8.0 LAND, SOILS AND GEOLOGY

8.1 INTRODUCTION

This chapter of the EIAR assesses the effects of the proposed power plant on the land, soil and geological environment. Information on the existing soil and geological environment is presented as a baseline for the site. The potential effects of the proposed power plant are discussed along with recommended mitigation measures for each potential effect. Any residual and cumulative effects are also assessed.

8.1.1 STATEMENT OF AUTHORITY

This chapter has been completed by John Dillon and Michelle Wong of TOBIN Consulting Engineers.

John Dillon (BSc., MSc., DIC, MCIWM, PGeo) is a hydrogeologist with 18 years' geological/hydrogeological experience on major infrastructure developments. John has authored numerous Land, Soils and Geology chapters for EIARs for a range of projects.

Michelle Wong (BSc., MSc., EurGeol, PGeo) is a hydrogeologist with over 10 years' experience in both the public and private sectors. Michelle has a strong background in groundwater resource assessment and hydrogeological/ hydrological investigations. Michelle has authored numerous Land, Soils and Geology chapters for EIARs for a range of projects.

8.2 METHODOLOGY

The methodology used to produce this chapter included completing a desk study and a site walkover.

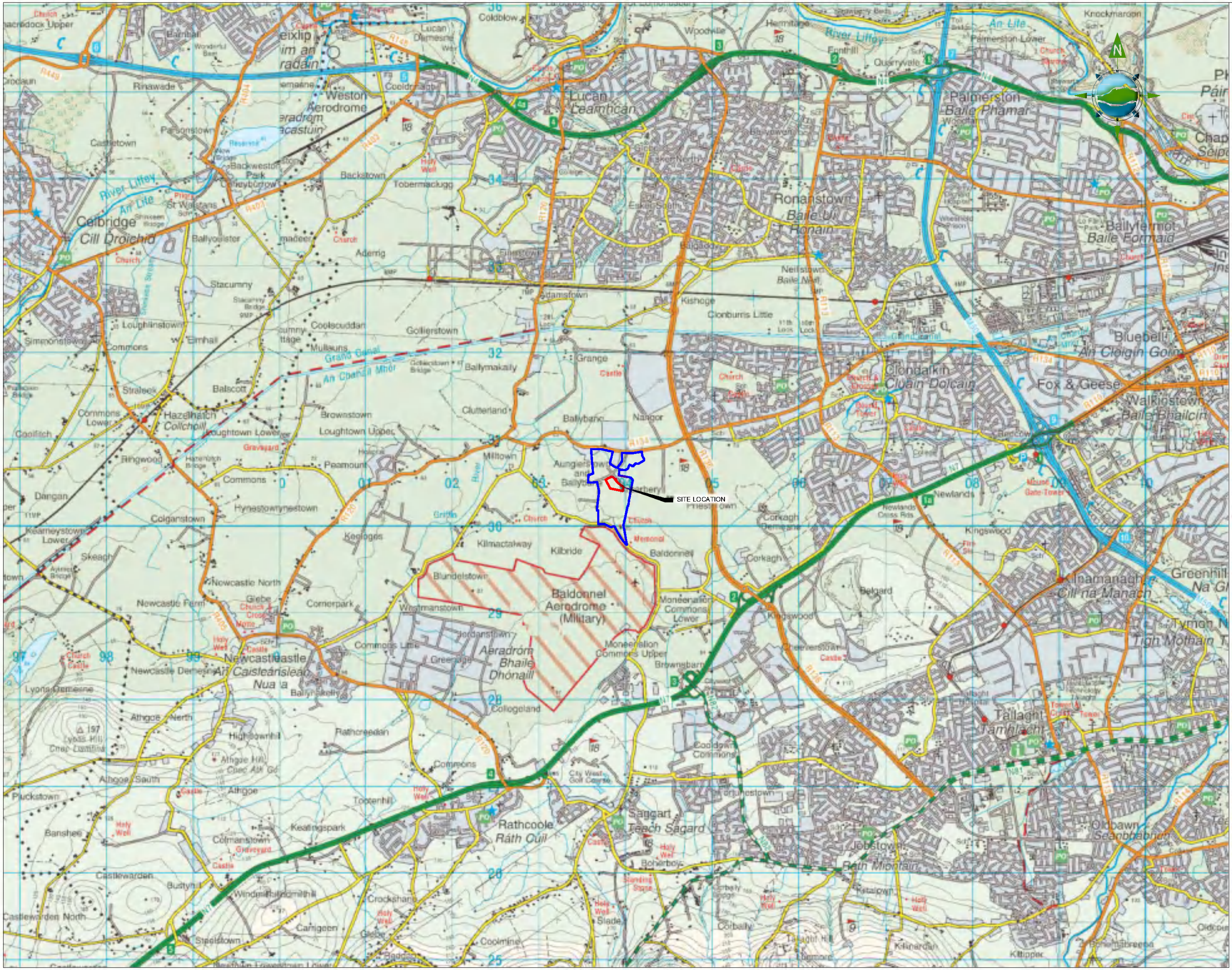
A desk study was undertaken to collate and review background information in advance of the site survey. The desk study involved the following:

- Examination of the Geological Survey of Ireland (GSI) datasets pertaining to geological and extractive industry data;
- Examination of Environmental Protection Agency (EPA) soil and subsoils datasets;
- Examination of National Parks and Wildlife Service (NPWS) nature conservation designations;
- Preparation of site maps and suitable field sheets for the site survey.

Site walkover surveys relating to the land, soil and geological environment was undertaken in February and May 2021. The site surveys included:

- A site walkover to review the ground conditions and assess the topography, land use, geomorphology and requirements for further investigations.

The information obtained is referenced throughout Section 8.3. Following the desk top study and the site survey, geological maps were generated in GIS and are included in Figure 8-1 to Figure 8-4.



THE INFORMATION ON THIS DRAWING IS TO THE ORDNANCE SURVEY IRELAND ITM COORDINATE SYSTEM

GENERAL LEGEND

PLANNING APPLICATION BOUNDARY

APPLICANT'S LANDHOLDING

As agreed with South Dublin County Council in the pre-application consultation meeting the final finishes, including cladding materials and colour codes, will be agreed with the Council post planning through planning condition. Greener Ideas Limited will ensure only Council approved finished are applied on site.

N O T E S :

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

CO. DUBLIN

OSI 1:2,500 Sheet No's: 3325-B, 3325-D, 3326-A & 3326-C.

