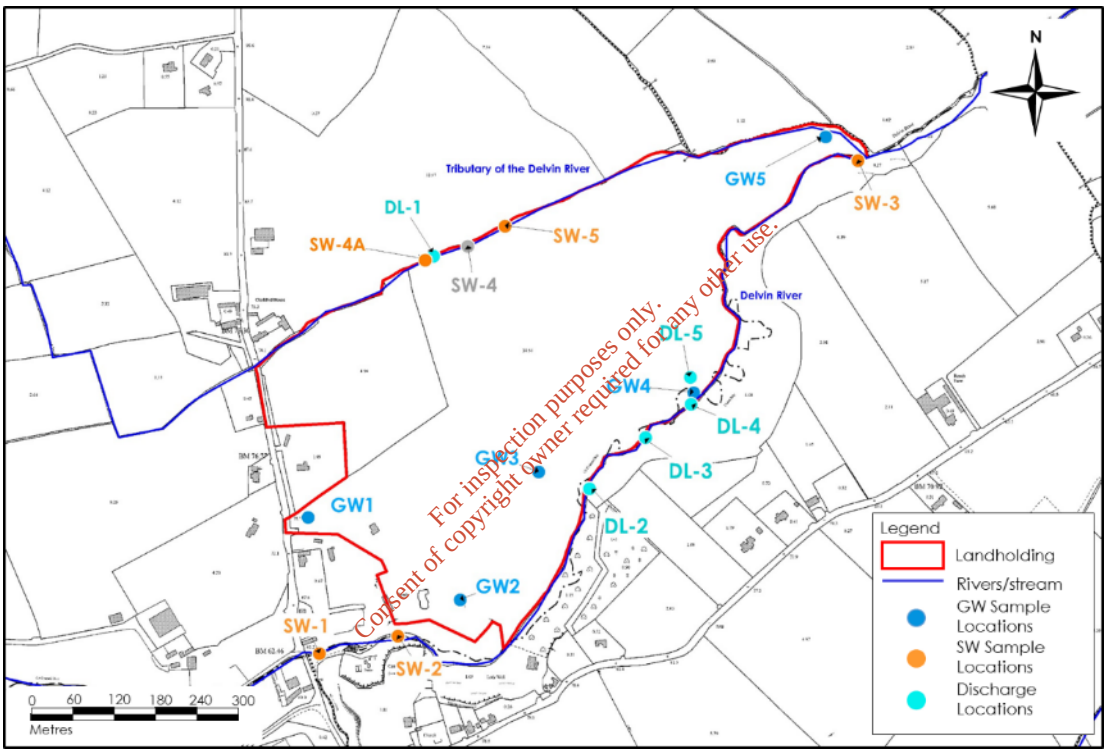


Figure 4.4-11 Groundwater and surface water sampling locations

The water quality results were compared with the following legislation/guidance (where relevant):

- Groundwater:
  - Groundwater Threshold Values (TVs) as set out in the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010) or in the absence,
  - Environmental Protection Agency (EPA) Interim Guideline Values (IGVs) (EPA, 2003),
  - Parametric Values in the Drinking Water Regulations 2014 (S.I. No. 122 of 2014).

- Surface Water: Environmental Quality Standards (EQSs) in the European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009).

4.4.3.8.1 Surface Water Quality

Surface water quality sampling was undertaken in accordance with *BS6068:6.6 Guidance on sampling of rivers and streams*. Grab samples were obtained by HES on 13th March 2018 at two locations along Tributary 1, at (SW5) 20m downstream of the point of discharge from the settlement lagoon to the tributary of the Delvin River, and at (SW4A) 6m upstream to the point of discharge. Grab samples were obtained from three locations at the Delvin River. SW1 is an upstream sample, SW2 is downstream of the WWTP (Refer to Figure 4.4-11 above) and SW3 is downstream of the site.

Prior to obtaining the samples in 2017 and 2018 the outlet from the settlement lagoon had not been discharging to the stream.

A comparison of the surface water sampling results with the relevant legislation is presented in Appendix 5.3.1 – Table 2 (*after text)*.

4.4.3.8.2 Surface Water Quality Data 2014

Electrical conductivity ranged between 514 and 714 µS/cm. pH was recorded between 7.93 and 8.12. Ammonia concentrations were higher upstream of the Clashford WRF site than downstream, and BOD and Ortho-P concentrations were elevated.

4.4.3.8.3 Surface Water Quality Data 2017

SW1-SW5 were sampled on 12th September 2017. The following discussion relates to surface water laboratory results from this date.

A lower EC was recorded in the surface water samples, between 491 and 638 µS/cm, compared to 559-938 µS/cm for groundwater, suggesting a higher content of dissolved ionic salts in the groundwater wells compared to the surface water.

The surface water pH level was recorded between 7.94 and 8.03 for all surface water sample locations.

Of note are the nitrogen-based parameters, which are not significantly elevated but do indicate a drop in water quality, particularly at monitoring points SW4A and SW5, relative to unpolluted watercourses. Typically, tillage, livestock or use of fertilisers are likely sources for a high nitrogen results (both organic and inorganic) and this is feasible given the location of the sampling points and the surrounding land uses. Faecal and total coliforms are also elevated in all samples.

Runoff for agricultural land can also be responsible for increased phosphate concentrations. Similarly, to the surface water nitrogen concentrations recorded, the total phosphate concentration is higher than unpolluted watercourses (0.13-0.06mg/L) but is likely to be a reflection of the agricultural land uses in the catchment.

4.4.3.8.4 Surface Water Quality Data 2018

SW1-SW5 were sampled on 13th March 2018. The following discussion relates to surface water laboratory results from this date.

The analysis of surface water samples did not detect any significant levels of pollutants in the samples besides high coliform and orthophosphate concentrations, very similar to the 2017 data. However, high levels in these two parameters are not unexpected as the surrounding land use includes a large degree of agriculture and, with regards to samples on the Delvin River, the Naul WWTP is located immediately upstream of SW2.

4.4.3.8.5 Groundwater Quality

In 2018, groundwater sampling of GW1 – GW5 was conducted by HES on 13th March 2018 and 1st May 2018. Previous groundwater sampling was carried out in 2014 and 2017.

A comparison of the groundwater sampling results with the relevant legislation is presented in Appendix 5.3.1 – Table 1 (after text).

4.4.3.8.6 Groundwater Quality Data 2014

In 2014, groundwater samples were taken from GW1, GW2, GW3, and GW4. Sampling was completed in August and September 2014, and data are presented in the 2014 EIS. The following discussion relates to the 2014 groundwater data.

The ammoniacal nitrogen concentration in GW4 (1.4mg/L and 0.65mg/L) exceeded the GTV and Drinking Water Regulation limits at this time. All other wells were within the regulation limits. In 2018, GW1 and GW4 exceeded the ammonium drinking water guideline limits of 0.3mg/L with concentrations of 0.57mg/L and 1.3mg/L respectively.

Elevated concentrations of total phosphorous were detected in GW3 (460µg/L, 315µg/L) relative to the phosphorous concentration measured in the other wells.

The chloride concentrations in the two downgradient wells GW3 (110.1mg/L, 48.6mg/L) and GW4 (120.4mg/L, 127.9mg/L) were significantly elevated above the concentrations in the upgradient well GW1 (18.9mg/L). In 2018, high chloride levels were detected in GW3, GW4 and GW5 that exceeded the Groundwater Regulations (SI 9/2010) and the IGV thresholds.

A high dissolved potassium concentration was initially detected in GW4 (75.2mg/L) in August 2014. Upon resampling the concentration had receded to 5.2mg/L. Concentrations of sodium were significantly higher at GW4 (138.3mg/L, 70.1mg/L) than the other wells. In 2018, high potassium concentrations were detected in GW3 (7.8mg/L) and GW4 (6.5mg/L) which was above the Interim Guideline Values (IGV) of 5mg/L.

Nitrate and orthophosphate concentrations were at low levels in both the 2014 and 2018 sampling.

In 2014, faecal coliforms were detected in samples at both downstream wells GW3 and GW4 but not the upstream wells GW1 and GW2. However, none of the 2018 samples detected coliforms or faecal coliforms.

EC levels in August 2014 were lower in GW1 (458µS/cm), GW2 (629µS/cm) compared to the downstream wells GW3 (938µS/cm, 755µS/cm) and GW4 (1140µS/cm, 1245µS/cm). In 2018, EC was in the normal range, between 405 and 869µs/cm for each of the groundwater wells, with the exception of GW4 which had a conductivity of 1417µS/cm.

4.4.3.8.7 Groundwater Quality Data 2017

All five on site wells were sampled on 12th September 2017. The following discussion relates to groundwater quality laboratory results from this date.

Total Alkalinity concentrations vary between 230mg/L and 398mg/L across all sampling locations and dates and they are representative of typically conditions at the site.

Ammoniacal Nitrogen exceeded the IGV limit in GW-4 (at 0.24mg/l), however the concentration is significantly reduced compared to the two samples taken in 2014(0.65-1.4mg/L) indicating an improvement in groundwater quality relative to the 2014 conditions.

Chloride concentrations for GW-3 (60.9mg/l), GW-4 (102.3mg/l) and GW-5 (51.3mg/l) exceed the IGV limit (30mg/l). Animal waste is a rich source of chloride and these concentration levels may indicate pollution related to slurry spreading. A likely source of elevated nitrogen and chloride is land spreading of organic fertilizer to aid in the revegetation process at the site. The highest chloride level detected continues to be in GW-4 but it has decreased from concentrations of 120.4mg/l and 127.9mg/l, measured in 2014, to its current concentration of 102.3mg/l.

All groundwater samples indicate the absence of any microbial pathogens or hydrocarbons in local groundwater which is an improvement on the 2014 environment where both total and faecal coliforms were detected in GW-3 and GW-4.

Manganese concentrations for all four samples exceeded the IGV limit (0.05mg/l), however manganese is a naturally occurring groundwater mineral and dissolves readily in groundwater in low dissolved oxygen conditions. It is consistently high at all locations and is therefore considered to be naturally occurring in local bedrock.

4.4.3.8.8 Groundwater Quality Data 2018

All five on site wells were sampled on 13th March 2018, and GW4 was resampled on 1st May 2018. The following discussion relates to groundwater quality laboratory results from this date.

Total Alkalinity concentrations vary between 198mg/L and 430mg/L across all sampling locations and dates and they are representative of typically conditions at the site.

Ammoniacal Nitrogen exceeded the IGV limit in GW1 and GW4 (at 0.57 and 1.3/1.99mg/l respectively). 2018 sampling appears to indicate similar ammonia values to what was recorded in 2014 in GW4. This may relate to ongoing landspreading and landscaping within the Clashford WRF site.

Chloride concentrations for GW-3 (67.5mg/l), GW-4 (223.2/210.4mg/l) and GW-5 (57.5mg/l) exceed the IGV limit (30mg/l). Animal waste is a rich source of chloride and these concentration levels may indicate pollution related to slurry spreading. As discussed above, a likely source of elevated nitrogen and chloride is land spreading of organic fertilizer to aid in the revegetation process at the site.

GW4 sample from 1st May indicates elevated total coliforms of 155.3 (MPN/100ml). This may be due to clay particles in the sample. All other groundwater samples from 2018 indicate the absence of any microbial pathogens or hydrocarbons in local groundwater which is an improvement on the 2014 environment where both total and faecal coliforms were detected in GW-3 and GW-4.

In 2018, iron and manganese concentrations exceeded Drinking Water Regulations (SI 122/2014) in GW1 (Manganese only), GW2, GW4 and GW5. Both 2014 and 2018 samples identified particularly high concentrations in GW4. These recorded values appear to relate to natural background chemistry of the local bedrock. There may also be increased mineralisation due to local faulting mapped in the area of the Clashford WRF site.

GW4 contained elevated levels of arsenic (15.7µg/L) and barium (126µg/L) which were significantly higher than the levels in other wells and exceeded the relevant guidelines for these parameters. The concentrations are small, but as they are above the concentrations recorded for other sampling locations their presence has been highlighted. The Drinking Water limit for arsenic is 10µg/L, so the exceedance is minor.

The barium concentration could be attributed to dissolution of the mineral Barite ($BaSO_4$), which is controlled by sulphate reducing bacteria. Again, the concentration is relatively small. Previous Drinking Water Regulation (S.I. 88 of 1988) values for Barium were 500µg/L. Also, WHO guidelines (WHO, 2004)[3] suggest a guideline value of 700 µg/L. As such, the recorded concentration at GW4 would be below both of these documented guideline values. The IGV value used in the screening process relates to A1 water (surface water) from the Surface Water Regulations (S.I. 294 of 1989)[4]

4.4.3.9 Conceptual Model of the Aquifer

The current understanding of the hydrogeological setting is described below.

An estimated 306 mm/yr effective rainfall is available for recharge or runoff in the vicinity of the site. However, Pl Aquifers, such as the aquifer beneath the majority of the site, are not considered to be capable of accepting all the recharge that may be available due to the limited capacity of the bedrock to both store and transmit the infiltrated water. Therefore, a maximum 25% of effective rainfall is considered to contribute to groundwater recharge in the bedrock (100 mm/yr).

The majority of groundwater is considered to flow in the upper 10 m – 15 m of the weathered and fractured bedrock, with groundwater flow through occasional interconnected fractures or faults at depths below this.

The groundwater contour map indicates that the groundwater flow direction is to the southeast, where it discharges to the Delvin River as baseflow. Shallow groundwater upflow also discharges in the southern section of the quarry. The borehole logs (for GW3 and GW4) show

[3] Barium in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality (WHO, 2004).

[4] S.I. No. 294/1989 — European Communities (Quality of Surface Water Intended For The Abstraction of Drinking Water) Regulations, 1989.

that the new boreholes draw in groundwater from the upper weathered bedrock zone, and wherever water-bearing fractures are encountered, through to the final drilled depth of the boreholes.

