Drumlins Park Wind Farm Substation and Grid Connection

Chapter 6: Land & Soil

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Contents

6.1 Introduction

6.1.1 Background and Objectives

This chapter provides an assessment of the likely and significant effects of the proposed development near Newbliss, Co. Monaghan on the land, soil and geological environment.

The assessment provides a description of the baseline environmental setting of the proposed development in terms of land, soils and geology and identifies the likely and significant effects that the construction, operation and decommissioning of the proposed development will have on them. Where required, appropriate mitigation measures to limit any identified effects to land, soils and geology are recommended. The residual effects of the proposed development post-mitigation are also assessed.

6.1.2 Development Description

A full description of the proposed development is presented in **Chapter 3**. In summary, the proposed development comprises the following main components:-

- A 110 kilovolt (kV) 'loop-in/loop-out' Air-Insulated Switchgear (AIS) electrical substation, including single-storey control buildings, energy storage system and all associated electrical equipment;
- Approximately 700m of 110kV underground electricity lines;
- Replacement of 1 no. existing pole-set with 2 no. lattice-type end masts, to a maximum height of up to 16m; and
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure.

The entirety of the proposed development is located within the administrative area of County Monaghan; while candidate quarries which may supply construction materials are also located within County Cavan.

6.1.3 Statement of Authority

Hydro-Environmental Services (HES) are a specialist geological, hydrological, hydrogeological, and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core areas of expertise and experience include water and geology. We routinely complete impact assessments for land soils and geology, hydrology and hydrogeology for a large variety of project types, including wind farms and associated grid connections.

This chapter was prepared by David Broderick and Michael Gill.

David Broderick (BSc, H.Dip Env Eng, MSc) is a hydrogeologist with over 13 years' experience in both the public and private sectors. Having spent two years working in the Geological Survey of Ireland, working mainly on groundwater and source protection studies, David moved into the private sector. David has a strong background in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms. David has also completed numerous geology and water assessments for inclusion within EIARs for a range of commercial developments. David has worked on the EIS for

Oweninny WF, Cloncreen WF, Meenbog WF, Arderroo WF and Yellow River WF, and over 80 other wind farm related projects across the country.

Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer with over 18 years' environmental consultancy experience in Ireland. Michael has completed numerous geological, hydrological and hydrogeological impact assessments of wind farms and renewable projects in Ireland. In addition, he has substantial experience in surface water drainage design and SUDs design and surface water/groundwater interactions. For example, Michael has worked on the EIS/EIAR for Oweninny WF, Cloncreen WF, and Carrownagown WF, and over 100 other wind farm related projects across the country.

6.1.4 Relevant Legislation

This chapter is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU.

The requirements of the following legislation are complied with:-

- S.I. No. 296 of 2018 European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001-2018;
- European Communities (Environmental Impact Assessment) Regulations 1989 to 2006;
- S.I. No. 30 of 2000 the Planning and Development Act, 2000 as amended; and,
- S.I. No. 4 of 1995: The Heritage Act 1995, as amended.

6.1.5 Relevant Guidance

This chapter has been prepared in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and having regard, where relevant, to guidance contained in the following documents:-

- Guidance Document on Wind Energy Developments and EU Nature Legislation (European Commission, 2020);
- Environmental Protection Agency (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*;
- Institute of Geologists Ireland (2013) *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements*;
- National Roads Authority (2008) *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*;
- *Wind Energy Development Guidelines for Planning Authorities* 2006;
- Forestry Commission (2004) *Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh*;
- COFORD (2004) *Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads*;
- Department of Housing, Planning & Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*; and,
- European Union (2017) Guidance *on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU)*.

6.2 Methodology

6.2.1 Desk Study

A desk study of the proposed development site (i.e. substation, grid connection and end masts), and its environs, was completed in advance of undertaking the walkover survey (see below). This desk study involved collecting all relevant land and geological information for the proposed development site and the nearby permitted Drumlins Park Wind Farm site. Data sources included:

- Environmental Protection Agency databases (www.epa.ie);
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 15 (Geology of Monaghan Carlingford). Geological Survey of Ireland (GSI, 1996);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets;
- Ordnance Survey Ireland (OSI) – 6" and 1;5000 scale basemaps; and,
- Aerial photography (www.bing.com/maps, www.google.com/maps).

6.2.2 Baseline Monitoring & Site Investigations

A detailed site walkover and geological mapping exercise was undertaken by HES on 25 and 26 July and on 15 August 2020.

A trial pit investigation (6 no.) was undertaken by Jennings O'Donovan & Partners Limited (JOD) in July 2020.