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400m 0 400m 800m 1200m

Rev	Date	Description	By	Chkd.
A	18.06.21	PLANNING ISSUE	MN	MMcC

Client: Greener Ideas

Project: PROFILE PARK POWER PLANT

Title: FIGURE 8.1 SITE LOCATION IN REGIONAL CONTEXT

Scale @ A1:	1:20,000
Prepared by: M. Nolan	Checked: M. McCarthy / Date: June 2021
Project Director:	S. Tinnelly
Drawing Status:	Planning

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Drawing No.: 11069-2000 Revision: A

N

Site Location

Legend

- Study Area

Soils

- 05RIV - River
- 0700c - Drumkeeran
- 0700d - Straffan
- 1000x - Elton
- 1100e - Ballylanders
- Rock
- Urban

0 0.5 1 Km

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	03/06/2021	Draft Issue	S.P	J.D

Client: Greener Ideas

Project: Profile Park Power Plant

Title: Figure 8.2 Soils Map

Scale @ A3: 1:24,000

Prepared by:	Checked:	Date:
S. Pezzetta	J. Dillon	June 2021

Project Director: D. Grehan

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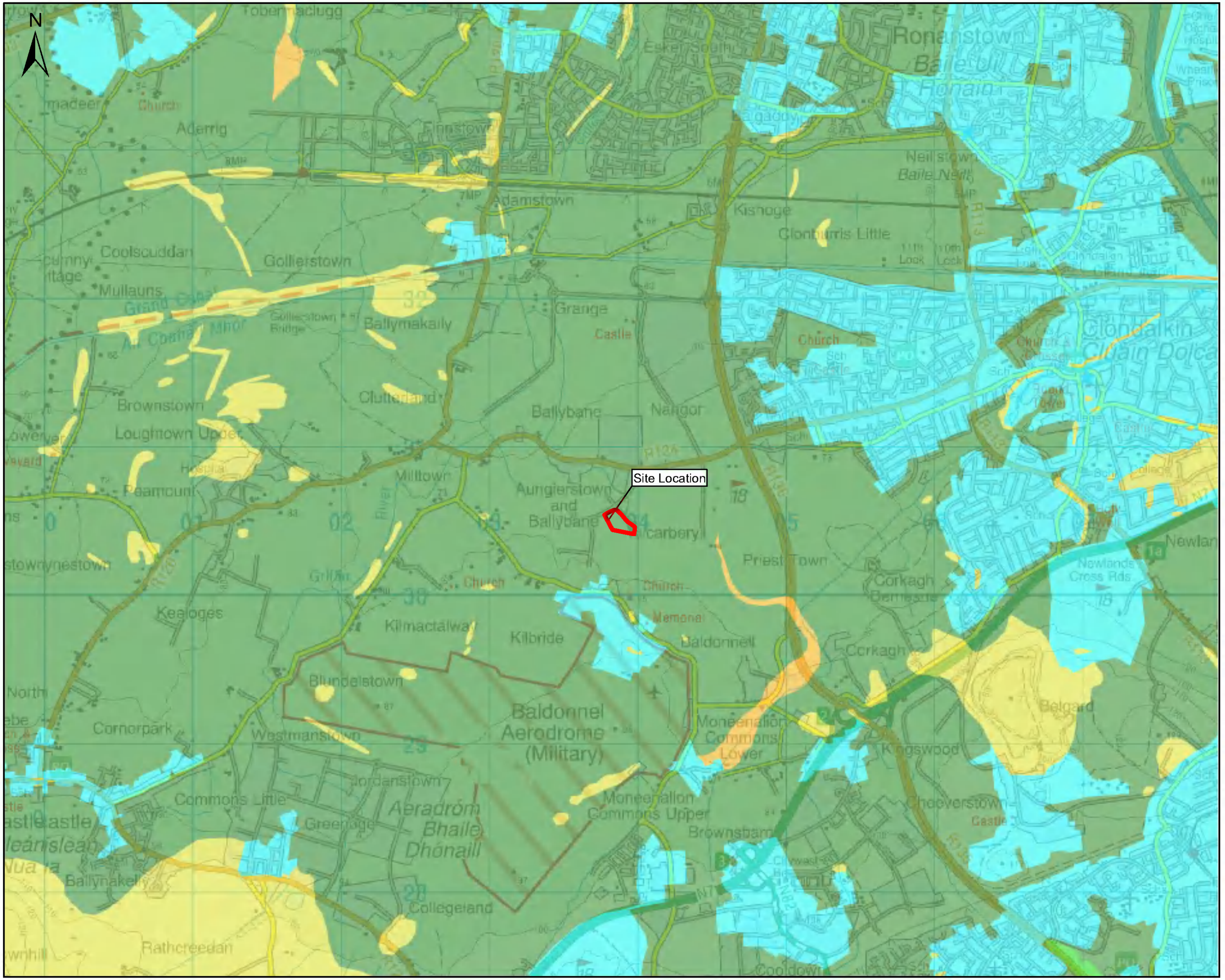
Drawing No.: Figure 8.2

Issue: D01



Legend

- Study Area

Subsoils

- A - Alluvium undifferentiated gravelly
- GLs - Limestone sands and gravels Carboniferous
- Made ground
- Rck - Bedrock at surface
- TLPSsS - Sandstone and shales till Devonian/Carboniferous
- TLs - Limestone till Carboniferous

0 0.5 1 Km

NOTES

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Issue	Date	Description	By	Chkd.
D01	03/06/2021	Draft Issue	S.P	J.D

