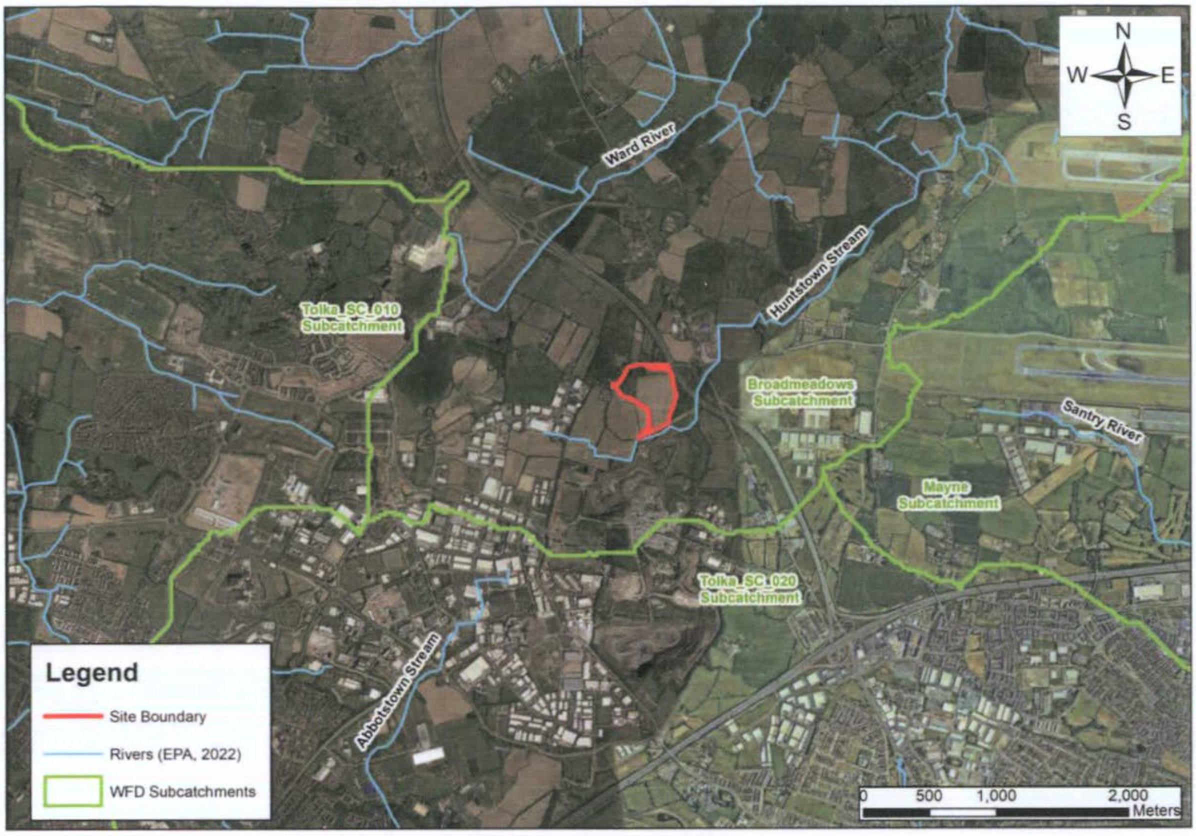

Figure 8.1 Local Hydrological Environment (EPA, 2022)

8.3.2 SURFACE WATER QUALITY

The proposed development is located within the former 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). It is situated in Hydrometric Area No. 08 of the Irish River Network and is located within the Nanny-Delvin Catchment.

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the ERBD River Basin Management Plan (RBMP) 2009-2015 was published. In the ERBD RBMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle river basin management plan for Ireland is currently in place and will run between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD).

This second-cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). In more general terms, three key lessons have emerged from the first cycle and the public consultation processes. These lessons have been firmly integrated into the development of the second cycle RBMP. Firstly, the structure of multiple RBDs did not prove effective, either in terms of developing the plans efficiently or in terms of implementing those plans. Secondly, the governance and delivery structures in place for the first cycle were not as effective as expected.

Thirdly, the targets set were too ambitious and were not grounded on a sufficiently developed evidence base. The second cycle RBMP has been developed to address these points.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following::

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019);
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011);
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988;
- Local Government (Water Pollution) Acts 1977-1990;
- SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations 1998.

Surface water quality is monitored periodically by the EPA at various regional locations along with principal and other smaller watercourses. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

According to EPA data, there are two historic inactive monitoring stations in close proximity to the subject site which have been previously decommissioned:

- Huntstown Stream Kilshane Br Ashbourne Rd' (EPA Code: RS08H020200): located immediately south of Kilshane Cross adjacent to the east boundary of North road.
- 'Huntstown Stream- d/s Roadstone' (EPA Code: RS08H020100): located adjacent to the north boundary of Huntstown Quarry c. 0.2 km south of the site.

In relation to the subject site, the nearest active EPA monitoring stations located in the Ward River catchment are:

- 'Coolatrath Br' (EPA Code: RS08W010070): located in the Ward River c. 3.3km upstream of the Huntstown Stream. The most recent status recorded by the EPA (2020) is classified as Q3-4/Moderate.
- 'Br N of Killeek' (EPA Code: RS08W010300): located in the Ward River c. 1.2km downstream from its join with the Huntstown Stream. The most recent status recorded by the EPA (2020) is classified as Q3-4/Moderate.

Refer to Figure 8.2 below for locations of these EPA quality monitoring points in the context of the site.

Figure 8.2 EPA Surface Water Quality Stations (Source: EPA, 2022)

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. The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'good ecological status' and 'good chemical status'.

The Huntstown Stream belongs to the Ward_030 WFD surface water body, which currently, the EPA classifies as having 'Moderate' and is 'At risk of not achieving good status'. This moderate status is related to the nitrogen (nitrate, specifically) and orthophosphate conditions measured in the Ward River.

8.3.3 FOUL WATER & WATER SUPPLY NETWORK

The nearest Irish Water foul water network, is located approx. 670m away on the R135 to the east of the N2 and is shown as the Kilshane Pump Station. Another foul network to the southwest of the subject site on the Mitchelstown Road has been identified. This network is a distance of 1.5km away from where the site boundary meets the Kilshane Road, at the entrance to Flaherty Logistics.

With regard to water supply, a 50.8 uPVC watermain is located to the north of the site on the Kilshane Road. The south of the site is traversed by a 914.4mm (36") concrete watermain. This distribution main is fenced-off as a protective measure.

In addition, there is an existing 110mm Ø MOPVC to the southwest of the site.

8.3.4 FLOOD RISK

According to the Flood Risk Assessment carried out by Waterman Moylan (2022), there is extremely low risk of flooding affecting the site from fluvial or coastal sources, since the site lies within Flood Zone C (i.e., where the probability of flooding from rivers is less than 0.1% or 1 in 1000).

8.3.5 AREAS OF CONSERVATION

According to the NPWS (2021) 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 8.3 below presents the location of these protected areas in the context of the Huntstown site.

