Environmental Impact Assessment Report

Planning Application to Wicklow County Council

Proposed Energy Centre at Avoca River Park Industrial Estate, Co. Wicklow.

Prepared by: AWN Consulting, August 2021

Prepared for: Crag Digital Avoca Limited

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Environmental Impact Assessment Report

Proposed Energy Centre at Avoca River Park Industrial Estate, Co. Wicklow.

Volume 1 – Non-Technical Summary

Prepared by: AWN Consulting, August 2021

Prepared for: Crag Digital Avoca Limited

NON-TECHNICAL SUMMARY

1.0 INTRODUCTION

This is the non-technical summary of an Environmental Impact Assessment (EIA) Report prepared by AWN Consulting (AWN) on behalf of Crag Digital Avoca Ltd (herein referred as 'the Applicant') to accompany a planning application to Wicklow Co. Co. (WCC) for planning permission for the provision of an energy centre development with battery compound along with associated and ancillary works on lands in the townlands of Shelton Abbey and Marsh. The location of the proposed development is shown in Figure 1.1.



Figure 1.2 Site Location Context

The site of the proposed Energy Centre development is part of the existing Avoca River Park Industrial Estate located within the Avoca River Valley c. 2.0km northwest of Arklow town. The proposed development site was part of the Irish Fertiliser Industries facility which closed in 2003 (Licence Register Number is P0031-02). The development footprint is 5.01 Ha.

Need for the development

The proposal is for up to 250 MW of gas fired generation, plus battery storage of 100 MW which complements the developments within and local to Avoca River Park:

- The Arklow Bank Wind Park Phase Two, capacity 520 MW, is due to start construction in 2023.
- Data Centres proposed for Avoca River Park with a demand in the order of 60 MW.

In summary, the purpose of this plant is to enable the transition of the electricity network to low carbon generation and it is located in an area where demand is froecast to increase significantly, therefore providing capacity where it is most needed. The development includes battery storage to provide instant capacity, to offset and balance the intermittency of renewables.

Requirement for an EIA

The requirement for EIA for certain types and scales of development is set out in the EIA Directives (2011/92/EU and 2014/52/EU), European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (the bulk of which came into operation in September 2018), the European Communities (Environmental Impact Assessment) Regulations 1989, as amended, the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001, as amended. This EIA Report is prepared in accordance with the 2011 EIA Directive (2011/92/EU), as amended by the 2014 EIA Directive.

The project proposed is not listed under Annex I of the EIA Directive and it is below the relevant threshold as set out in the Planning and Development Regulations 2001-2019 for Annex II projects. The threshold for "*industrial estate development projects, where the area would exceed 15 hectares"* as set out in Part 2 of Schedule 5 of the Regulations was considered to be most relevant threshold in the context of the proposed development in the subject location.

Regulatory Control

The Energy Centre component of the proposed development will require an Industrial Emissions Directive (IED) licence from the Environmental Protection Agency (EPA) prior to commencement of operation. In addition, a Greenhouse Gas (GHC) permit will be required for operation.

Additional Reports

The planning application includes the following reports which have been considered within the EIAR.

- **Appropriate Assessment Screening Report** - A screening report has been completed for the Proposed development, as required under the Habitats and Birds Directive (92/43/EEC and 79/409/EEC) by Moore Group. This is included as Appendix 7.1.

- **Flood Risk Assessment** - A Site Specific Flood Risk Assessment has been undertaken for the site by DBFL and is provided with the planning documentation.

- **Construction Environmental Management Plan (CEMP)** – A CEMP has been prepared by DBFL and is provided with the planning documentation.

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The subject site is located within the Avoca River Park Industrial Estate lands, approximately 2km northwest of Arklow, Co. Wicklow. The site is bound by the Avoca River Park Industrial Estate's private access road along its northern boundary and a gravel track and a drainage ditch along its southern boundary. A drainage ditch runs partly along the eastern boundary also. Both drainage ditches drain to the Avoca river which flows further south of the site. The Avoca river flows eastwards and into the sea at Arklow c 3.5 km to the east of the subject site. Beyond the river is the main Dublin-Rosslare railway line, which runs parallel to the river before branching southwards towards the town centre

of Arklow. The built up area of Arklow town is c. 1km from the subject site as the crow flies. The site is located within the townland of Shelton Abbey and Marsh.

Immediately to the east and west the industrial estate is bound by greenfield, undeveloped lands. Beyond an area of grassland to the west lies Shelton Abbey, a prison which is operated by the Irish Prison Service. The main building of the prison complex is a protected structure.

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased active operations in 2003), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phophogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring (see chapter 5 Land Soils and Hydrogeology). The design incorporates import of additional fill material which complements the requirements for flood protection and landfill capping. Foundations within the landfill area will be undertaken in compliance with EPA licence requirements for rehabilitation of the landfill.