6.2.3 Receptor Importance/Sensitivity Criteria

In addition to the utilisation of sensitivity and receptor importance criteria outline within the abovementioned EPA Guidance (EPA 2002 and 2017), this assessment, in accordance with National Roads Authority (NRA 2008) guidance, quantifies the importance of the land, soil and geology environments within the site by applying the criteria set out in **Table 6.1**, with the impact magnitude and impact rating/significance subsequently assessed using **Table 6.2.**

Importance	Criteria	Typical Example
Very High	• Attribute has a high quality, significance or value on a regional or national scale. • Degree or extent of soil contamination is significant on a national or regional scale. • Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	• Geological feature rare on a regional or national scale (NHA). • Large existing quarry or pit. • Proven economically extractable mineral resource.
High	• Attribute has a high quality, significance or value on a local scale. • Degree or extent of soil contamination is significant on a local scale.	• Contaminated soil on site with previous heavy industrial usage. • Large recent landfill site for mixed wastes. • Geological feature of high value on a local scale (County Geological Site).

	• Volume of peat and/or soft organic soil underlying site is significant on a local scale.	• Well drained and/or high fertility soils. • Moderately sized existing quarry or pit. • Marginally economic extractable mineral resource.
Medium	• Attribute has a medium quality, significance or value on a local scale. • Degree or extent of soil contamination is moderate on a local scale. • Volume of peat and/or soft organic soil underlying site is moderate on a local scale.	• Contaminated soil on site with previous light industrial usage. • Small recent landfill site for mixed Wastes. • Moderately drained and/or moderate fertility soils. • Small existing quarry or pit. • Sub-economic extractable mineral resource.
Low	• Attribute has a low quality, significance or value on a local scale. • Degree or extent of soil contamination is minor on a local scale. • Volume of peat and/or soft organic soil underlying site is small on a local scale.	• Large historical and/or recent site for construction and demolition wastes. • Small historical and/or recent landfill site for construction and demolition wastes. • Poorly drained and/or low fertility soils. • Uneconomically extractable mineral resource.

Table 6.1: Estimation of Importance of Soil and Geology Criteria (NRA, 2008)

Impact Characteristics		Geological/Hydrological Impacts
Quality	**Significance**	

Negative only	Profound	• Widespread permanent impact on:-
		  ○ The extent or morphology of a cSAC.
		  ○ Regionally important aquifers.
		  ○ Extents of floodplains.
		• Mitigation measures are unlikely to remove such impacts.

Positive or Negative	Significant	• Local or widespread time dependent impacts on:-
		  ○ The extent or morphology of a cSAC / ecologically important area.
		  ○ A regionally important hydrogeological feature (or widespread effects to minor hydrogeological features).
		  ○ Extent of floodplains.
		• Widespread permanent impacts on the extent or morphology of a NHA/ecologically important area,
		• Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.

Positive or Negative	Moderate	• Local time dependent impacts on:- o The extent or morphology of a cSAC / NHA / ecologically important area. o A minor hydrogeological feature. o Extent of floodplains. • Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends
Positive, Negative or Neutral	Slight	• Local perceptible time dependent impacts not requiring mitigation.
Neutral	Imperceptible	• No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

Table 6.2: Additional Impact Characteristics

6.3 Description of the Existing Environment

6.3.1 Site Location & Description

The proposed development site (which includes the substation, grid connection and end masts) is located in northwest County Monaghan; approximately 4km southwest of the village of Newbliss, 8km southeast of Clones and 7km northwest of Cootehill; in the townlands of Drumanan and Cornawall.

The proposed development site and surrounding environment are typical of a rolling drumlin landscape. The topography of the proposed development site, which is currently agricultural pasture, is gently sloping to the southwest with elevations ranging between approximately 99m and 105m above ordnance datum (mAOD) across the proposed substation site.

The proposed development site is drained by man-made agricultural drains with the nearest natural watercourse to the development site being the Bunnoe stream, located approximately 125m southeast of the end mast locations (520m southeast of the substation footprint). The proposed development site is accessed via a local-tertiary road to the north of the site.

6.3.2 Superficial Geology

6.3.2.1 Soils and Subsoils

The published soils map (www.epa.ie) for the area shows that Alluvium and deep well draining mineral soil (AminDW) are the dominant soil types at the proposed development site.

A map of the local subsoil cover is illustrated in **Figure 6.1** (www.gsi.ie). This indicates that Alluvium and Sandstone and Shale Tills are present in the area of the proposed development.

A trial pit investigation was undertaken by JOD at the proposed development site on 9 July 2020. A total of 6 no. trial pits were carried out at the site. The trial pit logs are enclosed at **Annex 6.1**. A summary of the investigation findings is shown in **Table 6.3** below and the location of trial pits are illustrated in **Figure 6.2**.

