Table 7.1 Summary of site activities

Phase	Activity	Description
Construction	Discharge to Ground	Run-off percolating to ground at the construction site.
	Earthworks: Excavation of Superficial Deposits	Ground works will be required to clear the site and levelling. All structures will require foundations to the structural engineers' specifications. The removal of localised overburden material will be required during preparation of the foundations and platform for the proposed structures. The planned foundation works foresee the excavations of up to depths of c. 9.05 mbgl. Excavations into the bedrock is foreseen as it was encountered at c. 1.5-3.7 mbgl. It is predicted that all the spoil generated during site preparation/levelling will be used in landscaped of berms. There will not be a requirement for disposal off site.
	Storage of soils/aggregates	Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination and to ensure this resource is reused on-site for the purpose of landscaping where possible. Temporary storage of spoil will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and solid matter. Materials will be sent off site for recycling where possible and, if not suitable for recycling, materials will be disposed of to an appropriate permitted/licensed waste disposal facility.
	Storage of hazardous Material	Temporary storage of fuel required for on site for construction traffic. Liquid materials i.e. fuel storage will be located within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.
	Import/Export of Materials	It has been estimated that 64,500m^3 of excavated subsoil and topsoil will be generated and it is currently anticipated that the totality of this will be reused for landscaping of the berms. There will not be a requirement for disposal off site. Importation of fill will also not be required. Material removed from site may be re-used offsite for beneficial use on other sites with appropriate planning/waste permissions/derogations (e.g., in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011) as amended or will be reused, recovered and/or disposed off-site at appropriately authorised waste facilities. The removal of waste from the site will be carried out in accordance with Waste Regulations, Regional Waste Plan (Eastern Midland Region) and Waste Hierarchy/Circular Economy Principals. Refer to Chapter 14 Waste Management for further detail.
	Dewatering	The deepest excavation is c. 9.05 mbgl. Therefore, localised dewatering can be expected during the excavation works, mainly related with perched groundwater within the subsoil which will require to be drained.
Operation	Increase in hard standing area	The proposed surface water networks for the development collect runoff from roofs, roads and other hard standing areas through a filter drainage system and gullies. The proposed development

Phase	Activity	Description
		represents an overall increase in hardstanding surfaces of c. 28,720 m^2. Storm water from the site will discharge at a controlled rate, limited to the greenfield equivalent runoff, to the existing ditches forming the site boundary. These local ditches serve to drain the subject site and adjacent agricultural lands and convey surface water flow from rainfall in a north easterly direction to subsequently merge and flow north east to join the River Ward (at St. Margarets Golf and Country Club), a tributary of Broadmeadow River which ultimately flows into the Malahide Estuary SPA, SAC pNHA site.
	Storage and management of hazardous Material (oil)	The General Electric 9FA.04 combustion turbine is dual fuel capable, with emergency operation < 500 hours per year on EN590 ultra low sulphur diesel fuel oil (<10ppmw). The facility will include a fuel oil tank, unloading station, forwarding pumps, and piping system to convey the fuel oil to the combustion turbine. The fuel oil will be delivered in tanker trucks. The unloading station will consist of a kerbed concrete tanker truck unloading pad adjacent to the facility road sized to contain 110% of a tanker truck volume (33.4 m3), a pumped tanker truck unloading station within the kerbed unloading area, and single wall piping routed to the fuel oil tank. Combustion turbine fuel oil will be stored in a nominal 6,246 m3 capacity field erected welded steel tank. The tank nominal sidewall height is 14 m, with maximum height at top of tank roof structure not to exceed 16.2m. Nominal tank diameter is 24.4m. The tank will be installed on a concrete foundation, and will include a secondary nominal 27.4m diameter wall for leak containment. A spiral stairway will provide access to the top of the tank and to the annular containment area for inspection and maintenance activities. The secondary containment wall height will be sized for at least 110% tank capacity, and will be high enough to avoid issues with spigot/jetting flow from a leak. A shed roof (or equivalent) will be provided to minimize rainwater ingress into the containment area. The fuel oil forwarding system consists of a fuel oil forwarding pump skid and piping to the combustion turbine skid. The forwarding pump skid, complete with piping, equipment, valves, and fittings will be located in the same kerbed unloading area described above to contain leaks during operation and maintenance. A section of piping may be routed underground. Underground piping will be double wall and welded with a leak detection system. Above ground piping is connected to the turbine liquid fuel/atomizing air module located to the south of the combustion turbine, and is single wall welded, with Type A connections and fittings. The above ground discharge piping from this module is connected to the turbine and is single wall welded, with Type A connections and fittings. The risk to the aquifer is considered low due to the mitigation in place for containment, delivery and distribution and use of oil interceptors on the stormwater system downgradient of the offloading area and prior to discharge from the site.

As outlined in Table 7.1 above, the activities required for the construction phase of the proposed development represent the greatest risk of potential impact on the geological and hydrogeological environment. These activities primarily pertain to the site preparation, excavation, levelling and infilling activities required to facilitate construction of the proposed development.

7.3 THE RECEIVING ENVIRONMENT

The receiving environment is discussed in terms of land geology, soils, hydrogeology and site history including potential for existing and historical contamination.

7.3.1 GENERAL DESCRIPTION OF THE SITE

The site is located to north west of Dublin city centre, adjacent to the N2 national carriageway and to the north east of Ballycoolin industrial estates. The proposed development site is c. 13.56 hectares of partly developed and partly greenfield land located south west of the N2 flyover intersection of Kilshane road and Kilshane Cross in the townland Kilshane/Piperstown, Dublin 11 (Refer Figure 7.1 below).

The subject site is currently a greenfield site, used for agricultural purposes. There is no existing surface water drainage network adjacent to or on-site. The site is comprised of multiple fields separated by hedgerows, and generally slopes from west to east. Surface water, rainfall, is generally percolated through the site via grass and soil. The topographic survey has confirmed that the internal and boundary hedgerows contain ditches which convey flow to an unnamed ditch system to the east of the site, during heavier rainfall events. These ditches only serve the subject site and the agricultural fields immediately to the west, located between the subject site and the Kilshane Road, and does not convey any upstream watercourse.

This ditch generally flows in a north-easterly direction to join the River Ward at St. Margaret's Golf and Country Club. The River Ward is a tributary of the Broadmeadow River, which in turn outfalls to the Irish Sea at the Malahide Estuary.

Figure 7.1 Site Location and Surrounding Activities

7.3.2 LAND USE

The majority of the site is currently in use for arable agricultural activities. Access/ entrance is found in the north portion of the site via a driveway off Kilshane road. The northwest of the site is occupied

with building structures characterised by an residential and associated agricultural function. The south of the site is bounded by agricultural land, directly adjacent to Huntstown Quarry and Huntstown Powerplant. The site is bounded to the east by the N2 national carriageway, to the north by Kilshane Road, and to the west by agricultural land.

Land use in the vicinity of the site is characterised by a mixture of primarily agricultural and an industrial function. Land to the north and north east is dominated by farmland and scattered residential dwellings with an associated agricultural function with the exception of Bay Lane Quarry. Dublin Airport is approximately 3.1 km to the north east. Huntstown Quarry and adjacent Huntstown Powerplant are located directly to the south, while Dublin Airport Logistics Park and Northwest Business Park are found to the east and west of the site, respectively. Further south are more greenfield lands and the M50
According to the EPA (2022) there are 3 no. licensed activities currently active in the vicinity of the subject site (between 550 and 1 km to the south of the southern boundary of the development site). These are:

- Energia Power Limited (P0077-02);
- Huntstown Power Company (P0483-04);
- Huntstwon Bioenergy Limited (P0993-02)

Huntstown quarry is a licensed inert waste recovery facility operating under license number W0277-03 issued in 2015. From a review of the Annual Environmental Reports and Licensee Reports related to the activities at the Huntstown Power Station and Huntstown Quarry on the EPA website a number of noncompliance issue were noted. However, there is no indication that these would result in adverse environmental impact on the subject site as it is located downgradient and therefore there would no effects on soils or groundwater underlying the subject site due to its operation (refer to Section 7.3.8 below).

Consultation with Fingal County Council have confirmed that there are no known illegal/historic landfills within 500 metres of the site. Historical Ordnance Survey maps were examined for the purpose of this assessment. O.S. maps were available from 1830 (the historic 6" maps) and 1900 from the historic 25" maps. The historic maps indicate that the subject site was greenfield up to the present. No evidence was noted to indicate commercial or industrial processes have been undertaken on the subject site. The subject site appears to be used for agricultural purposes possibly grazing, cropping, storing cattle.
According to historical maps and aerial photographs this land use has not changed from 1830 to present. However, the associated building structures currently occupying the northwest corner of the site are absent from the 1830 and 1900 historical maps, suggesting these structures were established sometimes between then and when they are first displayed in the 1995 aerial photograph.

7.3.3 SITE INVESTIGATION WORKS

investigations included the following:

- Excavation of sixteen trial pits with dynamic probes across the large site area to examine soil conditions and if any infill or foreign material is present across the land (TP; depths up to 3.1 mbgl);
- Drilling of four Cable Percussion Boreholes followed by rotary coreholes (depths up to 6.7 mbgl).
- Eight environmental testing was completed for a Waste Classification.

Trial pit and borehole logs are included in Appendix 7.2, which include a description of the lithologies observed in each excavation, depth to bedrock, type of bedrock and any water strikes encountered during the excavations.