Client: Greener Ideas

Project: Profile Park Power Plant

Title: Figure 8.3 Subsoils Map

Scale @ A3: 1:24,000

Prepared by: S. Pezzetta | Checked: J. Dillon | Date: June 2021

Project Director: D. Grehan

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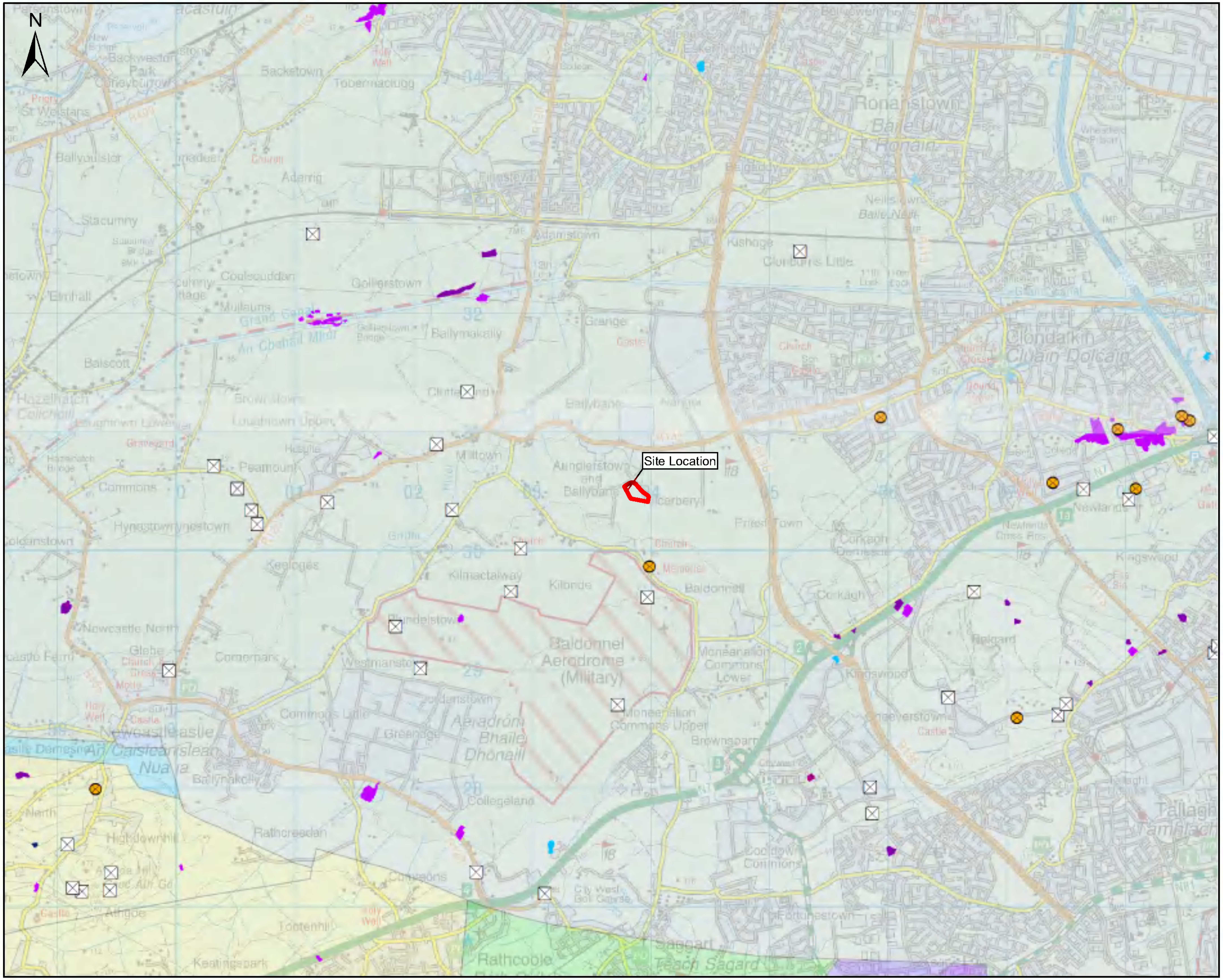
Drawing No.: Figure 8.3

Issue: D01



Legend

- Study Area

Historic Pits and Quarry Locations

- Pit
- Quarry

Pits and Quarries Areas

- Early to Mid-20thC: Pits
- Mid-19thC: Pits
- Early to Mid-20thC: Quarries
- Mid-Late 19thC: Quarries
- Mid-19thC: Quarries

Bedrock

- Boston Hill Formation
- Lucan Formation
- Waulsortian Limestones
- Aghfarrell Formation
- Butter Mountain Formation
- Carrighill Formation
- Pollaphuca Formation

0 0.6 1.2 Km

NOTES

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Issue	Date	Description	By	Chkd.
D01	03/06/2021	Draft issue	S.P	J.D

Client: Greener Ideas

Project: Profile Park Power Plant

Title: Figure 8.4 Regional Bedrock Geology, Mineral and Aggregate Resources

Scale @ A3: 1:30,000

Prepared by: S. Pezzetta | Checked: J.Dillon | Date: June 2021

Project Director: D. Grehan

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Drawing No.: Figure 8.4

Issue: D01

8.2.1 RELEVANT GUIDANCE

This chapter has been prepared having regard to the following guidelines:

- Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2017);
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency, draft September 2015);
- Advice Notes for Preparing Environmental Impact Statements (Draft September 2015);
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA 2003);
- Geology in Environmental Impact Statements – a Guide (Institute of Geologists of Ireland (IGI) 2002);
- Groundwater Directives (80/68/EEC) and (2006/118/EC);
- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance;
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA 2008a);
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2008b);
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI 2013);
- Good practice guidelines on the control of water pollution from construction sites (Construction Industry Research and Information Association (CIRIA 2001);
- Guidelines for Planning Authorities on 'The Planning System and Flood Risk; Management' published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG); and
- Guideline on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2008c).

8.2.2 CONSULTATION

As part of the study, TOBIN consulted with the following parties:

- Geological Survey of Ireland for details on background mapping and geological heritage; and
- Environmental Protection Agency.

Response provided by the GSI advised that the EIAR should address the effects of the project on:

- Groundwater;
- Geology;

- Geohazards;
- Natural resources.

These potential effects are included below in section 8.4.

8.2.3 PUBLIC INFORMATION SOURCES

- Published geological, soil, groundwater, surface water, aquifer, recharge data obtained from the Geological Survey of Ireland (GSI);
- National Parks and Wildlife Service data of designated conservation areas;
- Waste and IPPC licensed facility data from EPA Geoportal;
- Irish Geological heritage site map from the GSI (www.gsi.ie);
- EPA online Envision Map Viewer (www.epa.ie);
- Flood history of site from OPW National Flood Hazard Mapping website (www.floodmaps.ie);
- Catchment flood risk assessment & management study (http://www.cfram.ie/pfra/); and,
- Aerial Photography from ESRI (ArcGIS).

8.3 BASELINE ENVIRONMENT

The existing environment is discussed in this chapter in terms of geomorphology (landscape and topography) and superficial solid geology. The regional review of geological conditions covers a zone of 2 km from the site boundary, as suggested in the Institute of Geologists of Ireland (IGI) guidelines. The chapter also considers the ancillary development associated with the proposed power plant, including the electrical grid and gas connections.

8.3.1 SITE TOPOGRAPHY AND GEOMORPHOLOGY

The topography of the proposed power plant site can be described as mostly flat with elevations from c. 73 mAOD to 76 mAOD. The GSI data does not indicate there are any geomorphology features within the site boundary.

8.3.2 LAND USE

The site of the proposed power plant measures c. 1.9 ha and is predominantly covered by rough grassland, surrounded by industrial, commercial and transport units. Access is via the existing road network within Profile Park, located off the R134. Agricultural areas exist within 1km to the west and 0.5km south of the proposed site, with artificial surfaces less than 100m to the east defined as artificial non-agricultural vegetated areas, used primarily for the Grange Castle Club. Artificial surfaces associated with Casement Aerodrome, Baldonnel is located approximately 400 south of the proposed site.