The subsoils encountered consisted mainly of CLAY/gravelly CLAY over gravelly SILT

(till/boulder clay deposits). Bedrock was not encountered.

No ground stability issues were identified by the trial pit investigation and all subsoils were found to be relatively firm and cohesive which is generally typical of sandstone derived tills.

Location	Total Depth of TP (m)	Primary Subsoil Lithology	Depth to Bedrock (m)
TP01	2.6	CLAY over sandy gravelly SILT	>2.6
TP02	2.6	Gravelly CLAY	>2.6
TP03	2.2	Sandy SILT over gravelly CLAY	>2.2
TP04	1.9	CLAY over gravelly CLAY	>1.9
TP05	2.0	Gravelly CLAY over gravelly SILT	>2.0
TP06	2.2	Gravelly CLAY	>2.2

Table 6.3: Summary of the Trial Pit Investigation

6.3.3 Bedrock Geology

Based on the GSI bedrock mapping (www.gsi.ie), the proposed development site is mapped to be underlain by Ordovician Metasediments which comprise mainly shale and greywacke in this area.

Due to the drumlin landscape (with large overburden depths), bedrock is at depth and any exposures are limited to some of the main watercourse routes. Bedrock was not intercepted at any location during the site investigations.

There are mapped faults in the area of the proposed development, but they will have no consequence for the development. A bedrock geology map of the area is illustrated in **Figure 6.3.**