Proposed Development Description

The proposed development will comprise:

- All site clearance and enabling works required to facilitate the development.
- Construction of 2 no. energy centre buildings (Energy Centre 1 and Energy Centre 2) each with a height to parapet level of c. 13.85 metres.
- Energy Centre 1 will comprise a gross floor area (GFA) of 5,965 sq.m within a single storey building and will accommodate 12 no. generators. 4 no. flues 33 metres in height will be accommodated along the south-western elevation of the building.
- Energy Centre 2 will comprise a GFA of 9,180 sq.m within a single storey building and will accommodate 18 no. generators. 6 no. flues 33 metres in height will be accommodated along the south-western elevation of the building.
- Construction of a battery compound to provide electricity storage and backup power, located to the northeast of Energy Centre 2, to comprise 27 no. battery arrays within a compound area of c. 0.7 hectares. A single storey MV switchroom building will be provided to the west of the battery compound.
- Provision of a transformer compound (to the northwest of Energy Centre 1), along with a welfare building (38 sq.m GFA).
- Provision of fuel storage tanks (2 no.) within a bunded compound to the north of Energy Centre 2.
- Construction of a new access from the existing estate access road to the north of the site, internal road network and circulation areas, footpaths, provision of 6 no. car parking spaces and 4 no. cycle parking spaces.
- Landscaping and planting, boundary treatments, lighting, security fencing, and all associated ancillary and site works including underground foul and storm water drainage network (including on-site wastewater treatment system), and utility cables.

The energy centre comprises two buildings namly, Phase 1 which is capable of providing 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel replacement liquid fuel. The area allocated for Battery Storage Equipment will contain a

modular array of containers plus electrical infrastructure to connect into the generation system in the range 100 MW to 200 MW output with containerised LiIon battery arrays to provide up to 4 hours of duration. The battery equipment will be used in conjunction with the generation equipment to optimise the operational profile and provide no-break power.

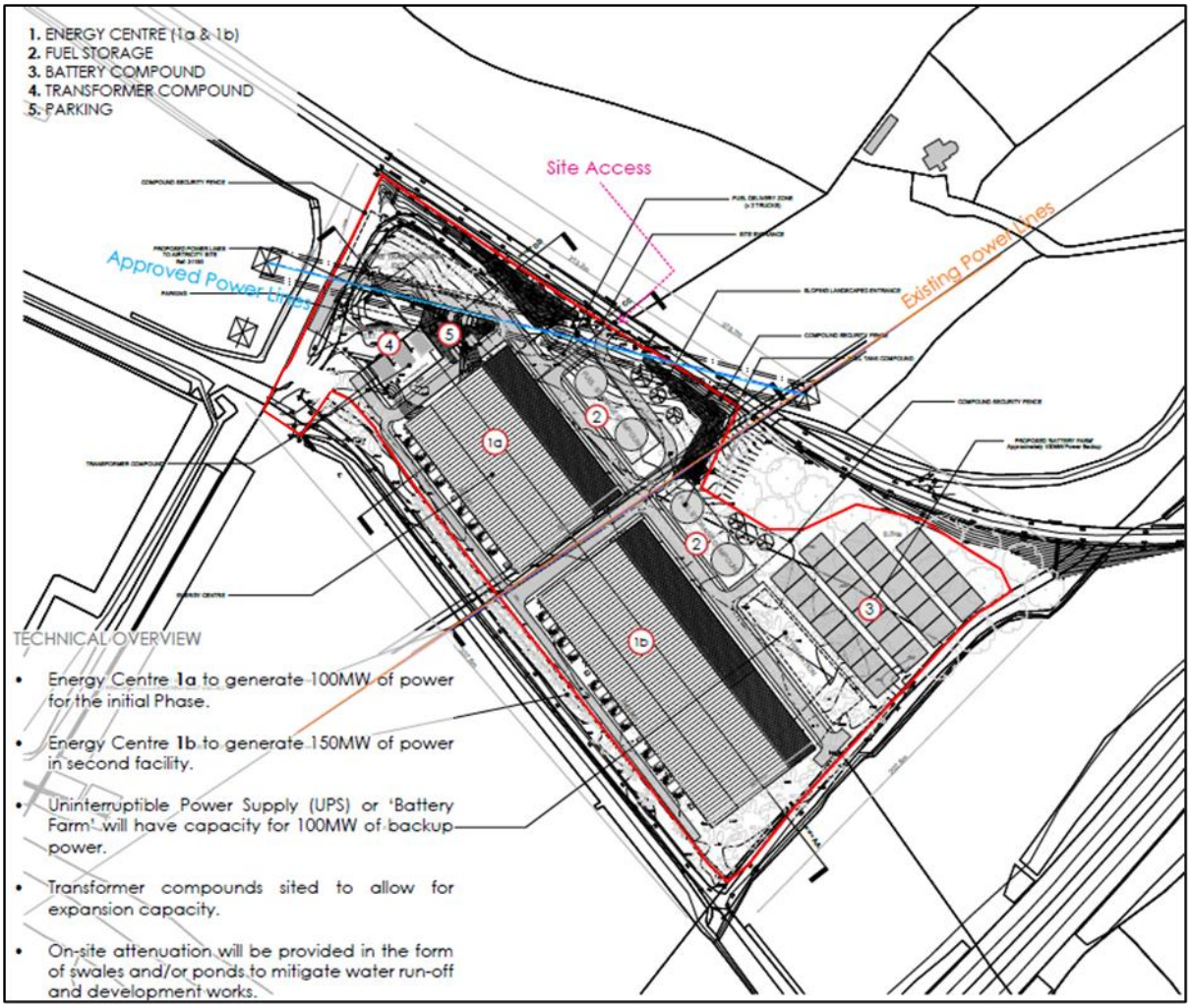


Figure 1.2 Layout outlined in red (Drawing P21-126K-02-00-XXX-DR-RAU-AR-1100) Red line = site boundary;

Description of Construction

Staffing and construction schedule

The planned construction schedule for the proposed and approved developments are shown in Table 2.1 below. The proposed schedules are subject to planning approval and assume a worst case scenario with construction on all three developments overlapping.