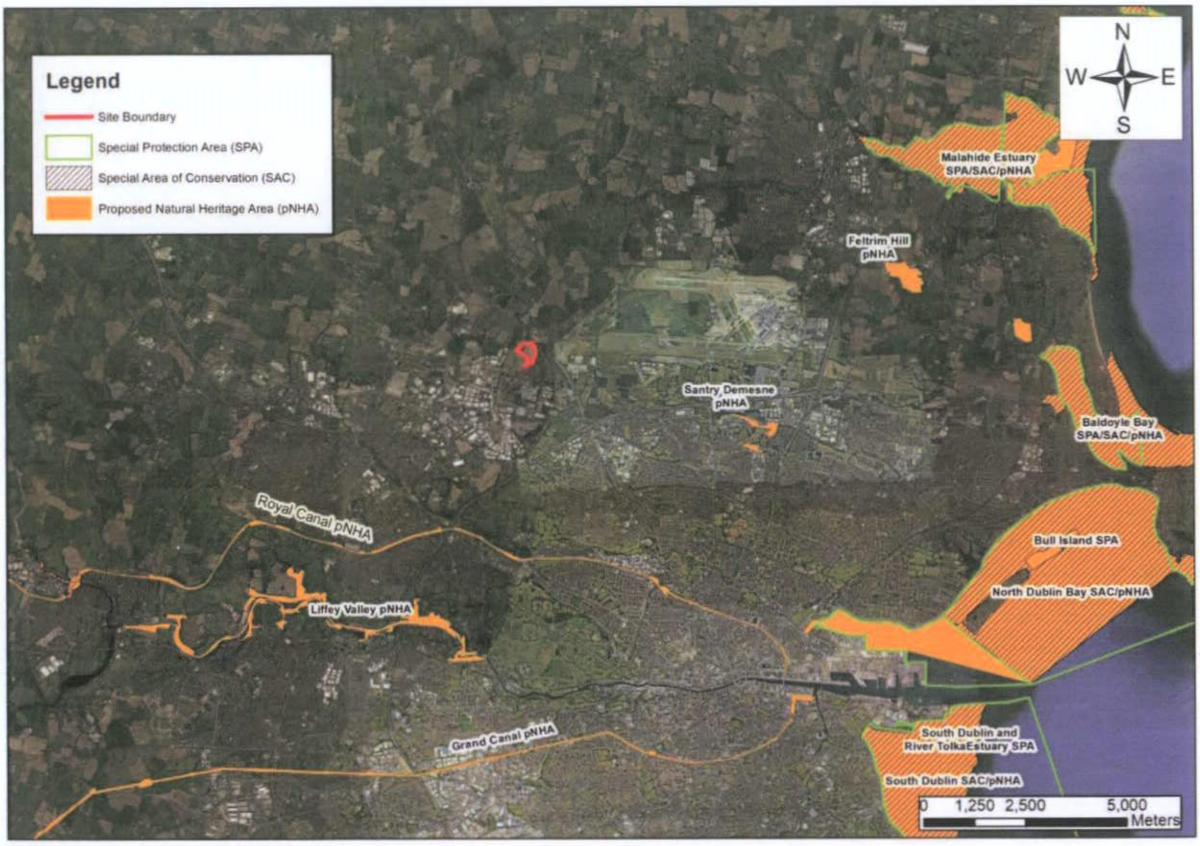

Figure 8.3 Natura Sites in the Context of the Subject Site (Source: NPWS, 2022)

8.3.6 RATING OF IMPORTANCE OF HYDROLOGICAL ATTRIBUTES

at this site is rated as 'Low importance' based on the assessment that the attribute has a low quality significance or value on a local scale.

Although there would be an indirect hydrological connection or pathway between the site and Malahide Estuary protected sites (SAC, SPA, NHA), this is considered to be of negligible significance due to the lack of surface water drainage at or adjacent to the site and the significant distance from the site (5 km).

8.4 PREDICTED IMPACTS

8.4.1 CONSTRUCTION PHASE

An analysis of the potential impacts of the proposed development on the hydrological environment during the construction and operation phases is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water the following impacts discussed will be considered applicable to both Chapter 7 and 8 of the EIAR. Mitigation measures included in the design of this project to address these potential impacts are presented in Section 8.5 below.

It should be noted that no impacts are expected on Malahide Estuary SAC/SPA. Given the potential loading and the distance from source to the Natura site (c. 9.8 Km), this risk would be imperceptible as any accidental discharge of potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]).

8.4.1.1 Increased Sediments Loading in Run-off

Surface water runoff during the construction phase may contain increased silt levels or become polluted from construction activities. Runoff containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads.

During the construction phase at this site there is potential for an increase in run-off due to the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage. Site investigations classified the subsoils as 'inert' (refer to Chapter 7).

The local drainage ultimately flows towards the Huntstown Stream.

In the absence of mitigation, the effect on the local and regional hydrological environment is likely to be ***short-term, moderate*** and ***negative***. The effect is considered to be 'moderate' due to the lack of evidence of contamination observed in the subsoils during the ground investigations carried out by Waterman Moylan in 2021 (refer to Chapter 7 for further details); therefore it is not expected to be a significant effect on local or regional hydrology.

8.4.1.2 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 short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer. The potential main contaminants include:

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.

Machinery activities on site during the construction phase may result in contamination of runoff/surface water. Potential impacts could arise from accidental spillage of fuels, oils, paints etc.

which could impact surface water if allowed to infiltrate to runoff to surface water systems and/or receiving watercourses. However, implementation of the mitigation measures detailed below will ensure that this does not occur.

Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora. However, employment of the mitigation measures highlighted below will ensure that any impact will be mitigated.

In the absence of mitigation, the effect on the local and regional hydrological environment is likely to be ***short-term, significant*** and ***negative***. It is considered significant due to the potential for accidental leakage to affect the receiving waters (Huntstown Stream and River Ward) and degrade the current water body status (chemically, ecological and quantity) or its potential to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

8.4.2 OPERATION PHASE

8.4.2.1 Direct or Indirect Discharges

Surface water drainage will discharge directly into an existing ditch network which ultimately outfalls into the Huntstown Stream. The surface water network has been designed to provide sufficient capacity to contain and convey all surface water runoff associated with the 1 in 100 year event to the attenuation basins without any overland flooding including an additional allowance of 20% in rainfall intensities due to climate change. Discharge flow will be restricted to the greenfield equivalent runoff for the catchment area.

The development will be fully serviced with separate foul and stormwater sewers which will have adequate capacity for the facility and discharge limits as required by Irish Water licencing requirements. Discharge from the site to the public foul sewer will be sewage and grey water only due to the nature of the proposed development. The foul discharge from the site will join the public sewer and will be treated at the Irish Water Ringsend Wastewater Treatment Plant (WWTP) prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence and meet environmental legislative requirements as set out its licence.

In the absence of mitigation, the effect on the hydrological environment is likely to be ***long-term, imperceptible*** and ***neutral***. The effect is considered to be 'imperceptible' because there will not be intervention on the hydrological regime on a local or regional scale due to the aforementioned design measures included in the surface water and foul water drainage.

8.4.2.2 Accidental Spill and Leaks

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 6246 m^3.

Any accidental emissions of oil, petrol or diesel could cause contamination if the emissions enter the water environment unmitigated. However, any accidental discharge will be mitigated through petrol interceptors.