The proposed electrical connection considered in this EIAR is an underground 110 kV cable. Electrical power will be exported from the power plant's main transformers to the existing Castlebaggot 220 / 110 kV Substation which is operated by EirGrid or to a new proposed 110 kV substation in Profile Park.

Natural gas will be delivered to the proposed power plant via a new below ground pipeline from the existing gas network from an existing AGI compound close to the Nangor Road. In the case of both the electrical and the gas connection, these will both be situated in existing private and public roads. Similarly, a private connection with a data centre operator in proximity, may be provided.

8.3.3 REGIONAL SOILS

The regional soils in this areaare shown in Figure 8-2. Based on mapping by the EPA this indicates that this site consists of 2 no. types of soil, namely:

- BminPD – Basic deep poorly drained mineral;
- BminDW – Basic deep well drained mineral.

The area within the red line boundary is underlain mostly by basic deep poorly drained material.

8.3.4 SUBSOILS

Figure 8-3 shows the regional subsoils in this area, including the area within the red line boundary and grid/gas connection. The dominant subsoil occurring in the region is classified as till. The site is underlain by till derived from limestone (TLS).

The till, which is Quaternary in age, formed as an extensive envelope of the landscape in the area since deglaciation approximately 7,000 – 10,000 years ago. Based on the site walkover date the site is underlain by firm, brown and grey slightly gravelly silty CLAY with occasional cobbles and pieces of broken rock. Gravel is subangular to subrounded, fine to medium. Cobbles are subangular to subrounded.

8.3.5 BEDROCK

The bedrock geology on the GSI 1:100 000 map indicate that this site is underlain by Lucan Formation limestone. The regional bedrock geology covering the proposed site and grid/ gas connection is shown in Figure 8-4.

The GSI database contain records of verified borehole logs, groundwater wells and springs within and close to the site of the proposed power plant. Bedrock exposures in the local area indicate strong to moderately strong, dark grey, fine grained, argillaceous limestones with minor calcareous shales.

8.3.6 MINERAL / AGGREGATE RESOURCES

A historical (currently inactive) quarry lies approximately 0.6km to the south of the southern site boundary. No active mineral or aggregate sources have been identified by GSI data within 2km of the site boundary.

The GSI online Aggregate Potential Mapping Database shows that the site is located within an area mapped as being typically Moderate in terms of crushed rock aggregate potential, with some areas of low to high potential. There are no significant mapped areas of granular aggregate potential (i.e. potential for gravel reserves).

8.3.7 GEOLOGICAL HERITAGE

According to the Geological Survey of Ireland Spatial Resources, there are no Irish Geological Heritage sites inside the site boundary. No geological heritage sites have been identified within 2km of the site boundary. Belgard Quarry, a large active quarry is located 2.15 km southeast of the proposed power plant. Belgard is the largest limestone quarry in the country and is excavating the Lucan Formation limestones. It is a designated County Geological Site (Site Code: SD002) of vital economic importance and of geological heritage significance.

8.3.8 SOIL CONTAMINATION

A review of the EPA website for both existing and historic licensed and illegal waste activities was carried out to identify any potential contamination sources present in the area and to identify any potential contaminating activities near the proposed power plant. The desk study indicated that no waste facilities, illegal waste activities within a 2km radius of the site of the proposed power plant. This a greenfield site with no previous development. No visual or olfactory evidence of contamination was noted during the site walkover.

8.3.9 GEOHAZARDS

A review of the landslide information on the GSI Irish Landslides Database indicate that there are no recorded landslide events within 2km, or within a wider context of 6km of the site. The site walkover conducted in May 2021 confirmed the site is generally very flat comprising topsoil underlain by firm glacial till.

8.4 ASSESSMENT OF SIGNIFICANT EFFECTS

The environmental effects of the proposed power plant are discussed and assessed in the following sections. The 'do-nothing' scenario is reviewed and potential effects are assessed for three stages of the project life cycle; i.e. construction, operation and decommissioning.

8.4.1 DO-NOTHING SCENARIO

If the proposed power plant does not proceed, the site and surrounding areas would remain as they currently are (i.e. artificial surfaces made up of industrial, commercial and transport units). The site would fall under the industrial management at Profile Park.

This would result in no effect to the existing land, soils and geology conditions in the area.

However given the zoning of the site it is likely that another industrial or commercial development would occur on the site which would result in similar effects as set out in this chapter.

8.4.2 CONSTRUCTION PHASE

The proposed power plant will be characterised by pre construction gradually phasing out to a number of main civil engineering works to provide the necessary infrastructure for completion.

The pre-construction phase of development includes preparatory works (i.e. post planning surveys and reporting) and consultation with statutory bodies and the public. Following this

process, site clearance activities will commence, the construction phase comprise civil and plant construction works. These include:

- Construction of access and hardstands (temporary contractor's compound, temporary site offices, welfare facilities, car parking and equipment laydown areas);
- Topsoil stripping of the construction working area (and localised at certain locations along the cable/ gas pipeline route), the removal of ditches, trees, and other vegetation from the site;
- Processing of materials and reinstatement;
- Construction of infrastructure foundations (power plant infrastructure foundations, parking, site entrance);
- Excavation for cable ducts, gas pipeline, tank farm, infrastructure foundations;
- Management of excavated materials; and
- Construction of surface water drainage system along the new access to site;

The entire project as described in Chapter 3 of this EIAR (Description of Development) has been considered in this impact assessment. The effects of the construction activities are discussed further in the following sections.

8.4.2.1 Land Use

The site of the proposed power plant is predominantly covered by till soils. There is an extensive network of existing access roads adjacent to the site to facilitate the ongoing commercial needs of Profile Park. The potential impact on artificial surfaces and soils environment is minor and long term.

The proposed power plant makes use of existing access roads thereby further minimising the potential for land use effects.

8.4.2.2 Access Roads

Current Profile Park access roads exist to accommodate the construction works and provide access to all infrastructure for the whole life cycle of the power plant.

Site entrance to the site will be provided via 2 No. asphalt surfaced roadways with incorporated drainage to maintain performance of the access road during wet weather. Both site entrances, Gate 1 at the northeast and Gate 2 at the northwest of the site are located a sufficiently distant from Baldonnell Stream. No culvert or diversion of Baldonnell Stream is required during the construction phase of the site access/ entrances. Heavy vehicles will be used during the construction of the development. Material from the local quarry will be used for their construction, and any surplus excavated material will be used for land reinstatement.