Development	**Proposed Energy Plant**	**Data Centre Development**	**Substation Development**
Application for Planning	August 2021	Approved	Jan 2021 (awaiting planning decision
Commencement of construction	Q3 2022	Q4 2021	Q3 2021
Completion of construction Commissioning	Q4 2023 2023-32	Q4 2023	Q4 2021

Peak no of construction staff	250	450	30

A ten year permission is sought for the proposed development. The rationale for the ten year permission duration primarily relates to the scale of the proposed development, the need to provide adequate time for the delivery of a gas connection to the subject site (subject to a separate planning application and connection process with Gas Networks Ireland), the necessary timeline for construction, commissioning, testing, and completion of the proposed energy centre development.

Working Hours
It is anticipated that the construction will be completed during normal construction hours i.e. 7am to 6 pm Monday to Friday with a half day working on Saturday (8am -1pm).

Site Preparation & Demolition Works

A temporary construction compound will be set up at commencement to facilitate office, portable sanitary facilities, equipment storage, parking etc. for contractors. No demolition or site clearance works are required. All remedial land works will be completed prior to commencement of construction of the energy centre.

Foundations and Structure
The contractor will be required to install the drainage, roads and foundations to minimise any potential impact on the underlying landfill. All ground works will be undertaken following preparation of a specification with the environmental engineer and following approval that works are in compliance with any licence conditions.

Levelling/Cut and Fill

As outlined in the site specific flood risk assessment, the land will be built up such that:
All proposed roads will be set above the 0.1%AEP fluvial flood level (3.20m AOD) including an appropriate freeboard:3.20m AOD +0.50m freeboard = 3.70m AOD. All proposed highly vulnerable development will be set above the 0.1% AEP fluvial flood level (4.10m AOD) including and appropriate freeboard: 4.10m AOD +0.50m freeboard = 4.60m AOD.

The cut and fill will be as follows:
- Topsoil (removal off site with partial storage for replacement) ~6,000 cubic metres
- Engineered stone fill material (import) ~42,000 cubic metres
- Engineering Materials (Bound and Unbound Sub-Base/Concrete/Asphalt) ~ 30,000 cubic meters.
- Pile arisings, if piles are required ~9,000 cubic metres. (This volume will be replaced by concrete).

Building Envelopes and Finishes
The articulation of the facade will be enhanced by expressing the horizontality and linear lines of the building's mass. By accentuating the long nature of the mass, the horizontal lines reduce in perspective and allow a continuous legibility of the facade.

The massing is further reduced by a louvered façade around the plant areas which will also conceal the external mechanical components of the buildings while allowing the required air flow and circulation around inlets. The colour tone of the horizontal metal louvres will compliment the cladding panels.

The metal cladding will be a Kingspan metal panel façade system from the Spectrum Range of colours.

Each of the relevant EIA Report chapters (Chapters 4-14) includes an assessment of the potential impact of construction works on their individual environmental aspect and set out the relevant mitigation measures relating to that aspects.

A Construction Environmental Management Plan (CEMP) has been prepared for the proposed development, and this will be put in place by contractors to minimise the impact of all aspects of the construction works on the local environment. The CEMP includes emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. A copy of the CEMP is included with planning application documents.

Description of Operation

Once operational the Energy centre will "go live". Staff are primarily required onsite for security, ongoing monitoring and maintenance of electrical equipment. The development will be required to operate in compliance with the EPA IED licence required for operation of the facility.

Each of the relevant EIA Report chapters (Chapters 4-14) includes an assessment of the potential impact of operational works on their individual environmental aspect and set out the relevant mitigation measures relating to that aspects.

It is proposed that c.7 staff will be onsite during the day shift. During the night shift c.2 staff will be located in the energy centre. The facility will operate on 2 no. 12-hour shift basis (7am to 7pm, 7pm to 7am). Working hours are expected to be 24 hours a day, 7 days a week. Traffic relating to staff movements have been assessed as part of the traffic and transportation chapter of this EIA Report (Chapter 13).

Fuel oil (for backup / emergency use only) will be delivered to the site by HGV road tankers, with a maximum of 3 tankers expected to be travelling to and from the site per month. A dedicated tanker unloading area will be provided which will be surrounded by a drainage channel to capture any run-off. A class 1 oil-water full retention separator will be installed to capture any oil in the run-off from the pad. A standard operating procedure for fuel unloading will be in place at the site and tanks will be fitted with high level alarms to prevent overfilling.