The vulnerability of groundwater beneath the site is classified as High (H) to Extreme and the subsoil permeability is also mapped as High. However, most of the natural subsoil has been excavated at the site and replaced with soil and stone, and other types of imported inert C&D waste used for construction of haul roads.

Groundwater flow at the site is to the east-southeast towards the Delvin River. Groundwater gradient is low at 0.054.

4.4.3.10 Site Water Management

The locations of the site water management components are shown on Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C. The water supply for the site is pumped from GW1 and GW2. This supplies washwater, in addition to recirculated water from the lagoons, where it is utilised for the wheel wash and for the dust suppression sprinkler system. All wheel washwater either evaporates from the surface or is returned to the lagoon system. The lagoons also act as sumps where silt is collected and allowed to settle. Water from the lagoons is discharged to Tributary 1 through an underground piped system. Surface water run-off from the P1 area of the site is collected in a land drain which discharges to the Delvin River at three separate locations, as shown on Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C.

There is an existing septic tank system off site for the treatment of wastewater. The existing site office including welfare facilities will be replaced including provision of septic tank and percolation area. The wheelwash will be upgraded and relocated towards the site entrance.

Water management within the site can be divided into the components summarised in Table 4.4-6 below.

Component	Description
Direct Input	*Effective Precipitation falling onto the site within the site boundary. *Pumped supply from site boreholes.
Partial	*Groundwater throughput beneath the site, partially intercepted on-site as groundwater upflow.
Uses	*Toilet and canteen facilities. *Dust suppression. *Operation of restoration of site.
Outputs	*Evaporation from lagoons, existing pit floor and restored areas. *Surface water discharge. *Drainage discharge to the natural hollow north of GW4. *Seepage to ground through existing pit floor, restored and unrestored areas of site. *Seepage through base and sides of site lagoons. *Discharge to ground via site septic tank and percolation area.

Table 4.4-6 Summary of Site Water Management Components

4.4.3.11 Surface Water Runoff – Treatment & Discharge

The silt and water from the wheel washing process flows by gravity into the settlement lagoons to the north of the site. The silt settles as the water flows across from Lagoon 1 to Lagoon 2, from where it is discharged to Tributary 1. These settlement lagoons are to be replaced with an upgraded wheelwash that will incorporate 3 settlement tanks.

Wash water lost during the wheel washing process, and surface run off in the existing pit area (P3) will either evaporate from the surface, percolate to ground or flow over ground to the silt lagoons.

Surface water drainage is discharged to the Delvin River at three locations, as shown on Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C.

An Emergency Response Procedure for hydrocarbon spills and appropriate training of site staff in its implementation, are in place.

4.4.4 RISK ASSESSMENT

4.4.4.1 Introduction

Defining the conceptual model requires identification of all potential sources, pathways and receptors of contamination and identifying plausible combinations of these three components. Potentially significant pollutant linkages can then be qualitatively or quantitatively assessed to identify potential risks.

No significant source of contamination was found during this assessment. This statement is supported by the site investigation works, soils analysis and groundwater analysis completed at the site.

Listed below are all the potential minor sources of contamination that were noted this assessment, along with the main potential pathways and receptors. These notes should be read in conjunction with the CSM diagram presented in Figure 2 (after text of Appendix 5.3.1).

4.4.4.2 Sources

The main sources of potential contamination identified at the site are:

- Leakages and spillages of fuels and chemicals stored on the site or used in machinery and trucks during backfill of the site;
- Leaching to groundwater from the infilled deposition areas; and
- Material with pollution potential on site surfaces *e.g.* sediment, and subsequent entrainment in site runoff during rainfall events.

4.4.4.3 Pathway

The pathways by which the contamination could reach potential receptors are described below:

- Surface water runoff and on-site surface water drainage pathways; and,
- Vertical and lateral migration via groundwater flow paths.

4.4.4.4 Receptors

The following potential receptors were identified:

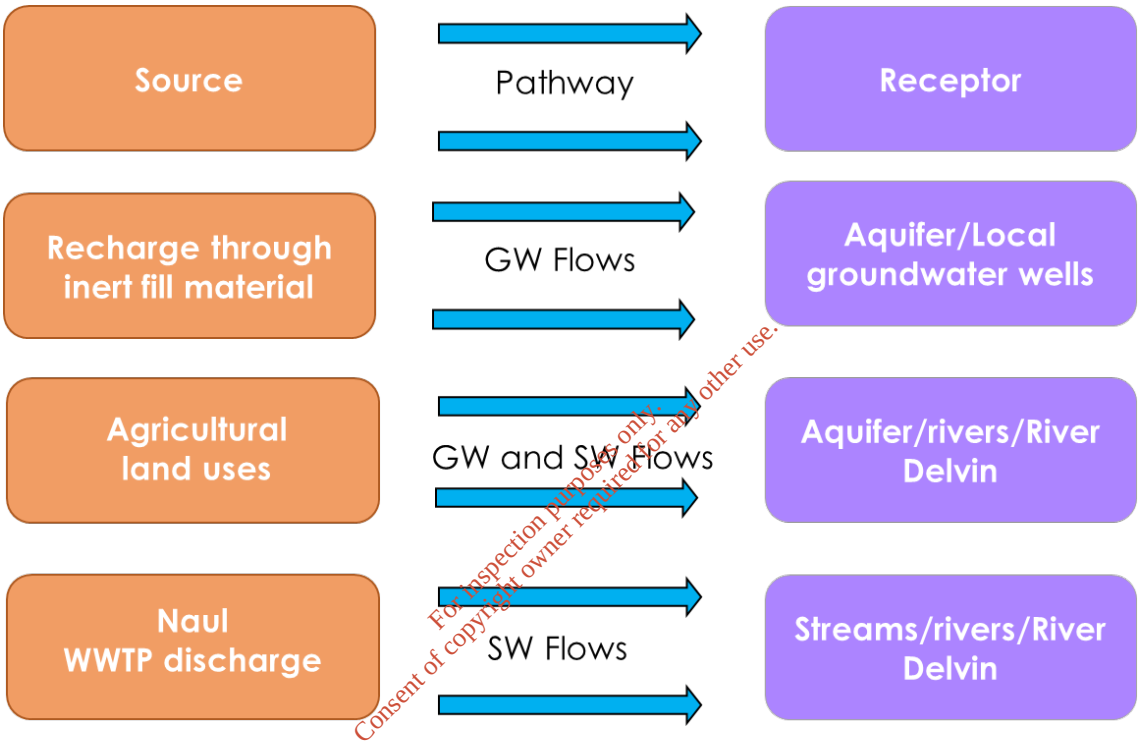
- Local surface water courses *i.e.* Delvin River and its tributary;
- The underlying bedrock aquifer; and,
- The County Council water supply wells.

4.4.4.5 Source-Pathway-Receptor Model

The conventional source-pathway-receptor model (see graphic below) for groundwater / surface water protection was applied to assess impacts on groundwater and surface water specifically on surface water, groundwater aquifers and local groundwater supplies. In the case of the subject site the primary sources of impact is the recharge to the bedrock through the infill material, nearby agricultural land uses and the Naul WWTP discharge whereby the

primary potential hazards are suspended solids, leaching and spillages, and accidental discharges of potential pollutants to the local surface waters and groundwater causing a deterioration in water quality. It should be noted that the in-situ infill material is inert soil and stone and therefore should contain no harmful/toxic contaminants.

The pathway in terms of groundwater flowpaths is via the underlying permeable infill material, and for surface water this will be via potential surface water runoff that ultimately enter the River Delvin and its tributary. The primary local targets of concern are the underlying aquifer, local wells and local surface water receptors.



Where potential impacts are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2015); and,
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2017).

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature. In order to provide an understanding of the stepwise impact assessment process applied below, we have firstly presented below a summary guide that defines the steps (1 to 7) taken in each element of the impact assessment process in Table 4.4-7 below. The guide also provides definitions and descriptions of the assessment process

and shows how the source-pathway-target model and the EPA impact descriptors are combined.

Using this defined approach, this impact assessment process is then applied to all levelling and infilling activities which have the potential to generate a source of significant adverse impact on the geological and hydrological/hydrogeological (including wells, streams and water quality) environments.

Table 4.4-7 Impact Assessment Step-Wise Process

Step 1	**Identification and Description of Potential Impact Source** This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	**Pathway / Mechanism:**	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of land infilling developments, surface water and groundwater flows are the primary pathways.
Step 3	**Receptor:**	A receptor is a part of the natural environment which could potentially be impacted upon, *e.g.* human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	**Pre-mitigation Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	**Proposed Mitigation Measures:**	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. These measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by best practice engineering design.
Step 6	**Post Mitigation Residual Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	**Significance of Effects:**	Describes the likely significant post mitigation effects of the identified potential impact source on the receiving environment.

4.4.5 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential water environment effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.4-8 Water - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	●	●	**X**
Indirect Impacts	X	X	**X**
Cumulative Impacts	X	X	**X**
Residual Impacts	X	X	**X**
`Worst Case' Impacts	●	●	●

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

4.4.5.1 'Do Nothing' Impacts

The "do nothing scenario" will involve the restoration works without any mitigation measures in place.

4.4.5.2 Direct Impacts

4.4.5.2.1 Impacts on Surface Water Quality

The site drainage is shown on Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C. Surface water runoff from the existing pit area (P3) of the site currently discharges via two settlement lagoons to the tributary of the Delvin River that runs along the northern boundary of the site.

Regular removal of sediment build-up and periodic maintenance of the drainage system is required in order to ensure optimum treatment of runoff before discharge off-site.

A stormwater drainage line runs along the road in the restored area P1 and discharges to the natural hollow area beside GW4. This area was dry during the site visits and the outfall was not observed. The depth to this drain varies from 0.8 m to 1.4 m along its length. This drainage

line delivers attenuated water to the natural hollow beside the Delvin River (*see* Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C).

The land drain south of the stormwater line discharges to the Delvin River at three locations as shown on Site Infrastructure – Surface Water Management Plan Figure D 1.2 Rev C. This drain collects runoff from the restored sloping agricultural land in P1.

The impact of releasing non-attenuated suspended solids from surface run-off at the Clashford Facility development site has the potential to be a *negative short-term moderate to significant impact* on Tributary No 1 that drains the north of the site and the Delvin River that flows along the southern boundary of the site. Any drainage not captured in this system will infiltrate into the ground and recharge to the underlying aquifer.

The implementation of mitigation measures, specified in Section 4.4.6 below will reduce the overall risk of surface water contamination in Tributary 1 and the Delvin River during operation of the quarry restoration works.

Where adequate mitigation measures are not implemented during the on-going restoration phase activities in P2, and future activities scheduled for P3, the drainage network within the site may serve as rapid flow paths for uncontrolled runoff in the direction of the River.

4.4.5.2.2 Impacts on Groundwater

The continued operation of the recovery facility has the potential to impact on groundwater in terms of both the groundwater quality and the groundwater flow regime. Based on results obtained from the five on-site boreholes, there is evidence of potential agricultural contamination of the downgradient boreholes.

The implementation of mitigations measures specified in Section 4.4.6 below will reduce the overall risk of groundwater contamination beneath, and downgradient of, the quarry in addition to reducing the risk of altering the groundwater recharge beneath the site during the restoration works at the quarry.

4.4.5.3 Indirect Impacts

The Clashford quarry site is situated in a relatively rural area and the surface water and groundwater quality at the site may be indirectly affected by the predominant land uses in the area. Agricultural land uses and the close proximity of the Naul WWTP may be partially responsible for the concentrations of nitrogen, phosphorus and coliforms detected during sampling.

As described above, these parameters were detected at concentrations that do not present a major risk to human health or the local environment.

4.4.5.4 Cumulative Impacts

The other land use activities visible in the area include farming operations, the Naul waste water treatment plant and single dwelling houses. There will be no significant in combination impacts on surface water and groundwater quality resulting from operations at the Clashford quarry site and other local existing developments, projects and plans.

Mitigation measures are already in place at the site and the site is being progressively restored to agriculture and forestry. Continual monitoring and measurement will ensure the effective application of these mitigation measures an ensure that activity at the WRF will not result in any significant environmental impact.

4.4.5.5 'Worst Case' Impacts

The 'worst case' impacts are limited by the fact that fill material imported to the site is of an inert nature. If the inert fill was contaminated by more reactive materials, there could be a greater impact on surface water and groundwater quality at the site. However, the monitoring carried out in 2014, 2017 and 2018 demonstrates that contaminants are at low levels within the site.

4.4.6 MITIGATION & MONITORING MEASURES

In order to reduce the impact of the ongoing restoration works on groundwater and surface water receptors, the following are proposed details of measures/procedures to be implemented at the site in order to ensure that the source and/or the pathway is removed. In this way, the potential risk for groundwater/surface water contamination and groundwater flow regime alteration at the site is minimised.

Many of these recommendations are in accordance with the publication "*Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non-scheduled Minerals)*" (EPA, 2006).

The most effective means by which to implement the proposed measures is to condition the mitigation measures as part of a permission for the waste licence at the site. The most effective mitigations measures for the site are:

- Adequate containment of site fuels and oils, to prevent any accidental spillages which may migrate to the subsoils and underlying groundwater;
- Diesel Plant on site is refuelled from a double skinned fuel tanker that is mobilised to site on a needs basis. Spill trays and spill kits should be provided at all times;
- Adequate drainage network for the interception and treatment of runoff prior to entry into surface water drains, i.e., a drainage network that is not overwhelmed by runoff;
- Strict control measures to ensure only suitable material is allowed onto the site, i.e., thorough inspection of waste loads entering the site to confirm inert nature prior to deposition on-site;

- Only granular wastes should be deposited into areas immediately above the groundwater table to prevent the influx of suspended solids into groundwater;
- A Drainage pipe has been provided along the Northwestern boundary of the P2 restored area, to intercept any surface run-off and direct it into the settlement lagoons before discharge to Tributary 1; and
- The specific mitigation measures could be included in an Environmental Management Plan as part of the conditions for the site waste licence.