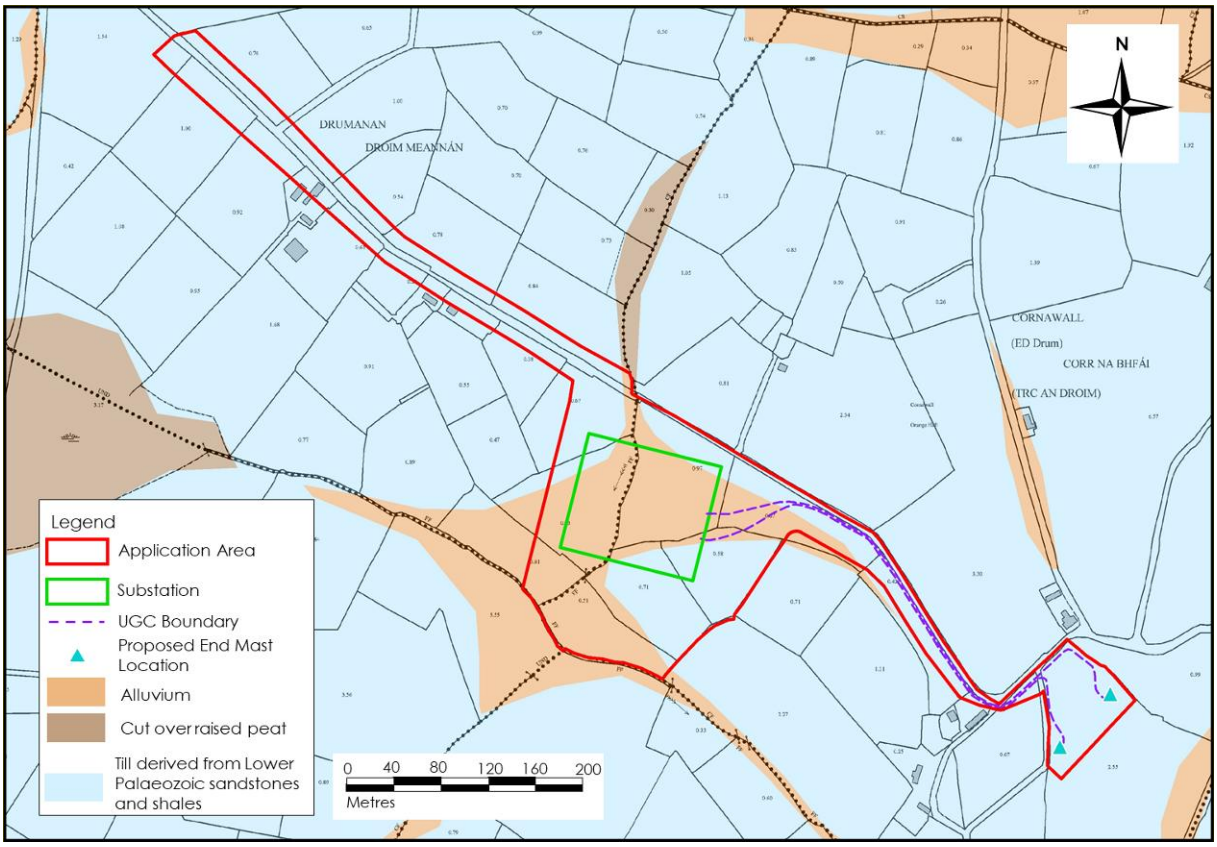

Figure 6.1: Local Subsoils Geology Mapping

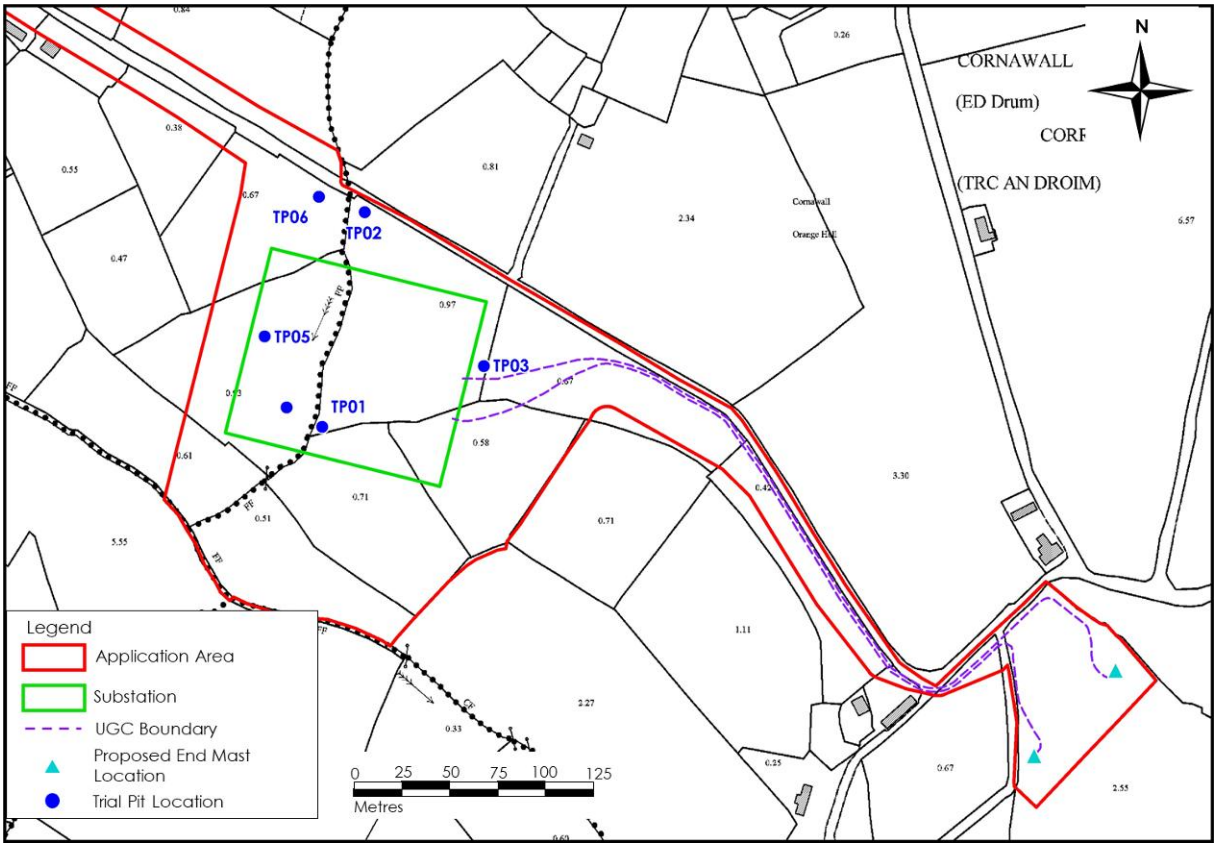

Figure 6.2: Site Investigation Map

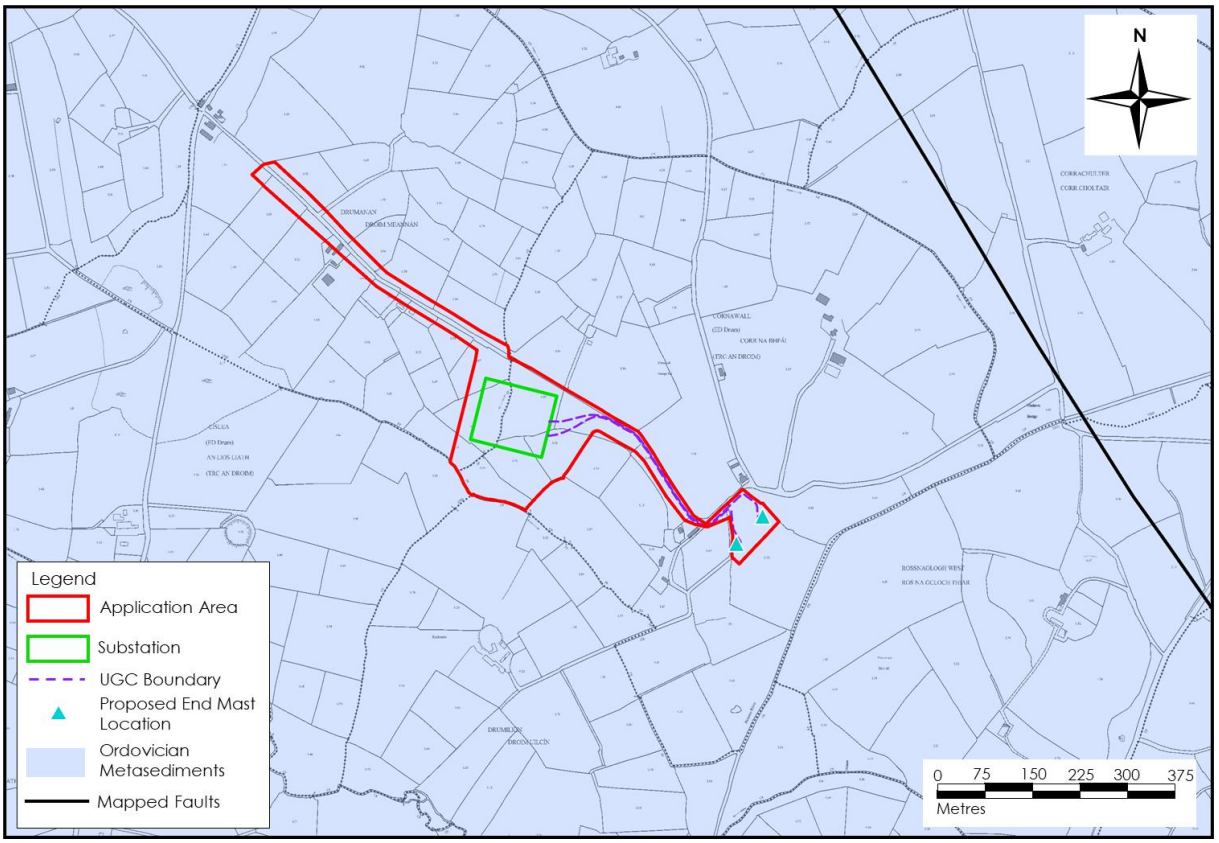

Figure 6.3: Local Bedrock Geology Mapping

6.3.4 Geological Resource Importance

The closest active quarry to the proposed development is at Scotshouse, approximately 3.5km to the southwest of the proposed development site. Typically, the metasediments are of low geological resource importance.

According to the GSI natural resource mapping, the area of the proposed development has a low to moderate crushed aggregate potential and low to very low potential for granular aggregate.

Based on criteria at **Table 6.1** above and the GSI aggregate potential, the local bedrock has a Low to Medium Importance.

Additionally, soils and subsoils at the proposed development site are also classified as being of Low to Medium Importance due to their supportive role in agriculture.

6.3.5 Geological Heritage & Designated Sites

The closest Geological Heritage Site to the proposed development site is Rockcorry-Cootehill Ribbed Moraines (Site Code MN015) which is located less than 1km to the southeast. This is a large geological heritage site covering an area of over 100km^2. However, no element of the proposed development will overlap with this Geological Heritage Site.

Another Geological Heritage Site, the Mid-Cavan Drumlinised Ribbed Moraines (Site Code CN013), is located approximately 8km to the south of the site.

Based on criteria shown in the **Table 6.1** above, geological heritage sites have a High Importance.

Designated sites include National Heritage Areas (NHAs), proposed National Heritage Areas (pNHAs), candidate Special Areas of Conservation (cSAC), Special Areas of Conservation (SAC) and Special Protection Areas (SPAs). There are no designated sites within or in the immediate vicinity of the proposed development that can be directly affected (from a land, soil and geology perspective) by the proposed development.

The likelihood of indirect hydrology effects on downstream designated sites in the Republic of Ireland and Northern Ireland is assessed in **Chapter 7**.

6.4 Description of Likely Effects

6.4.1 Characteristics of the Proposed Development

The proposed development will typically involve removal of soil and subsoils to facilitate the construction of the proposed substation, grid connection, end masts and ancillary infrastructure. As referred to above, and described in detail at **Chapter 3**, a level platform for the proposed substation footprint will be created through cut and fill; however, the level of required excavations will not be significant.