Samples were collected from the arisings from all of the trial pits, which were considered representative of the material observed at the selected sampling location and were transferred directly into laboratory-supplied containers. The containers were then clearly labelled to identify the

sample location and depth. Standard sampling techniques were used to collect the samples, which are designed to reduce the risk of cross contamination between sampling events. Appendix 7.3 presents tables with the soil analytical test results. The full analytical laboratory reports are presented in Appendix 7.4. The locations of trial pits and boreholes from which representative samples were collected are presented Figure 7.2 below.

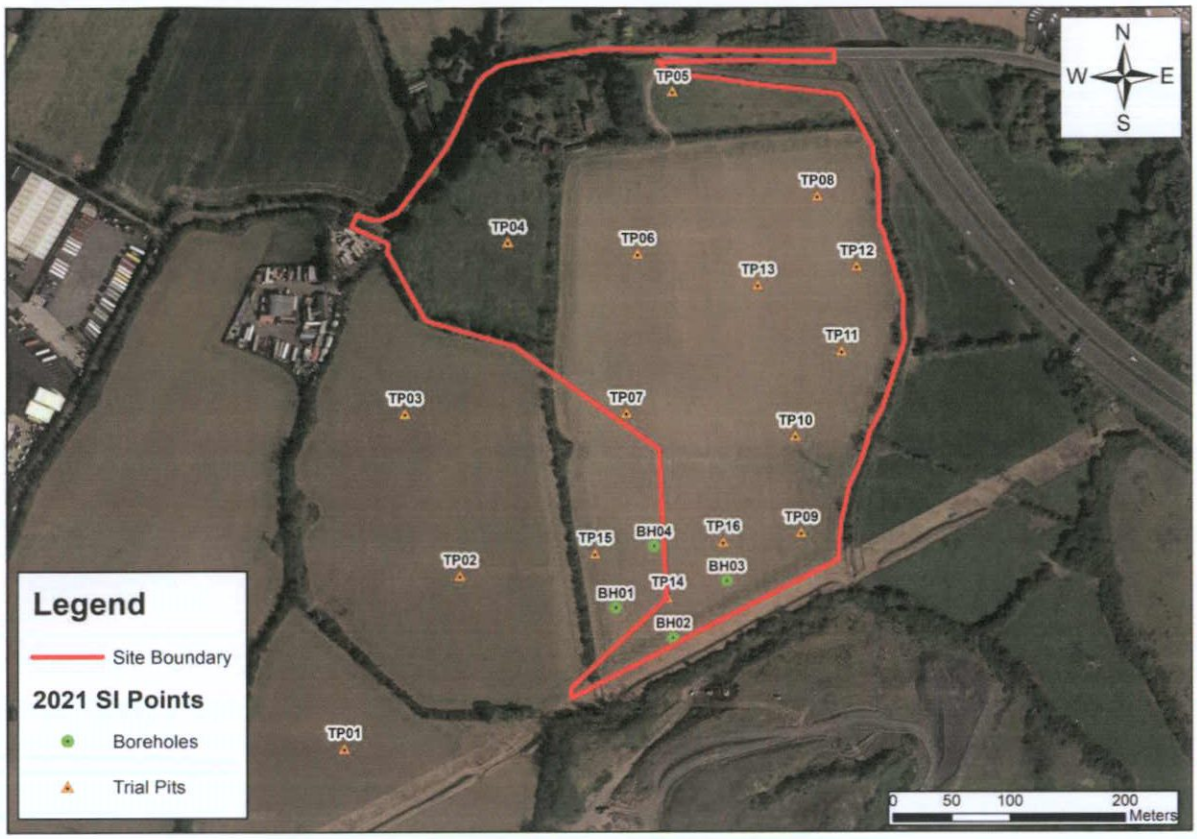

Figure 7.2 Site Investigation Points (Site Investigation Ltd., 2021)

7.3.4 SOILS

The GSI/ Tegasc mapping shows that the soil type beneath the local area is composed predominantly of BminPD mainly basic poorly drained soils coupled with BMinDW mainly basic deep well-drained mineral soils as presented in Figure 7.3 below. BminSW mainly basic shallow well drained soils is found in lesser abundance in the vicinity of the subject site.

A ground investigation undertaken by Site Investigation Ltd. (2021) reported the ground conditions to be consistent with cohesive brown and brown grey slightly sandy slightly gravelly silty CLAY with occasional black CLAYs encountered.

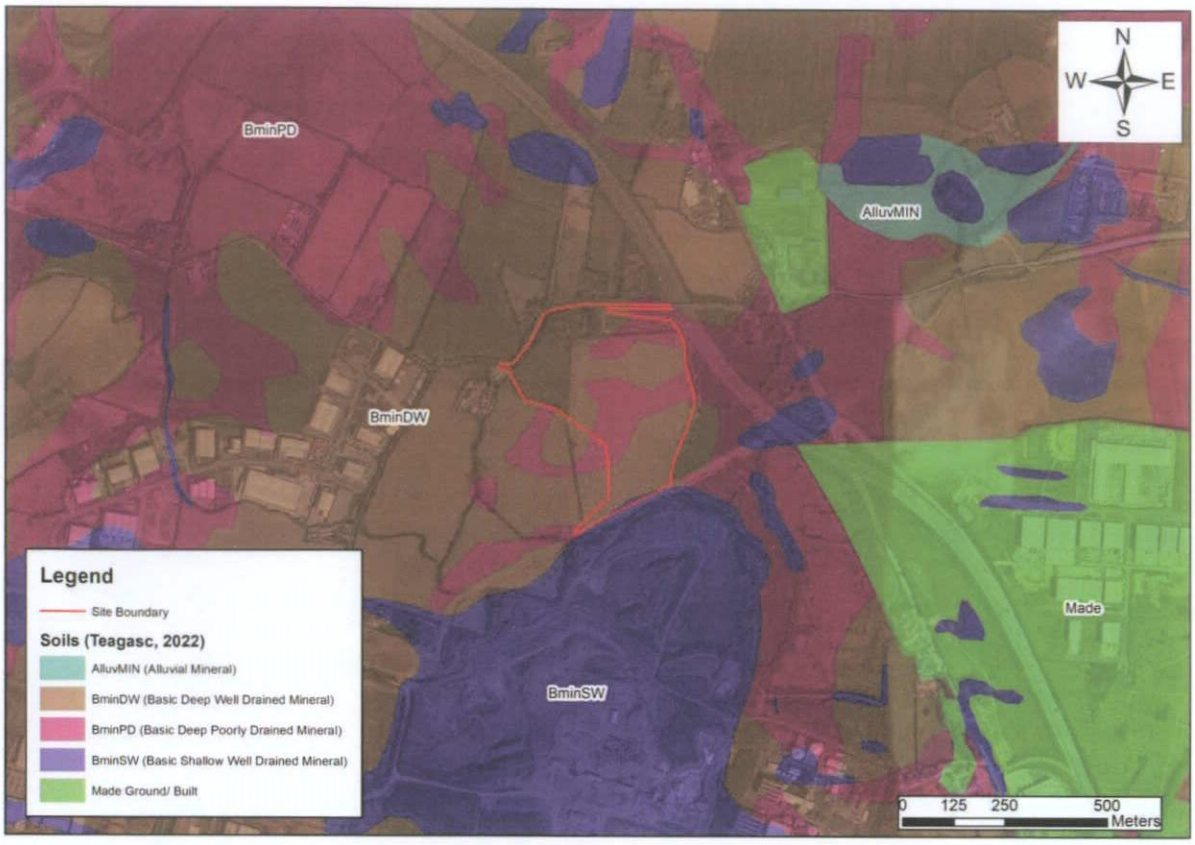

Figure 7.3 Soils Map (Source: Teagasc, 2022)

7.3.5 SUBSOILS

The Quaternary geological period extends from about 1.5 million years ago to the present day and can be sub-divided into the Pleistocene Epoch, which covers the Ice Age period, and which extended up to 10,000 years ago and the Holocene Epoch, which extends from that time to the present day. The GSI/ Teagasc mapping database of the subsoils in the area of the subject site indicates one principal soil type, as shown in Figure 7.4 below. The quaternary subsoil type present across the site is:

- LIMESTONE till Carboniferous (TLs). The north portion of the subject site is composed primarily of TILL derived from limestone. This till is made up of glacial CLAYs which are less permeable than alluvium subsoils.
- Bedrock OUTCROP or shallow underlying SUBCROP. The southern portion of the site is dominated by a combination of bedrock outcrop and shallow buried subcrop according to the GSI mapping.

The EPA soil mapping indicates that the soils comprise primarily of Carboniferous limestone diamictons (tills). The EPA have classed this area as non-irrigated agricultural land with arable farming function while the east portion of the site is characterised by a complex cultivation patterns. The southern end of the site lies within the boundary of previous mineral extraction sites.

Figure 7.4 Subsoils Map (Source: GSI, 2022)

As mentioned above, site investigations were undertaken in 2021 within the site boundary and adjacent lands to establish the shallow soil and water conditions. Five trial pits were excavated within the site boundary (referenced TP04, TP05, TP06, TP08, TP10, TP11, TP12 and TP13). Four boreholes (referenced BH01 to BH04) were drilled using a rotary rig to a depth between 20.0 mbgl and 21.7 mbgl. Water strikes are detailed in the trial pit and borehole logs. The soil profile encountered can be summarised accordingly as follows:

- Topsoil: From ground level up to 0.2-0.3 mbgl.
- Subsoil: Cohesive Deposits (sandy gravelly Clay) underlie topsoil up to depths of 1.5-3.7 mbgl.
- Weathered Limestone Bedrock/ Bedrock was encountered below subsoil.