4.4.6.1 Surface Water

It is proposed that Tributary 1 and the Delvin River should be monitored frequently during the on-going site works in Phase 2 and future site works planned in Phase 3 to ensure that the water quality is not adversely affected by on-site activities.

Discharge monitoring will continue to be undertaken at the discharge monitoring point to Tributary 1 on a quarterly basis for the following parameters: BOD, COD, Suspended Solids, Total Petroleum Hydrocarbons and Fats, Oils and Grease in order to ensure that the quarry discharge is not impacting negatively on the Tributary 1 and the Delvin River.

The drainage pipe provided along the northern extent of the restoration works in the P2 area will ensure that Tributary 1 is protected from untreated surface water run-off during the backfilling of the restoration area. Surface water runoff from this area should be directed into the settlement lagoons before discharging to Tributary 1.

It is proposed to install perimeter drains where required around the restoration area to capture and divert runoff to the current closed system for treatment.

4.4.6.2 Groundwater

It is proposed that on-going groundwater monitoring is conducted at GW3, GW4 and GW5 to confirm possible contamination in these boreholes.

Only suitably permeable and inert material should be used in the restoration process, thereby reducing the potential to create a low permeability zone which could hinder local/ regional groundwater recharge and/or creating an impermeable barrier to groundwater recharge.

Slurry spreading and organic fertiliser spreading on-site should adhere strictly to the Good Agricultural Regulations S.I. No. 31 of 2014. Appropriate buffer zones should be maintained from all watercourses as stipulated in the Regulations when applying fertiliser and other chemicals to the land.

4.4.6.3 Stockpiling Area

High absorbency mats, pig tails and drums are to be added/ maintained in the stock-piling areas of the site and in quarry vehicles to clean up any leaks from plant or machinery.

4.4.6.4 Machinery Maintenance & Repair

No servicing or maintenance of any plant or machinery takes place within the restoration areas. All plant and machinery is driven or tracked to the hardstanding area associated with the site entrance and between the entrance and the wheel wash for service or maintenance works.

4.4.6.5 Storage of Fuel/Chemicals

Diesel Plant on site is refuelled from a double skinned fuel tanker that is mobilised to site on a needs basis. This is due to the fact that the previously maintained bunded fuel storage tank had been subject to burglary.

Hydrocarbon spill kits and drip trays will be maintained on site. The operator has in place an Emergency Response Procedure for hydrocarbon spills and appropriate training of site staff in its implementation. All waste oils are collected and removed off-site by an approved licensed waste collection contractor in the area.

High absorbency mats are provided to contain any spills that may occur.

4.4.6.6 Restoration Area

The area that is to be restored as part of Phase 2 is located in the northern area of the site. The Phase 3 restoration area is the pit area in the southwestern area of the site. All material to be used for the restoration should be thoroughly inspected to ensure only suitably permeable, inert material is deposited.

4.4.6.7 Water Quality Monitoring

It is proposed that groundwater monitoring be carried out biannually. This is recommended to ensure that the restoration of the site is not impacting on the groundwater beneath the site and to establish on-going trends in the groundwater monitoring boreholes.

4.4.7 RESIDUAL IMPACTS

Due to the inert nature of the fill material, no significant residual impacts on the water environment are anticipated.

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GSI (2017) Online Map Viewer [Available at https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx

Google (2017) Google Maps [Available at https://www.google.ie/maps]

National Parks & Wildlife Services Public Map Viewer [Available at www.npws.ie]

OPW Indicative Flood Maps [Available at www.floodmaps.ie]

Water Framework Directive WaterMaps Map Viewer [Available at www.wfdireland.ie]

4.5 CLIMATE

Climate was an environmental factor under Directive 2011/92/EU, whilst Directive 2014/52/EU requires the vulnerability of a project to climate change to be addressed, particularly the risk of major accidents and/or disasters that are relevant to the project, including those caused by climate change.

The Intergovernmental Panel on Climate Change (IPCC, 2013) define “Climate, in a narrow sense, ….. is the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Classically the period for averaging these variables is 30 years, as defined by the World Meteorological Organization”. In the context of an EIAR, climate may refer to local climatological conditions (long-term weather patterns, e.g., local wind flow, temperature, rainfall or solar radiation) and particular “microclimate” effects of the project location (e.g., due to localised heat island effects, the effects of buildings / shade or coastal effects).

4.5.1 INTRODUCTION

“Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission 1987), and is the principle underpinning all current planning legislation. There is no greater challenge to meeting the latter obligation than the issue of human-induced global climate change. Developments can have implications on a national or global scale, where for example, it may represent a significant proportion of the national contribution of greenhouse gases. In the context of most Environmental Impact Statements however, climate is restricted in scope to the local climatological conditions or "microclimate" of an area, such as local wind flow, temperature, rainfall or solar radiation patterns.

For the purposes of Environmental Impact Assessment, a development may be seen to have potential climatic implications if its emissions are likely to alter meteorological conditions with possible weather effects.

This section of the EIAR addresses the issues related to climate for the proposed development of a Waste Recovery Facility (WRF) at Clashford, and its impact on the climate of the application site and its environs as a result of the activities been undertaken.

The prevailing weather systems are described with emphasis on the long-term patterns and trends. It involves an assessment of the prevailing climatic conditions, and assesses the potential impact of the development on the latter.

4.5.2 METHODOLOGY

The objective of this study was to:

- Assess the prevailing climatic conditions of the development area on a local and regional level.
- Determine the impact, if any, of the development on the local microclimate and regional macroclimate.
- Determine any interaction between other aspects of the development and the climate of the area.

4.5.2.1 Desk Study

The study of climate in respect of the proposed development was entirely a desktop study, involving the compilation of data and information on weather, climate, climate change, and impact of and vulnerability to climate change.

The principal sources of information include:

1. Met Eireann, Glasnevin, Dublin, Ireland.
2. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland.
3. Sustainable Energy Authority of Ireland (SEAI), Dublin, Ireland.
4. Intergovernmental Panel on Climate Change (IPCC), New York, USA.
5. European Union, Brussels, Belgium.

4.5.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.5.3.1 Climate

The site of the sand and gravel pit at Clashford is located within the Townland of Naul, c. 300m north of the village of Naul, in south County Meath, c. 25km north of Dublin, and c. 7.5km inland from the coast. The site is situated at c. 60-80m AOD in a predominantly rural area across the Delvin River immediately north of the village of Naul. The surrounding landscape is defined by the valley of the Delvin River, known as Roche Valley (elev. c. 60-90m OAD), separating two sets of hills to the northwest (max. elev. 159m) and southeast (max. elev. 176m). The quarry has been developed on a c. 1km long mound of sand and gravel within a southwest-northeast oriented ribbon of glacial deposits that extends down the river valley to the coastal plain. The topography of the quarry site is thus elevated above the valley floor.

The dominant influence on Ireland's climate is the Atlantic Ocean, such that Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The warm North Atlantic Drift or Current has a marked influence on sea temperatures, the influence of which is strongest near the Atlantic coasts and decreases with distance inland.

The Atlantic circulation, which includes ocean currents such as the North Atlantic Current, moves heat northwards, which is then carried by the prevailing winds towards Ireland. The prevailing winds are westerly to south-westerly, and break on the hills and mountains of the

west coast, which provide shelter from both the strong winds and from the direct oceanic influence. Rainfall is therefore a particularly prominent aspect of the climate in the west, with annual average precipitation highest on the west coast and in inland areas of high relief. Rainfall is much less prominent in the eastern half of the island.

The climate of Ireland is described as a typical “Temperate Maritime Climate”, which is modified by the North Atlantic Current, and is overcast about half the time with consistently high average humidity. Winters tend to be cool, moist and windy, while summers are mostly mild, cloudy and less windy, when the depression track is further north and depressions less deep. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to moderate the climate from the extremes of temperature experienced by many other countries at similar latitude.

A prominent feature of the atmospheric circulation in the North Atlantic, the polar front, plays an important role in the Irish climate (Met Eireann, 2017). It's a zone of transition between warm, moist air (often of tropical origin) moving northwards and colder, denser, drier air (typically of polar origin) moving southwards. In winter, the polar front usually extends north eastwards from the east coast of the United States, whereas in summer it is less well-defined. Disturbances on the front sometimes amplify and deepen to form the large-scale depressions of the middle latitudes. These depressions often move north eastwards across the North Atlantic and pass to the northwest of Ireland. Ahead of the depression centres, warm moist air is swept northwards, while behind them colder, drier air is swept southwards. This gives the sequence of cloudy, humid weather with rain, followed by brighter, colder weather with showers so typical of the Irish climate.

Ireland experiences a range of air masses with different sources and tracks, giving us our variable weather. Air masses of polar origin are most common, but they usually have a long track over the Atlantic before reaching Ireland. Even southerly or south-westerly winds can bring us returning polar air, albeit highly modified by its excursion into the warm waters of the mid Atlantic. Air masses of direct tropical or polar origin are uncommon.

The World Meteorological Organization (WMO) recommends that climate averages are computed over a 30-year period of consecutive records. The period of 30 years is considered long enough to smooth out year to year variations. By collecting weather data from around the country every hour and by analysing these records over a long period of time, 30-year average values are calculated. Met Éireann now reference 1981 to 2010 as the baseline period for day-to-day weather and climate comparisons. The closest synoptic station to the Clashford site with 30-year averages for the 1981 to 2010 period is at Dublin Airport, c. 18km to the south.

Ireland has a typical temperate maritime climate, with relatively mild, moist winters and cool, cloudy summers. The prevailing winds are westerly to south-westerly. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to moderate the climate from the extremes of temperature experienced by many other countries at similar latitude. The average humidity is high. Annual average precipitation is highest on the west coast and in inland areas of high relief.

4.5.3.1.1 Rainfall

Rainfall in Ireland normally arises from Atlantic frontal systems, which travel in a north-easterly direction delivering cloud and rain. Highest rainfall occurs in the Western half of the country and on high ground; rainfall generally decreases towards the Northeast (See Figure 4.5.1). Averaged over all Ireland, the average annual rainfall is approximately 1,230mm. The driest seasons are spring and summer, with an all-Ireland average of approximately 260 mm, autumn and winter have all Ireland averages of approximately 350mm. The driest months are April, May, June and July, with an all-Ireland average of approximately 80mm each month. February, March, August and September have average rainfall totals of approximately 100mm, while October, November, December and January have all Ireland averages of approximately 130mm.

On an annual basis, averaged over the country, there has been an increase of approximately 5% in rainfall totals between the two normal periods (1961-1990 and 1981-2010), with the higher increases in the Western half of the country. All seasons show an overall increase in rainfall but there are regional differences. There are decreases of up to 10% in rainfall in the South and East in winter, with corresponding increases in the West and Northwest. Spring and summer show increases of 5-10%. While most months show an increase in rainfall of 5-10%, January and February had decreases of 5-10% in the South and East, while September had a general decrease of up to 10%. In July, the average increase in rainfall was in the order of 15%.

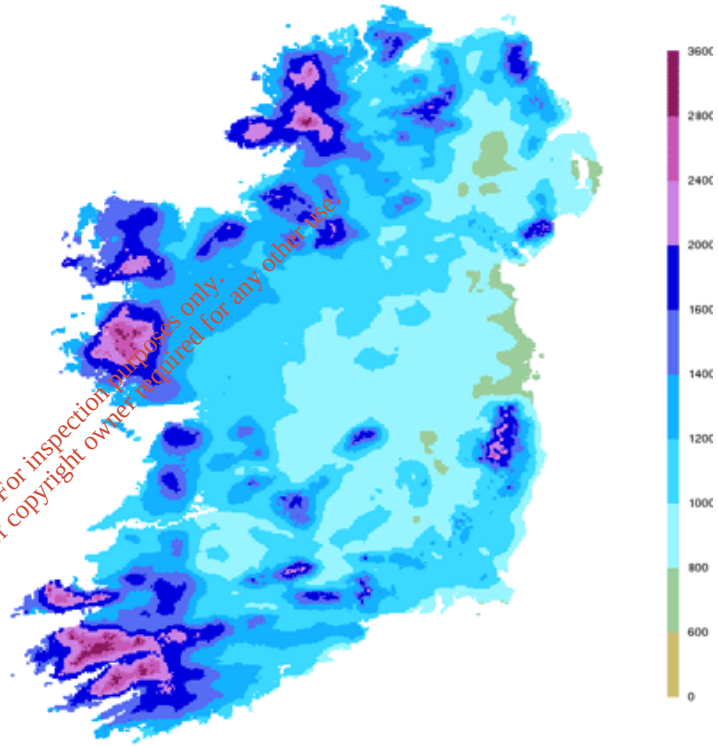

Figure 4.5-1 1981-2010 Mean Annual Rainfall (mm). Redrawn from Met Eireann (2014).

Long Rainfall data for the area was obtained from Met Eireann. The SAAR (Standard Average Annual Rainfall) recorded at Bellewstown (Collierstown) (~5km northwest) is 838mm (www.met.ie). Long term Potential Evaporation (P.E.) data was obtained for the closest synoptic station at Dublin Airport, 14km south of the quarry. The average P.E. for this synoptic station (based on 1961-1990 average monthly data) is 560 mm/year. The Actual Evaporation (A.E.) is taken to be 0.95 of P.E. Therefore, the A.E. at the quarry is estimated at 532mm/yr.

Further details with respect to the water balance for the site are included in EIAR Section 4.4 Water.

4.5.3.1.2 Temperature

The temperature regime in Ireland is greatly affected by the moderating effect of the sea, and height above sea level. Mean annual temperatures generally range between 9°C and 10°C with the higher values in coastal regions. Summer is the warmest season, followed by autumn, spring and winter. Highest temperatures occur inland during the summer, with mean seasonal maxima between 18°C and 20°C while highest values occur in coastal regions during the winter. July is the warmest month, followed by August and June; the coldest month is January followed closely by February and then December.