Emissions to air as a result of operation of the dual fuel engines (which will be operated on gas except for in emergency / backup situations) has been modelled (Chapter 8). SCR abatement and a stack heights of 33m has been incorporated in the design to mitigate air quality emissions. Noise modelling has been undertaken (Chapter 9) in relation to building services plant for general site operation and mitigation measures including noise and vibration control measures to ensure that emissions from building services plant do not exceed the relevant criteria at nearby noise sensitive locations.

"Do Nothing" Scenario & Cumulative Impacts

The "Do Nothing" scenario and cumulative impact of the proposed development with the permited and concurrent datastorage development and substation within the overall landholding have been considered in each chapter.

3.0 PLANNING AND DEVELOPMENT CONTEXT AND ALTERNATIVES

The relevant local planning policy with which the proposed development complies is Wicklow Co Co. The proposed development is in accordance with the policies and objectives of Wicklow County Development Plan 2016-2022, and Arklow Town and Environs Local Area Plan 2018 – 2024.

The land is zoned as '*E1 Employment'* in the Arklow and Environs Local Area Plan (Arklow LAP) 2018 – 2024.

A list of all relevant current applications are presented (Table 3.3). The subject lands overlap partially with the sites of one current electricity transmission applications to An Bord Pleanála under section 182 of the Planning and Development Act (ABP Ref: 310090-21). There is also one granted permission (*ABP Ref.: 309252-21*) for a substation development further to the west. Previous permissions exists for a Gas Powered Peaking plant within the immediate vicinity of the proposed development at Avoca River Park in 2008 and extension of period in 2013 (WCC Reg.ref:08/426 and *ABP Ref.:138382).* In March 2021, a final grant of permission was issued by Wicklow County Council for a revised layout for a data storage facility development on the lands to the west and southwest of the current application site (*Reg. Ref.: 201285).*

The proposed development is required at this location as it complements the developments local to Avoca River Park i.e. The Arklow Bank Wind Park Phase Two and the adjacent permitted data centre Development. Chapter 3, Figure 3.4 presents the two locations considered for the proposed power generation facility at Avoca.

Proposed location 1 is the site area chosen for the development. Proposed location 2 was not chosen primarily as it did not have adequate space for both phases of the power generation facility and the battery store. In addition, location 2 was considered to have a more significant landscape impact in terms of proximity to the Shelton Abbey site. With mitigation in place there are no significant variations in terms of other environmental aspects i.e. air, noise, soils, geology water, traffic or archaeology.

As the proposed development will provide power to the broader network, it is limited in the alternate processes that can be considered. To meet the requirements for a back up supply, the engines are designed for dual fuel (diesel and gas). In addition the proposed development includes a significant battery store to facilitate storage of power and trickle feed in off peak times. The design will meet with Eirgrid's strict specifications respectively to ensure they will be seamlessly absorbed into the national grid infrastructure and can provide a reliable power supply.

For each aspect of the environment, each specialist has considered the existing environment, likely impacts of the proposed development and reviewed feasible mitigation measures to identify the most suitable measures appropriate to the environmental setting of the proposed development. In making a decision on the most suitable mitigation measure the specialist has considered relevant guidance and legislation. In each case, a comparison of environmental effects was made, and the specialist has reviewed the possible mitigation measures available and considered the use of the mitigation in terms of the likely residual impact on the environment. The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction and offsetting (not required in this Proposed development). Mitigation measures have also been considered based on the effect on quality, duration of impact, probability and significance of effects. The selected mitigation measures are set out in each of the EIA Report Chapters.

Based on the assessment of reasonable alternatives (in relation to location, layout, design, technology, mitigation) relevant to the proposed development and its specific characteristics as set out in this chapter, the selected site is considered to be a suitable location for the proposed development from both an environmental perspective and a planning perspective.

4.0 HUMAN HEALTH AND POPULATION

This chapter has been prepared to assess the likely impacts associated with Human Health for the proposed development. In accordance with the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017), Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015), and European Commission (EC), Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017) this chapter has considered the "existence, activities and health of people" with respect to "topics which are manifested in the environment such as employment and housing areas, amenities, extended infrastructure or resource utilisation and associated emissions".

Issues examined in this chapter include demography, population, employment, social infrastructure, landscape, amenity and tourism, natural resources, air quality, noise and vibration, material assets, traffic and health and safety.

The site of the proposed energy centre is a brownfield and located in an industrial setting to the east of the main industrial estate. The estate currently comprises a timber processing facility, vehicle storage, and several warehouse / industrial / administration buildings including a plastic manufacturing facility.

The proposed development site is located in County Wicklow, and in the electoral district of Kilbride (ED 15055).

The potential for major accidents has been considered with reference to Seveso/Control of Major Accident Hazards (COMAH) Regulations. The proposed development will not be a Seveso/COMAH facility. There are substances stored on site controlled under Seveso/COMAH as there is diesel storage proposed for the operational phase. However, due to the low volume stored on site, the proposed development is classified as Level 1 type development which is permittable in terms of the land use planning guidelines. The proposed development is located within the 1,000 m Seveso consultation zone for the Sigma Aldrich Ireland Ltd Arklow facility.

The proposed development site zoned as is *'E1 – Employment'.* There will be a temporary, imperceptible, positive effect on local business as a result of the impact of construction workers using local facilities during the construction phase. During operation there is a temporary, imperceptible, positive effect in employment at the facility as a result of providing power for future development to proceed. The main potential negative impacts on human beings associated with the proposed development will be in relation to air quality, noise and visual effects during the construction stage. This is a short term impact. The long-term impact during operation is assessed as imperceptible/not significant i.e., in line with emerging trends for an industrial development area.