In the event of an accidental leakage of transformer oil or a spill from the emergency generator, this will be intercepted by the drainage infrastructure; drainage from the generator yard passes through petrol interceptor prior to connection to the onsite drainage networks.

In the absence of mitigation, the effect on the hydrological environment is likely to be ***long-term, imperceptible*** and ***neutral***. The effect is considered to be 'imperceptible' because there will not be intervention on the hydrological regime on a local or regional scale due to the aforementioned design measures.

8.4.3 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 hydrological environment in terms of hydrological environment.

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 be mitigated by requiring developers to maintain green field runoff rates as a result there would be no overall change to flooding but the trend in change of land use will result in local changes to recharge and hydrological flow patterns.

The temporal evolution of the current baseline in terms of water and hydrological environment involves climate change and its effects on the quantity or quality of the surface water. This can potentially affect the surrounding projected flooding.

8.5 MITIGATION AND MONITORING MEASURES

The design has taken account of the potential impacts of the development on the hydrology 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 hydrology.

The site is drained by a local network which is composed of ditches bordering the site. This network ultimately flows in a northerly direction towards the Huntstown Stream, which in turn joins the Ward River. The Ward River flows towards Malahide Estuary, a Natura Site (SPA/SAC/pNHA) located c. 9.8 km to the northeast of the site after joining the Broadmeadow River.

Thus, the site would have an indirect hydrological connection with the Malahide Estuary through the local drainage network, the Huntstown Stream and the Ward River.

As stated above, no impacts are expected on Malahide Estuary SAC/SPA, given the potential loading, tenuous hydrological connectivity and the distance from source to the Natura site. The potential risk is considered to be imperceptible as potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]).

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.

8.5.1 CONSTRUCTION PHASE

8.5.1.1 Construction Environmental Management Plan

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP 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 CEMP 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.

8.5.1.2 Surface Water Run-Off

As there is potential for run-off to enter current stormwater systems and indirectly discharge to a watercourse, mitigations will be put in place to manage run-off during the construction phase.

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, attenuation, settlement measures (silt or sediment traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors.

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 drainage ditch network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the drainage ditches. 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 drainage ditch. 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.

Run-off water containing silt will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds).

The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.

Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from drainage ditches and constructed surface water drains will be maintained.

8.5.1.3 Fuel and 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 should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

8.5.1.4 Soil Removal and Compaction

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (see Surface Water Run-off section above). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants 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 segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Site investigations carried out at the site in 2021 (Refer to Chapter 6) found no residual contamination on site. Nonetheless, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants 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 segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

8.5.1.5 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 (once constructed) 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 of 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.

8.5.2 OPERATIONAL PHASE

8.5.2.1 Oil System

The curbed unloading area is designed to contain leaks from the tanker truck and unloading station during tank fill operations and unloading station maintenance activities. The curbed 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. This together with hardstand cover and permeable paving will minimise the potential for any impact to the hydrological environment.

8.5.2.2 Emergency Response Procedures

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.

8.5.2.3 Environmental Procedures

During operation the site will operate in compliance with the requirements of an Irish Water (IW) licence for discharge to sewer. The following containment measures are included within the design to reduce potential for environmental impact. There will be comprehensive emergency response procedures and standard operating procedures to respond to chemical spillage all types. 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 as outlined in the Emergency Response Plan.

8.5.2.4 Spill Kit Facilities

The provision of spill kit facilities and training of site operatives in use of same; should be undertaken at the operational stage in line with the Emergency Response Plan in order to manage any leaks from fuel storage and vehicles resulting in surface water quality impacts.

8.5.2.5 Storm Water & Foul Sewer Drainage

The proposed development will provide full attenuation for increase in hardstand area in compliance with the requirements of the Greater Dublin Strategic Drainage Study. A number of measures will be put in place to minimise the likelihood of any spills entering the water environment to include the design of the car park, fitting of refuelling areas with hydrocarbon interceptors and on-site speed restrictions. Refer to the Engineering Assessment Report for further details (Waterman Moylan, 2022).

It is proposed to ultimately discharge surface water from the proposed development, post attenuation and outflow restrictions into the existing local drainage.

Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

8.6 RESIDUAL IMPACTS

8.6.1 Construction Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the hydrological 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 8) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

8.6.2 Operational Phase

The implementation of mitigation measures highlighted above will ensure that the predicted impacts on the hydrological 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 8) for rating the magnitude and significance of impacts on the hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

8.7 CUMULATIVE IMPACT 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 Hydrology. This considers the proposed development and other surrounding proposed and permitted developments considered in Chapter 4.

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 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 hydrological 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 hydrological 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 hydrological 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 hydrological 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 hydrological 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 hydrological environment.

The remainder of the planning permissions identified in the planning history section of the Planning Report which forms part of this planning application have no potential for cumulative effects with the proposed development in terms of the hydrological 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 hydrological 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 hydrological environment.

8.7.1 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 both the Proposed Development and FW21A/0151, FW21A/0144 will be contractually required to operate in compliance with their PCEMPs which include the mitigation measures outlined in their respective EIA reports. The remaining developments (FW19A/0015, FW18A/0082, the AGI installation and the GIS installation) will also be contractually obliged to operate in compliance with a PCEMP which will be required by law to incorporate measures to protect surface water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019 amendments).

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 surface water quality or the natural hydrological regime.

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

8.7.2 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 hydrological 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 surface water quality or the natural hydrological regime 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. 272 of 2009 and S.I. 77 of 2019. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Surface Waterbody Status.

The cumulative impact during the operational phase is considered to be ***neutral*** and ***imperceptible***.

8.8 INTERACTIONS

Due to the inter-relationship between land, soils , geology, hydrogeology and hydrology, - there is a strong overlap between the assessed impacts and mitigation measures in both chapters.

9 AIR QUALITY & CLIMATE

9.1 INTRODUCTION/METHODOLOGY

9.1.1 CRITERIA FOR RATING OF IMPACTS

9.1.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 9.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which give effect to European Commission Directive 2008/50/EC which has set limit values for the pollutants NO2, PM10, and PM2.5 relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and also includes ambient limit values relating to PM2.5.

Table 9.1 Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation (Note 1)	Limit Type	Value
Nitrogen Dioxide (NO2)			
	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m3
	2008/50/EC	Annual limit for protection of human health	40 µg/m3
Nitrogen Oxides (NO + NO2)			
	2008/50/EC	Critical limit for the protection of vegetation and natural ecosystems	30 µg/m3
Particulate Matter (as PM10)			
	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m3
	2008/50/EC	Annual limit for protection of human health	40 µg/m3
Particulate Matter (as PM2.5)	2008/50/EC	Annual limit for protection of human health	25 µg/m3
Dust Deposition	TA Luft (German VDI 2002)	Annual average limit for nuisance dust	350 mg/m2/day
Carbon Monoxide (CO)	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m3

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

9.1.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards outlined in the previous section have set ambient air quality limit values for PM10 and PM2.5.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction and decommissioning phases of a development in Ireland.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust)(5) sets a maximum permissible emission level for dust deposition of 350 mg/m2/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled '*Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals*)' (6). The document recommends that the Bergerhoff limit of 350 mg/m2/day be applied to the site boundary of quarries. This limit value shall be implemented with regard to dust impacts from construction of the Proposed Development.