Generally, there has been an increase of approximately +0.5°C in mean temperature between the 1961-1990 and the 1981-2010 periods, with the highest increases in the Southeast. Maximum and minimum temperatures have also increased by approximately +0.5°C. All seasons show a rise in mean temperature with the spring and summer seasons displaying the largest differences between the two periods of approximately +0.7°C. Almost all mean monthly temperatures show an increase, except October and December, which show small decreases of up to -0.2°C in the West and Northwest.

The average daily air temperatures at Dublin Airport (1981-2010) range from 5.3ºC to 15.6ºC. These values can be considered comparable to those expected at the application site.

4.5.3.1.3 Wind

The prevailing wind direction over Ireland is between south and west. Average annual wind speeds range from 3m/s in parts of south Leinster to over 8m/s in the extreme north. On average there are less than 2 days with gales each year at some inland places like Carlow, but more than 50 a year at northern coastal locations such as Malin Head.

During the course of a typical day, the range (difference between the highest and lowest) of mean hourly wind speed is considerable. At Belmullet, a western coastal station, the mean diurnal range is 11.5m/s in January and is still as high as 8.4m/s in July. At Clones, a typical inland station the mean diurnal range is 8.4m/s in January and 6.2m/s in July. The diurnal variation is much more pronounced in summer than in winter.

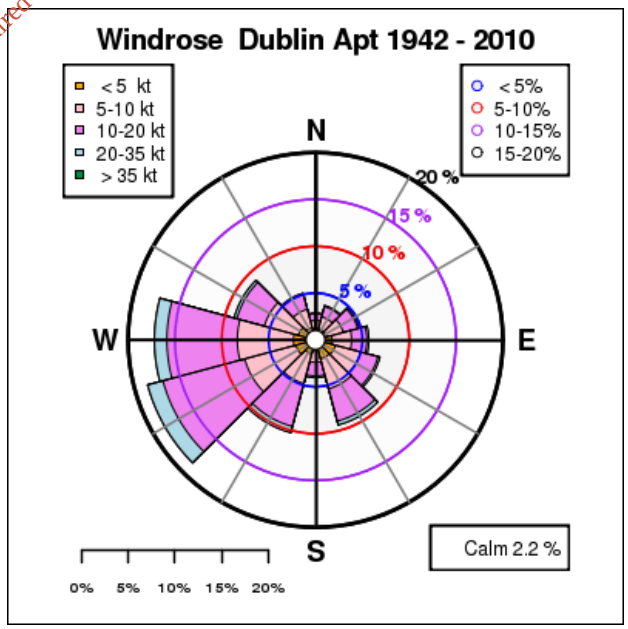

Figure 4.5-2. Dublin Airport Wind Rose based on 1942-2010 Averages. Redrawn from Met Eireann (2014).

Wind blows most frequently from the south and west for open sites, while winds from the northeast or north occur least often. In January the southerly and south-easterly winds are more prominent than in July, which has a high frequency of westerly winds. Easterly winds occur most often between February and May and are commonly accompanied by dry weather.

The prevailing winds in this area are from west to west southwest as illustrated by the Wind Rose for the synoptic weather station at Dublin Airport approximately 18km south of the site (See Figure 4.5-2).

4.5.3.2 Climate Change

Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions). The Directive also requires the vulnerability of a project to climate change to be addressed, particularly 'the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change.

The EPA define Climate Change as a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period of decades or longer. The IPCC (2013) define Climate Change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer".

Natural factors that can give rise to climate change include: (a) changes in the sun's intensity, (b) volcanic eruptions; (c) slow changes in the Earth's orbit around the sun; and (d) variations within the climate system, such as changes in ocean current circulation. However, climate change has been attributed more recently to human activities through our emissions of greenhouse gases that are changing the composition of the earth's atmosphere. The main human activities that contribute to climate change include: (a) carbon dioxide emissions through burning fossil fuels, such as coal, oil and gas and peat; (b) methane and nitrous oxide emissions from agriculture; and (c) emissions through land use changes, such as deforestation, reforestation, urbanization, and desertification. Since the beginning of the industrial revolution, the increased burning of fossil fuels and deforestation have caused the concentrations of heat-trapping greenhouse gases to increase significantly in the atmosphere, which prevents heat from escaping to space.

The Fifth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) published in 2013, states that "Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO_2 are stopped. This represents a substantial multi-century climate change commitment created by past, present and future emissions of CO_2".

4.5.3.2.1 Kyoto Protocol 1997

Member countries, including Ireland, ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994. It was soon augmented by an international agreement linked to the existing treaty, known as the Kyoto Protocol, with stricter demands for reducing greenhouse-gas emissions. The protocol was adopted in 1997 and entered into force on 16 February 2005. The Protocol's major feature is that it has mandatory targets on greenhouse-gas emissions for the world's leading economies. These targets range from -8 per cent to +10 per cent of the countries' individual 1990 emissions levels, with a view to reducing their overall emissions of such gases by at least 5 per cent below existing 1990 levels in the commitment period 2008 to 2012. In almost all cases, the limits call for significant reductions in currently projected emissions. A mechanism to set future more stringent mandatory targets for subsequent "commitment periods" after 2012 was established.

As a signatory nation to the Kyoto Protocol, and for the purposes of the EU burden sharing agreement under Article 4 of the protocol, Ireland agreed to limit the net anthropogenic growth of the six Greenhouse gases (GHGs; principally CO_2 emissions) under the protocol to 13% above the 1990 level over the period 2008 to 2012 (ERM, 1998). There have been substantial reductions in Ireland's GHG emissions in recent years, due in significant part to the impact of the economic downturn. Under the Kyoto Protocol, Ireland's total emissions are limited to an average of 62.8 Mt CO_{2eq} per annum for the first commitment period 2008-2012. By 2012, Ireland was 5.68 Mt CO_{2eq} below the Kyoto commitment for the period, and thus broadly on track to meet its commitment under the Kyoto Protocol first commitment period. However, when the impact of the EU Emissions Trading Scheme and forest sinks are taken into account, Ireland exceeded the Kyoto limit by 2.1 Mt CO_{2eq} (EPA, 2014a).

Although Ireland is currently on track to meet its Kyoto second commitment period 2013-2030 targets, there remains significant risk that these will not be met, even under the most ambitious emission reduction scenario. Total national GHG emissions are projected to decrease by an average of 0.4% per annum out to 2020, if all national policies are implemented and delivered. Emissions are projected to increase in 2020-2030 (12% in total), with strong growth in emissions from transport and agriculture, indicating that Ireland is not on a pathway to a low-carbon economy (EPA, 2014b). Thus, rather than rely on economic recession, Ireland needs to develop as a low carbon economy in order to meet future targets.

4.5.3.2.2 Paris Agreement 2015

The UNFCCC has continued on-going, detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The Conference of the Parties (COP21) was convened in Paris in 2015, and was an important milestone in terms of international climate change agreements. The so-called "Paris Agreement" builds upon the convention, and for the first time, brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort.

The Paris Agreement was signed by over 200 nations (166 parties have ratified the agreement at the time of writing). The central aim of the agreement is to strengthen the global response

to the threat of climate change by keeping a global temperature rise this century below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5°C. The objective is to limit global GHG emissions to 40 gigatonnes as soon as possible, while acknowledging that peaking of GHG emissions will take longer for developing countries. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions. The agreement requires all parties to put forward their best efforts through based on intended nationally determined contributions (INDCs), which will form the foundation for climate action post 2020.

The agreement also aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives.

The EU agreed the "2030 Climate and Energy Policy Framework" on the 23/24th of October 2014 (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the emissions trading system (ETS) and non-ETS sectors, amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all member states will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

In August 2017, the Trump Administration notified the UN that the USA was formally withdrawing from the Paris Agreement, although no country was supposed to be able to give notice of its departure until November 4, 2019. Notwithstanding the former notification, many US states and cities (e.g. California and Philadelphia) have pledged to meet their commitments under the agreement irrespective of the Federal government's position on climate change.

4.5.3.2.3 Impact of Climate Change on Ireland

Much of the discussion on Climate Change revolves around the issue of rising global temperatures. The EPA notes that the temperature records show a mean temperature increase of 0.7℃ between 1890 and 2008, which corresponds to an increase of 0.06℃ per decade. However, the increase during the period 1980-2008 corresponds to 0.14℃ per decade, and suggests an accelerating trend in global warming. Other indicators include: (a) six of the ten warmest years in Ireland have occurred since 1990; (b) a reduction in the number of frost days and shortening of frost season length; and (3) an increase in annual rainfall in northern and western areas with a decrease or small increase in the south and east. Further, ocean acidification has emerged as another significant issue, which will have harmful effects on marine organisms and has the potential to disrupt global marine ecosystems.

Climate change impacts are projected to increase during the rest of this century, with significant uncertainties remaining in relation to the scale and extent of these impacts. Projections of global temperatures to 2030, and beyond, based on multiple climate models,

indicate widening band of potential trajectories, with predicted temperatures of 0.5–2℃ above 1960–1990 temperatures. The greatest uncertainly lies in how effective global actions will be in reducing greenhouse gas emissions. Predicted adverse impacts include:

- Sea level rise, with minor inundation of low lying coastal areas.
- More intense or extreme storms (incl. storm surges) and rainfall events
- Increased likelihood and magnitude of river and coastal flooding
- Water shortages in summer in the east
- Adverse impacts on water quality
- Changes in distribution of plant and animal species
- Effects on fisheries sensitive to changes in temperature

Paradoxically, some studies have reported that global warming due to climate change could shut-down or retard the North Atlantic Current, and result in colder average temperatures in Ireland. A huge amount of heat is circulated by a single ocean current system - the Atlantic Meridional Overturning Circulation (AMOC), also known as the Atlantic Conveyor Belt. The system is driven by density, with denser waters that are cold or salty sinking to the ocean floor in the North Atlantic and flowing southwards, while warm tropical waters at the surface flow northwards in the North Atlantic Current or Gulf Stream, rendering northern Europe unusually mild for its latitude. This density-driven mechanism could become weakened if the northern waters get too warm or too fresh from melting ice. IPCC (2013) report that the AMOC will most likely weaken over the 21st century, with a best estimate of 34% loss.

4.5.3.2.4 Vulnerability to Climate Change

Vulnerability to climate change has been defined as “the degree to which a system [natural or human] is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC, 2013). Thus, exposure is viewed as an external dimension, while sensitivity and adaptive capacity are viewed as internal dimensions of vulnerability.

Exposure to climate variation is primarily a function of geography, in that coastal communities will have higher exposure to sea level rise and cyclones, while communities in semi-arid areas may be most exposed to drought. IPCC (2013) state that “Sensitivity is the degree to which a given community or ecosystem is affected by climatic stresses”, while “Adaptive Capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences”. Access to and control over natural, human, social, physical and financial resources is one of the most important factors shaping the adaptive capacity of individuals and communities. Whereas climate impacts can generally be described quantitatively by changes in biophysical indicators or in socio-economic indicators, there is no agreed metric to quantitatively describe the vulnerability of a natural system or sector. Consequently, vulnerability seems to be a relative measure rather than a quantity that can be expressed in

absolute terms. Therefore, a vulnerability assessment might consider climate change projections, the socio-economic setting, and estimates of the adaptive capacity of the project.

Resilience is the ability of a system to resist, absorb, and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity. Resilience is a familiar concept in the context of disaster risk reduction (DRR), and is increasingly being discussed in terms of adaptation to climate change. Resilience enables management of hazards to minimize their effects and/or to recover quickly from any negative impacts, and needs to be incorporated into the fabric of projects to future-proof them against increasingly extreme weather.

4.5.3.3 Air Quality

Air quality in Ireland is of a high standard across the country and is among the best in Europe, meeting all EU air quality standards in 2010. This is due largely to prevailing clean Atlantic air and a lack of large cities and heavy industry. Over the past decade, levels of particulate matter have decreased in cities and large urban areas, arising principally from improvements in vehicle engine technology.

For Ireland to comply with its international commitments on air quality and air emissions, industrial emissions of pollutants to air must continue to be rigorously controlled; policies must be implemented to increase the use of alternatives to the private car and improve efficiencies of motorised transport. Government departments, national agencies and local authorities must make air quality an integral part of their traffic management and planning processes. Households and businesses must shift from solid fuel to cleaner and more efficient alternatives including gas.

Cross reference section 4.6.3 for a full discussion of the national and European policy and legislative background to air quality.

4.5.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.5-1 Climate - Impact Matrix

'Do Nothing' Impacts			
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	X	X	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	X	X

None/imperceptible: X; Slight:  ; Moderate:  ; Significant/Very significant:  .
Refer to Appendix 5.2 for definition of Significance

4.5.4.1 'Do Nothing' Impacts

If the WRF is not licensed to continue operations, then inert soils and stone and C&D waste materials may have to be transported further afield with a consequential impact in terms of increased exhaust emissions for transport of materials to more removed WRF facilities and/or landfill sites. It is considered that the proposed continued operation of the WRF will have a slight to imperceptible positive impact with respect to climate due to restoration of the lands to agriculture/woodland.

4.5.4.2 Direct & Indirect Impacts

It is proposed that circa 40,000 to 70,000 cubic metres per annum of inert materials will be accepted to site (subject to market conditions) to complete the restoration of the lands to beneficial after use. It is estimated that c. 20,000 tonnes per annum of inert construction and demolition waste is to be recovered at the facility. As such the facility is not of sufficient scale to have any direct or indirect impacts on the regional or local climatic conditions.