In terms of noise and air (dust) during the construction phase impacts on noise-sensitive locations are not expected to exceed the significance thresholds that have been set based on the existing environment and appropriate mitigation during

construction. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits and therefore the predicted impact is short-term, negative and imperceptible with respect to the construction phase and long-term, neutral and imperceptible with respect to the operational phase in terms of human health impacts. During operation, the plant will be required to operate in compliance with an EPA IED licence.

In relation to the operational phase of the proposed development, additional traffic on surrounding roads and truck deliveries and collections have been assessed. No likely significant impacts have been identified in the course of these assessments.

The nature of the proposed development, together with the low sensitivity receiving environment and the existing land use and land use zoning, is such that landscape and visual impacts are considered to be imperceptible and neutral. The predicted impact on local amenities and tourism with respect to human health will be neutral, negligible, and long-term.

The cumulative impact of the proposed development together with the permitted proposed and existing developments in the area have been assessed based on a thorough traffic survey of the affected road network, air and noise modelling and it has been determined to be imperceptible in the context of the existing environment.

5.0 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

This chapter of the EIA Report assesses and evaluates the potential impacts of the proposed development on the land, soils, geological and hydrogeological environment. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phophogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring. These works will be undertaken following approval of the EPA and prior to commencement of the proposed development.

The Groundwater Body (GWB) underlying the site is the Wicklow GWB. Currently, the most recent WFD groundwater status for this water body (2013-2018) is 'Good' with a current WFD risk score 'Under Review'. Overall, the groundwater quality results (collected as part of the former landfill rehabilitation works) indicate that there are long term decreasing trends in groundwater pollution in the site area.

The aquifer is a locally important (Lg) gravel aquifer over site and is used for public water supply in Arklow (Woodenbridge wellfield which, however, is located upgradient of the site). In addition, it hosts the Arklow Town Marsh pNHA, located 370 m downgradient of the subject site.

As outlined in Chapter 2 summary above, the contractor will be required to install the drainage, roads and foundations to minimise any potential impact on the underlying landfill. All ground works will be undertaken following preparation of a specification with the environmental engineer and following approval that works are in compliance with any licence conditions.

Following implementation of mitigation measures detailed in Chapter 5 of the EIA Report, the predicted impact during construction of the proposed development will be *short-term*, *imperceptible* and *neutral.*

During the Operational phase, there are limited activities that could potentially impact on the land soils, geological and hydrogeological environment. A new on-site wastewater treatment system will be operating at the south western part of the site. The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage ditch, along the western boundary, is of sufficient quality. A site suitability assessment will be undertaken in accordance with Annex C of EPA Code of Practice Part 1 2010.

All fuel tanks shall be stored in designated areas, and bunded to a volume of 110% of the capacity of the tank within the bund (plus an allowance of 30 mm for rainwater ingress). 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 gulley's or drains.

As the plant will be licenced, an environmental management plan will apply to the overall development during the operational phase incorporating mitigation measures and emergency response measures.

The predicted impact during operation of the Proposed Development, following implementation of mitigation measures detailed in Chapter 5 of the EIA Report will be *long-term, imperceptible* and *neutral*.

6.0 HYDROLOGY

This chapter of the EIA Report assesses and evaluates the potential impacts of the proposed development on the surrounding hydrological environment.

The Avoca River is the primary watercourse/surface water body in the local region. The Avoca is situated approximately 140 m south of the site and flows west to east. The Sheepwalk River borders the western and eastern side of the subject site and flows into the Avoca river. The Shelton Abbey Canal runs from the eastern site boundary of the Avoca River Park through the former landfill / lagoons east of the site before discharging into the Avoca River. At local level, there are existing surface water features in the vicinity of the subject site. These include drainage ditches along the south-west and south-east boundaries, both of which ultimately drain to the Avoca River by way of marshlands further downstream.

The water quality at the nearest gauging station in the Avoca River which was tested in 2020 (Avoca Bridge EPA station located c. 6.5 upstream of the subject site) is classified as 3 (slightly polluted). The Avoca Estuary (downstream of the site) has a 'Moderate' status and is 'At risk of not achieve Good status'.

The importance of the hydrological features at this site is rated as 'Medium Importance'. This is based on there is direct connectivity with the Arklow Marsh proposed NHA, and the receiving waterbodies Avoca Estuary and Brittas Bay through the Avoca River. The nearest European sites to the proposed development Buckroney-Brittas Dunes and Fen SAC (Site Code 000729) which is located approximately 5km to the north of the discharge point of the Avoca River.

The potential risk of flooding on the site was also assessed by a Site Specific Flood Risk Assessment that was completed for the site (refer to Infrastructure Design Report). Portions of the subject site fall within the 1% and 0.1% AEP fluvial flood extents from the Avoca River and associated watercourses. This was identified as the primary source of flooding. Therefore, as part of the design measures to reduce the associated flood risk for site users, all 'highly vulnerable' finished floor levels are located above the 0.1% AEP fluvial flood level plus 500mm freeboard. This requires infill above the capped landfill.