This profile encountered at the site is considered to be representative for characterising the site in question. Refer to Figure 7.2 above for locations of trial pits and boreholes. Trial pit and borehole logs from the above investigation can be viewed in Appendix 7.2.

7.3.6 BEDROCK GEOLOGY

Inspection of the available GSI (2020) records (Data Sheet 16 and on-line mapping database) shows that the bedrock geology of the site and the surrounding area is dominated by Calcareous shale and limestone conglomerates referred to as part of the Tober Colleen Formation (Rock Unit code: CDTOBE). Massive unbedded lime mudstone associated with the Waulsortian Limestones Formation (CDWAUL) are found underlying immediately southeast/east of the site. (Refer to Figure 7.5 below).

The regional area is highly geologically variable. GSI maps do show the site as overlying the Tober Colleen formation which is bordered to the south east by Waulsortian Limestones (which have been noted to underly the Tober Colleen), further to the south and east by the Boston Hill Formation, to the north east by the Rush Conglomerate Formation. Due to this variability the GSI (2022) bedrock geology map (100K structural database) indicates a number of faults in the study area, one of which passing/transverse through the site with a north-south orientation.

According to the rotary cores drilled in the subject site, the encountered bedrock can be classified as weak to moderately strong Calcareous Mudstone interbedded with moderately strong argillaceous limestone characterised by slight weathering.

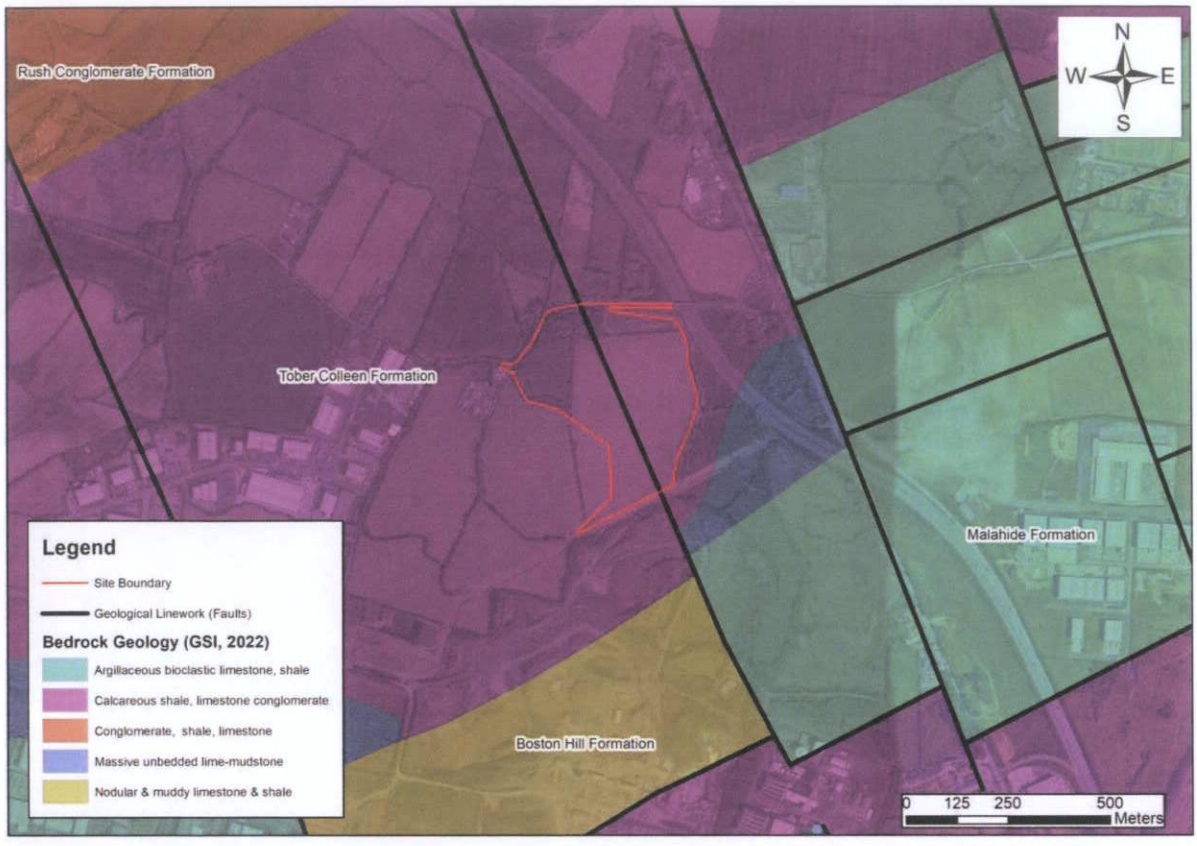

Figure 7.5 Bedrock Geology Map (Source: GSI, 2022)

Site investigations indicate bedrock depth immediately south of the site (while within the same agricultural plot of land) was recorded at 3.6, 3.3, 3.7 and 3.5 mbgl at BH01, BH02, BH03 and BH04 respectively, while intrusive investigations within the site boundary were terminated at shallower depths subsequently encountering no bedrock, with the exception of the following trial pits which encountered obstructions (possible bedrock) at the following depths:

- TP05: 2.7 mbgl;
- TP06: 2.4 mbgl;
- TP08: 2.0 mbgl;
- TP11: 1.5 mbgl;
- TP13: 2.7 mbgl.

7.3.7 REGIONAL HYDROGEOLOGY

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m3/d), specific capacity (m3/d/m) and groundwater transmissivity (mm3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

From analysis of GSI National data the bedrock aquifer underlying the study site is classified as Poor which is characterised as Generally Unproductive except for Local Zones. GSI mapping has shown a Locally Important Aquifer (LI) which is moderately productive only in Local Zones located in close proximity immediately south of the site (refer to Figure 7.6 below).

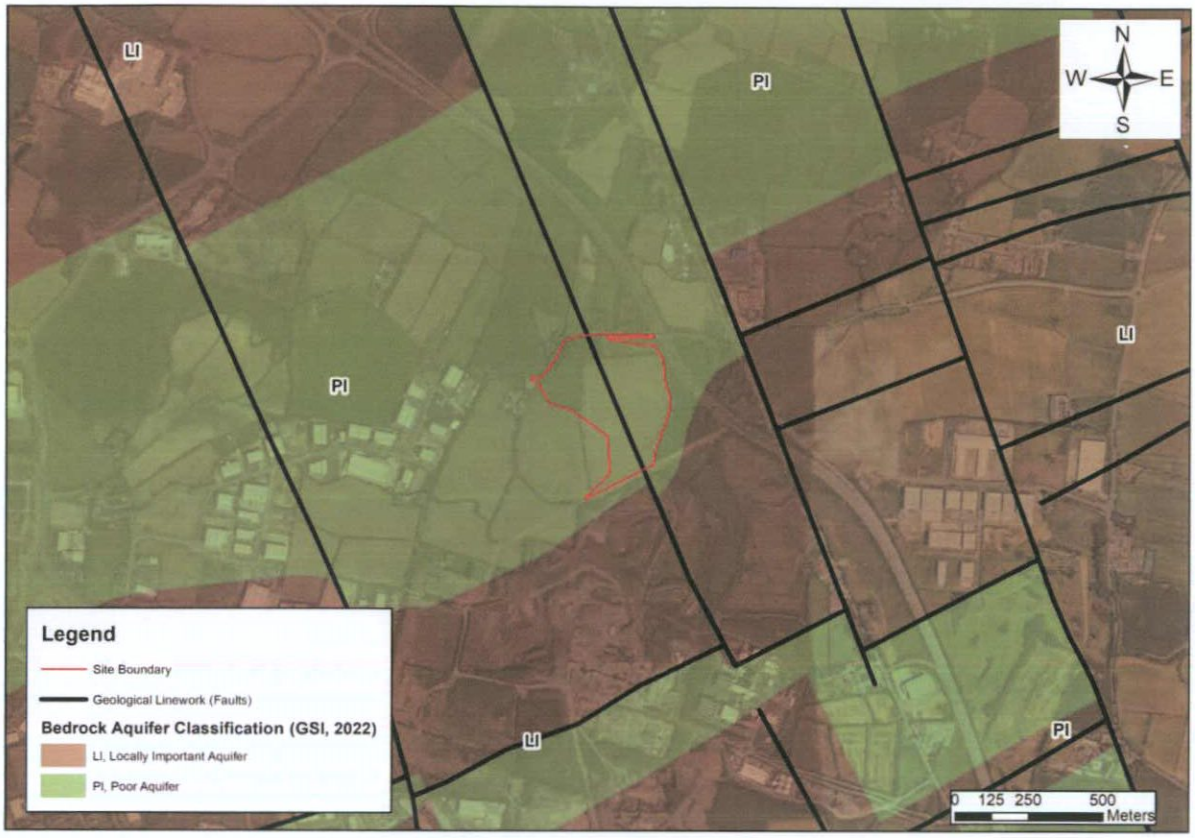

Figure 7.6 Aquifer Classification Map (Source: GSI, 2022)

7.3.8 AQUIFER VULNERABILITY

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely or of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI currently displays/shows varied aquifer vulnerability across in the region. The approximate northwest half of the site overlies a 'Moderate' vulnerable aquifer, while moving south east the vulnerability progresses to 'High' and 'Extreme' in the southeast portion of the site. As can be seen from Table 7.2 below an 'Extreme' vulnerability with clayey subsoil denotes a depth to bedrock of 0-3 mbgl with 'High' vulnerability categorised as 3-5 mbgl. The aquifer vulnerability class in the region of the site is presented below as Figure 7.7.