4.5.4.3 Cumulative Impacts

The effect of climatic conditions (e.g., rainfall, wind, etc.) on other potential impacts of the development (e.g., dust deposition, drainage, etc.), are dealt with in the relevant sections of

this EIAR. The cumulative impact with respect to the operation of the WRF has also been taken into consideration throughout the preparation of the EIAR.

4.5.4.4 Residual Impacts

It is considered that following completion of the backfilling works there will be a slight to imperceptible positive impact with respect to climate due to restoration to agriculture and forested lands.

4.5.4.5 'Worst Case' Impact

There is no worst case impact on the regional or local climatic conditions with respect to the proposed WRF at Clashford quarry.

4.5.5 MITIGATION & MONITORING

As the development is not expected to affect the local climate or microclimate of the area, there is no requirement for mitigation or monitoring within this development proposal in respect of climatic issues.

Nonetheless, the proposed development to restore the lands will probably lead to a reduction in the emissions from fossil fuels and dust from the site, further lessening any impact on the climate.

4.5.6 REFERENCES

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4.6 AIR

4.6.1 INTRODUCTION

This section of the report deals with the issue of air quality associated with the development of a Waste Recovery Facility (WRF) at Clashford. It will assess the level of airborne dust and particulate matter in the vicinity of the site, the impacts and appropriate mitigation measures, if required, by the applicant to remedy any significant adverse effects on the environment.

4.6.2 METHODOLOGY

The baseline study comprised a desktop study including:

- A review of the relevant policy, legislation and guidance with respect to air quality and emissions.
- The existing dust monitoring results were analysed to evaluate the current air quality conditions.
- An assessment of the impact of the development on the existing air quality of the area.

4.6.3 POLICY & LEGISLATION

4.6.3.1 International Agreements

4.6.3.1.1 Climate Change

Recent climate change has been attributed to human activities through our emissions of greenhouse gases that are changing the composition of the earth's atmosphere. The Fifth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) published in 2013 states that "Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes (IPCC, 2013). It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO_2 are stopped".

The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by member countries, including Ireland, in April 1994. It was soon augmented in 1997 by an international agreement linked to the existing treaty, known as the Kyoto Protocol, with stricter demands for reducing greenhouse-gas emissions. The Paris Agreement was signed in 2015 by over 200 nations, and for the first time, brings all nations into a common cause to undertake ambitious efforts to combat climate change. The central aim of the agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5°C.

The EU agreed the "2030 Climate and Energy Policy Framework" in 2014 (EU, 2014), with a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. It was agreed the target will be delivered collectively by the EU, and that all member states will participate in this effort, balancing considerations of fairness and solidarity.

Refer to section 4.5.3.2 for discussion of Climate Change and particularly Kyoto Protocol & Paris Agreements.

4.6.3.1.2 Transboundary Pollution

The Convention on Long-Range Transboundary Air Pollution (LRTAP convention) is the main international framework for cooperation and measures to limit and gradually reduce and prevent air pollution. Fifty-one countries, including all EU member states, Canada, the United States and several countries in Central Asia, are parties to the convention. Since its signature in 1979, the LRTAP convention has been extended by 8 specific protocols, including the 1999 Gothenburg Protocol to stop acidification, eutrophication and ground-level ozone. The protocol was approved by the Council on behalf of the EU member states, including Ireland, and was transposed into EU law mostly through the 2001 National Emissions Ceiling (NEC) Directive and the 2001 Directive on emissions from large combustion plants.

The initial objective of the Protocol was to control and reduce emissions of Sulphur dioxide (SO_2), nitrogen oxides (NOX), volatile organic compounds (VOCs) and ammonia (NH_3). To achieve its initial targets, Ireland was required to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NOX (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction) by 2010. In 2012, the protocol was modified with the changes aimed at strengthening efforts to meet the objectives on the long-term protection of human health and the environment. The amendments not only introduced commitments for parties to reduce emissions of volatile organic compounds (VOCs), but also mandatory emission limit values for the main air pollutants by 2020 and beyond, and to include emission reduction commitments for $PM_{2.5}$. The 2020 emission targets for Ireland are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NOX (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels).

European Commission Directive 2001/81/EC, the NEC Directive, prescribed the same emission limits as the 1999 Gothenburg Protocol. A national programme for the progressive reduction of emissions of the four main transboundary pollutants has been in place since April 2005 (DoEHLG, 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3, but failed to comply with the ceiling for NOX.

Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC, will apply the 2010 NEC Directive limits until 2020, and establish new national emission reduction commitments that will be applicable from 2020 and 2030 for SO_2, NOX, NMVOC, NH_3, CH_4, and $PM_{2.5}$. In relation to Ireland, 2020-29 emission targets are for SO_2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH_3 (1% reduction) and for $PM_{2.5}$ (18% reduction). In 2030, Ireland's emission targets are for SO_2 (83% below 2005

levels), for NOX (75% reduction), for VOCs (32% reduction), for NH_3 (7% reduction), for $PM_{2.5}$ (35% reduction) and for CH_4 (7% reduction).

4.6.3.2 Air Quality Standards

The principal national legislation for the control of air pollution is the Air Pollution Act, 1987 (SI No. 6 of 1987). This Act provides a comprehensive statutory framework for the control of air quality by Local Authorities, specifically through 'orders' or 'plans' produced under Part IV Special Control Areas and Part V Air Quality Management Plans and Standards to which Local Authorities must have regard to in planning. Part V of the Act also makes provision for transposing Air Quality Standards into law.

The Act also has relevance to potential nuisance emissions of dust and or odours. Section 24(2) of the Act states 'The occupier of any premises shall not cause or permit an emission from such premises in such a quantity, or in such a manner, as to be a nuisance'.

In order to protect our health, vegetation and ecosystems, EU Directives set down air quality standards for a wide variety of pollutants. The current standards are contained in the Clean Air for Europe (CAFE) Directive (EP & CEU, 2008) and the Fourth Daughter Directive (EP & CEU, 2004). These Directives also include rules on how Member States should monitor, assess and manage ambient air quality.

The CAFE Directive was transposed into Irish legislation as the Air Quality Standards Regulations 2011 (S.I. 180 of 2011), which revoked and replaced three earlier statutory instruments (S.I. 33 of 1999, S.I. 271 of 2002 and S.I. 53 of 2004).

These regulations set limit values/ target values for a range of pollutants, including sulphur dioxide; nitrogen dioxide and other oxides of nitrogen; particulate matter (PM_{10} and $PM_{2.5}$); lead; benzene; carbon monoxide; and ozone.

The above directives require that Member States divide their territory into zones for the assessment and management of air quality. The zones adopted in Ireland are Zone A, the Dublin conurbation; Zone B, the Cork conurbation; Zone C, comprising 21 large towns in Ireland with a population >15,000; and Zone D, the remaining area of Ireland.

Under the EU Directives, Ireland is required to monitor a number of air pollutants that have an impact on health and vegetation. These include NO_X, SO_2, carbon monoxide (CO), ground level ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), benzene, heavy metals and polycyclic aromatic hydrocarbons (PAHs). Across Europe, the most problematic pollutants have consistently been NO_X, PM and O_3. Recently PAHs have also been identified as pollutants of concern.

NO_X refers to the two pollutants nitric oxide (NO) and nitrogen dioxide (NO_2). The main sources of these pollutants are vehicle exhausts and combustion sources. Exposure to NO_2 is harmful to health, while NO_X contributes to the formation of ground-level ozone and acid rain. NO_2 levels across Ireland have remained relatively static since 2005; and although an increasing trend was identified from 2008-2010 with the limit value exceeded in Dublin in 2009, from 2010 to 2015 no exceedances occurred. The 2009 exceedance occurred before the limit value came into force on 1 January 2010. Although NO_2 levels decreased from 2010 to 2012, some locations such as Zone B have indicated an increase in the 2013 and 2014 period.

Figure 4.6-1 shows annual mean nitrogen dioxide concentrations from 2005 to 2015 for monitoring sites across Ireland (EPA 2016).

PM_{10} and $PM_{2.5}$ are particles with diameters less than 10 micrometres and less than 2.5 micrometres, respectively. The health impacts of these small particles relate to their ability to penetrate deep into the respiratory tract. In Ireland, the main sources are domestic use of solid fuel and vehicular traffic.

Having regard to PM_{10} during the 2005 to 2015 period, in cities, traffic emissions were the main source of PM_{10} whilst in areas not connected to the natural gas grid and smaller towns, emissions from residential solid fuel combustion were prevalent. Due to these factors, levels of PM_{10} are similar across all zones and during the ten-year period, no distinguishable trends or decreases were noted (EPA, 2016).

Under the CAFE Directive, Ireland is required to achieve reductions in levels of $PM_{2.5}$ of 10% between 2012 and 2020. This reduction is challenging, as it will require an integrated approach across a number of sectors including industrial, transport and residential emissions. Figure 4.6-2 below shows annual mean PM_{10} concentrations 2005–2015 for monitoring sites across Ireland.

The sources of PAHs include industry, traffic emissions and domestic use of solid fuels such as wood and coal. Long-term exposure to low levels of PAHs may cause a number of diseases including lung cancer.

PAHs were monitored in Ireland for the first time in 2009 at five monitoring stations. From 2013 to 2015 PAH concentrations were relatively stable, however, Benxo[a]pyrene (BaP) concentrations are above the EEA air quality estimated reference level at four out of five stations. Reductions in emissions from traffic and from domestic use of solid fuels are required to reduce ambient levels of PAHs.

Ozone is a gas that is formed as a secondary pollutant at ground-level by the reaction of a mixture of other chemicals – NO_X, CO, and VOCs – in the presence of sunlight. Ozone is a powerful oxidising agent and can affect health and vegetation.

Table 4.6-1 below shows VOC emissions exceeding the national 2013 ceiling. This has occurred since 2010 and is primarily due to the inclusion of a new source category (emissions from manure management in agriculture).

Short acute ozone pollution episodes are infrequent in Ireland; however, they have happened in the past, and will happen in the future. They are most likely to occur in summer months when a stable anti-cyclone is established over Ireland, bringing settled, warm weather combined with transmission of polluted air masses from other European countries. Reducing ozone requires limiting emissions of its precursors locally, regionally and globally. The objectives of both the Convention on Long-range Transboundary Air Pollution (CLrtAP) and National Emissions Ceilings (NEC) Directive include addressing ground-level ozone (EPA, 2012).

The other health-relevant pollutants measured are SO_2, CO, benzene, lead, arsenic, cadmium, nickel and mercury. Levels of all these pollutants are low in Ireland and below all relevant limit and target values (EPA, 2015).

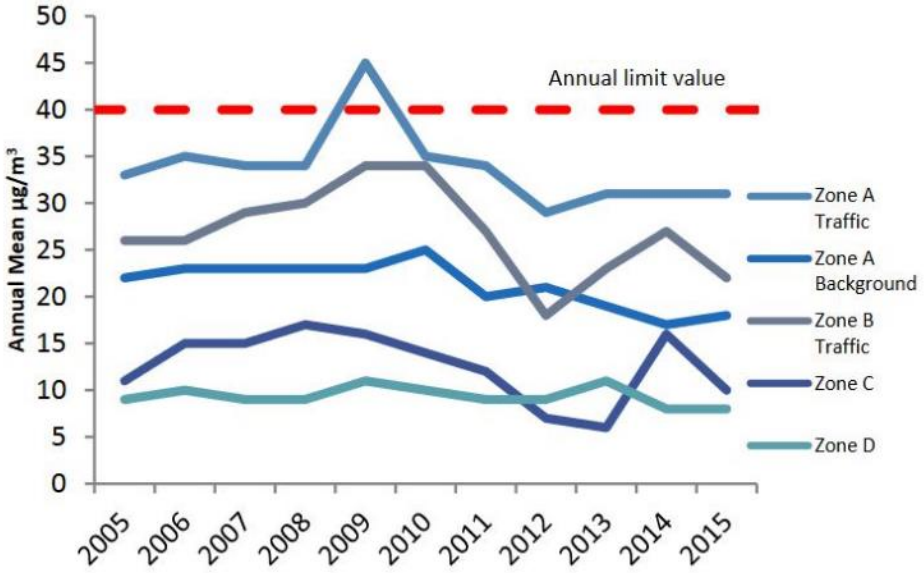

Figure 4.6-1 Annual Mean Nitrogen Dioxide Concentrations 2005-2015 (Source: EPA)

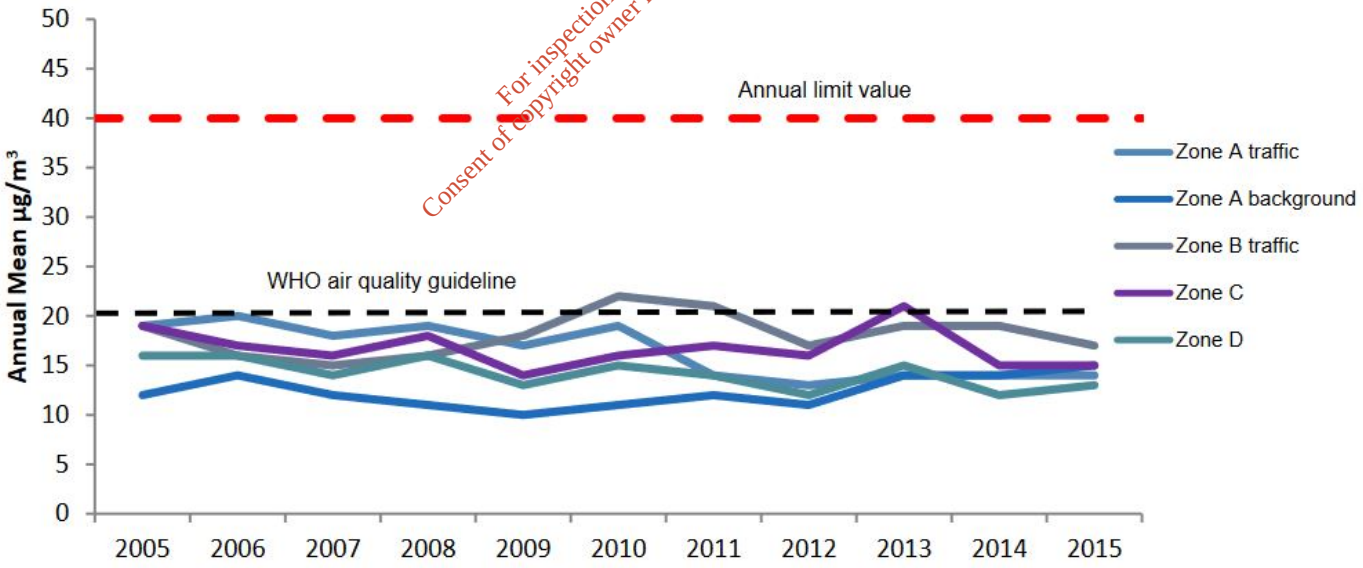

Figure 4.6-2 Annual Mean PM_{10} Concentrations 2005-2015 (Source: EPA)