Soil sealing is the covering of a soil with an impermeable material; it often affects agricultural land as it changes the nature of the soil to become impermeable, sealed areas are lost to agricultural uses while the ecological soil functions are impacted. Soil sealing also potentially increases the risk of flooding as surrounding soils may be influenced by change in water flow patterns. The proposed power plant is within a developed commercial area and therefore will have limited soil sealing. The proposed hardcore areas will have incorporated drainage to ensure all surface water runoff is managed effectively. The pre-mitigation construction

potential impact is imperceptible, negative, and long-term due to the relatively small footprint of infrastructure and its location.

8.4.2.3 Material Calculations

Preliminary volume calculations provide an approximate estimation of stone fill required for all of the hardstanding foundations of 8,500m^3. Overall, the construction of the hardstanding areas for site infrastructure including temporary compounds, material storage areas and site office where the impact is considered to be similar and presents a not significant, long-term, negative effect.

8.4.2.4 Management of Excavated Materials

The handling, storage and re-use of excavated materials are of importance during the construction phase of the proposed power plant. Stockpiles will be located away from watercourses and drainage ditches. Topsoil and subsoils will be stored separately and used for landscaping and in the reinstatement of the site areas. Topsoil will be stockpiled no higher than 2.5m and follow the recommendations set out in the NRA Guidelines for the Management of Waste from National Road Construction Projects (NRA, 2014). There is potential for a negative effect on water as a result of the erosion of soil and the inappropriate storage of excavated materials. However, any risk from the stockpiling of excavated materials can be managed through good site practice. The presence of watercourses within the site requires a robust sediment and erosion plan to effectively reduce the risk of sediment release to surface waters.

For works along the grid and gas connections, and site entrance works, the excavated material will be cast to the side to be reused as backfilling material where appropriate. This material will not be stored in the vicinity of any watercourse i.e. Baldonnell Stream. It will be cast on the upgradient side of the trench, so if any runoff did occur it would run into the downgradient trench. Excess material will be transported to a local appropriately licensed/permitted waste recovery facility. Examples of these facilities include Roadstone Belgard Quarry, Roadstone Huntstown and Calary Quarries and Sorundon Ltd, Dublin 12. Some materials, subject to testing may be utilised under Article 27 of the European Communities (Waste Directive) Regulations 2011 for recycling. Where contaminants are found (or where bitumen-based materials are present) the material will be removed from site and disposed at an appropriately licenced/permitted facility. This action is expected to have a not significant, short-term negative effect.

8.4.2.5 Hydrocarbon Release

Wherever there are vehicles and plant in use, there is the potential for hydro-carbon release which may contaminate the soil and subsoil. A spill also has the potential to indirectly pollute water, if the soil and subsoil act as a pathway from any source of pollution. Any spill of fuel or oil would potentially present a moderate, long-term negative effect on the soil and geological environment. Good site practice can mitigate any effect (Refer to Section 8.5 Mitigation Measures).

Bunded fuel storage will be provided for the secondary fuel, required as a backup for the on-site plant and equipment. This bunded fuel storage area is shown on Drawing No. 11069-20XX.

8.4.2.6 Excavations

The construction of the proposed power plant will require removal of topsoil and subsoil to a competent founding layer and upfilling with structural fill and/or concrete (concrete only proposed for the tank farm, oil supply and storage, engine hall, electrical annex building, transformers, workshop, parking and plant associated structures) to the required finished floor level. Up to 8,500m^3 is required as part of the cut and fill balance.

Materials required for the construction works will be sourced locally, where feasible. Material importation to site will be required such as ready mixed concrete, road surface, etc. The use of off-site material importation will increase the environmental effect of other aspects of the development by requiring the need to transport material to site. The relatively shallow excavations into bedrock will create a temporary exposure of bedrock which will provide additional in-situ information of the soils and geology in the area. Overall, the excavations will have a slight negative and permanent environmental effect.

8.4.2.7 Gas Connection

The gas connection will be laid beneath the ground surface and/or public road. The area where excavations are planned will be the subject of a confirmatory survey, prior to the commencement of works. A verification condition survey will be carried out for all parts of the route within the public road. A trench will be opened using an excavator to accommodate the formation. The excavated material will be cast to the side to be reused as backfilling material where appropriate. This material will not be stored in the vicinity of any watercourse and will be smoothed with the back of an excavator bucket to minimise runoff. It will be cast on the upgradient side of the trench, so if any runoff did occur it will run into the downgradient trench. Excess material will be used on the site of the proposed power plant for local landscaping and reinstatement, further detail is provided in Chapter 3 (Description of Development).

Overall, the excavation required for the gas connection will have an imperceptible, temporary and neutral environmental effect on soils and geology.

8.4.2.8 Grid Connection

The grid connection will be laid beneath the ground surface and/or private road. The area where excavations are planned will be the subject of a confirmatory survey, prior to the commencement of works. A verification condition survey will be carried out for all parts of the route within the public road. A trench will be opened using an excavator to accommodate the formation. The excavated material will be cast to the side to be reused as backfilling material where appropriate. This material will not be stored in the vicinity of any watercourse and will be smoothed with the back of an excavator bucket to minimise runoff. It will be cast on the upgradient side of the trench, so if any runoff did occur it will run into the downgradient trench. Excess material will be used on the site of the proposed power plant for local landscaping, further detail is provided in Chapter 3 (Description of Development).

Overall, the excavation required for the grid connection will have an imperceptible, temporary and neutral environmental effect on soils and geology.

8.4.2.9 Geohazards

The walkover study carried out in February and May 2021 found the entire area within the site boundary comprising low permeability clays, matching the till cover mapped by the GSI. The lay of the land across the site is considered to be relatively flat.

The local subsoil data has been reviewed together with the GSI landslide susceptibility classification. No areas of peat or other geohazards were identified within or in proximity to the site proposed power plant. No areas of potential instability were identified during the site walkovers.

Mitigation measures to address localised stability issues such as battering of excavations are outlined in Section 8.5.

8.4.3 OPERATIONAL PHASE

During the operational phase of the proposed power plant, no new effects on the soil and geological environment will arise. A few direct effects are and these may include:

- Some construction traffic may be necessary for maintenance of the site (power plant and tank farms) which could result in minor accidental leaks or spills of fuels/ oils affecting the groundwater; and
- There is potential for spills and leaks of oils from the proposed power plant infrastructure (i.e. low sulphur diesel oil will be stored as a backup fuel) and equipment resulting in contamination of soils and water.

The operational effects have the potential to negatively affect the ground or water directly. These would have potential for moderate, negative and long term effects. However, mitigation measures/standard design measures and management controls will negate this risk (refer to Section 8.5.2).

8.4.4 DECOMMISSIONING PHASE

In general, the potential effects associated with decommissioning will be similar to those associated with construction but of reduced magnitude because extensive excavation, and wet concrete handling will not be required. The potential environmental effect of soil stockpiling and contamination by fuel leaks are present during decommissioning. The potential for impact as a result is slight to not significant.