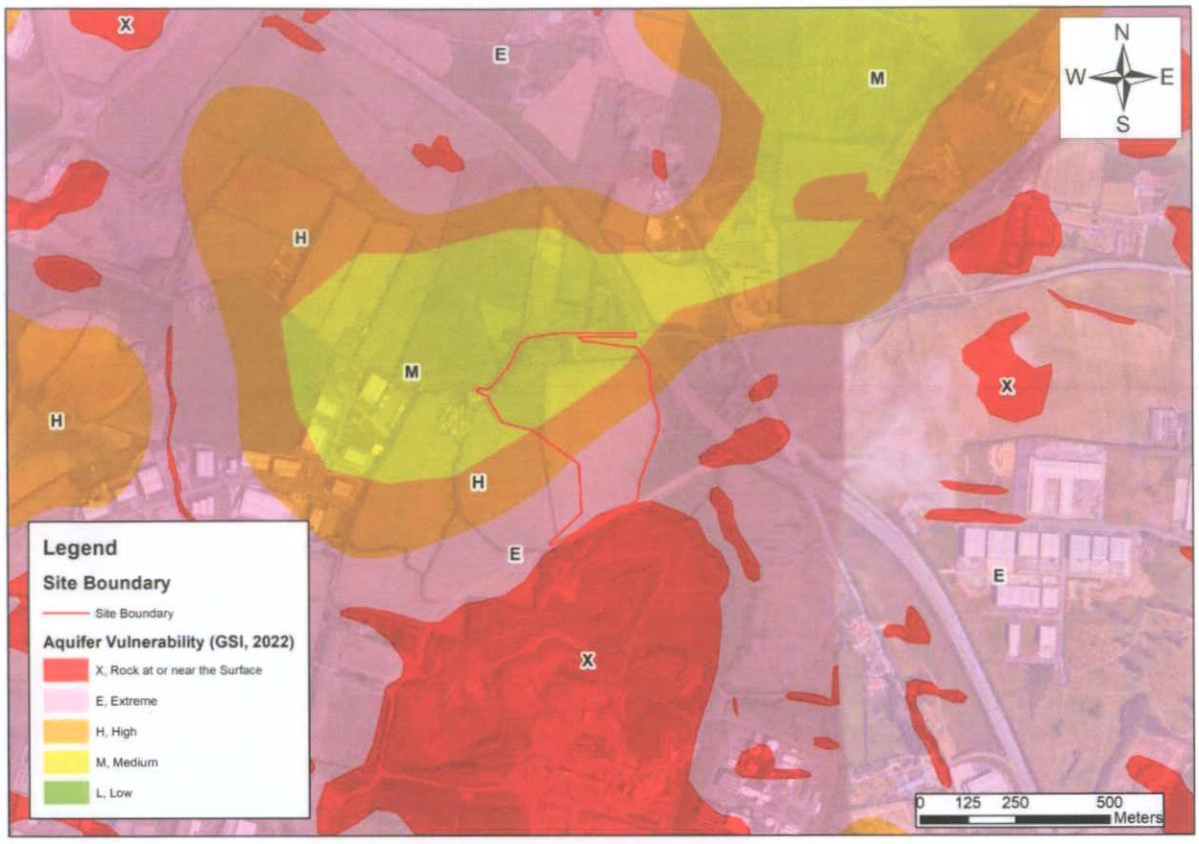

Figure 7.7 Aquifer Vulnerability Map (Source: GSI, 2022)

Table 7.2 Vulnerability Mapping Guidelines (Source: GSI, 2022)

Vulnerability Rating	Hydrogeological Condition				
	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 m	0 - 3 m	0 - 3 m	0 - 3 m	-
High (H)	> 3 m	3 - 10 m	3 - 5 m	> 3 m	n/a
Moderate (M)	n/a	> 10 m	5 - 10 m	n/a	n/a
Low (L)	n/a	n/a	> 10 m	n/a	n/a

Notes: (1) n/a: Not applicable

(2) Precise permeability values cannot be given at present

(2) Release point of contaminants is assumed to be 1-2 below ground surface

The site investigations carried out by Site Investigations Ltd. in 2021 confirmed that the depth to bedrock to the east in the study area ranges between 1.5-3.7 mbgl which is representative of an 'Extreme' groundwater vulnerability.

7.3.9 GROUNDWATER LEVELS AND FLOW DIRECTION

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of all wells is not currently a requirement in the Republic of Ireland. This current index does not show any wells drilled or springs at the site or in the immediate vicinity. The well in closest proximity to the site is located approximately 1.3 km to the south (Church Well). None of the wells is the surrounding area listed are categorised as domestic use. The area is serviced by Local Authority mains therefore it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or

group schemes. There are no groundwater source protection zones in the immediate vicinity of the site. The closest is approximately 10 km to the west (Dunboyne PWS) and the proposed site is outside of the zone of contribution of this supply.

Figure 7.8 below presents the GSI well search for the area surrounding the site (note this source does not include all wells). There are no details of this recorded well in the GSI Well Card Index.

Regional groundwater flow would most likely be to the south – southeast towards the River Tolka and Dublin Bay. However, it is understood that dewatering activates are taking place at Huntstown quarry and these will likely have a local influence on the groundwater flow at the subject site. In particular they will control any potential migration pathway from the quarry towards the subject site.

Figure 7.8 GSI Well Search Map (Source: GSI, 2022)

7.3.10 Soil Quality

There are no legislated threshold values for soils in Ireland. As such soil samples were compared to a Generic Assessment Criteria (GAC) derived to be protective of human health, water bodies (including groundwater) and also ecology for a resident and commercial/industrial end use.

GAC in the UK has been derived using the Contaminated Land Exposure Assessment (CLEA) model to be protective of human health for a number of different land uses. LQM (Land Quality Management) and the CIEH (Chartered Institute of Environmental Health) developed a document in July 2009 detailing their own research and derivation of their own 'LQM GACs'. A total of 82 substances including many organic substances had LQM GACs derived, for the standard land uses of residential, commercial/industrial and allotments. This was updated in 2015 following further research and the derived results are now called LQM/CIEH Suitable 4 Use Level (S4UL). The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and as transparently derived and cautious "trigger values" above which further assessment of the risks or remedial action may be needed. For each contaminant S4ULs have been derived for six land use scenarios based on assessing exposure pathways in each planning scenario. In this instance the

commercial scenario has been considered. Soil type and soil organic matter (SOM) has an influence on the behaviour of contaminants. S4ULs have been derived for three SOM contents (1%, 2.5% and 6%) to cover the likely range in soils. A prudent approach has been taken by considering the lower 1% SOM content.

The UK values do not have any legal standing within the Republic of Ireland and no statutory guidance for assessing the significance of soil contamination currently exists. However, the values do provide a means of placing the data within context when considering magnitude of risk and have been used in that capacity for this assessment.

In total, 11 no. soil samples were collected throughout the trial pitting exercise at the data centre site and analysed for a range of parameters to examine the soil quality and to investigate any present and/or past contamination occurred across the site. Full laboratory result tables for the soil samples are presented in Appendix 7.4.

The soil samples were analysed by ALS Life Sciences LTD, UK for the following parameters:

- Metals (As, Cd, Cr, Pb, Se, Cu, Ni, and Zn);
- Polychlorinated Biphenyls (PCB);
- Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Waste Acceptance Criteria (WAC) for inert waste landfills in accordance with the 2002 European Landfill Directive (2002/33/EC). This suite of parameters includes the following (carried out on 5 samples including 2 from onsite stockpiles);
- Mineral oil;
- Polycyclic aromatic hydrocarbons (PAHs);
- Polychlorinated biphenyls (PCBs);
- BTEX compounds (benzene, toluene, ethylbenzene and xylenes) and methyl tert-butyl ether (MTBE);
- Total organic carbon (TOC); and
- Leachable component of a range of organic and inorganic parameters.

The full analytical laboratory report is presented in Appendix 7.4. For this EIAR the soil results were compared to the GAC concentrations. GACs are soil concentrations that have been derived for a defined set of generic assumptions and are used as trigger values in determining whether further risk management action is required in cases where detailed quantitative risk assessment is not being undertaken.

7.3.10.1 Metals

All metal parameter concentrations recorded values below the most conservative threshold value for the LQM/CIEH for HHRA (Human Health Risk Assessment) Residential Threshold at 1% SOM.

7.3.10.2 Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG)

All parameters recorded below the laboratory's limit of detection (LOD) for all soil samples collected across the site. Therefore, there are no exceedances recorded when these concentrations were compared to the most conservative threshold i.e. LQM/CIEH for HHRA Residential Threshold at 1% SOM.

7.3.10.3 PCBs

All parameters recorded below the laboratory's LOD for all samples collected across the site.

7.3.10.4 PAHs

All parameters recorded below the laboratory's LOD for all samples collected across the site. Therefore, there are no exceedances recorded when these concentrations were compared to the most conservative threshold i.e. LQM/CIEH for HHRA Residential Threshold at 1% SOM.

7.3.10.5 Waste Acceptance Criteria (WAC) Analysis

Of the 11 no. samples taken, 8 no. samples were analysed and compared against Waste Acceptance Criteria (WAC) set out by the adopted EU Council Decision 2003/33/EC which established criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). There was no fill material noted during trial pit excavations with all samples being recorded as original clay subsoil.