Table 4.6-1 National Total Emissions of the Four NEC Pollutants 2005-2013 (Source: EPA)

	2005 (kt)	2006 (kt)	2007 (kt)	2008 (kt)	2009 (kt)	2010 (kt)	2011 (kt)	2012 (kt)	2013 (kt)	2013 Emission Ceiling (kt)	Ceiling achieved?
SO_2	71.2	60.7	55.1	45.3	32.7	26	26.7	25.2	25.4	42	**Yes**
NO_X	116.6	113.4	113.0	106.2	88.8	72.6	73.4	75.9	76.5	65	**No**
VOCs	59.7	58.4	56.9	55.2	52.2	91.4	88.7	88.2	90	55	**No**
NH_3	113.3	112.4	107.6	107.4	107.8	106.2	104.9	105.9	107.8	116	**Yes**

Air Quality in Ireland is generally of an acceptable standard, not exceeding any EU legislative or target values. However, when compared with WHO guideline values and EEA reference level values, ozone, particulate matter and PAHs emerge as pollutants of concern in the short term with NO_2 expected to rise due to increased road emissions.

With regard to air emissions, the strategies implemented to achieve compliance with the EU NEC Directive have successfully controlled emissions of sulphur dioxide, ammonia and volatile organic compounds. Emissions of all three are expected to remain below the prescribed ceilings.

For Ireland to comply with its international commitments on air quality and air emissions, industrial emissions of pollutants to air must continue to be rigorously controlled; policies must be implemented to increase the use of alternatives to the private car and improve efficiencies of motorised transport, which accounts for 40% of national energy consumption. Government departments, national agencies and local authorities must make air quality an integral part of their traffic management and planning processes. The introduction of the nationwide ban on smokey coal in 2018 is to be welcomed and should help shift the use of solid fuel to cleaner alternatives including gas.

4.6.3.3 Extractive Industry Guidelines

The impact of dust is usually monitored by measuring rates of dust deposition (DoE, 1995). There are currently no Irish statutory standards relating specifically to dust deposition thresholds for inert dust. There are a number of methods to measure dust deposition, but only the German TA Luft Air Quality Standards specify a method of measuring dust deposition – The Bergerhoff Method (German Standard VDI 2119, 1972). It is the only enforceable method available.

On this basis, both the DoEHLG (2004) and EPA (2006) recommended 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^2/day (when averaged over a 30-day period). This limit is in accordance with condition No. 8 of P.A Reg. Ref. QY/36 (17.QC.2085) for the quarry development.

4.6.4 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.6.4.1 Sensitive Receptors

The village of Naul is situated 300m south of the application site (Refer to Figure B 2.2 Rev C, *Section 6* for locations of residences). Residential property in the area typically comprises one-off single residences and farmsteads along public roads.

The site of the quarry and WRF is on a landholding of c. 33.4 ha, owned by the applicant Clashford Recovery Facilities Ltd. Although there are no residences within the landholding, there are several nearby residences within 50-100m on the R108. In addition, there are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A 1.0 Rev A and B 2.2 Rev C for site location details).

The principle concern in respect of potential airborne dust emissions from the proposed development is the effect on residential amenity. Properties within the vicinity of the development are shown on Figures B.2.1 – Rev C and B.2.2 – Rev C, *Section 6)*.

The materials to be recovered are principally “soils and stone” and inert construction and demolition waste. Any dust generated by the operation will comprise inert particulate matter.

Experience of reclamation workings indicates that mechanical activity is the most significant factor in material erosion and dust generation. Dust emanates from the placement of materials, the movement of vehicles on internal roads, loading and processing operations. However, the effect of wind is also an important factor in dust generation and problems may arise at reclamation workings when both factors arise simultaneously.

The impact of fugitive dust will be direct, temporary and non-cumulative and largely confined to the application site.

4.6.4.2 Meteorology

Cross reference section 4.5.3.1 for a full discussion of wind (4.5.3.1.3) and rainfall (4.5.3.1.1).

4.6.4.3 Air Quality

The Environmental Protection Agency (EPA) manages the National Ambient Air Quality Network. For monitoring purposes, the country is divided into four air quality zones as follows: 'A' (Dublin); 'B' (Cork); 'C' (Large Towns), and; 'D' (Rural). The Clashford area falls into zone D.

As stated previously (Refer to Section 4.6.3.2 above under the EU Directives, Ireland is required to monitor a number of air pollutants that have an impact on health and vegetation. The nearest Air Quality monitoring station to Clashford is situated 7km to the East at Balbriggan.

The EPA's Air Quality Index for Health (AQIH) is a scale from one to 10 that ranks air quality, and is applied to characterise the current air quality in each zone. A reading of 10 means the air quality is very poor and a reading of one to three inclusive means that the air quality is

good. The current air quality in the Rural East AQIH Region in which Naul is situated is "1 – Good" (Refer to Figure 4.6-3 below).

The AQIH is based on measurements of five air pollutants, all of which can harm health. The five pollutants are:

- Ozone gas
- Nitrogen dioxide gas
- Sulphur dioxide gas
- $PM_{2.5}$ particles and
- PM_{10} particles

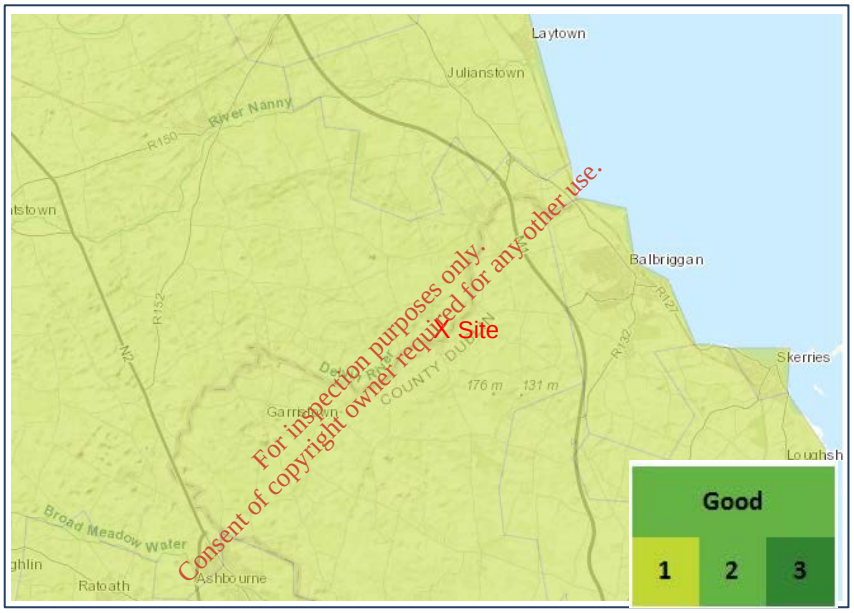

Figure 4.6-3 Air Quality Index for Health Map (EPA August 2018)

4.6.4.4 Environmental Monitoring

Dust deposition monitoring is carried out in compliance with condition No. 8 of P.A Reg. Ref. QY/36 (17.QC.2085) which states that the total dust deposition (soluble and insoluble) arising from the onsite operations associated with the development shall not exceed 350 milligrams per square metre per day averaged over a continuous period of 30 days.

In order to comply with this condition the operator set up a dust monitoring programme. Two dust monitoring stations (A2-4, A2-5) were established at the site boundary (Refer to Environmental Monitoring Plan Figure F.1.0 – Rev C, *Section 6*). The results of dust monitoring are provided in Table 4.6-2 below. Following discussion with the EPA it has been agreed to include a further two monitoring locations (A2-6, A2-7) so as to account for prevailing winds.

Dust fall is measured using the Bergerhoff method as set out in German Standard VDI 2119. The normal recommended standard for dust emissions for this type of development is that "dust deposition shall not exceed 350 mg/m^2/day measured at the site boundaries and averaged over 30 days". This limit refers to total dust (using DIN method). It is proposed to carryout dust monitoring for the activity on a bi-annual basis.

The above standard is also in accordance with guidance issued by both the Department of the Environment and the EPA in relation to dust deposition monitoring for these types of developments and will continue to be applied.

This programme will allow on-going monitoring of fugitive dust emissions from the site, thereby assisting in ensuring compliance with any future requirements or regulations.

Table 4.6-2 Dust Deposition Results (mg/m^2/day)

Monitoring Period	A2-4	A2-5	A2-6	A2-7
21/04/08 to 21/05/08	22	5	*	*
11/07/14 to 11/08/14	227.7	31.1	40.5	27

* *Stations not established at date of survey*

The results show that the dust levels at the site boundary are within the recognised TA Luft dust deposition limit value of *350 mg/m^2 per day.*

The existing dust monitoring programme will allow on-going monitoring of fugitive dust emissions from the site, thereby assisting in ensuring compliance with any future requirements or regulations.

4.6.5 ASSESSMENT OF IMPACTS

4.6.5.1 Aspects of Dust Deposition

For the purpose of this assessment, dust is defined as particulate matter that emanates from the site, or from the vehicles that serve it, which is borne by air and carried downwind from the point of origin or source. The amount of dust that may be emitted from any operation, activity or wind action is a function of two main factors:

- The susceptibility of the material involved to produce dust (i.e., 'erodibility').
- The erosive actions to which the material is subjected that could produce dust.

4.6.5.1.1 Susceptibility of Materials to Erosion

The nature and particle size of the materials being handled at a site have a fundamental influence on their tendency to be broken down and to generate fugitive dust emissions. Particles that may become suspended in air are generally a maximum of 75µm in diameter (i.e., silt size or smaller). It is also dependent on material density and to some extent particle shape. Materials erodibility is therefore directly related to the proportion of particles smaller than this size. Erodibility is also affected by the cohesion within the material. Cohesion increases with clay and moisture content, but decreases with sand content. The presence of

larger particles such as coarse sand, gravel or stone also reduces the tendency to erosion and by implication dust generation.

4.6.5.1.2 Erosive Actions

Experience of inert WRF's, quarry workings and associated ancillary activities indicates that mechanical activity is the most significant factor in material erosion and dust generation. Dust emanates from a number of site activities as detailed in section 4.6.5.3 below. However, the effect of wind and high ambient temperatures are also important factors in dust generation and migration. Problems may arise at sites when all these factors arise simultaneously.

Dust generation occurs from three main sources:

- **Point Source** – where dust is generated by activities such as loading, conveyor transfer points.
- **Line Source** – where dust is generated by activities identified above along well-defined haul roads and open conveyors.
- **Dispersed Source** – where dust is generated by activities such as general site activity.

4.6.5.1.3 Dust Dispersal

The amount of dust capable of being dispersed to a particular location during windy conditions is related to several factors including:

a) Distance from source to receptor.

b) Prevailing weather conditions.

c) Intervening topography between source and receptor.

As dust travels downwind from the source it initially disperses outwards and upwards and then progressively falls to the ground surface. Larger particles will fall first and therefore will not migrate as far as the smaller particles. The concentration of dust therefore reduces very quickly from the emission source. Most emitted dust is in fact deposited close to its source, generally within a distance of a few tens of metres.

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.6-3 Air - Impact Matrix			
'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	Decommissioning
Direct Impacts	●	●	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	X	X
None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●. *Refer to Appendix 5.2 for definition of Significance*			

4.6.5.2 'Do Nothing' Impacts

If the WRF is not permitted to continue recovery operations, then inert soils and stone and C&D waste materials may have to be transported further afield with a consequential impact in terms of increased exhaust emissions for transport of materials to more removed WRF facilities and/or landfill sites. It is considered that the proposed continuation of operations at the WRF will have a slight to imperceptible positive impact with respect to climate due to restoration to agriculture and forested land.

4.6.5.3 Direct Impacts

Fugitive dust emissions are generated wherever there is movement of dust relative to the air. The emission of fugitive dust from inert soils and stone backfilling site activities is very dependent on weather conditions. Where nuisance complaints from activities arise, they are generally as a result of a combination of specific site activities and particular weather conditions (e.g. dry, windy).

Within the application area, the following site activities may give rise to potential fugitive dust emissions:

- Internal movement of vehicles
- Tipping and levelling of placed materials
- Loading and Unloading of Vehicles
- Processing Area

They are generally dispersed sources rather than specific point sources, and this dictates the measures required to mitigate potential dust related impacts.

The following flow diagram shows the sources of fugitive dust emissions arising on site and the methods of treatment/ abatement employed.

The impacts of any dust deposition from the operations will be direct, of short duration, temporary and largely confined to the site area. Various mitigation measures have and will continue to be implemented to minimise any impacts as much as practical (Refer to Section 4.6.6 below).

Dust monitoring results for the operation are given above (Refer to Table 4.6-2 above). These results show that the dust levels at the site boundary are within the recognised TA Luft dust deposition limit value, and are considered typical of dust levels in the quarry area. The existing operation has in place a number of mitigation measures to ensure the continued operation of the WRF will not result in any significant impact on residences or local amenities (Refer to Section 4.6.6 below).