Power plant foundations and the grid connection infrastructure will remain in place underground and would be covered with earth and allowed to revegetate or reseed as appropriate. The site access/ road will be in use for additional purposes to the operation of the commercial usage (e.g. for Profile Park) by the time the decommissioning of the project is to be considered, and therefore will remain in-situ for future use.

8.4.5 SUMMARY OF POTENTIAL EFFECTS

A summary of the significance criteria is outlined below for the construction, operational and decommissioning phase in Tables 8-1 to 8-3.

Table 8-1: Significance of Land and Soils Criteria – Construction Phase (Pre-mitigation)

[illegible] (Land, Soil and Geology)	[illegible] pipeline	[illegible]
Geological heritage sites	No IGH sites at proposed site. -Imperceptible	
Contaminated sites	No contaminated sites identified - Imperceptible	
[illegible] potential pollutants/hydrocarbons	Slight - unlikely, direct and short term on localised soils and bedrock within the site boundary	[illegible] and long term on localised soils and bedrock within the site boundary
[illegible] karst/geohazard features	No Karst/peat features - Imperceptible	
Mineral resources and Mines	None identified, imperceptible	
[illegible] resources)	Slight - certain and permanent due to relocation of soils within the site boundary	[illegible] permanent due to relocation of soils within the site boundary

Table 8-2: Significance of Land and Soils Criteria – Operational Phase (Pre-mitigation)

[illegible] (Land, Soil and Geology)	[illegible]	Site Infrastructure
Geological heritage sites	No IGH sites at proposed site. -Imperceptible	
Contaminated sites	No contaminated sites identified - Imperceptible	
[illegible] potential pollutants/hydrocarbons	Slight - unlikely, direct and long term	Moderate - unlikely, direct and long term
Karst/geohazards [illegible]	No Karst features / peat- Imperceptible	
[illegible] Mines	None identified, imperceptible	
[illegible] resources)	No significant excavations during operational phase- Imperceptible	

Table 8-3: Significance of Land and Soils Criteria – Decommissioning Phase (Pre-mitigation)

Environmental Attribute (Land, Soil and Geology)	Electrical cable and gas pipeline	Site infrastructure
Geological heritage sites	No IGH sites at proposed site. -Imperceptible	
Contaminated sites	No contaminated sites identified - Imperceptible	
Contamination of soil by potential pollutants/hydrocarbons	Slight - unlikely, direct and short term	Slight to not significant - unlikely, direct and short term due to fuel storage within the site boundary
Identification of hydrogeological features from the GSI karst database	No Karst / peat features Imperceptible	
Mineral resources and Mines	None identified, imperceptible	None identified, imperceptible
Land and Soils (Natural resources)	Slight - certain and permanent due to relocation of soils within the site boundary	Slight - certain and permanent due to relocation of soils within the site boundary

Overall, the potential effects are slight/not significant. Mitigation measures are identified in section 8.5 to address these effects.

8.4.6 MAJOR ACCIDENTS

Low consequence events, such as minor spills, have been scoped out as these events are unlikely to result in significant adverse effects as they do not fall into the definition of a Major Accidents and Disasters. The proposed power plant (and associated works) to natural disasters. In this regard, the most likely major accidents that could occur as a result of the proposed power plant (and its associated works) include:

- Significant hydrocarbon spillage;
- Power plant infrastructure collapse; and
- Power plant infrastructure or substation fire.

The most likely natural disasters that might occur and potentially impact the proposed power plant (and its associated works) include:

- Fire

In relation to major accidents, the following geological hazards do not occur on the site:

- Earthquakes do not occur in a sufficient intensity at the site;
- No karst risk occurs on the site due to the underlying geology; and
- There are no deposits in the proposed footprint that give rise to a major accident or disaster (e.g. landslide).

No significant geohazards arise on the site due to the lack of peat soils or low gradients in the proposed footprint. Hardstand areas surround the substations and power plant infrastructure areas which further limits fire risk potential. In order to comply with CRU requirements, low sulphur diesel oil will be stored as a backup fuel. Up to 72 hours (3 days) maximum running capacity of diesel oil is required to be stored on site (approximately 3000m^3) in 2 x bunded tanks. The tanks will be bunded in accordance with the requirements set out in the EPA publication, 'Storage and Transfer of Materials for Scheduled Activities' (2004), which states bunds are to contain 110% of the volume of the tank in the event of a tank rupture. Additionally, in the event of substation fire there is minimal potential for fire spread due to construction of the power plant elements and minimal storage of flammable material. Based on the bunded fuel farm at the power plant, there is no significant impact from fire on the land and soils environment as a result of the proposed power plant.

In relation to land, soils and geology, it can be concluded that the risk of accidents associated with this development is very low and would not cause unusual, significant or adverse effects on land and soils environment during the construction, operational and decommissioning phase. Further analysis on major accidents is provided in Chapter 17.

8.5 MITIGATION AND MONITORING MEASURES

Mitigation measures for the construction, operation and decommissioning of the proposed power plant to avoid or reduce its potential effects are presented below. A number of mitigation measures considered for soil and geology are similar to those relating to hydrology and hydrogeology, further detail can be found in Chapter 9 'Hydrology and Hydrogeology'.

8.5.1 CONSTRUCTION PHASE

The construction of the proposed power plant has the potential (with no mitigation) to cause "not significant" short-term to long-term effects to the soil and geology of the proposed power plant site. Implementing mitigation measures detailed below will reduce the significance of the effects. The mitigation measures have been based on CIRIA (Construction Industry Research and Information Association, UK) technical guidance on water pollution control and on current accepted best practice (CIRIA, 2001). Good site practice will be applied to ensure no fuels, oils, wastes or any other substances are stored in a manner on site in which they may spill and enter the ground. Dedicated, bunded storage areas will be used for all fuels or hazardous substances.

All works will be managed and carried out in accordance with the Construction and Environmental Management Plan (CEMP) which is included in Appendix 3.2. In the event that South Dublin County Council decides to grant permission for the proposed power plant, the final CEMP will address the requirements of any relevant planning conditions, including any additional mitigation measures.

The CEMP will be monitored and updated accordingly in agreement with South Dublin County Council.

8.5.1.1 Land Use

In order to minimise the potential effects to Land Use, the following mitigation measures are proposed:

- Minimising areas for earthworks thereby reducing land take requirements;

- Restricting areas for construction works and temporary storage to a minimum within site boundary;
- The handling, storage and re-use of excavated materials are of importance during the construction phase of the project. Stockpiles will be located away from the watercourses and drainage ditches. Topsoil and subsoils will be stored near the landscaping and in the reinstatement of development site areas. Topsoil will be stockpiled no higher than 2.5m and follow the recommendations set out in the NRA Guidelines for the Management of Waste from National Road Construction Projects (NRA, 2014);
- No permanent spoil or stockpiles will be left on site.