The potential impacts of construction and mitigation measures proposed have been identified and are included in the CEMP for the proposed development. The implementation of mitigation measures detailed in Chapter 6 of the EIA Report will ensure that the potential impacts on the surface water environment do not occur during the construction phase and that the residual impact will be *short-term, imperceptible* and neutral.

During the operational phase, there are limited activities that could potentially impact on the water environment. All activities including management of stormwater discharges to surface water will be undertaken in accordance with the IED licence.

There is a requirement for diesel store for a maximum storage c. 1,000 m^3; this will be stored within a bunded area which is greater than 110% of the storage capacity. Run-off from this area will discharge through an oil interceptor to storm sewer.

An environmental management plan will apply to the overall development during the operational phase incorporating mitigation measures and emergency response measures.

The predicted impact during operation of the Proposed Development, following implementation of mitigation measures detailed in Chapter 6 of the EIA Report will be *long-term, imperceptible* and *neutral*.

7.0 BIODIVERSITY

This chapter provides an assessment of the impacts of the proposed development in question on the ecological environment, i.e. flora and fauna.

The proposed development is to take place on a partly brownfield site within the catchment of the Avoca River which discharges to the Irish Sea at Arklow downstream with limited connectivity to European Sites in the Irish Sea.

The proposed development area currently comprises spoil and bare ground, grass, scrub and woodland. Site surveys have shown that few mature trees are likely to hold roosting value for bat species.

Surveys also confirmed that there is no potential for otter habitats on site and there will be no direct or indirect impact on otters downstream on the Avoca River. There will be no direct or indirect impact on badgers.

Potential direct impact on nesting birds can be avoided by timing of construction activity outside the nesting season.

There are no rare or protected habitats recorded in the study area. The site development areas are considered of Low Local Ecological Value.

Although there will be loss of local habitat, the proposed development will have no predicted significant impacts on Biodiversity.

The conclusion of a report for AA Screening is that the possibility of any likely significant effects on the European Sites considered, or on any other European Site (having regard to their conservation objectives), arising from the proposed development, either alone or in combination with other plans or projects, can be excluded.

8.0 AIR QUALITY AND CLIMATE

This chapter of the EIA Report evaluates the impacts which the proposed development may have on air quality and climate.

In terms of the existing air quality environment, baseline data and data available from similar environments indicates that levels of nitrogen dioxide, carbon monoxide, particulate matter less than 10 microns and less than 2.5 microns are generally well below the National and European Union (EU) ambient air quality standards.

The existing climate baseline can be determined by reference to data from the EPA on Ireland's total greenhouse gas (GHG) emissions and compliance with European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC). Data from the EPA in 2021 indicates that Ireland had total GHG emissions for 2019 of 59.78 million tonnes carbon dioxide equivalent (Mt CO_2eq). This is 6.85 Mt higher than Ireland's emission ceiling for 2019 as set under the EU's Effort Sharing Decision (ESD), 406/2009/EC. Emissions are predicted to continue to exceed the targets in future years.

Air Quality

During the construction phase there is the potential for dust emissions to impact nearby sensitive receptors resulting in potential dust soiling and human health impacts. Best practice mitigation measures have been proposed for the construction phase of the proposed development in order to mitigate potential dust impacts. With the mitigation measures outlined within Chapter 9 are implemented construction dust impacts will be short-term, negative, localised and not significant to nearby sensitive receptors.

Air dispersion modelling of operational phase emissions from the proposed development was carried out using the United States Environmental Protection Agency's regulatory model AERMOD. The aim of the study was to assess the contribution of operational emissions of NO_2 from the proposed development to off-site levels of this pollutant. The modelling assessment has found that ambient NO_2 concentrations as a result of the operations of the engines are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary.

Emissions from the site will lead to an ambient NO_2 concentration (including background) which are no more than 60% of the maximum ambient 1-hour limit value (measured as a 99.8th%ile) and 84% of the annual limit value at the worst-case location at or beyond the site boundary. The impacts to air quality from operation of the proposed development are therefore deemed long-term, slight, localised and negative.

The results for the Cumulative Assessment Scenario including emissions from the adjacent DUB20 data centre, will lead to an ambient NO_2 concentration (including background) which are no more than 72% of the maximum ambient 1-hour limit value (measured as a 99.8th%ile) and 90% of the annual limit value at the worst-case location

at or beyond the site boundary. The impacts to air quality from operation of the proposed cumulative development are therefore deemed long-term, slight, localised and negative.

Climate

Based on the scale and temporary nature of the construction works, the potential impact on climate change and transboundary pollution from the construction of the proposed development is deemed to be short-term and not significant in relation to Ireland's obligations under the EU 2030 target.

On-site CO_2 emissions as a result of the proposed development will operate under the Emission Trading Scheme (ETS). This will result in Masterplan emissions of no more than 448.3 tonnes CO_{2eq} per annum which is less than 0.032% of the total EU-wide ETS market, and thus the overall impact to climate is deemed indirect, negative, long-term and slight.

Human Health

The best practice dust mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be short-term and imperceptible with respect to human health. As demonstrated by the dispersion modelling results, pollutant concentrations with the proposed development operational are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health.