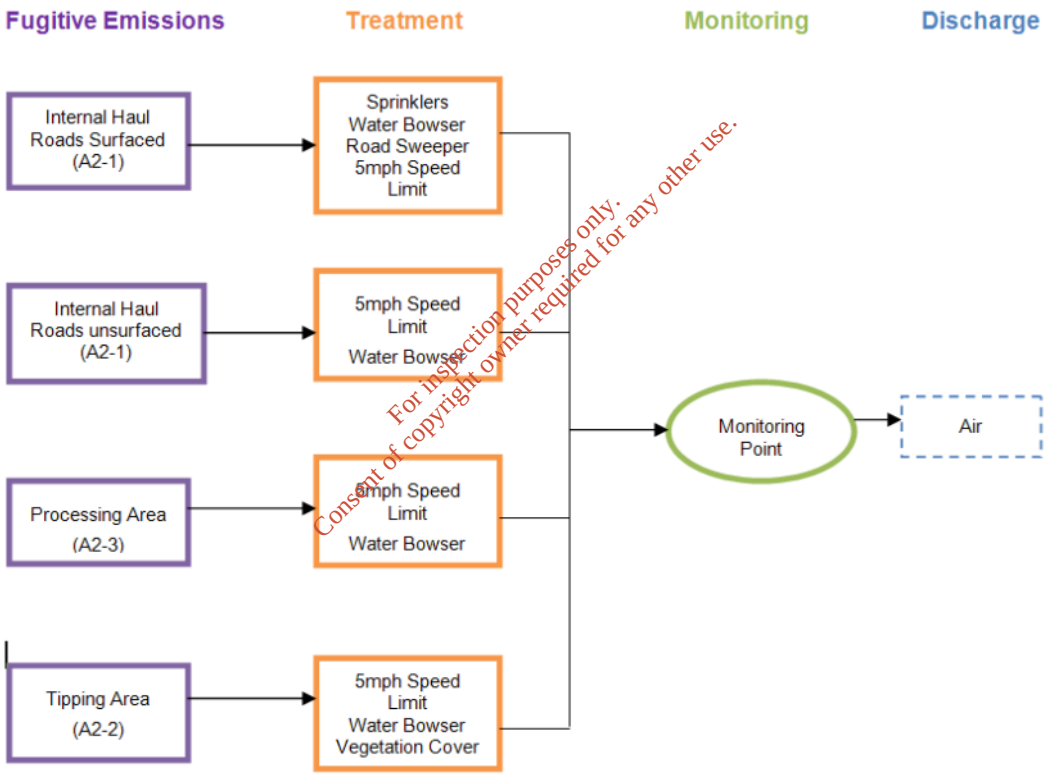

Figure 4.6-4 Operational Activities

The Air Quality Standards Regulations (2002 S.I. No. 271 of 2002) sets limit values for sulphur dioxide, nitrogen dioxide, particulate matter and lead in ambient air. The regulations apply to ambient air quality in the vicinity of land use/development types including Waste Recovery Facilities. The development requires movement of materials by road, and transport by other methods is not practical in this situation. Given the proximity of the site to the National Road network fuel consumption and therefore exhaust emissions will be reduced relative to more removed locations. The current air quality in the region is known to be “good” (Refer to Section

4.6.4.3 above), and thus the impact on air quality with respect to the existing quarry/WRF is considered to be negligible.

4.6.5.4 Indirect Impacts

Apart from the direct impact of the deposition of particulate material, there may be an associated visual impact with fugitive dust generation. This impact will be minimised by both the mitigation measures described to minimise dust in Section 4.6.6 below and those described to minimise visual impacts in Section 4.8.

4.6.5.5 Cumulative Impacts

The restoration works using imported "soil and stones" are no different from normal quarry restoration operations. There are no other major quarries or waste recovery facilities in the locality. There are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A1.0 Rev A and B2.2 Rev C for site location details). Environmental dust monitoring (Refer to EIAR Section 4.6.4.4 above) has shown that the WRF can be operated within acceptable standards for these types of developments and as such there is no significant cumulative impact with respect to the continued operation of the WRF.

Progressive restoration of the quarry over time will also reduce the area of exposed ground within the existing quarry. As such there is no cumulative impact with respect to the movement and placement of materials during the progressive restoration of the quarry development.

The results of dust deposition monitoring show that the dust levels at the quarry comply with the recommended dust deposition limit of 350 mg/m^2/day (averaged over a 30-day period and measured at the quarry site boundary).

The proposed development will also be operated within acceptable standards for this type of development. Continual monitoring and measurement will ensure the effective application of the mitigation measures (Refer to 4.6.6 below) an ensure that activity at the WRF will not result in any significant environmental impact.

4.6.5.6 Residual Impacts

Given the low inherent potential for dust generation and dispersion from the proposed development following restoration, the rural location, and the mitigation measures incorporated in the design, it is anticipated that the effect on the existing air quality will be negligible, and no residual impacts are predicted.

4.6.5.7 'Worst Case' Impact

The site is not located within any designated areas such as proposed Natural Heritage Areas (pNHA), candidate Special Areas of Conservation (SAC), or Special Protection Areas (SPA). The nearest Natura 2000 site is the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), which is located c. 8km to the northeast.

The nearest large population centre is the town of Balbriggan, approximately 7km to the east, albeit Naul village is located c. 300m south of the site. There are several residences located on the R108 that are within 50-100m of the quarry site.

The lands directly adjoining the nearest residences have been restored and the final phase of the lands to be restored is further removed. Thus, it is expected that there will be an imperceptible neutral impact with respect to local amenity and residential receptors as a result of the continued operation of the WRF at Clashford.

4.6.6 MITIGATION & MONITORING

Mitigation measures are already in place with respect to the quarry to reduce dust emissions, to aid fugitive dust reduction, and to ensure that the operations remain within the stated thresholds (Refer to 4.6.3.3 above). The company will put place an Environmental Management System (EMS) that sets out procedures to follow to ensure emissions are kept to a minimum.

A number of measures have/will be adopted to minimise dust emissions to the atmosphere from general site activity, internal haulage, processing and tipping operations as follows:

- During dry weather the haul roads and stockpiles are sprayed with water to dampen any likely dust blows.
- A mobile water browser is provided in periods of dry or windy weather to cover locations where it is impractical or inappropriate to use a fixed water spray system.
- Consideration will be given to location of mobile plant so as to ensure that any principle dust sources cannot adversely affect sensitive off-site locations.
- Static and mobile wet dust suppression systems will be located at strategic points in the process if required.
- Drop heights are kept to a minimum by using short conveyors and maintaining stocks under the head drum load out points.
- A wheel wash facility has been installed on site and all vehicles are required to pass through the wheel wash on exiting the site.
- A sprinkler system has been installed on the site access road and is in operation during periods of dry weather.
- Main site haulage routes within the site shall be maintained with a good temporary surface, as is the case at present.
- All internal roadways will be adequately drained, to prevent ponding.
- A road sweeper is available for use on site and adjacent sections of the R108 at least on a weekly basis and/or if a spillage occurs onto the public roadway.
- Suitable vegetation is to be provided on restored areas at the earliest opportunity.
- Regular servicing of facility plant & machinery will ensure that exhaust emissions are kept to a minimum.

- Ongoing dust monitoring to ensure threshold limits are not exceeded.

Dust emissions from the facility will be controlled and monitored. Dust emissions and their management will be addressed in the 'Environmental Management System' (EMS) for the Clashford site.

It is considered given the nature of the activity, control and abatement measures and management of the existing quarry that emissions of pollutants (as defined in Waste Management Acts 1996 to 2003 and Air Pollution Acts 1992 and 1987 respectively) to the atmosphere are not likely to degrade the environment (i.e., be injurious to public health, or have a deleterious effect on flora or fauna or damage property, or impair or interfere with amenities or with the environment).

The active working area of the site will be inspected frequently during dry, windy weather to assess the potential for dust blows, and when necessary, appropriate dust suppression and control measures will be implemented in response.

These measures are considered sufficient to ensure that dust emissions will remain below recognised thresholds for this type of development.

4.6.7 REFERENCES

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https://europa.eu/european-union/eu-law/legal-acts_en European Union, Regulations, Directives and other Acts.

http://ec.europa.eu/environment/eia/eia-guidelines/g-screening-full-text.pdf European Commission, Guidance on EIA Screening.

http://www.irishstatutebook.ie/home.html Irish Statute Book, Office of the Attorney General, Dublin, Ireland.

4.7 NOISE & VIBRATION

4.7.1 INTRODUCTION

This section of the report deals with the issue of noise associated with the proposed development of a Waste Recovery Facility (WRF) at Clashford.

The section will determine the existing environment with respect to noise by assessing the level of noise in the vicinity of the site, the potential impacts on the environment, and propose appropriate mitigation measures, if required, by the applicant to avoid, reduce or remedy any significant adverse impacts on the environment.

4.7.2 METHODOLOGY

The baseline study comprised a desktop review of relevant policy, legislation including guidance with respect to noise emissions.

The purpose of the baseline study is to assess the existing levels of noise. Noise monitoring is carried out at the existing recovery facility in accordance with conditions imposed under P.A Reg. Ref. QY/36 (17.QC.2085) and waste management permit (WMP 2005/25).

Noise measurements surveys were undertaken at a number of noise sensitive locations and the results analysed to determine noise conditions. From these results, an assessment can be made of the impact of the development on the existing noise levels of the area.

4.7.2.1 Sources of information

The following has been taken into consideration with respect to noise monitoring surveys:

- Measurement of noise levels was undertaken using a Type 1 Sound Level Meter;
- Cognisance was taken of the EPA's 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in relation to Scheduled Activities (NG4);
- The surveys were carried out in accordance with 'ISO 1996 Acoustics - Description and Measurement of Environmental Noise: Parts 1/2/3'.

4.7.2.2 Policy & Legislation

The strategic control of environmental noise is directed by the Environmental Noise Regulations, which transposed EU Directive 2002/49/EC. This Directive was developed to provide a common framework to avoid, prevent, or reduce the harmful effects of environmental noise. The regulations focus on the process for addressing environmental noise from major infrastructure such as airports, major roads, and large agglomerations.

Sections 106 to 108 of the *Environmental Protection Agency Act* deal with noise on a smaller (i.e. more local) scale:

- Section 106 deals with control of environmental noise by the Minister and the Agency;

- Section 107 sets out the powers prescribed by the Act to a local authority or the Agency to prevent or limit noise. It typically relates to noise from sites regulated by the Agency or a local authority. This allows local authorities or the Agency to serve notices on premises/sites where prevention or limitation of noise is required. The Environmental Protection Agency Act 1992 (Noise) Regulations 1994 provide for a prosecution where there is a failure to comply with the requirements of the issued notice, and;
- Section 108 describes the provisions for complaints regarding noise nuisance to be taken to the District Court by any person or agency. It allows for any person, local authority or the Agency to make a complaint to the District Court where noise levels are considered to be generating a reasonable cause for annoyance. Where the court finds in favour of a noise nuisance complaint, the person or body responsible for the noise must reduce it to a specific level, to limit it or cease it altogether.

4.7.2.3 Meath County Development Plan 2013.

The following CDP Policy is considered relevant with respect to Noise Emissions

PC POL 1: Noise

(a) Seek the preserve and maintain air noise quality in the country in accordance with good practice and relevant legislation.

A detailed assessment of potential noise impacts of the proposed development is provided within this report. Given the proximity of the site to the R108 and the village of Naul, and several commercial properties, including an adjacent Kilsaran concrete batching plant, the impact of noise due to site traffic is considered to be insignificant in terms of the noise impact and effect. The main noise sources in the area are from the R108 Regional Road and an adjacent concrete batching plant. The proposed development will not give rise to significant adverse noise related effects on nearby noise sensitive locations provided the limits and conditions are complied with and mitigation measures are in place.

4.7.2.4 Emission Limit Value

The following are Environmental noise limits based on Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016) as produced by the Environmental Protection Agency (EPA 2016). It should be noted *"that the guidance within this document relates to the assessment and measurement of noise in relation to* ***Agency scheduled activities only***".

Table 4.7-1 Recommended General Noise Limit Criteria (For EPA Scheduled Activities (NG4, 2016)

Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night-time Noise Criterion, dB $L_{Ar,T}$ (23:00 to 07:00hrs)
55dB	50dB	45dB

Where tonal and/or Impulsive noise is identified a rating level based on the penalty as outlined in Table 4.7-2 is to be applied to the measured L_{Aeq}.

Table 4.7-2 Recommended Tonal/Impulsive Noise Ratings

Period	Sound Characteristic	Correction to L_{Aeq} to Arrive at Rating Level $L_{Ar,T}$ (dB)
Daytime & Evening	Tonal/Impulsive	5
Night-time	Tonal/Impulsive noise from the facility should not be audible at any NSL	

If more than one adjustment is potentially applicable for the type or character of a given single sound source (i.e. a source that is both tonal and impulsive), only a single adjustment shall be applied.

The EPA Guidance Note (NG4) also addresses a number of specific activities including Quarrying and Mining Operations. Detailed guidance in relation to noise and vibration associated with these activities is provided in the Agency publication Environmental Management in the Extractive Industry (EPA, 2006a). Section 3.5 Noise & Vibration of this document sets out appropriate Emission Limit Values (ELV's) and deals with control of noise, vibration and air overpressure i.e.

In relation to quarry developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following noise ELVs at the nearest noise-sensitive receptor:

Daytime (08:00 — 20:00) L_{Aeq} (1 hour) 55 dB (A)

Nighttime (20:00 — 08:00) L_{Aeq} (1 hour) 45 dB (A)

(Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA).