8.5.1.2 Management of Excavated Materials

The disturbance and excavation of soil, subsoil and bedrock is an unavoidable effect of the development, but every effort will be made to ensure that the amount of earth materials excavated is kept to a minimum in order to limit the effect on the geological aspects of the site. The management of geological materials and spoil is an important component of controlling dust and sediment and erosion control.

These measures will prevent the erosion of soil in the short and long term. Soils, overburden, and rock will be reused on site to reinstate any excavations where appropriate.

To ensure slope stability, excavations will be battered back (sloped) to between 1:1.5 and 1:2 depending on depth and type of material. The works programme for the construction stage of the proposed power plant will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecasted. Works should be suspended if forecasting suggests any of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures should be completed:

- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff; and,
- Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.

All excavation works during the construction stage will be monitored by an experienced engineer.

Mitigation measures will be put in place during the construction of the proposed power plant to reduce the likelihood of an excavation collapsing. Mitigation measures include construction of a granular berm or temporary sheet pile wall to support the clays during construction. There is a very low risk of landslide (high factor of safety) which is further reduced by implementation of the mitigation measures.

8.5.1.3 Waste Management

An Outline Waste Management Plan (OWMP) is included in Appendix 3.3 of this EIA Report. A final Construction Waste Management Plan (CWMP) will be agreed with South Dublin County Council prior to the commencement of construction on site.

The final WMP will control the management of all site-generated construction waste and the storage and disposal of the waste. Waste streams (including material-related streams such as soils, stone, metals, paper and cardboard, plastics, wood, rubber, textiles, bio-waste and product-related streams such as packaging, electronic waste, batteries, accumulators and construction waste) will be managed, collected, segregated and stored in separate areas at the temporary compound and removed off site by a licensed waste management contractor at regular intervals during the works. Appropriated facilities are included in the OWMP, Appendix 3.3.

8.5.1.4 General Site Management

The CEMP (Appendix 3.2 of this EIAR) has been developed to include the checking of equipment (plant, vehicles, fuel bowsers) on a regular basis during the construction phase of the project. The purpose of the CEMP is to ensure that the measures in place are operating effectively, prevent accidental leakages, and identify potential breaches in the protective retention and attenuation network during earthworks operations.

Management of Fuel and Oil

The CEMP provides details on measures and mitigation in relation to the management of fuels and oils on site. These include:

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station;
- Mobile bowsers, tanks and drums will be stored in secure, bunded, impermeable storage area, away from drains and open water;
- Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores;
- Ancillary equipment such as hoses, pipes will be contained within the bund;
- Taps, nozzles or valves will be fitted with a lock system;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Only designated trained operators will be authorised to refuel plant on site;
- An emergency spill kit with oil boom and absorbers will be kept on site in the event of an accidental spill. All site operatives will be trained in its use.

Drainage and the Management of Sediment and Geological Spoil

The area within the site boundary will require a drainage network to be in place for the construction and operation phases of the site. Fundamental to any construction phase is the need to keep clean water (i.e. water running along the Baldonnell Stream which enters the development site from the south-eastern boundary, flowing along the eastern boundary)

separate from construction area runoff and manage all other run off and water from construction in an appropriate manner.

This will necessitate the implementation of the measures in the CEMP to mitigate against sediment loss and erosion, with associated settlement ponds and silt traps.

The handling, storage and re-use of excavated materials are of importance during the construction phase of the project. Excavated topsoil will not be stored in excessive mounds on the site. Excavated and affected areas will be reinstated and left to naturally revegetate. If revegetation of the upper layer is unsuccessful, the area will be seeded with indigenous species. The re-vegetation of these areas promotes stability, reduces desiccation, run-off erosion and susceptibility to freeze/thaw action.

8.5.1.5 Excavations

The materials to be encountered are likely to be relatively stable during the excavation for the proposed power plant infrastructure foundations. A physical barrier can be implemented between the excavations and the potentially unstable material at unstable conditions, in the form of a granular berm or sheet piles. The long-term stability of the area around the proposed power plant will be achieved by filling the area back up to existing ground level following installation of the foundation and sealing the subsoil environment with artificial surfaces with managed drainage network.

Excavation works will be monitored by a suitably qualified and experienced geotechnical engineer or engineering geologist. The earthworks will not be scheduled to be carried out during severe weather conditions.

Following these mitigation measures, the resultant effect will be not significant, permanent and negative.

8.5.2 OPERATIONAL PHASE

In order to comply with CRU requirements, low sulphur diesel oil will be stored as a backup fuel. Up to 72 hours (3 days) maximum running capacity of diesel oil is required to be stored on site (approximately 3000m^3) in 2 x bunded tanks. The tanks will be bunded in accordance with the requirements set out in the EPA publication, 'Storage and Transfer of Materials for Scheduled Activities' (2004), which states bunds are to contain 110% of the volume of the tank in the event of a tank rupture. The height of the bund wall will be 2.8m.

Diesel oil will be delivered to site by road tankers. The maximum number of expected tankers travelling to and from the site in any one day will be in the region of 2- 3 tankers, however this would be an extremely infrequent occurrence of once every 12 months.

A standard operating procedure will be followed during tanker unloading and filling of the bulk tank. The bulk tank will be fitted with a high level alarm to prevent overfilling. There will be a dedicated tanker unloading area surrounded by a drainage channel which will drain to a petrol interceptor. This separator will provide for full retention of any material in the event of a rupture and spillage of a tanker compartment. A shut-off device incorporated into the separator will close the outlet in the event of its capacity being exceeded.

The operational team will carry out maintenance works (to power plant infrastructure, drainage network) and will put in place mitigation measures to reduce the risk of hydrocarbon or oil spills during the operational phase of the proposed power plant.

The proposed mitigation measures during the operational phase are as follows:

- Potential impact of spillages and/ or leaks will be mitigated against by proper management and design of plant including impermeable bunded areas, were required. All storage areas will be designed in accordance with current oil storage regulations, local fire authority requirements and in accordance with BS8007:1987, Code of Practice for design of concrete structures for retaining aqueous liquids; and
- Fuel Storage areas where required will be bunded appropriately for the fuel storage volume for the time period of the operation and fitted with a storm drainage system and an appropriate oil interceptor;
- On site re-fuelling will be undertaken using a double skinned bowser with spill kits on the ready for accidental leakages or spillages;
- Re-fuelling will be undertaken by suitably trained personnel only;
- Surface water discharges from the site will be regulated by the EPA under the Industrial Emissions Licensing regime and will undergo pre-treatment, where required, to prevent pollution of the receiving watercourse.