9.1.1.3 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for PM2.5. In relation to Ireland, 2020 emission targets are 25 kt for SO2 (65% below 2005 levels), 65 kt for NOX (49% reduction), 43 kt for volatile organic carbons (VOCs) (25% reduction), 108 kt for ammonia (NH3) (1% reduction) and 10 kt for PM2.5 (18% reduction).

European Commission Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National EPA Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005. The data available from the EPA in 2021 indicated that Ireland complied with the emissions ceiling for SO2 in recent years but failed to comply with the ceilings for NH3, NOX and non-methane volatile organic carbons (NMVOCs). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and methane (CH4). In relation to Ireland, 2020-29 emission targets are 25 kt for SO2 (65% on 2005 levels), 65 kt for NOX (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH3 (1% reduction on 2005 levels) and 10 kt for PM2.5 (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 10.9 kt (85% below 2005 levels) for SO2, 40.7 kt (69% reduction) for NOX, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH3 and 11.2 kt (41% reduction) for PM2.5

9.1.1.4 Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013 (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to

2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

Following on from the recently published European Climate Law Regulation (EU) 2021/1119, and as part of the EU's "Fit for 55" legislative package where the EU has recently committed to a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 levels by 2020, the Effort Sharing Regulation is proposed to be strengthened with increased ambition by the year 2030. The proposal for Ireland is to increase the GHG emission reduction target from 30% to 42% relative to 2005 levels whilst the ETS market will also have more stringent reductions from the currently proposed reduction of 43% by 2030 compared to 2005 to a 61% reduction by 2030 based on annual reductions of 4.2% compared to the previous annual reduction level of 2.2% per year (EU, 2021). In terms of the current operation of the ETS, the European Commission reported that the ETS Carbon Market reported a fall of 9% in emissions in 2019 relative to 2018 levels.

The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing, heavy industry and facilities which have greater than 20MW thermal input capacity (which is applicable to the Kilshane facility). Under the ETS scheme, there are no country-specific targets. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture. In contrast to the ETS scheme, Ireland has a country-specific obligation under the Regulation of a 42% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015)(7) was enacted (the 2015 Act). The purpose of the Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (3.(1) of No. 46 of 2015). This is referred to in the Act as the 'national transition objective'.

The Climate Action Plan (CAP)[(8)] , published in June 2019, outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlines the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The CAP also details the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The CAP has set a built environment sector reduction target of 40 - 45% relative to 2030 pre-NDP (National Development Plan) projections.

In June 2020, the Government published the Programme for Government – Our Shared Future[(9)] . In relation to climate, there is a commitment to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (51% reduction over the decade) with an ultimate aim to achieve net zero emissions by 2050. Policy changes include the acceleration of the electrification of the transport system, including electric bikes, electric vehicles and electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030. In addition, there is a policy to ensure an unprecedented model shift in all areas by a reorientation of investment to walking, cycling and public transport.

Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) was published in July 2021. The purpose of the 2021 Climate Act is to provide for the approval of plans 'for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'. The 2021 Climate Act will also 'provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority. The Act has set a target of a 51% reduction in the total amount of greenhouse gases over the course of the first two carbon periods ending 31 December 2030 relative to 2018 annual emissions. The 2021 Climate Act defines the carbon budget as 'the total amount of greenhouse gas emissions that are permitted during the budget period'.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) outlines a series of specific actions including:

- To make a strategy to be known as the 'National Long Term Climate Strategy' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer-term perspective of at least 30 years;
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035;
- To introduce a requirement for Government to adopt "sectoral emission ceilings" for each relevant sector within the limits of each carbon budget;
- To request all local authorities to prepare climate action plans for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt;
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies;
- Requiring the Minister to set out a roadmap of actions to include sector specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis with progress including policies, mitigation measures and adaptation measures that have been adopted.

In terms of wider energy policy, as outlined in the EPA publication "Ireland's Greenhouse Gas Projections 2021-2040"[(10)] under the With Additional Measures scenario, emissions from the energy industries sector are projected to decrease by 48.9% to 4.5 Mt CO2eq over the period 2020 to 2030 including the proposed increase in renewable energy generation to approximately 80% of electricity consumption:

- In this scenario it is estimated that renewable energy generation increases to approximately 80% of electricity consumption. This is mainly a result of further expansion in wind energy (comprising 5.0 GW offshore). Expansion of other renewables (e.g. solar photovoltaics) also occurs under this scenario.
- Under the With Additional Measures, one power station operates to the end of 2023 with 30% co-firing.
- In this scenario the Moneypoint power station is assumed to operate in the market up to end 2025 at which point it no longer generates electricity from coal.
- In terms of inter-connection, it is assumed that the Greenlink 500MW interconnector to the UK to come on stream in 2025 and the Celtic 700MW interconnector to France to come on stream in 2027.

The 2021 Climate Action Plan (CAP)(12) provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021. The plan outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The CAP 2021 also detailed the required governance arrangements for implementation including carbon-proofing of policies and establishment of sectoral emission ceilings and carbon budgets. The CAP 2021 provides that emissions from industry sectors covered by the ETS are subject to EU-wide rather than national targets set out under EU Effort Sharing Decision. Box 2.1 states:

"Emissions from electricity generation and large industry in the ETS are subject to EU-wide targets which require that emissions from these sectors be reduced by 43% by 2030, relative to 2005 levels".

As part of the preparation of a 'local authority climate action plan', each local authority shall consult and co-operate with an adjoining local authority in making a local authority climate action plan and co-ordinate the mitigation measures and adaptation measures to be adopted, where appropriate. Each local authority is also required to consider any significant effects the implementation of the local authority climate action plan may have on the adjoining local authority.

Individual county councils in Ireland have also published their own Climate Change Strategies which outline the specific climate objectives for that local authority and associated actions to achieve the objectives. The Fingal County Council (FCC) Climate Action Plan(13) outlines FCC's goals to mitigate GHG emissions and plans to prepare for and adapt to climate change. The FCC Climate Action Plan highlights the risks that climate change poses to transportation network with risks mainly associated with extreme weather events and sea level rise. The FCC Climate Action Plan, in relation to energy and built environment, has a target of a 33% improvement in energy efficiency by 2020 and a 40% reduction in council's GHG emissions by 2030. Additional measures include an energy master plan for the Dublin region and upgrades in buildings using Energy Performance Contracts.

9.1.2 CONSTRUCTION PHASE METHODOLOGY

9.1.2.1 Air Quality

The current assessment focuses on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the Proposed Development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the Proposed Development.

The Institute of Air Quality Management in the UK (IAQM) guidelines(14) outline an assessment method for predicting the impact of dust emissions from demolition, earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely magnitude of the dust impacts in the absence of mitigation measures.

Construction phase traffic also has the potential to impact air quality and climate. The UK Highways Agency Design Manual for Roads and Bridges (DMRB) guidance(15) , states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. The use of the UK guidance is recommended by Transport Infrastructure Ireland (TII)(16) in the absence of specific Irish guidance, this approach is considered best practice and can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band; or
- A change in carriageway alignment by 5m or greater.