The WAC analysis identifies that the representative sample is suitable for classification as Category A – Inert. Based on the laboratory results and parametric concentrations obtained from the site investigation, material from the sample locations would be acceptable at inert waste facilities (Category A). It should be noted that waste facilities develop facility specific criteria also and this should be considered should any soil/ material to be removed from site in the future. The comparison tables for the analysed samples against current WAC criteria can be seen in Appendix 7.

7.3.11 Groundwater Quality

The Water Framework Directive (WFD) Directive 2000/60/EC, was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present. 'Good Status' was to be achieved in all waters by 2015, as well as maintaining 'high status' where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

Presently, the groundwater body in the region of the site (Dublin GWB) is classified under the WFD Risk Score system (EPA, 2020) as 'Under Review'. The Dublin GWB was given a classification of "Good" for the last WFD cycle (2013-2018).

7.3.12 Economic Geology

The GSI (2022) mineral database was consulted to determine whether there were any mineral sites in the area of the subject site. As stated, the Huntstown Quarry is adjacent to the subject site (c. 200 m to the south) and is an active limestone quarry.

7.3.13 Geologic Heritage

The Geological Survey of Ireland (GSI) Public Viewer (www.gsi.ie/mapping) was reviewed to identify sites of geological heritage for the site and surrounding area. The Huntstown Quarry (Site Code DF022) to the south is the closest audited site. The Phoenix Park and Glasnevin Cemetery are located approximately 5.5 and 6.1 km to the south and south east of the site respectively. to the east and south of the site respectively.

7.3.14 Radon

According to the EPA pre May 2022 (now incorporating the Radiological Protection Institute of Ireland) the site location in Kilshane is a Low Radon Area where is it estimated that less than 1% of dwellings within the given 10 km grid square will exceed the Reference Level of 200 Bq/m3. This is the lowest of the five radon categories which are assessed by the EPA.

7.3.15 GEOHAZARDS

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows are a result. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff and leads to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The GSI landslide database was consulted and the landslide in closest proximity to the proposed development was approximately 2 km to the south west of the site, referred to as the M3 J4 Clonee 2014 which occurred on 3rd February 2014. There have been no recorded landslide events at the site. Due to the generally flat/level local topography and the underlying strata there is a negligible risk of a landslide event occurring at the site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. Currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the proposed location was in the Irish sea (1.0 – 2.0 Ml magnitude) and ~55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the proposed development site.

There are no active volcanoes in Ireland so there is no risk from volcanic activity.

7.3.16 AREAS OF CONSERVATION

According to the NPWS (2022) on-line database there are no special protected area on or in the vicinity of the subject site. The closest European listed sites are as follows:

- The Royal Canal (002103) pNHA - circa. 5.1 km to the south of the site.
- The Santry Demesne (00178) pNHA – circa 4.8 km to the east of the site

The site would have an indirect hydrological pathway or connection with the Malahide Estuary SPA/SAC/pNHA through the local drainage network, the Huntstown Stream and the Ward River. Figure 7.9 below presents the location of these protected areas in the context of the Huntstown site.

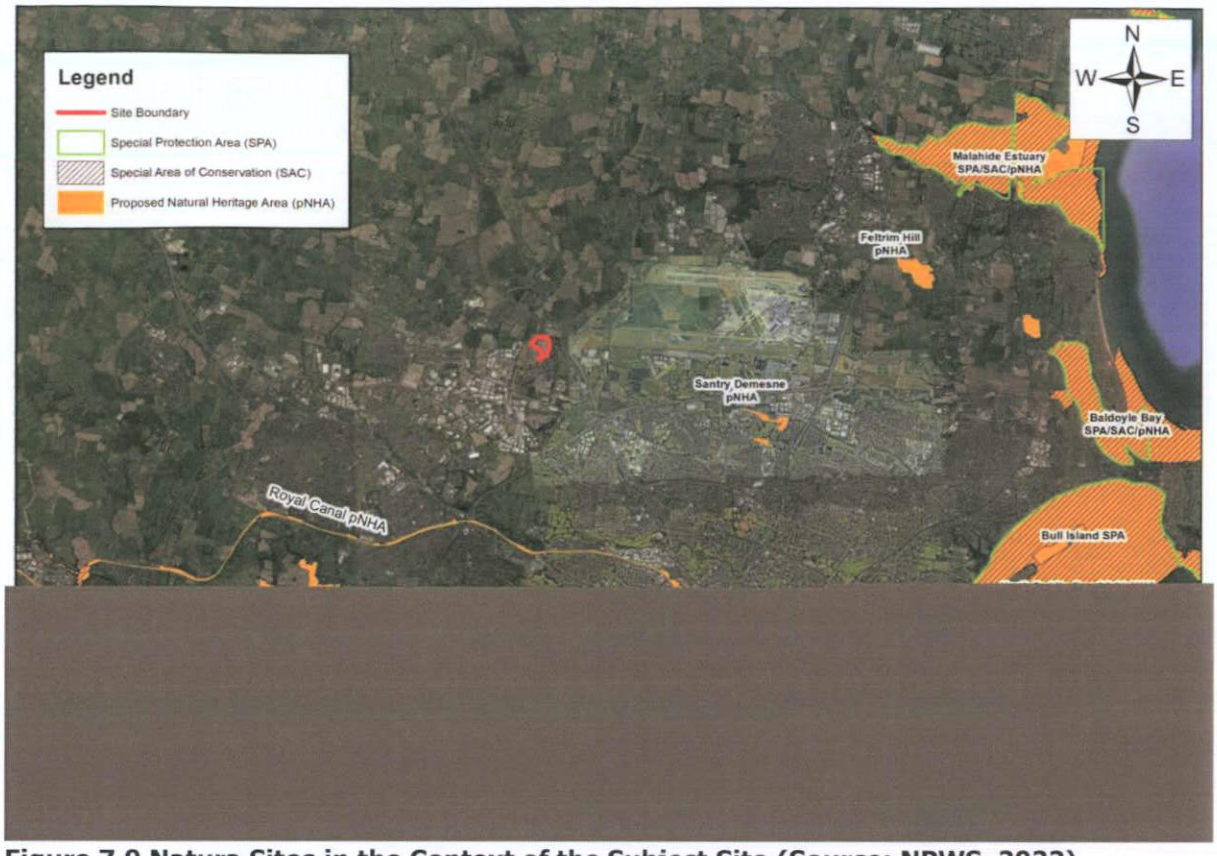

Figure 7.9 Natura Sites in the Context of the Subject Site (Source: NPWS, 2022)

7.3.17 Conceptual Site Model

The subsoil underlying the site is classified as glacial Tills (generally low permeable) by the GSI and the underlying limestone aquifer (Poor aquifer) has an 'Extreme' vulnerability based on site investigations carried out in 2021.

The soil profile encountered can be summarised as follows (based on location RC04):

- Topsoil: From ground level up to 0.2-0.3 mbgl.
- Subsoil: Cohesive Deposits (sandy gravelly Clay) underlie topsoil up to depths of 1.5-3.7 mbgl.
- Weathered Limestone Bedrock/ Bedrock was encountered below subsoil.

The site investigations carried out by Site Investigations Ltd. in 2021 confirmed that the depth to bedrock to the east in the study area ranges between 1.5-3.7 mbgl which is representative of an 'Extreme' groundwater vulnerability.

Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development. No evidence of disposal of waste material was identified the location area proposed for excavation. Collection and analysis of representative soil and groundwater samples for a wide range of parameters shows no evidence of contamination. The review of the groundwater quality data collected on site found that the groundwater beneath the site is of good quality.

A regional cross section can be seen in Figure 7.10.

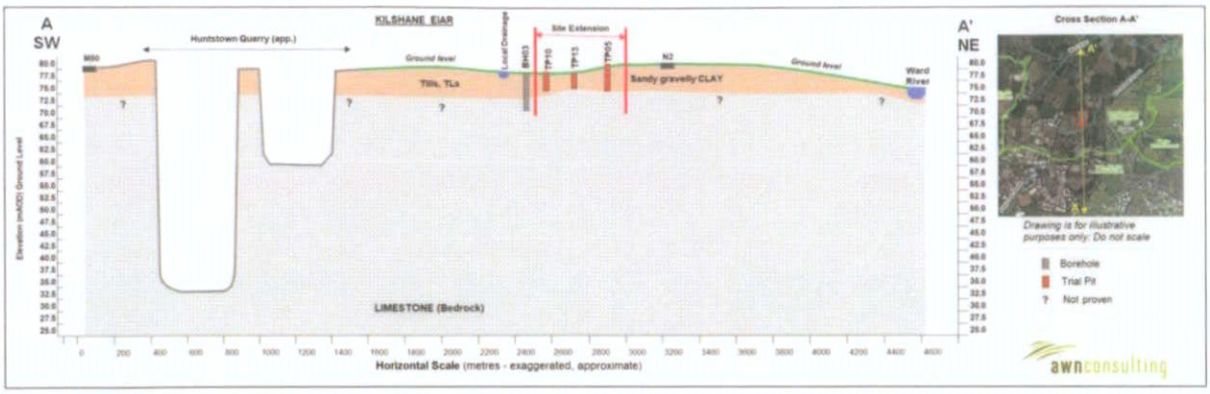

Figure 7.10 Regional Cross Section

7.3.18 Rating of Site Importance of Geological/Hydrogeological Attributes

Based on the TII methodology (2009) (See Appendix 7.1), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as 'High importance' with high significance or value on a local scale. This is due to the existence of an existing quarry in the immediate vicinity of the subject site (Huntstown Quarry) which is located c. 0.2 km to the south of the site.