The overall indicative volume of soil/subsoil excavation for the proposed development has been established as being approximately 6,160m^3. The estimated volume of material to be re-used on site as fill or in the reinstatement/landscaping of the site 1,102m^3. Refer to **Table 6.4** below for excavation volumes and spoil volumes.

It is proposed that excavated material (topsoil and subsoil) will, where possible, be utilised in the reinstatement (e.g. at the substation site, reinstatement of UGL trenches and reinstatement of the end mast foundations) and landscaping (e.g. substation) of the proposed development.

Where excess topsoil or subsoil material is generated which cannot be utilised for reinstatement or landscaping purposes, it is proposed to develop a dedicated on-site spoil deposition area immediately south of the proposed substation footprint where excess soil and subsoil, will be stored permanently.

It is estimated that c. 5,055m^3 of excess material (topsoil and subsoil) will arise which cannot be re-used or landscaping and will, therefore, be transported to the deposition area for permanent storage.

Spoil will be transported to deposition area where it will be placed in accordance with best-practice methods to ensure the long-term stability of the stored material.

Tarmac cuttings (~3m^3), arising from trenching works adjoining the LT62013 or upgrade works to the LT62013, will not be re-used due to the possibility of soil contamination and will be removed from site and disposed of at a licensed waste handling facility.

Proposed Development Element	Volume of Material to be Excavated (m^3)	Volume of Material to be utilised for reinstatement/ landscaping (m^3)	Volume of Material to be placed in deposition area (m^3)	Volume to be disposed of off-site (m^3)
Substation	4,740	210	4,530	0
Underground Electricity Line	796	424	369	3

End Masts	624	468	156	0
Total	6,160	1,102	5,055	3

Table 6.4: Excavation Volumes and Spoil Management

6.4.2 "Do Nothing" Impacts

In the event that the proposed development is not progressed, the site will continue to be used as agricultural land and there will be no alteration to the land, soil or geological environment.

6.4.3 Construction Phase

6.4.3.1 Soil, Subsoil and Bedrock Excavation

The excavation of soil and subsoil will be required for the levelling of the proposed development site to the requisite gradient and for the installation of building foundations, concrete plinths for electrical apparatus, electricity line trench and end mast foundations. This will result in a permanent removal of soil and subsoil at excavation locations. Estimated volumes of soil and subsoils to be relocated are discussed at **Section 6.4.1** above.

The overall impact magnitude is determined not to be significant for the following reasons:-

- Soils and subsoil at the site can be classified as "Low to Moderate" importance;
- The soil and subsoil which will be removed during the construction phase will be localised to the footprint of the proposed development site;
- A minimal volume of soil and subsoil, in comparison to the total resource in the local area will be removed to allow for the construction of the proposed development; and
- No infrastructure will be constructed within or near any designated sites.

The soil and subsoil excavation final effect is summarised in **Table 6.5** below.

Attribute	Description
Receptor	Soil and subsoil
Pathway/Mechanism	Excavations and landscaping
Final Effect	Negative, slight/moderate, direct, high probability, permanent effect on soil and subsoil.

Table 6.5: Soil and Subsoil Excavation

6.4.3.2 Erosion of Exposed Soil and Subsoil

Exposure of soil and subsoils at excavation areas and deposition areas can increase the likelihood for soil erosion resulting in a direct physical effect on the land and soil environment. The overall effect is determined to be 'Small Adverse' due, predominately, to the small extent of exposed soil and subsoil in comparison to the overall local resource.

The soil and subsoil erosion pre-mitigation effect is summarised in **Table 6.6** below.

Attribute	Description
Receptor	Soil and subsoils

Pathway/Mechanism	Vehicle movement, surface water erosion and wind action.
Pre-mitigation Effect	Negative, direct, slight, likely effect on soil and subsoils.

Table 6.6: Soil and Subsoil Erosion

6.4.3.3 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk. The accumulation of small spills of fuels and lubricants during routine plant use can also be a significant pollution risk. Hydrocarbon has a high toxicity to humans and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks are likely to result in significant effects (i.e. contamination of soils and subsoil on the geological environment.

The soil contamination pre-mitigation effect is summarised in **Table 6.7** below.

Attribute	Description
Receptor	Soil, subsoil and bedrock
Pathway	Soil, subsoil and bedrock pore space
Pre-mitigation Effect	Negative, direct, slight, short term, medium probability effect on soils, subsoils and bedrock.

Table 6.7: Soil and Subsoil Contamination

6.4.4 Operational Phase

Following the completion of the construction phase, including the appropriate reinstatement and landscaping of the proposed development site which will avoid the likelihood of erosion effects, very few likely direct effects are envisaged during the operational phase of the proposed development. These may include:-

- Minor accidental leaks or spills of fuel/oil from vehicles associated with the occasional maintenance of the proposed electricity substation; and,
- The transformer in the substation is oil cooled. There is a risk for spills/leaks of oils from this equipment resulting in contamination of soils and groundwater.