The construction stage traffic does not meet the above scoping criteria. Therefore, a detailed air quality modelling assessment has been scoped out as there is no potential for significant impacts to air quality during construction as a result of traffic emissions.

9.1.2.2 Climate

The impact of the construction phase of the Proposed Development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the Proposed Development.

9.1.3 OPERATIONAL PHASE METHODOLOGY

9.1.3.1 Air Quality

Air dispersion modelling was carried out by AWN Consulting Ltd. using the United States Environmental Protection Agency's regulated model AERMOD (Version 21112). AERMOD is recommended as an appropriate model for assessing the impact of air emissions from industrial facilities in the EPA Guidance document "Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)".

The modelling of air emissions from the site was carried out to assess the concentrations of nitrogen dioxide (NO_2) beyond the site boundary and the consequent impact on human health. The assessment was undertaken in order to quantify the impact of the Proposed Development and the existing baseline level of pollutants on ambient air quality concentrations.

To obtain all the meteorological information required for use in the model, data collected during 2017 – 2021 from the Met Éireann meteorological station at Dublin Airport has been incorporated into the modelling. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site and five full years of meteorological data. Using this input data, the model predicted ambient concentrations beyond the site boundary for each hour of the meteorological year. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC). The PEC was then compared with the relevant ambient air quality standard to assess the significance of the releases from the site.

Throughout this study a worst-case approach was taken. This will most likely lead to an over-estimation of the levels that will arise in practice. The worst-case assumptions are outlined below:

- Maximum predicted concentrations were reported in this study, even if no residential receptors were near the location of this maximum;
- Worst-case background concentrations were used to assess the baseline levels of substances released from the site;
- The effects of building downwash, due to on-site and any nearby off-site buildings, has been included in the model; and
- Worst-case operations for NO_2 emissions assumes all emission points were running continuously for a full year and emergency operations on backup liquid fuel would run for 100 hours per year.

AERMOD is a "new-generation" steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement of the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources. Details of the model are given in Appendix 9.1. Fundamentally, the model has made significant advances in simulating the dispersion process in the boundary layer. This will lead to a more accurate reflection of real-world processes and thus considerably enhance the reliability and accuracy of the model particularly under those scenarios which give rise to the highest ambient concentrations.

Due to the proximity to surrounding buildings, the PRIME Building Downwash Program (BPIP Prime) has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered.

The AERMOD model incorporated the following features:

- Three receptor grids were created at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. The receptor grids were based on Cartesian grids with the site at the centre. An outer grid extended to 10,000 m^2 with the site at the centre and with concentrations calculated at 200 m intervals. A middle grid extended to 3,000 m^2 with concentrations calculated at 100 m intervals. A smaller denser grid extended to1,00 m^2 from the site with concentrations calculated at 50 m intervals. Boundary receptor locations were also placed along the boundary of the site, at 25 m intervals, giving a total of 4,067 calculation points for the model. All receptors have been modelled at 1.5 m to represent breathing height;

- All on-site buildings and significant process structures were mapped into the computer to create a three-dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.;
- Detailed terrain has been mapped into the model using SRTM data with 90 m resolution. The site is located in gentle terrain. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP(17) ;
- Hourly-sequenced meteorological information has been used in the model covering the years 2017 – 2021 from the Met Éireann(18) meteorological station at Dublin Airport as shown in Figure 9.1. AERMOD incorporates a meteorological pre-processor AERMET which allows AERMOD to account for changes in the plume behaviour with height using information on the surface characteristics of the site. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convective boundary layer (CBL) height, stable boundary layer (SBL) height, and surface heat flux (see Appendix 9.2); and
- The source and emission data, including stack dimensions, gas volumes and emission temperatures have been incorporated into the model.

9.1.3.2 Terrain

The AERMOD air dispersion model has a terrain pre-processor AERMAP(17) which was used to map the physical environment in detail over the receptor grid. The digital terrain input data used in the AERMAP pre-processor was obtained from SRTM. This data was run to obtain for each receptor point the terrain height and the terrain height scale. The terrain height scale is used in AERMOD to calculate the critical dividing streamline height, Hcrit, for each receptor. The terrain height scale is derived from the Digital Elevation Model (DEM) files in AERMAP by computing the relief height of the DEM point relative to the height of the receptor and determining the slope. If the slope is less than 10%, the program goes to the next DEM point. If the slope is 10% or greater, the controlling hill height is updated if it is higher than the stored hill height.

In areas of complex terrain, AERMOD models the impact of terrain using the concept of the dividing streamline (Hc). As outlined in the AERMOD model formulation(19) a plume embedded in the flow below Hc tends to remain horizontal; it might go around the hill or impact on it. A plume above Hc will ride over the hill. Associated with this is a tendency for the plume to be depressed toward the terrain surface, for the flow to speed up, and for vertical turbulent intensities to increase.

AERMOD model formulation states that the model "captures the effect of flow above and below the dividing streamline by weighting the plume concentration associated with two possible extreme states of the boundary layer (horizontal plume and terrain-following). The relative weighting of the two states depends on: 1) the degree of atmospheric stability; 2) the wind speed; and 3) the plume height relative to terrain. In stable conditions, the horizontal plume "dominates" and is given greater weight while in neutral and unstable conditions, the plume traveling over the terrain is more heavily weighted".

9.1.3.3 Geophysical Considerations

AERMOD simulates the dispersion process using planetary boundary layer (PBL) scaling theory (USEPA, 2021). PBL depth and the dispersion of pollutants within this layer are influenced by specific surface characteristics such as surface roughness, albedo and the availability of surface moisture.

Surface roughness is a measure of the aerodynamic roughness of the surface and is related to the height of the roughness element. Albedo is a measure of the reflectivity of the surface whilst the Bowen ratio is a measure of the availability of surface moisture.

AERMOD incorporates a meteorological pre-processor AERMET(21) to enable the calculation of the appropriate parameters. The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and albedo and to a distance of 1km for surface roughness in line with USEPA recommendations(21) as outlined in Appendix 9.2.

In relation to AERMOD, detailed guidance for calculating the relevant surface parameters has been published. The most pertinent features are:

- The surface characteristics should be those of the meteorological site (Dublin Airport) rather than the installation;
- Surface roughness should use a default 1km radius upwind of the meteorological tower and should be based on an inverse-distance weighted geometric mean. If land use varies around the site, the land use should be sub-divided by sectors with a minimum sector size of 30°; and
- Bowen ratio and albedo should be based on a 10km grid. The Bowen ratio should be based on an un-weighted geometric mean. The albedo should be based on a simple un-weighted arithmetic mean.

AERMOD has an associated pre-processor, AERSURFACE which has representative values for these parameters depending on land use type. The AERSURFACE pre-processor currently only accepts NLCD92 land use data which covers the USA. Thus, manual input of surface parameters is necessary when modelling in Ireland. Ordnance survey discovery maps (1:50,000) and digital maps such as those provided by the EPA, National Parks and Wildlife Service (NPWS) and Google Earth® are useful in determining the relevant land use in the region of the meteorological station. The Alaska Department of Environmental Conservation has issued a guidance note for the manual calculation of geometric mean for surface roughness and Bowen ratio for use in AERMET. This approach has been applied to the current site with full details provided in Appendix 9.2.