Based on the TII methodology (2009) (See Appendix 7.1) the importance of the hydrogeological features at this site is rated as 'Low importance' based on the assessment that the attribute has a medium quality significance or value on a local scale. The aquifer is a Poor Aquifer but is not widely used for public water supply or generally for potable use. In addition, there would not be direct or indirect hydrogeological connection between the site and any protected sites (SAC, SPA, NHA).

7.4 PREDICTED IMPACTS

An analysis of the potential effects of the Proposed Development on the land, soils, geology and hydrogeological environment during the construction and operation phases is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water (Hydrology), the following impacts are also applicable to Chapter 8 (Hydrology). Mitigation measures included in the design of this project to address these potential impacts are presented in Section 7.5 below.

7.4.1 Construction Phase

In the absence of mitigation, the following potential effects to land, soil and groundwater (hydrogeology) have been considered for the construction phase.

7.4.1.1 Excavation and Infilling

Due to the lack of previous development at the site and the historical residential and agricultural use at the site, the risk of contaminated soils being present onsite is low and this was confirmed by onsite soil sampling and analysis. Nonetheless material, which is exported from site, if not correctly managed or handled, could impact negatively on human beings (onsite and offsite) as well as water and soil environments.

The levelling of ground and excavation for foundations will require the excavation of topsoil, subsoil and bedrock, as the depth of bedrock ranges 1.5-3.7 mbgl. The maximum excavation level would be c. 9.05 mbgl.

It has been estimated that 64,500m^3 of excavated subsoil and topsoil will be generated. All this excavated material will be reused on site for landscaping of the berms. Import of fill will not be required.

Site investigation and laboratory analysis has not identified any existing contamination. However, if contaminated soil/water is encountered, it will be required to be removed by a licensed waste contractor.

As it was described in Section 7.1, it is noted that the deepest proposed excavation is c. 9.05 mbgl. Therefore, groundwater ingress can be expected. However, this groundwater volume would be minor given the ground condition of relatively impermeable clay overlying rock. As inflow rates are expected to be low, there will be a localised zone of contribution which will not likely extend beyond the site boundary.

It is expected during the excavation works that localised dewatering of the subsoils will be required to address perched groundwater. It can be expected minor ingress of rainfall in the excavation to occur during construction phase.

In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, slight*** and ***negative***. The effect is considered to be 'slight' due to the fact that there will not be intervention on the geological and hydrological regime on a local or regional scale.

7.4.1.2 Accidental Spills and Leaks

As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant temporary risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer.

During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the site should contaminants migrate through the subsoils and impact the underlying groundwater. Groundwater vulnerability at the site is currently classified as extreme, high, and moderate in the south, central portion, and north of the site respectively. Any soil stripping will also further reduce the thickness of subsoil and the natural protection they provide to the underlying aquifer.

In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, slight*** and ***negative***. The effect is considered to be 'slight' due to the fact that there will not be intervention on the geological and hydrological regime on a local or regional scale.

7.4.1.3 Loss of Agricultural Land

There will be local loss of agricultural soil however the area of development is small in the context of the overall agricultural land available in the region. The majority of the land is zoned for development. Within the overall context of Ireland's available farmland, the loss is negligible. There will be no impact to mineral resources in the area as a result of the Proposed Development.

7.4.2 Operational Phase

The development includes the storage and use of fuel oil. The reserve fuel for the turbine will be diesel fuel oil which will be stored in a dual-containment tank with a capacity of 6,246 m^3.

Any accidental spills of chemicals during storage, transfer, or delivery or leakage in the car parks could cause localised contamination if the emissions enter the soil and groundwater environment without adequate mitigation. However, it is noted that any accidental discharge will more likely impact stormwater drainage due to the hardstand and drainage infrastructure proposed and any releases to drainage will be mitigated through a Class 1 Petrol interceptor which is proposed to be installed before surface water outfalls to the existing ditch system (refer to Chapter 8 for further details).

There will be an increase in hardstand as a result of the development of the facilities of c. 28,720m^2. Incorporation of hard stand area on previous greenfield area and the use of SUDs techniques will have a minor effect on local recharge to ground; however, the impact on the overall groundwater regime will be insignificant considering the proportion of the site area in relation to the total aquifer.

In the absence of mitigation, the effect on the geological and hydrogeological environment is likely to be ***long-term, slight*** and ***negative***. The effect is considered to be 'slight' because there will not be intervention on the geological and hydrological regime on a local or regional scale.

7.4.3 Do Nothing Scenario

If the proposed development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no, excavation or construction at this site. There would, therefore, be a neutral effect on the geological and hydrogeological environment in terms of waste.

The site is zoned for development, and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies and therefore the likely significant effects would be similar to this proposal. A potential increase in hardstanding areas would result in local changes to recharge and hydrological flow patterns.

7.5 MITIGATION AND MONITORING MEASURES

The design has taken account of the potential impacts of the development on the soils, geology and hydrogeology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding soils, geology and hydrogeology. These are described below.

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

7.5.1 Construction Phase

7.5.1.1 Construction Environment Management Plan

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (PCEMP). The detailed PCEMP will set out the overarching vision of how the construction of the Proposed Development will be managed in a safe and organised manner by the Contractor. The PCEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions relevant to the Proposed Development.

As a minimum, the PCEMP will be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;

- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association
- CIRIA (2005), Environmental Good Practice on Site (C650); Construction Industry Research and Information Association
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

In order to reduce impacts on the soil, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site as outlined below.

7.5.1.2 Control of Soil Excavation

Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will require imported material. Suitable soils will be reused on site as backfill in the grassed areas, where possible. Contractors shall be required to submit and adhere to a method statement indicating the extent of areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.

According to onsite investigations, the bedrock vulnerability is 'Extreme'. However, removal and reinstatement of subsoil cover will not alter the vulnerability category of the underlying bedrock. The deposition of infill soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Site investigations classified the subsoils as 'inert'. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.

7.5.1.3 Fuel & Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon

adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

In the case of drummed fuel or other chemical which may be used during construction, containers will be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

7.5.1.4 Control of Water During Construction

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.

Should any discharge of construction water be required during the construction phase, discharge will be to the local drainage ditches. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. All water runoff from designated refuelling areas will be channelled to an oil interceptor or an alternative treatment system prior to discharge.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be low and limited to the northeast of the site. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the local drainage ditch. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the Dublin Boulder Clay and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

7.5.1.5 Monitoring Measures

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not occur.

7.5.2 Operational Phase

The kerbed unloading area is designed to contain leaks from the tanker truck and unloading station during tank fill operations and unloading station maintenance activities. The kerbed area will be monitored visually during the temporary manual operations. Rainwater collecting in the curbed area will be visually inspected before manual discharge to grade. The operator will connect the tanker

truck hose to the unloading station and will manually operate the unloading station pumps to fill the site fuel oil tank. The unloading station will include local tank level indication and alarms with automatic shutdown of the unloading station pumps on high level to avoid overfilling the tanks. The pumps will incorporate a recirculation valve from pump discharge to pump suction, which will avoid an overpressure event without discharging fluid to grade. The fill connection piping will be routed above the tank secondary containment wall and connect to the top of the tank. The fill line between the pump containment area and the tank containment area will be single wall welded, with Type A connections and fittings.

With regard to the oil storage system, the tank will be installed on a concrete foundation, and will include a secondary nominal 27.4m diameter wall for leak containment. A spiral stairway will provide access to the top of the tank and to the annular containment area for inspection and maintenance activities. The secondary containment wall height will be sized for at least 110% tank capacity, and will be high enough to avoid issues with spigot/jetting flow from a leak. A shed roof (or equivalent) will be provided to minimize rainwater ingress into the containment area. The containment area will include redundant level switches to alarm if fluid is detected. Piping penetrations through the secondary containment wall will be limited to necessary low level connections for fuel forwarding pump suction, manual tank and containment drainage, and level switches to alarm on fluid level within the containment area. The penetrations will be sealed to avoid leaks. The balance of the tank connections will be routed above the secondary containment wall. Connections and fittings outside of the containment area will be designed as Type A.

The design includes hardstand cover and permeable paving across the site prior to discharge into the attenuation system. Therefore, the risk of accidental discharge has been adequately addressed through design.

Petrol interceptors will be installed as part of the SuDS measures to capture any potential oil or hydrocarbon contamination prior to discharge into the attenuation system on site (refer to Chapter 7 for further details). This together with hardstand cover and permeable paving will minimise the potential for any impact to the hydrological environment.

An Environmental Safety and Health Management System (EMS) will be implemented at the proposed development during operations. An environmental management plan will apply to the overall development during the operational phase incorporating mitigation measures and emergency response measures. An Emergency Response Plan has been developed for the proposed facility and has been included in the planning application. Section 7 and 8 of the ERP outline the procedures to be followed in response to a fire or spill.

There will be comprehensive emergency response procedures and standard operating procedures to respond to an onsite fuel spillage. All employees will be provided with such equipment, information, training and supervision as is necessary to implement the emergency response procedures and standard operating procedures. Section 6 of the Emergency Response Plan outlines the training plan to be provided to site personnel. The Emergency Response Plan will be updated based on final as built design and layout prior to the operational phase.

7.6 RESIDUAL IMPACTS

7.6.1 CONSTRUCTION PHASE

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

7.6.2 OPERATIONAL PHASE

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

7.7 CUMULATIVE ASSESSMENT

The following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Land, Soils, Geology and Hydrogeology. This considers the proposed development and other surrounding proposed and permitted developments listed in Appendix 17.1.