8.5.3 DECOMMISSIONING PHASE

Decommissioning will comprise the removal of all over ground elements of the power plant.

The site roadways / access roads may be in use for additional purposes to the operation of Profile Park or future use of the development area (e.g. for commercial access/ egress) by the time the decommissioning of the project is to be considered, and therefore the site roads will remain in-situ for future use. Some of the hardstand material will be removed where required, and along with the power plant foundations, covered in topsoil and revegetated. The substation and grid connection infrastructure would likely form part of the permanent national grid network.

The risks associated with leaving roads and site entrance in-situ are relatively low. The decommissioning phase will not require any significant works that will impact the land and soils environment.

A fuel management plan to avoid contamination by fuel leakage during decommissioning works will be implemented as per the construction phase mitigation measures.

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the effects will be avoided by leaving elements of the proposed power plant in place where appropriate. The foundations will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Roads and site entrances will be maintained for future users. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures in Section 8.5.

8.6 CUMULATIVE EFFECTS

Cumulative effects of this project with other developments in the region, as discussed in Chapter 6 – Planning Policy, relate to the effects on soils and geology. As the access roads to the site are pre-existing within Profile Park, the demand for external aggregate (natural resources) for roads is greatly reduced, therefore limiting the potential for cumulative effects.

It is not envisioned that there will be any significant effects in relation to land, soils and geology during the construction phase given efficient design along with material management such as using local nearby quarries for the construction phase. This will ensure optimisation of the volume of materials required to be imported to site. This will mitigate any cumulative effects relating to importing of material and use of public roads as haul roads.

No cumulative effects on the soils and geology environment are envisaged during the construction, operational and decommissioning stages. Pre mitigation, there will be a slight risk of pollution from hydrocarbons or other leakage from machinery but with mitigation, this is not likely to add to a significant cumulative effect.

8.7 RESIDUAL EFFECTS

The replacement of topsoil, subsoils and rock, with gravels, concrete and impermeable surfaces for the construction of the infrastructure (temporary and permanent) will result in a change in ground conditions within the proposed power plant site. Overall, this residual effect is permanent but not significant.

All potential effects on the soil and geological environment will be mitigated through good site practice on vehicular movements, management of fuels, sustainable use of soils etc. Overall, the residual effects from these aspects will be not significant to imperceptible, temporary and negative.

8.7.1 *SUMMARY OF RESIDUAL EFFECTS*

A summary of the significance criteria is outlined below for the construction, operational and decommissioning phase in Tables 8-4 to 8-6.

Table 8-4: Significance of Land and Soils Criteria – Construction Phase (Post-mitigation)

[illegible] (Land, Soil and Geology)	[illegible] pipeline	[illegible] infrastructure
Geological heritage sites	No IGH sites at proposed site. -Imperceptible	
Contaminated sites	No contaminated sites identified - Imperceptible	
[illegible] potential pollutants/hydrocarbons	Not significant - unlikely, direct and short term on localised soils and bedrock within the site boundary	[illegible] direct and short term on localised soils and bedrock within the site boundary

(Land, Soil and Geology)	pipeline	
features	No Karst features - Imperceptible	
Mineral resources and Mines	Not applicable	
	No peat deposits encountered. Unlikely Imperceptible to Not significant	encountered. No significant excavation to be undertaken on site. Unlikely Imperceptible to Not significant
resources)	Not significant - certain and permanent due to relocation of soils and bedrock within the site boundary. Soils to be reused within the site.	permanent due to relocation of soils and bedrock within the site boundary. Soils to be reused within the site for landscaping.

Table 8-5: Significance of Land and Soils Criteria – Operational Phase (Post-mitigation)

Environmental Attribute (Land, Soil and Geology)	Electrical cable and gas pipeline	Site Infrastructure
Geological heritage sites	No IGH sites at proposed site. -Imperceptible	
Contaminated sites	No contaminated sites identified – Imperceptible	
Contamination of soil by potential pollutants/hydrocarbons	Not Significant - unlikely, direct and short term due to relocation of soils and bedrock within the site boundary	Not Significant - unlikely, direct and short term due to relocation of soils and bedrock within the site boundary
Identification of karst features	No Karst features- Imperceptible	
Mineral resources and Mines	None identified, imperceptible	
Geohazards	No significant excavations - Imperceptible	No significant excavations - Imperceptible
Land use (Natural resources)	No significant excavations - Imperceptible	No significant excavations - Imperceptible

Table 8-6: Significance of Land and Soils Criteria – Decommissioning Phase (Post-mitigation)

Environmental Attribute (Land, Soil and Geology)	Electrical cable and gas pipeline	Site Infrastructure
Geological heritage sites	No IGH sites at proposed site. -Imperceptible	
Contaminated sites	No contaminated sites identified - Imperceptible	
Contamination of soil by potential pollutants/hydrocarbons	Not Significant - unlikely, direct and short term due to relocation of soils and bedrock within the site boundary	Not Significant - unlikely, direct and short term due to relocation of soils and bedrock within the site boundary
Identification of hydrogeological features	No Karst features Imperceptible	

(Land, Soil and Geology)	pipeline	
database		
Mines	None identified, imperceptible	None identified, imperceptible
	Not significant, certain and permanent	permanent
resources)	Imperceptible - No changes to substation and cables as a result of decommissioning	permanent due to relocation of soils within the site boundary

Overall, the potential effects are of imperceptible/not significant with the implementation of the mitigation measures.

8.8 REFERENCES

- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency, draft September 2015);
- Advice Notes for Preparing Environmental Impact Statements (Draft September 2015);
- Construction Industry Research and Information Association (CIRIA) 2001, Control of water pollution from construction sites, Guidance for consultants and contractors.
- Construction Industry Research and Information Association (CIRIA) 2015, c750 Groundwater control: design and practice.
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA 2003);
- Geology in Environmental Impact Statements – a Guide (Institute of Geologists of Ireland (IGI) 2002);
- Groundwater Directives (80/68/EEC) and (2006/118/EC);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA 2008a);
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2008b);
- Guidelines for the Management of Waste from National Road Construction Projects (Revision 1, NRA 2014);
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI 2013);
- Good practice guidelines on the control of water pollution from construction sites (Construction Industry Research and Information Association (CIRIA 2001);
- Guideline on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2008c);
- Environmental Protection Agency., 2020. EPA Map Viewer. http://gis.epa.ie/Envision
- Geological Survey of Ireland., 2021. Department of Communication, Energy and Natural Resources: Online Mapping. https://www.gsi.ie/Mapping.htm
- GeoHive., 2021. Ordnance Survey Ireland: Spatial data. www.geohive.ie