9.1.3.4 Building Downwash

When modelling emissions from an industrial installation, stacks which are relatively short can be subjected to additional turbulence due to the presence of nearby buildings. Buildings are considered nearby if they are within five times the lesser of the building height or maximum projected building width (but not greater than 800m).

The USEPA has defined the "Good Engineering Practice" (GEP) stack height as the building height plus 1.5 times the lesser of the building height or maximum projected building width. It is generally considered unlikely that building downwash will occur when stacks are at or greater than GEP(23).

When stacks are less than this height, building downwash will tend to occur. As the wind approaches a building it is forced upwards and around the building leading to the formation of turbulent eddies. In the lee of the building these eddies will lead to downward mixing (reduced plume centreline and reduced plume rise) and the creation of a cavity zone (near wake) where re-circulation of the air can occur. Plumes released from short stacks may be entrained in this airflow leading to higher ground level concentrations than in the absence of the building.

The Plume Rise Model Enhancements (PRIME)(24)(25) plume rise and building downwash algorithms, which calculates the impact of buildings on plume rise and dispersion, have been incorporated into AERMOD. The building input processor BPIP-PRIME produces the parameters which are required in order to run PRIME. The model takes into account the position of each stack relative to each relevant building and the projected shape of each building for 36 wind directions (at 10° intervals). The model determines the change in plume centreline location with downwind distance based on the slope of the mean streamlines and coupled to a numerical plume rise model[24].

Given that most stacks onsite are less than 2.5 times the lesser of the building height or maximum projected building width, building downwash will need to be taken into account and the PRIME algorithm run prior to modelling with AERMOD. The dominant building may change as the wind direction changes for each of the 36 wind directions. The dominant building for each relevant stack will vary as a function of wind direction and relative building heights.

9.1.3.5 Climate

The impact of the operational phase of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating operational activities associated with the Proposed Development.

9.2 THE PROPOSED DEVELOPMENT

The Proposed Development is described in further detail in Chapter 4 (Project Description). The details of the construction and operation of the development in terms of air quality and climate are discussed below.

9.2.1 CONSTRUCTION PHASE

During the construction stage the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. Emissions from construction vehicles and machinery have the potential to impact climate.

9.2.2 OPERATIONAL PHASE

The information used in the dispersion model for the normal operations of the gas turbine and the emergency operations of the turbine running on liquid fuel is shown in Table 9.2. Information on the gas turbine to be used at the power generation facility was provided by the engine supplier. Information on the Huntstown Power Company Ltd and Energia Power Generation Ltd IE Licensed facilities in the area has been taken from their IE Licences (P0483-04 and P0777-02). For the purposes of this assessment all plants were assumed to be operating at full load continuously all year round.

Table 9.2 Process Emission Characteristics Used In The Air Modelling

Parameter	Emission Details					
Process	Normal operations (turbine running on natural gas)	Testing of turbine (liquid fuel mode)	Emergency operations (turbine running on liquid fuel for 100 hours per year)	E1 (Hunts-town Power)	E2 (Hunts-town Power)	E3 (Energia Power)
Stack Location (UTM Zone 29)	677422 E, 5922495 N	677422 E, 5922495 N	677422 E, 5922495 N	677732 E, 5921512 N	677747 E, 5921551 N	677736 E, 5921395 N
Height above Ground (m)	28	28	28	34.5	34.5	34.5
Exit Diameter (m)	6.7	6.7	6.7	7	7	7

Parameter	Emission Details					
Cross-sectional Area (m^2)	35.3	35.3	35.3	38.5	38.5	38.5
Temperature (K)	855.95	837.55	837.55	853.2	853.2	853.2
Max Volume Flow (Nm^3/hr)	2,348,699	2,470,228	2,470,228	2,250,000	2,250,000	2,800,000
Exit Velocity (m/sec actual)	43.5	43.2	43.2	36.3	36.3	45.0
NO_X Conc. (mg/Nm^3)	35	250	250	50	50	50
NO_X Mass Emission (g/s)	22.835	816.815	9.324	31.366	31.366	38.889
CO Conc. (mg/Nm^3)	40	24	24	n/a	n/a	n/a
CO Mass Emission (g/s)	26.097	51.178	0.584	n/a	n/a	n/a
SO_X Mass Emission (g/s)	n/a	0.38	0.004	n/a	n/a	n/a
PM Mass Emission (g/s)	n/a	6.63	0.076	n/a	n/a	n/a

9.3 THE RECEIVING ENVIRONMENT

9.3.1 METEOROLOGICAL DATA

The selection of the appropriate meteorological data has followed the guidance issued by the USEPA(20). A primary requirement is that the data used should have a data capture of greater than 90% for all parameters. Dublin Airport meteorological station, which is located approximately 1 km south of the site, collects data in the correct format and has a data collection of greater than 90%. Long-term hourly observations at Dublin Airport meteorological station provide an indication of the prevailing wind conditions for the region (see Figure 9.1 and Appendix 9.2)(18). Results indicate that the prevailing wind direction is westerly to south-westerly in direction over the period 2017 - 2021. The mean wind speed was approximately 5.3 m/s over the period 1981 - 2010. Calm conditions account for only a small fraction of the time in any one year peaking at 70 hours in 2018 (0.8% of the time). There are also no missing hours over the period 2017 – 2021. All meteorological data used in this assessment is provided by Met Eireann(18).