In relation to indirect effects, a small amount of granular material may be required to maintain access tracks during operation which will place intermittent minor demand on local quarries.

6.4.5 Decommissioning Phase

As set out at **Chapter 3** (**Sections 3.2** and **3.8**), the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, decommissioning phase effects will not occur.

6.4.6 Cumulative Effects

This assessment concludes that significant effects are unlikely to arise predominately due to the localised and near surface nature of construction works and the absence of likely significant effects during the operation phase.

Therefore, and given the absence of likely significant effects arising from the proposed development individually, there is no likelihood of significant cumulative effects with any existing, permitted or proposed development on land, soils and geology. All effects relating to the proposed development are assessed to be direct and contained within or in the immediate vicinity of the proposed development site and it is assessed that there is no pathway for the development to act in combination with other projects.

In relation to the Drumlins Park Wind Farm, the residual effects of the permitted wind farm on land, soils and geology were assessed not to be significant. Due to the direct nature of the construction works associated with both the permitted and proposed developments, the 'spread-out' footprint of the permitted wind farm infrastructure (thus diluting the likelihood of significant effects) and the non-significant effects of the proposed development (as assessed above), no likely significant cumulative effects on land, soils and geology will occur.

All other existing, permitted and proposed developments in the vicinity of the proposed development have been assessed to determine their likelihood to act in combination with the proposed development. However, due to contained nature of likely effects associated with the proposed development and the physical separation to other developments, it is concluded that there is no likelihood of significant cumulative effects arising.

6.4.7 Assessment of Likely Health Effects

The likelihood of health effects, albeit low, arises mainly from the possibility of soil and ground contamination during construction. A development, such as that proposed, is not a recognised source of land or soil pollution and therefore the likelihood of effects during the construction or operational phases are negligible.

Hydrocarbons will be used onsite during construction. However the volumes will be small and will be handled and stored in accordance with best practice mitigation measures. As a result, it is concluded that the likely residual effects associated with soil or ground contamination and subsequent health effects are negligible.

6.4.8 Transboundary Effects

The proposed development site is located c. 7km of the border with Northern Ireland. However, due to the localised nature of the likely effects on land, soils and geology and the separation distance involved, no transboundary effects on this receptor are likely.

6.5 Mitigation & Monitoring

6.5.1 Construction Phase

6.5.1.1 Soil, Subsoil and Bedrock Excavation

The excavation of soil and subsoil will have a direct effect on the geological environment and no specific mitigation measures are proposed. The excavation of materials will be completed in accordance with best practice for the management and treatment of such materials.

6.5.1.2 Erosion of Exposed Soil and Subsoil

The following measures are proposed to reduce effects on exposed soil and subsoil:-

- Bog mats will be used, as necessary, to support construction plant and machinery on soft ground, thus reducing the likelihood of soil and subsoil erosion and avoiding the formation of rutted areas. This will substantially reduce the likelihood for surface water ponding to occur;
- Excavated soil will be side cast and stored temporarily adjacent to excavation areas for reuse during reinstatement and landscaping;
- Silt fences, and all necessary surface water management infrastructure, will be installed around all temporary stockpiles to limit movement of entrained sediment in surface water runoff. All slopes will be sealed with the bucket of an excavator;
- Upslope interceptor drains will be installed to direct rainfall or surface water interacting with exposed surfaces to avoid the effects of erosion;
- In order to minimise runoff during the construction phase, works will not take place during periods of intense or prolonged rainfall (to prevent increased silt laden runoff). Drainage control systems, as outlined in **Chapter 7**, will be implemented to limit runoff effects during the construction phase;
- Permanently mounded soils and subsoils (e.g. berms which may be created as part of the reinstatement/landscaping process and at the spoil deposition area) will be seeded and grassed over at the earliest opportunity to prevent erosion;
- The electricity line trench will be reinstated to the required specification and in accordance with landowner requirements and will be reseeded or allowed to vegetate naturally (on agricultural land) or topped with aggregates/tarmacadam (at private laneway crossings) at the earliest opportunity to prevent erosion;
- Following the installation of the proposed end masts, excavated material material will be reinstated, graded to match the surrounding ground profile and reseeded or allowed to vegetate naturally; and
- At the designated spoil deposition area, material will be placed in layers to ensure stability is maintained and works will be undertaken in accordance with best practice construction methodologies. Works at the spoil deposition area will be monitored, on a weekly basis during the construction phase and monthly for a 6 month period thereafter, by an appropriately qualified Geotechnical Engineer. In the event that any ground stability issues arise, the Engineer will have the power to cease works until such time as remedial works have been completed to his/her satisfaction.