These same "*appropriate Emission Limit Values (ELV's)"* for quarry developments are also set out in the 2nd Edition of the Irish Concrete Federation Environmental Code (ICF, 2005). As acknowledged in these guidelines *"the Code has gained national recognition and has now become a reference document in the Department of the Environment, Heritage and Local Government's "Quarries and Ancillary Activities – Guidelines for Planning Authorities" and in the EPA "Environmental Management in the Extractive Industry (Non-Scheduled Minerals) – Guidelines for Operators".*

These levels are also consistent with guidance issued by the Department of the Environment: "Quarries and Ancillary Activities – Guidelines for Planning Authorities (2004) DOEHLG".

The noise levels measured on site must be in compliance with P.A Reg. Ref. QY/36 (17.QC.2085) i.e. Condition No.6 - *"the noise levels associated with day to day activity, when measured from any house in the vicinity of the quarry, shall not exceed 55 dB (a) leq over a measured time interval of one hour by day time and shall not exceed 45 dB (A) leq over a*

measured time of 15 minutes by night time. These levels may be exceeded to allow temporary but exceptionally noisy phases in the extraction process or for short term construction activity which is required to bring long-term environmental benefits following written consent by Meath County Council".

It is considered that the noise limit imposed at the WRF should be in accordance with existing condition No. 6 of P.A. Reg. Ref. QY/36 (17.QC.2085) being consistent with both the EPA (2006a) and DoEHLG(2004b) guidelines as detailed above.

Adoption of the above ELV's will ensure that there is no significant impact on noise sensitive receptors in the vicinity of the site.

4.7.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.7.3.1 Proposed Development

The lands are being restored to agricultural use by importation and recovery of inert materials in accordance with a phased restoration scheme. Designated internal haul roads are used to direct site traffic to the current tipping area. A bulldozer is used to appropriately grade and compact the material to the desired profile as shown by the detailed plans and sections (Refer to Figures B.2.4 – Rev. C and B.2.5 – Rev. C, *Section 6*.

There will also be intermittent noise associated with the Construction and Demolition processing operations. Designated internal haul roads will be used to direct site traffic to the C&D processing area.

The principle concern in respect of potential noise emissions from the development is the effect on residential amenity. Properties within the vicinity of the development are shown on Figure B.2.2 – Rev C, *Section 6*. As shown the nearest noise sensitive locations are along the R108 Regional road to the west of the existing site.

The main noise sources in the area are from the R108 Regional Road and an adjacent concrete batching plant. The area of restored lands completed to date adjoins the north western boundary of the site and Phase 1 along the southern boundary with the Delvin River. In general the future restoration works will be further removed from the nearest noise sensitive residences in the area. Noise monitoring to date has shown that site activity at the existing facility are within accepted thresholds for this type of development (Refer to Section 4.7.3.2 below).

4.7.3.2 Noise Monitoring

Noise monitoring is carried out at nearby residences and site boundaries adjoining same (Refer to Figure F.1.0 – Rev C, *Section 6*).

A baseline noise monitoring survey was undertaken at the site to determine the existing noise levels. The noise monitoring survey was carried out between the 22/07/14 and 25/7/14. The results of the noise survey are provided in Table 4.7-3 below.

The following parameters were recorded during the noise monitoring surveys:

$L_{Aeq, T}$ is the equivalent continuous A-weighted sound pressure level, in decibels, determined over a time interval *T* (the sampling interval).

$L_{A10,T}$ the A weighted level of noise exceeded for 10% of the specified measurement period (T). It gives an indication of the upper limit of fluctuating noise such as that from road traffic.

$L_{A90,T}$ the A weighted noise level exceeded for 90% of the specified measurement period (T). It is typically used as a descriptor for background noise, giving an indication of the underlying noise level or the level that is almost always there between intermittent noise events.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

L_{eq} is recommended by the International Organisation for Standardisation (ISO) for measuring and rating noises for traffic areas and for the description of environmental noise.

Table 4.7-3 Noise Monitoring Results

Location	Sampling Interval	L_{Aeq} dB	L_{A10} dB	L_{A90} dB	Sampling notes
N4	15:24-16:11hrs *22/07/14*	46.19	47.1	37.53	The weather conditions prevailing at the time were warm and sunny with slight to no breeze. Activity at the WRF comprised lorries unloading, and intermittent operation of an excavator and bulldozer. Distant road traffic audible.
N5	14:08-15:08hrs *22/07/14*	45.26	47.26	37.52	
N6	9:46-10:48hrs *25/07/14*	42.41	44.07	34.31	The weather conditions prevailing at the time were warm and sunny with light easterly breeze. Activity at the WRF comprised lorries unloading. Construction activity not associated with quarry was audible from the direction of Naul Village.
N7	8:39-9:39hrs *25/07/14*	42.52	42.47	32.67	The weather conditions prevailing at the time were warm and sunny with light easterly breeze. Activity at the WRF comprised lorries unloading, and intermittent operation of an excavator and bulldozer.

The noise levels measured on site are in compliance with condition No. 6 of P.A Reg. Ref. QY/36 (17.QC.2085). The above noise levels are considered typical during the operation of the WRF. The facility has remained closed since August 2017 and Meath County Council have informed our client that Environmental Order No. A02789/2017 (Section 55 Notice (WMA Act, 1996, as amended) is to remain in place until such time as the EPA reach a decision with respect to Waste Licence application.

4.7.4 ASSESSMENT OF IMPACTS

The principle concern in respect potential noise emissions from the proposed WRF is the effect on residential amenity.

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.7-4 Noise - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	Decommissioning
Direct Impacts	●	●	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	X	X

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

4.7.4.1 'Do Nothing' Impacts

The main noise sources in the area are from the R108 Regional Road and an adjacent concrete batching plant. The area of restored lands completed to date adjoins the north western boundary of the site and Phase 1 along the southern boundary with the Delvin River. In general the future restoration works will be further removed from the nearest noise sensitive residences in the area. Noise monitoring to date has shown that site activity at the existing facility are within accepted thresholds for this type of development (Refer to Section 4.7.3.2 above).

4.7.4.2 Direct Impacts

The main source of noise and vibration on site is from:

- Movement of trucks on internal haul roads and tipping of material
- Bulldozer placing and grading the infill material

- Processing Plant

Given the nature of the development the location of the above will vary dependent on area of site being restored (Refer to Figure B.2.1 – Rev C, *Section 6*).

The following flow diagram shows the main sources of noise emissions arising on site and the methods of treatment/abatement employed.

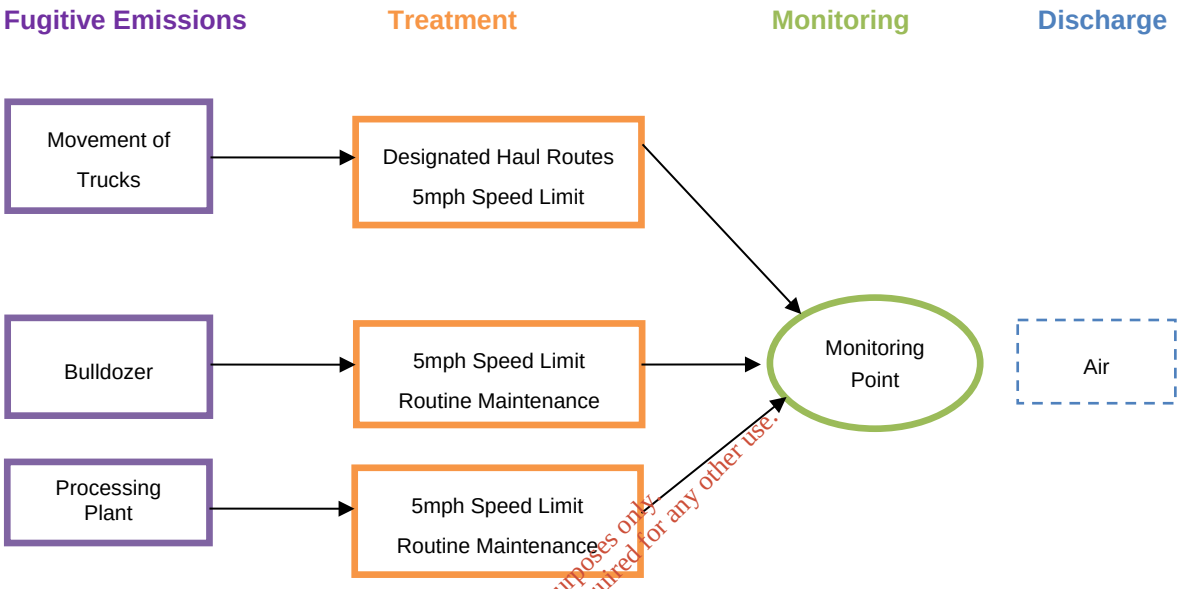

Figure 4.7-1 Operational Activities

The existing facility has been in continuous operation under successive Waste Management Permits since 2001. Environmental noise monitoring has been carried out at this location in compliance with both the terms of the Waste Management Permits and various planning permissions pertaining to the site. It should be noted that for most of this time the site activity was concentrated close to the nearest noise sensitive receptors (in particular adjoining environmental monitoring locations N4 and N5). Noise monitoring to date has shown that noise levels due to site activity are within acceptable thresholds for this type of development. Given that site activity will in general be further removed from the nearest noise sensitive locations the overall impact with respect to noise will be further reduced with respect to the continuance of operations.

4.7.4.3 Indirect Impacts

The main noise sources in the area are from the R108 Regional Road and an adjacent concrete batching plant. There are no indirect impacts with respect to noise.

The area of restored lands completed to date adjoins the north western boundary of the site. In general the future restoration works will be further removed from the nearest noise sensitive residences in the area. Noise monitoring to date has shown that site activity at the existing facility are within accepted thresholds for this type of development (Refer to Section 4.7.3.2 above).

4.7.4.4 Cumulative Impacts

The restoration works using imported “soil and stones” are no different from normal quarry restoration operations. There are no other major quarries or waste recovery facilities in the locality. There are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A1.0 Rev A and B2.2 Rev C for site location details).

The cumulative impact of noise emissions at the quarry is assessed through the existing environmental monitoring programme that has been established in compliance with the planning permission associated with the quarry.

Environmental noise monitoring (Refer to EIAR Section 4.7.3.2 above) has shown that the WRF can be operated within acceptable standards for these types of developments and as such there is no significant cumulative impact with respect to the continued operation of the WRF.

Continual monitoring and measurement will ensure the effective application of the mitigation measures (Refer to 4.7.5 below) an ensure that activity at the WRF will not result in any significant environmental impact.

4.7.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design of the development that there will be no significant effects with regard to noise levels on the local residences, their property, livestock and amenity and no residual impacts are predicted.

Based on the impact assessment and existing mitigation measures in place, no additional remediation measures are considered necessary with respect to noise.

4.7.4.6 ‘Worst Case’ Impact

The site is not located within any designated areas such as proposed Natural Heritage Areas (pNHA), candidate Special Areas of Conservation (SAC), or Special Protection Areas (SPA). The nearest Natura 2000 site is the Laytown Dunes/Nanny Estuary cSAC (Site Code 0554), which is located c. 8km to the northeast.

The nearest large population centre is the town of Balbriggan, approximately 7km to the east, albeit Naul village is located c. 300m south of the site. There are several residences located on the R108 that are within 50-100m of the quarry site. There are several commercial enterprises on the R108, including the adjacent Kilsaran concrete plant immediately south of the site (Refer to Figures No. A1.0 Rev A and B2.2 Rev C for site location details).

The existing facility has been in continuous operation under successive Waste Management Permits since 2001. It should be noted that for most of this time the site activity was concentrated close to the nearest noise sensitive receptors (in particular adjoining environmental monitoring locations N4 and N5). Noise monitoring to date has shown that noise levels due to site activity are within acceptable thresholds for this type of development. Given that site activity will in general be further removed from the nearest noise sensitive

locations the overall impact with respect to noise will be further reduced with respect to the continuance of operations.

4.7.5 MITIGATION & MONITORING MEASURES

Mitigation measures are already in place with respect to the quarry to reduce noise emissions and to ensure that the operations remain within the stated thresholds (Refer to Section 4.7.2.4 above). The company will put place an Environmental Management System (EMS) that sets out procedures to follow to ensure emissions are kept to a minimum.

4.7.5.1 Mitigation

Noise resulting from the operations can be kept to acceptable levels by the implementation of good design, effective operation and management and by the adoption of 'best practices'. Reducing noise at source wherever possible is the most effective way of minimising the impact, but barriers and screens between noise source and receptor can also be used to very good effect.

The type of mitigation techniques implemented to reduce noise are detailed below:

- The provision of temporary peripheral screen banks to screen site activities from outside views.
- General site activity will be within the existing pit and below the level of the nearest residences.
- The use of designated haul roads to ensure that site traffic is removed from nearest noise sensitive receptors.
- All machinery used will be CE certified for compliance with EU noise control limits.
- Regular maintenance of all plant and machinery is an integral part of site management and is important in helping to minimise noise impact.
- All plant and machinery is switched off when not in use.
- A noise management programme will be defined as part of the EMS.

4.7.5.2 Monitoring

The operator has established an environmental monitoring programme to include noise monitoring.

Noise monitoring can be carried out at four noise monitoring stations (N4-N7) in the vicinity of the nearest noise sensitive properties (Refer to Figure F 1.0 – Rev C) in accordance with any monitoring programme agreed with the EPA. It is proposed to carryout noise monitoring on a bi-annual basis.

The results of monitoring to date shows that the development can comply with the noise level threshold as specified and as a consequence the development will have no significant effects regards noise levels in the area. Noise emissions and their management will be addressed in the 'Environmental Management System' (EMS) for the Clashford site.

This programme will allow on-going monitoring of noise emissions from the site, thereby assisting in ensuring compliance with any future requirements or regulations.

Through implementation of the proposed mitigation measures it is considered the development will continue to have no significant effects with regard to noise levels on the local residences, their property, livestock and amenity.

4.7.6 REFERENCES

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