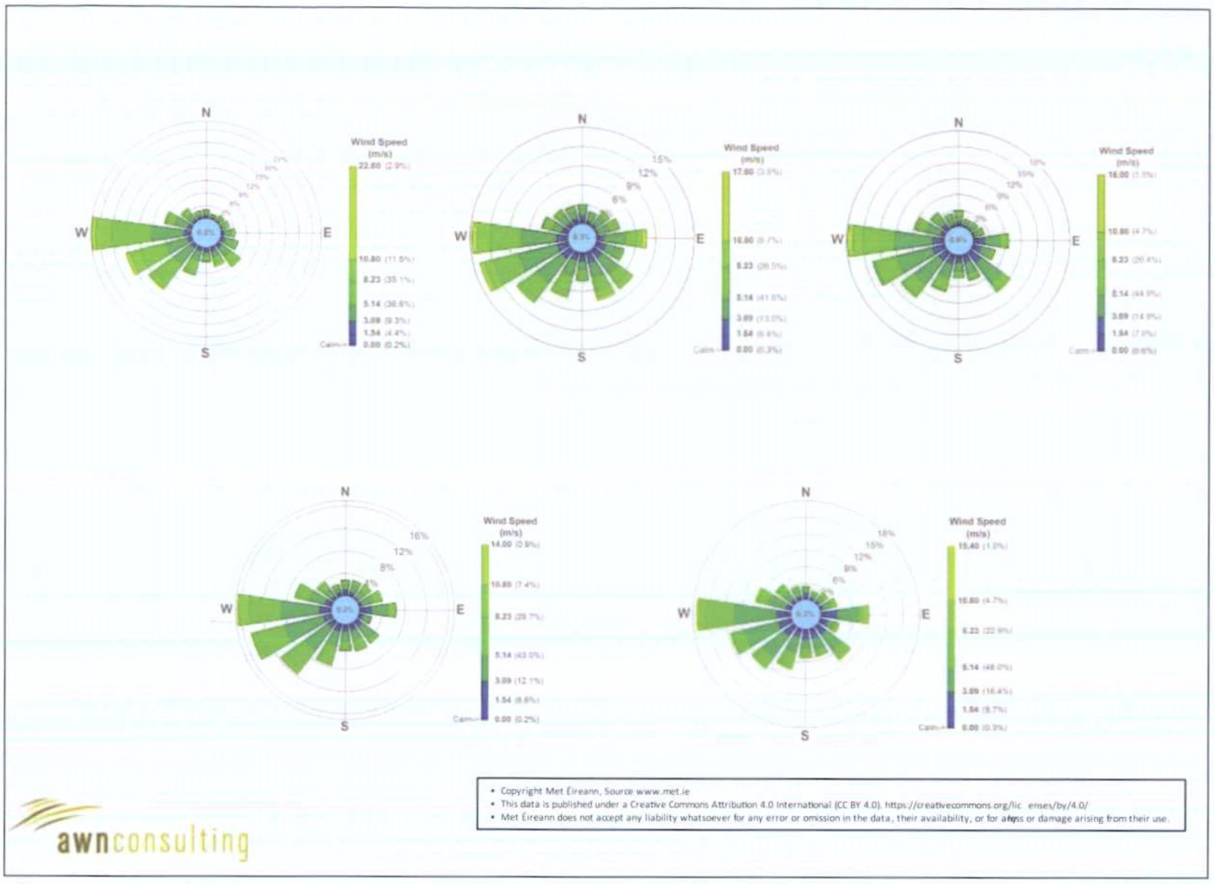

Figure 9.1 Dublin Airport Windrose 2017 – 2021

9.3.2 BASELINE AIR QUALITY

Air quality monitoring programmes have been undertaken in recent years by the EPA and Local Authorities(27). The most recent annual report on air quality "*Air Quality in Ireland 2020*"(27), details the range and scope of monitoring undertaken throughout Ireland. As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes(27). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, Ballycoolin, Co. Dublin is categorised as Zone A(27).

In 2020 the EPA reported(27) that Ireland was compliant with EU legal limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA report details the effect that the Covid-19 restrictions had on stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have not been included in the baseline section.

9.3.2.1 NO_2

With regard to NO_2, continuous monitoring data from the EPA(27) at suburban Zone A background locations in Rathmines, Swords and Ballyfermot show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 15 - 22 µg/m^3 in 2019. Sufficient data is available for the station in Ballyfermot to observe long-term trends over the period 2015 – 2019(27), with annual average results ranging from 16 – 20 µg/m^3. Based on these results, an estimate of the current background NO_2 concentration in the region of the facility is 17 µg/m^3.

Table 9.3 Annual Mean and 99.8th Percentile 1-Hour NO_2 Concentrations In Zone A Locations (μg/m³)

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Ballyfermot	Annual Mean NO_2 (μg/m³)	16	17	17	17	20
	99.8th%ile 1-hr NO_2 (μg/m³)	127	90	112	101	101
Rathmines	Annual Mean NO_2 (μg/m³)	18	20	17	20	22
	99.8th%ile 1-hr NO_2 (μg/m³)	105	88	86	87	102
Swords	Annual Mean NO_2 (μg/m³)	13	16	14	16	15
	99.8th%ile 1-hr NO_2 (μg/m³)	93	96	79	85	80

Note 1 Annual average limit value of 40 μg/m³ and hourly limit value of 200 μg/m³ (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011)

The Ozone Limiting Method (OLM) was used to model NO_2 concentrations. The OLM is a regulatory option in AERMOD which calculates ambient NO_2 concentrations by applying a background ozone concentration and an in-stack NO_2/NO_X ratio to predicted NO_X concentrations. An in-stack NO_2/NO_X ratio of 0.1 and a conservative ozone value of 54 μg/m³ was used in the assessment based on the maximum annual average levels recorded over a 5-year period (2015 – 2019) at EPA Zone A locations[27].

In relation to the annual average background, the ambient background concentration was added directly to the process concentration with the short-term peaks assumed to have an ambient background concentration of twice the annual mean background concentration.

9.3.2.2 PM_{10}

Continuous PM_{10} monitoring carried out at the suburban background locations of Ballyfermot, Dún Laoghaire, Rathmines and Tallaght showed annual mean concentrations ranging from 11–15 μg/m³ in 2019 (see Table 9.4), with at most 9 exceedances (in Rathmines) of the daily limit value of 50 μg/m³ (35 exceedances are permitted per year)[27]. Sufficient data is available for all stations to observe trends over the period 2015 – 2019. Average annual mean PM_{10} concentrations ranged from 9– 16 μg/m³ over the period of 2015–2019, suggesting an upper average concentration of no more than 12.9 μg/m³. PM_{10} results from the urban background location in the Phoenix Park show similarly low levels over the period of 2015–2019 with concentrations ranging from 9 – 12 μg/m³. Based on these results, a conservative estimate of the background PM_{10} concentration in the region of the proposed development is 15 μg/m³.

Table 9.4 Annual Mean and 24-Hour Mean PM_{10} Concentrations In Zone A Locations (μg/m³)

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Ballyfermot	Annual Mean PM_{10} (μg/m³)	12	11	12	16	14
	24-hr Mean > 50 μg/m³ (days)	3	0	1	0	7
Dun Laoghaire	Annual Mean PM_{10} (μg/m³)	13	13	12	13	12
	24-hr Mean > 50 μg/m³ (days)	3	0	2	0	2
Phoenix Park	Annual Mean PM_{10} (μg/m³)	12	11	9	11	11
	24-hr Mean > 50 μg/m³ (days)	2	0	1	0	2
Rathmines	Annual Mean PM_{10} (μg/m³)	15	15	13	15	15
	24-hr Mean > 50 μg/m³ (days)	5	3	5	2	9

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Tallaght	Annual Mean PM_{10} (µg/m³)	14	14	12	15	12
	24-hr Mean > 50 µg/m³ (days)	4	0	2	1	3

Note 1 Annual average limit value of 40 µg/m³ and hourly limit value of 50 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011)

9.3.2.3 $PM_{2.5}$

Continuous $PM_{2.5}$ monitoring carried out at the Zone A location of Rathmines(27) showed an average concentration ranging from 9 – 10 µg/m³ over the 2017 – 2021 period, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.60 – 0.75. Based on this information, a conservative ratio of 0.75 was used to generate a background $PM_{2.5}$ concentration in the region of the development of 9 µg/m³.

9.3.2.4 CO

Continuous CO monitoring carried out at one Zone A location at Winetavern St in 2019(27) showed an annual mean concentration of 0.4 µg/m³. Long-term data for the period 2017 – 2021 for Winetavern St and Coleraine St shows that concentrations range from 0.1 – 0.4 µg/m³. Based on this EPA data, an estimate of the background PM_{10} concentration in the region of the facility is 0.5 µg/m³.