A dust management plan will be implemented during the construction phase of the proposed development to ensure that no significant dust nuisance occurs outside the site boundary.

During the operational phase, SCR mitigation and stack height (based on dispersion modelling) will be utilised to ensure compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary.

Residual Impacts

If the mitigation measures outlined in this assessment are implemented, there will be no residual impacts of significance on air quality or climate from the construction or operational phases of the proposed development.

9.0 NOISE AND VIBRATION

This chapter assesses the anticipated noise and vibration impact associated with the proposed development at nearby noise sensitive locations.

The existing noise climate has been surveyed at nearby noise sensitive receptors over the course of typical day, evening and night-time periods. Road traffic movements, both distant and local, were noted as the most significant source of noise during both daytime, evening and night-time periods. Other noise sources included existing plant noise and other typical noise sources expected in a semi rural environment (e.g. pedestrian activity, dogs barking, distant plant noise etc.)

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages: the short-term impact of the construction phase and the longer-term impact of the operational phase.

During the construction phase of the proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site activity and traffic. The application of noise limits and limits on the hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. The resultant impact is *not significant*, *negative and short-term*. In relation to construction traffic the resultant impact is *neutral*, *imperceptible and short-term*

The primary sources of noise during the operational phase of the proposed development will be long-term and include the introduction of additional building services plant for general site operation including the gas generation plant, and the introduction of additional vehicular traffic on existing public roads. Proprietary noise and vibration control measures will be employed in order to ensure that emissions from building services plant do not exceed the relevant criteria at nearby noise sensitive locations. Any change in noise levels associated with additional vehicles at road junctions in the vicinity of the proposed development is expected to be imperceptible. The resultant noise impact is *not significant*, *negative* and *long-term* while being within all adopted noise criteria. In relation to operational traffic the resultant impact is *neutral*, *imperceptible and long-term*

No significant sources of vibration will be present during the operational phase. There are therefore no predicted vibration impacts at neighbouring dwellings during the operational phase. The resultant vibration impact is *imperceptible*, *neutral* and *long-term*.

10.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

The site of the proposed Energy Centre development is part of the existing Avoca River Park Industrial Estate located within the Avoca River Valley c. 2.0km northwest of Arklow town. The overall industrial estate was originally part of the grounds of Shelton Abbey. Shelton Abbey is a late 18th century mansion and protected structure (RPS No. 16404005) which was sold in the early 1950's and NET Irish Fertiliser Industries built a facility the low lying grounds which were the eastern part of the demesne. Shelton Abbey became an open prison facility.

The fertiliser facility was closed in 2003 and much of the infrastructure was demolished or dismantled, leaving the prilling and drying towers and a number of smaller structures together with extensive areas of flat tarmac marshalling and storage areas. Today, Holfeld Plastics have a factory on the western part of the lands, and a wood processing facility and a small substation are located within the central portion of the lands. The eastern portion of the lands extend a further 400m east to the M11 motorway overbridge, and include some additional lands further east of the motorway. The Shelton Canal cuts diagonally across this eastern portion of the land is part of the canal and walkway that originally lead from Shelton Abbey towards Arklow town. Shelton Abbey remains in use as an open prison.

The Wicklow County Development Plan 2016-2022 identifies a number of Landscape Categories within the Arklow area, including the Urban Area LCA, the M11 East Corridor Area LCA and the southern extent of the Southern Coastal Area AONB LCA. The proposed substation lands are within the designated Urban Area LCA.

The lands are substantially undeveloped and not currently in use. The southern part between the Avoca River and Shelton Canal is substantially low lying grassland and

scrub while the northern portion – the subject of this planning application – is a mix of low lying grassland, scrub and some two areas of mixed broadleaved woodland along the northern and eastern sides. A watercourse, or Shelton Stream, leads along the eastern part of the lands and drains into the Avoca River.

The Avoca River lies along the southern edge of the industrial estate and the Dublin to Rosslare railway and the R747 Vale Road run to the south of the river. The northern and southern sides of the valley rise steeply from the low lying (3.0 to 6.0m OD) industrial lands to the north and south of the Avoca River valley and are mostly in mixed woodland. The M11 motorway spans the valley and river and the undeveloped eastern part of the industrial estate lands and is elevated is elevated. An existing 220kV overhead powerline crosses the eastern part of the lands and a number of overhead powerlines and associated supporting pylons are apparent in the wider locality as they converge on the Arklow substation located at Kilbride to the north of Arklow.

The closest dwelling to the proposed development site is c. 160m to the north set on elevated ground and behind mature woodland trees that screen it from the valley to the south. A halting site is located along the Vale Road dues south of the proposed development site. To the north of the industrial estate, the terrain is more elevated and comprises more gently sloping agricultural land and a number of individual houses on private roads and clusters of dwellings.

By virtue of the industrial site area being low lying and substantially secluded within the Avoca River valley, the zone of visual influence of the lands and the proposed substation facility is localised to the immediate area of the R747 Vale Road and the M11 overbridge.