As has been identified in the receiving environment section all cumulative developments that are already built and in operation contribute to our characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational cumulative developments has been assessed in the preceding sections of this chapter.

There are six (6 no.) potentially cumulative developments which have been granted in the recent past whose impact (either in construction phase or operational phase) are not yet wholly realised within the existing land soils, geology and hydrogeological baseline environment. These cumulative developments are:

- FW22A/0108: Involves primarily internal alterations to warehousing facilities with some minor external works. This proposed development is still within the planning system and decision has not yet been provided. Due to the nature of this planning application (FW22A/0108), there is no potential for cumulative impacts with the proposed development in terms of the land soils, geology and hydrogeological environment.
- FW21A/0151: Entails the demolition of existing structures and the installation of a data centre with associated works. This recently granted development has the potential to act cumulatively with the proposed development during both the construction and operational phases with respect to the land soils, geology and hydrogeological environment.
- F21A/0144: Concerns the transfer of above ground power lines to underground between Huntstown Power Plant to the south of the subject lands and Finglas substation. Applying the precautionary principle this granted planning permission has the potential to act cumulatively with the proposed development for the construction phase only with respect to the land soils, geology and hydrogeological environment.
- FW19A/0015: the installation of BESS (Battery Energy Storage Systems) units within Huntstown Power Plant to the south of the subject lands. Applying the precautionary principle this granted planning permission has the potential to act cumulatively with the proposed development for the construction and operational phases with respect to the land soils, geology and hydrogeological environment.
- FW18A/0012: Provision of a WWTP (Wastewater Treatment Plant). Applying the precautionary principle this granted planning permission has the potential to act cumulatively with the proposed development for the construction and operational phases with respect to the land soils, geology and hydrogeological environment.
- FW17A/0012: Application for the increase of permitted rate of C&D (construction and demolition) waste at a recycling facility. This granted permission does not present any potential to act cumulatively with respect to the land soils, geology and hydrogeological environment.

The remainder of the planning permissions identified in Appendix 17.1 have no potential for cumulative effects with the proposed development in terms of the land soils, geology and hydrogeological environment, and or are already operational and as such are reflected in the current environmental baseline.

There are two closely related projects that are not part of the subject proposal but are integral to its operation. Although these are both subject to separate consent processes, they are both integral to the operation of the power station. These are:

- An Above Ground Installation (AGI) gas supply project - The AGI (Above Ground Installation) will regulate delivery of gas supply to the power station. It will be located within the subject lands and it will be connected to an existing nearby gas main by means of a new underground pipe. The pipe route has not yet been confirmed however Gas Networks Ireland have indicated a range of options. Depending on the route taken this will be approximately 600-700 m in length. Applying the precautionary principle this future related project has the potential to act cumulatively with the proposed development for the construction phase only with respect to the land soils, geology and hydrogeological environment.
- Gas Insulated Switchgear (GIS) project - The location of the GIS electrical substation, which is required to convey generated electricity to the grid connection, is within the subject lands. The GIS will be connected to the national grid at Cruiserath substation to the west. The connection will be by means of a buried cable c. 4.69 km in length, generally laid under public roads. Applying the precautionary principle this future related project has the potential to act cumulatively with the proposed development for the construction phase only with respect to the land soils, geology and hydrogeological environment.

7.7.1 Construction Phase

Applying the precautionary principle a number of granted permissions that may well have completed their construction phase by the time the proposed development is undergoing construction have been included within this assessment of cumulative effects. In this regard it is assumed that there is potential for the construction phases of FW21A/0151, FW21A/0144, FW19A/0015, FW18A/0082, the AGI installation and the GIS installation to occur at the same time. In reality such an occurrence is highly unlikely.

Based upon the information available within the planning files for FW21A/0151, FW21A/0144, FW19A/0015, FW18A/0082 (including an EIAR for FW21A/0151 and FW21A/0144), along with the author's knowledge of likely construction related hydrological impacts associated with the AGI installation and the GIS installation there is sufficient information available to determine the likelihood of cumulative effects.

Contractors for the both the Proposed Development and FW21A/0151, FW21A/0144 will be contractually required to operate in compliance with their PCEMPs which includes the mitigation measures outlined in their respective EIA reports. The remaining developments (FW19A/0015, FW18A/0082, the AGI installation and the GIS installation) will be contractually obliged to operate in compliance with a PCEMP which will be required by law to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016).

Taking into account the relatively contained nature of the identified cumulative developments, the short-term aspect of their occurrence, the contractual controls, and the unlikelihood of them occurring in tandem, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime.

The cumulative impact for the construction phase is considered to be ***neutral*** and ***imperceptible***.

7.7.2 Operational Phase

With respect to the operational phase the following developments have the potential to act cumulatively with the proposed development with respect to the land, soils, geology and hydrogeological environment; FW21A/0151, FW19A/0015, and FW18A/0082.

Based upon the information available within the planning files for FW21A/0151, FW19A/0015, FW18A/0082 (including an EIAR for FW21A/0151 and FW21A/0144) there is sufficient information available to determine the likelihood of cumulative effects for the operational phase.

Operators for FW21A/0151, FW19A/0015, and FW18A/0082 will be legally required to operate according to the conditions of their planning permission and in accordance with S.I. 272 of 2009 and S.I. 77 of 2019.

Taking into account the SUDS control measures within the cumulative developments, along with the design measures to compensate from impacts to recharge rates to the underlying aquifer due to additional hardstanding there will be minimal cumulative potential for change in ground water quality during the operational phase.

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 9 of 2010 and S.I. 266 of 2016 amendments. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status.

The operation of the proposed development during the operational phase is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

7.8 INTERACTIONS

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, there is a strong overlap between the assessed impacts and mitigation in both chapters. There is also an interaction between this chapter and Waste topics due to the generation of excavated soil and stones (c. 64,650m^3 of subsoil and 14,400m^3 of topsoil) required to facilitate site levelling, construction of new foundations and installations of site services. It is estimated that all of excavated material will need to be removed off-site . Where material has deemed unsuitable or is unable to be reused onsite it will be taken off-site, it will be taken for reuse or recovery, where practical, with disposal as a last resort.

8 WATER & HYDROLOGY

8.1 INTRODUCTION/METHODOLOGY

This chapter assesses and evaluates the potential impacts of the Proposed Development on the hydrological aspects of the site and surrounding area, in accordance with the requirements of 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 (i.e. the EIA Directive) (European Union, 2014a). This Chapter also provides a characterisation of the receiving hydrological environment within the proposed Project and within a wider study area in the vicinity of the proposed Project. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

This chapter was prepared by Marcelo Allende (BSc, BEng). Marcelo is a Senior Environmental Consultant (Hydrologist) at AWN with over 15 years of experience in Environmental Consulting and water resources. Marcelo holds a degree in Water Resource Civil Engineering from the University of Chile. He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site specific flood risk assessments, Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI).

8.1.1 REVENANT GUIDANCE

The hydrological baseline assessment has been carried out in accordance with the following guidance and established best practice:

- Environmental Protection Agency (EPA) Advice notes on current practice in the preparation of Environmental Impact Statement (EPA, 2015) and Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022).
- Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).
- Transport Infrastructure Ireland - Road Drainage and Water Environment (TII, 2015).
- Transport Infrastructure Ireland (previously National Road Authority) - Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009).
- Water Framework Directive (WFD) - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)).
- Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland, 2016).
- Guidelines for the Crossing of Watercourses during Construction of National Road Schemes, (TII, 2008).

Water resource management in Ireland is dealt with in the following key pieces of legislation and guidelines:

- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended by SI No. 77 of 2019).
- Part IV of the First Schedule of the Planning and Development Act 2000, as amended.
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).
- Environmental Protection Agency 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report', (EPA 2003).
- European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014).
- European Union (Drinking Water) (Amendment) Regulations (S.I. No. 464 of 2017).

8.1.2 Criteria for Rating of Effects

This chapter evaluates the effects, if any, which the development has had or will have on Hydrology as defined in the Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022). The Draft EPA document entitled 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015) is also followed in this hydrological assessment and classification of environmental effects. In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental effects on the hydrological environment is based on the standard EIAR impact predictions table included in Chapter 1 which takes account of the quality, significance, duration, and type of effect characteristic identified (in accordance with impact assessment criteria provided in the EPA Guidelines (2022) publication).

The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

The NRA criteria for rating the magnitude and significance of impacts and the importance of hydrological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1-3 in Appendix 7.1.

The principal attributes (and effects) to be assessed include the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from proposed development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

8.1.3 Sources of Information

Desk-based hydrological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the subject site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Environmental Protection Agency (EPA) – website mapping and database information. Envision water quality monitoring data for watercourses in the area;
- River Basin Management Plan for Ireland 2018-2021.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)

- Fingal County Council (2005), Greater Dublin Strategic Drainage Study: Final Strategy Report.
- 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001);
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

Site specific data was derived from the following sources:

- Engineering Assessment Report. Proposed Road Realignment and Gas Turbine Power Generation Station at Kilshane, Dublin 11. Waterman Moylan, June 2022;
- Site Investigation Report. Kilshane, Ballycoolin, Dublin 15. Site Investigation Ltd., December 2021;
- Various design site plans and drawings; and
- Consultation with site engineers.