9.3.2.5 SO_2

Long-term SO_2 monitoring was carried out at the Zone A urban traffic location of Winetavern Street and the suburban background locations of Rathmines, Tallaght and Ringsend in 2019(27). The SO_2 annual average measured 1.5 µg/m³ in 2019. Long-term monitoring from 2015 – 2019 at Winetavern Street, Coleraine Street, Rathmines, Tallaght and Ringsend indicated annual averages ranging from 0.1 – 4.3 µg/m³ (see Table 9.5). Based on the above information a conservative estimate of the background SO_2 concentration in the region of the facility is 5 µg/m³. The average 99.7th%ile of 1-hour means for Winetavern Street, Rathmines, Tallaght and Ringsend in 2019 was 32 µg/m³ whilst the average 99.2th%ile of 24-hour means in 2019 was 6.9 µg/m³.

Table 9.5 Annual Mean, 99.7th Percentile 1-Hour and 99.2nd 24-Hour SO_2 Concentrations In Zone A Locations (µg/m³)

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Winetavern Street	Annual Mean SO_2 (µg/m³) Note 1	1.0	0.2	-	0.7	0.8
	99.7th%ile of 1-hour mean SO_2 (µg/m³) Note 2	20.0	10.2	5.8	21.0	37.2
	99.2th%ile of 24-hour mean SO_2 (µg/m³) Note 3	6.0	3.9	1.4	7.0	6.1
Coleraine Street	Annual Mean SO_2 (µg/m³)	0.3	0.6	0.1	-	-
	99.7th%ile of 1-hour mean SO_2 (µg/m³)	17.0	13.8	34.2	-	-
	99.2th%ile of 24-hour mean SO_2 (µg/m³)	7.0	4.0	9.2	-	-
Rathmines	Annual Mean SO_2 (µg/m³)	2.0	1.7	1.7	2.3	1.3
	99.7th%ile of 1-hour mean SO_2 (µg/m³)	27.0	26.6	29.5	25.0	29.3
	99.2th%ile of 24-hour mean SO_2 (µg/m³)	10.0	7.6	12.1	8.0	4.3

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Tallaght	Annual Mean SO_2 (µg/m^3)	3.0	2.4	2.2	2.2	2.5
	99.7th%ile of 1-hour mean SO_2 (µg/m^3)	30.0	20.7	47.6	22.0	18.6
	99.2th%ile of 24-hour mean SO_2 (µg/m^3)	17.0	10.0	16.0	9.0	10.4
Ringsend	Annual Mean SO_2 (µg/m^3)	-	-	4.3	3.3	1.4
	99.7th%ile of 1-hour mean SO_2 (µg/m^3)	-	-	50.0	51.0	42.8
	99.2th%ile of 24-hour mean SO_2 (µg/m^3)	-	-	14.0	20.0	6.9

Note 1 Annual average limit value of 20 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011)

Note 2 24 hour limit value of 125 µg/m^3 not to be exceeded more than 3 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011)

Note 3 Hourly limit value of 350 µg/m^3 not to be exceeded more than 24 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011)

When calculating the short-term peak results, concentrations due to emissions from stacks cannot be combined by directly adding the annual background level to the modelling results. Guidance from the UK DEFRA(26) and EPA(4) advises that for SO_2 an estimate of the maximum combined pollutant concentrations can be obtained as shown below:

SO_2 - The 99.2th%ile of total 24-hour SO_2 is equal to the maximum of either A or B below:

a) 99.2th%ile of 24-hour mean background SO_2 + (2 x annual mean process contribution SO_2)
b) 99.2th%ile 24-hour mean process contribution SO_2 + (2 x annual mean background contribution SO_2)

SO_2 - The 99.7th%ile of total 1-hour SO_2 is equal to the maximum of either A or B below:

a) 99.7th%ile hourly background SO_2 + (2 x annual mean process contribution SO_2)
b) 99.7th%ile hourly process contribution SO_2 + (2 x annual mean background contribution SO_2)

9.3.3 SENSITIVITY OF THE RECEIVING ENVIRONMENT

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*'(14)prior to assessing the impact of dust from a Proposed Development the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are between 1 and 10 residential properties within 20m of the Proposed Development site. These are considered high sensitivity receptors in terms of dust soiling. Therefore, the overall sensitivity of the area to dust soiling impacts is considered medium based on the IAQM criteria outlined in Table 9.6.

Table 9.6 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the Proposed Development 15 μg/m^3 and there are between 1 and 10 number of high sensitivity residential properties within 20 m of the proposed site area. Based on the IAQM criteria outlined in Table 9.7, the worst case sensitivity of the area to human health is considered to be low.

Table 9.7 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from source (m)			
			<20	<50	<100	<350
High	< 24 μg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24 μg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 μg/m^3	>1	Low	Low	Low	Low

Consideration has also been given to the IAQM document 'A guide to the assessment of air quality on designated conservation sites 2020'(28) with respect to ecologically sensitive receptors.

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases. Designated sites within 50m of the boundary of the site or within 50m of the route used by construction vehicles on public highways up to a distance of 500m from a construction site entrance can be affected according to the IAQM guidance(14). There are no ecologically sensitive sites within 50m of the site boundary, therefore no significant impacts are predicted.

9.3.4 CLIMATE BASELINE

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details final emissions up to 2019. The data published in 2021 states that Ireland has exceeded its 2019 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.85 Mt. For 2019, total national greenhouse gas emissions are 59.78 million tonnes carbon dioxide equivalent (Mt CO_2eq) with 45.58 MtCO_2eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met.

Agriculture is the largest contributor in 2019 at 35.3% of the total, with the transport sector accounting for 20.3% of emissions of CO_2.

GHG emissions for 2020 are estimated to be 9.7% lower than those recorded in 2019. Emission reductions have been recorded in 7 of the last 11 years. However, compliance with the annual EU targets has not been met for five years in a row. Emissions from 2016 – 2020 exceeded the annual EU targets by 0.29 $MtCO_2eq$, 2.94 $MtCO_2eq$, 5.57 $MtCO_2eq$, 6.98 $MtCO_2eq$ and 6.73 $MtCO_2eq$ respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2021 GHG Emissions Projections Report for 2020 – 2040(10) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan published in 2019. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 to 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2$MtCO_2eq$ under the "With Existing Measures" scenario and under the "With Additional Measures" scenario(10). The projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the 2019 Climate Action Plan and the use of the flexibilities available.

9.4 PREDICTED IMPACTS

9.4.1 DO NOTHING SCENARIO

Under the Do Nothing Scenario no construction works will take place and the identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. Impacts from increased traffic volumes and associated air emissions will also not occur.

The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments on the site and in the surrounding area, changes in road traffic, etc.).

9.4.2 CONSTRUCTION PHASE

9.4.2.1 Air Quality

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. Sensitive receptors include residential properties within 20 m of the site boundary on the L3120 Kilshane Road. A review of Dublin Airport meteorological data indicates that the prevailing wind direction is westerly to southerly and wind speeds are generally moderate in nature. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm(18). A review of historical 30 year average data for Dublin Airport indicates that on average 191 days per year have rainfall over 0.2 mm and therefore it can be determined that over 50% of the time dust generation will be reduced.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in