6.5.1.3 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

The following mitigation measures are proposed:-

- The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound at the Drumlins Park Wind Farm. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil interceptor;
- All bunded areas will have 110% capacity of the volume to be stored;
- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled at the temporary compound and will be towed around

the site by a 4x4 jeep to where plant and machinery is located. The 4x4 jeep will also be fully stocked with fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations to avoid any accidental leakages;

- All plant and machinery used during construction will be regularly inspected for leaks and fitness for purpose;
- Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area; and,
- An emergency plan for the construction phase to deal with accidental spillages is contained within the Outline Construction and Environmental Management Plan (**Annex 3.5**). This emergency plan will be further developed by the contractor prior to the commencement of construction.

6.5.2 Operational Phase

Following the completion of construction activities and the re-colonisation or reseeding of exposed soil, it is assessed that due to the absence of likely soil erosion effects, no specific mitigation measures are required.

Oil used in transformers (and other electrical apparatus as may be necessary) and storage of hydrocarbons could result in leakages during the operational phase and result in effects on soil and subsoils. The transformer and any hydrocarbon storage areas will be located in a roofed concrete bund capable of holding 110% of the stored oil volume. As part of the project design, the transformer and car parking areas within the substation compound will be fitted with a storm drainage system and an appropriate oil interceptor to ensure that no hydrocarbons are discharged to ground.

6.5.3 Decommissioning Phase

As set out at **Chapter 3** (**Sections 3.2** and **3.8**), the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, no decommissioning phase mitigation measures are required.

6.5.4 Monitoring Measures

During and post construction, all excavation and spoil storage areas will be inspected for signs of erosion and instability. These inspections will be undertaken on a weekly basis during the construction phase and monthly, for a six-month period, post construction.

6.6 Residual Effects

6.6.1 Construction Phase

6.6.1.1 Soil, Subsoil Excavation and Bedrock Excavation

The importance of the soil at the site can be classified as of 'Low to Medium' but is not designated or unique in any way. The residual effect on the land, soil and geological environment is the disturbance and relocation of c. 6,160m^3 of soil and subsoil during construction, however, no likely significant effects on the geological environment are likely to arise from these excavations. Therefore, the residual effect

is assessed to be negative, imperceptible, direct, short term, and a high probability effect.

For the reasons outlined above, no significant residual effects on soils, subsoils or bedrock will occur.

6.6.1.2 Erosion of Exposed Subsoils During Construction Work

Soil and spoil can be eroded by vehicle movements, wind action and by water movement. To prevent this, all excavation works will be followed (or preceded as relevant) by appropriate reinstatement, landscaping and drainage control. Following the implementation of these measures, the residual effects on soil and subsoil are assessed to be negative, slight, direct and a medium probability.

For the reasons outlined above, no significant residual effects on soils, subsoils or bedrock will occur.

6.6.1.3 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the source and the receptor. The residual effect is assessed to be negative, imperceptible, direct, short term and a low probability effect.

For the reasons outlined above, no significant residual effects on soils, subsoils or bedrock will occur.

6.6.2 Operational Phase

No significant residual effects will occur during the operational phase.

6.6.3 Decommissioning Phase

As set out at **Chapter 3** (**Sections 3.2** and **3.8**), the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, residual decommissioning phase effects will not occur.

6.7 Summary

Excavations will be required for site levelling and for the installation of building and end mast foundations, access tracks and underground electricity line trenches. This will result in the permanent removal of soil and subsoil at excavation locations. Excavated soil and subsoil will be used for reinstatement and landscaping and where excess material arises, this will be disposed at the dedicated spoil disposal area or, where necessary, removed from site and disposed of at a licensed waste facility.

Due to geographically spread out nature of the Drumlins Park Wind Farm with regard to the characteristics of the proposed infrastructure, the proposed development will not result in a significant cumulative effect with the wind farm development.

Furthermore, all other existing, permitted and developments in the vicinity of the proposed development have been assessed to determine their likelihood to act in combination with the proposed development. However, due to physical separation, it is concluded that there is no likelihood of any significant cumulative effects.

In conclusion, this assessment has determined that the proposed development will

not result in any likely significant effects on the land, soils and geology environment. Where effects are likely to occur, such as soil contamination and erosion, the implementation of appropriate mitigation measures will ensure that any effects are negligible and imperceptible. Where it is not possible to implement mitigation measures, such as in respect of the direct excavation of soil and subsoil, the level of effect is considered to be slight/moderate and will not be significant.