8.2 THE PROPOSED DEVELOPMENT

The proposed development site is located on a 13.56 ha site in the townland of Kilshane, and Piperstown, Kilshane Road, Dublin 11. The proposed development comprises the construction of a gas turbine power generator station with an output of up to 293 Megawatts, the application of which includes a turbine, an associated exhaust stack, two air cooled condenser units, administration and control building, workshop, stores, fuel gas area, electrical module for fuel gas area, step-up transformer, transfer compound, one fuel oil tank, one demin water tank and one raw water tank and recessed bund area, miscellaneous plant, and equipment.

The proposed development will also include 26 no. staff car parking spaces, site and landscaping works, and all associated ancillary site development infrastructure such as foul and surface water drainage works and internal roads, footpaths, access routes, and all associated engineering and construction site works necessary to facilitate the development. Additionally, the proposal includes the realignment of a section of the Kilshane road and construction of a new roundabout junction (bounding the site to the east).

The proposed development is described in further detail in Chapter 4 *Project Description* and in the PCEMP. The details of the construction and operation of the development in terms of Hydrology are detailed in the subsections below.

8.2.1 CONSTRUCTION PHASE

The key civil engineering works which will have a potential impact on the water and hydrological environment during construction of the proposed development are summarised below.

- Excavations are required for foundations of installation of associated services included within the development.
- Possible discharge of collected rainwater/ dewatering during excavation works and groundworks (the extent of which is dependent on the time of year development works are carried out); and
- Construction activities will necessitate storage of cement and concrete materials, temporary oils, and fuels on site. Small localised accidental releases of contaminating substances including hydrocarbons have the potential to occur from construction traffic and vehicles operating on site.

8.2.2 OPERATIONAL PHASE

The key activities which will have a potential impact on the hydrological environment during operation of the proposed development are summarised below.

8.2.2.1 Increase in Hard Standing Area

The proposed development represents an overall increase in hardstanding surfaces of c. 28,720 m^2.

8.2.2.2 Storage of Hazardous Materials

Combustion Turbine Fuel Oil System

The General Electric 9FA.04 combustion turbine is dual fuel capable, with emergency operation < 500 hours per year on EN590 ultra low sulphur diesel fuel oil (<10ppmw). The facility will include a fuel oil tank, unloading station, forwarding pumps, and piping system to convey the fuel oil to the combustion turbine.

Fuel Oil Unloading System

The fuel oil will be delivered in tanker trucks. The unloading station will consist of a kerbed concrete tanker truck unloading pad adjacent to the facility road sized to contain 110% of a tanker truck volume (33.4 m3), a pumped tanker truck unloading station within the curbed unloading area, and single wall piping routed to the fuel oil tank.

Fuel Oil Storage System

Combustion turbine fuel oil will be stored in a nominal 6,246m^3 capacity field erected welded steel tank. The tank nominal sidewall height is 14 m, with maximum height at top of tank roof structure not to exceed 16.2m. Nominal tank diameter is 24.4m. The tank will be installed on a concrete foundation, and will include a secondary nominal 27.4m diameter wall for leak containment. A spiral stairway will provide access to the top of the tank and to the annular containment area for inspection and maintenance activities. The secondary containment wall height will be sized for at least 110% tank capacity, and will be high enough to avoid issues with spigot/jetting flow from a leak. A shed roof (or equivalent) will be provided to minimize rainwater ingress into the containment area.

Fuel Oil Forwarding System

The fuel oil forwarding system consists of a fuel oil forwarding pump skid and piping to the combustion turbine skid. The forwarding pump skid, complete with piping, equipment, valves, and fittings will be located in the same curbed unloading area described above to contain leaks during operation and maintenance. A section of piping may be routed underground. Underground piping will be double wall and welded with a leak detection system. Above ground piping is connected to the turbine liquid fuel/atomizing air module located to the south of the combustion turbine, and is single wall welded, with Type A connections and fittings. The above ground discharge piping from this module is connected to the turbine and is single wall welded, with Type A connections and fittings.

The risk to the aquifer is considered low due to the mitigation in place for containment, delivery and distribution and use of oil interceptors on the stormwater system downgradient of the offloading area and prior to discharge from the site.

8.2.2.3 Surface Water Management

A Storm Water Management Plan will be implemented through the use of various SuDS techniques to treat and minimise surface water runoff from the site. The methodology involved in developing the Storm Water Management Plan for the subject site will be based on recommendations set out in the Greater Dublin Strategic Drainage Study (GDSDS) and in the SuDS Manual.

Fingal County Council have requested that the Kilshane Road realignment, which is to be taken in charge, be attenuated separately from the remainder of the subject application which is to remain under private management.

Storm water from the site will discharge at a controlled rate, limited to the greenfield equivalent runoff, to the existing ditches forming the site boundary, which are connected to the Huntstown Stream. Rainfall in excess of this will be attenuated in the underground tanks for each catchment The proposed development will be designed to incorporate best drainage practice.

The proposed development includes the provision of permeable paving at parking areas serving the development. Swales will be connected to the surface water network so that any excess flows can be

directed to the mains rather than overspilling to open spaces on the site. An underground attenuation system is proposed to be utilised for the development site. These underground tanks are modular systems, which will provide sufficient attenuation volume. These tanks allow suspended particles to settle out of suspension by reducing the velocity of the surface water as it flows through the system.

The system also allows for the percolation of water back to the water table. A flow control device (Hydrobrake) is proposed between the attenuation tank and the outfall headwall. This will limit flow volumes exiting the site to the greenfield equivalent runoff rate.

A Class 1 Petrol interceptor will be installed before surface water outfalls to the existing ditch system. The Interceptor will remove hydrocarbons from surface flows before they outfall to natural watercourses.

Refer to Engineering Assessment Report (Waterman Moylan, 2022) for further details.

8.2.2.4 Foul water

A reason for the previous planning applications refusal was the lack of consideration given to the remainder of the lands outside the subject application area, but under the ownership of the applicant. A Outline has now been developed and the flows from these industrial units which will form a future application, have now been incorporated into the foul design of the subject application.

It is now proposed, due to site topography, to serve the subject application and Outline lands by a pumping station as agreed with Irish Water, which is to remain under private management. The location, depth, and dimensions of the pumping station as per Drawing Number: 21-099-P203, has been designed in anticipation of the future connection of the Outline lands.

A 150mm diameter rising main will be constructed from the on-site pumping station for a distance of C. 1,818m to the existing gravity foul network on Mitchelstown Road. While the Kilshane pumping station is closer, it is not considered feasible to undertake the construction of the rising main under the N2 and through the Kilshane Cross junction.

A pre-connection enquiry was submitted to Irish Water with a reference number of CDS22004080, the subsequent confirmation of feasibility letter received is included in the accompanying Engineering Report.

The proposed pumping station will be sized to accommodate the fully developed Outline lands and subject application and will provide a storage capacity for 24 hours of foul flow.

8.2.2.5 Water Supply

It is not considered feasible to upgrade the existing watermain network which traverses the N2. As such, it is proposed to connect to the 110mm Ø MOPVC watermain located to the southwest of the site on Kilshane Road to the 50.8 uPVC watermain adjacent to the site via a new 150mm Ø watermain.

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8.3 THE RECEIVING ENVIRONMENT

The proposed development site extends to over 13.56 ha. on lands adjacent to Kilshane road, N2 national carriageway, and Huntstown Quarry Dublin 11. The site is bounded to the north by Kilshane road, to the east by the N2 national carriageway, to the south and west by agricultural fields, while land further south (c. 0.2 km) is occupied by Huntstown Quarry.

8.3.1 HYDROLOGY

The subject site is located in the River Tolka WMU (Water Management Unit) within the former Eastern River Basin District (ERBD) (now the Irish River Basin District), as defined under the

European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD).

According to the EPA maps, the proposed development site lies within the Nanny-Delvin Catchment (Hydrometric Area 08) and the Broadmeadow sub-catchment (refer to Figure 8.1 below). The current EPA watercourse mapping does not include any existing streams within the subject site boundaries, a review of the historical mapping records provided within the GeoHive website do not indicate any watercourses within the site.

The subject site is currently a greenfield site, used for agricultural purposes. There is no existing surface water drainage network adjacent to or on-site.

The site is comprised of multiple fields separated by hedgerows, and generally slopes from west to east. Surface water, rainfall, is generally percolated through the site via grass and soil. The topographic survey has confirmed that the internal and boundary hedgerows contain ditches which convey flow to the Huntstown Stream to the east of the site, during heavier rainfall events. These ditches only serve the subject site and the agricultural fields immediately to the west, located between the subject site and the Kilshane Road, and does not convey any upstream watercourse.

The Huntstown Stream generally flows in a north-easterly direction to join the River Ward at St. Margaret's Golf and Country Club. The River Ward is a tributary of the Broadmeadow River, which in turn outfalls to the Irish Sea at the Malahide Estuary. The hydrological environment is presented in Figure 8.1 below. The Malahide Estuary is a Special Protection Area (SPA), a candidate Special Area of Conservation (cSAC), a proposed National heritage Area (pNHA) and a RAMSAR site.

The Huntstown Stream generally flows in a north-easterly direction to join the River Ward to join the Ward River c. 4.4 km to the northeast of the site (at Saint Margaret Golf and Country Club). The Ward River flows towards Malahide Estuary, a Natura 2000 Site (SPA/SAC/pNHA) located approximately 9.8 km to the northeast of the site after joining the Broadmeadow River.

Therefore, the subject site belongs to the Broadmeadow sub-catchment (WFD name: Broadmeadow_SC_010, Id 08_3) and would have an indirect hydrological connection with the Malahide Estuary (SPA/SAC/pNHA) through the local drainage network, the Huntstown Stream and the Ward River.