The proposed Energy Centre development will occupy 5.01 hectares towards the north eastern part of the industrial lands between the local road accessing the facility and the Shelton Canal. It will comprise two Energy Centre buildings that are c. 94m and 144m long and both are c.65m wide and up to 13.5m high. The building will include an array of ten flue stacks along the southern side of the buildings that are 33m. Additionally, a battery storage compound will be located behind Energy Centre No. 2 and will comprise twenty seven battery arrays within a battery storage compound extending to 0.7 hectares. A number of other ancillary structures and supporting utilities will be located around the buildings together with internal access tracks, car and bicycle parking and site landscaping.

The R747 Vale Road runs along the southern side of the industrial lands and the elevated railway line and intervening landscaping provides substantial screening towards the site of the proposed Power Energy Centre site on the northern side of the valley. Nonetheless, there are views into the industrial lands from this section of the Vale Road. The proposed development will be visible to varying degrees from this portion of the Vale Road with the main buildings beings viewed against the backdrop of the wooded northern valley face and the stacks presenting as part of the skyline.

The northbound carriageway of the M11 has the most open aspect towards the industrial lands. From the motorway, there will be momentary views of the proposed development with the buildings structures seen against the backdrop of the sloping woodland valley face and the stacks presenting on the skyline signalling the industrial nature of the development.

From the elevated lands to the north and south of the valley, the proposed development site is not visible as it is set low within the valley corridor.

The proposed development will present as an intensification of industrial uses within the industrial estate and Avoca River valley. The scale of the development is consistent with both existing and permitted developments within the industrial estate.

The proposed development will be sited and has been designed to take maximum advantage of the screening characteristics of the valley topography and of the established industrial character of the site area such that potential impacts are reduced to the immediate locality of the Vale Road and nearby M11. Landscape and visual effects of the proposed development will not be significant.

11.0 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

This chapter assesses the predicted impacts of the proposed development on archaeological, architectural and cultural heritage using a number of sources including the Record of Monuments and Places, the National Inventory of Architectural Heritage, the Wicklow County Council Development Plan 2016-2022, the Excavations Database, cartographic and documentary sources.

There are no recorded archaeological sites or monuments within the proposed development lands, as listed in the Record of Monuments and Places for Co. Wicklow.

There are fourteen recorded archaeological sites within c. 1.5km of the proposed development lands. Seven of these were discovered during the course of development works and have been excavated. None of these sites will be impacted, either directly or indirectly, by the proposed development works. However, they are indicative of the landscape having been densely populated since at least the Bronze Age.

There are no recorded archaeological finds from the site, though a stone axe found in the area suggests settlement in the Neolithic Period.

Archaeological excavations in the area in advance of development works over the past two decades has also revealed a number of previously unrecorded archaeological sites. The results of the excavation of these sites further indicate prehistoric and medieval settlement and activity in the area.

There are no architectural heritage structures within the site boundary, recorded in either the National Inventory of Architectural Heritage or the Record of Protected Structures. There are three NIAH sites in the study area, but the proposed development will not have a direct or indirect impact on these.

A desk-top survey of the lands proposed for development did not identify any evidence of archaeological features within the development land.

Field survey confirmed that the site of the proposed development has been extensively and significantly impacted by previous development.

As such, there will be no direct or cumulative impacts on archaeological, architectural or cultural heritage associated with the proposed development, and no mitigation measures are required for archaeological, architectural and cultural heritage during the construction of operational phases of the Proposed Development.

12.0 TRAFFIC AND TRANSPORTATION

This chapter assesses the traffic impact of the proposed development for both the construction and operational stages of the development. The assessment considers the

impacts that the traffic generated by the proposed development would have on the local highway network. The development will not require significant regular staffing.

The proposed site is located in the Avoca River Park. The site is accessible from the R772 near Junction 20 of the M11 northwest of Arklow town via local rural road network. The Avoca River Park Access Road is a c.7 metre wide carriageway with no existing with no existing footways or cycle lanes.

At the construction stage the site will generate a maximum of 103 operatives' vehicle visits per day together with up to 76 HGV movements over a short period of the eighteen month construction programme. At operational stage there will be a maximum of five two-way van trips to and from the site per week, with other infrequent site visits for less regular maintenance tasks.

All traffic will access the site via a priority junction with the Avoca River Park Access Road and onwards to the R772. There will be internal roads provided to access various elements of the development. There will also be six number parking spaces for light vehicles.

The site is on reasonably hilly terrain and services are provided along the existing road network adjacent to the site. Construction activities will therefore be largely contained within the boundary of the site. There will be a requirement for haulage of unusable earthworks material together with importation of engineering fill to raise site levels. Construction materials will need to be brought to the site as will specialist plant. It is anticipated that these deliveries will occur throughout the day.

The traffic movements at peak hour are anticipated to exceed those of the operational phase but will readily be accommodated within the capacity of the existing road junctions. The estimated increase in traffic associated with the construction phase of the proposed development will be short term, not significant and of neutral effect.

The generated trips to and from the site throughout the operational phase of the development, will not result in a material impact upon the surrounding road network and junctions in terms of capacity. Overall, the impact of the development on the traffic and transportation environment will be long term in duration of imperceptible neutral effect.

The potential for impact on transportation during construction primarily arises from additional trips due to the works associated with the development as well as other developments in the vicinity of the site. The developments considered included those approved and proposed. Given the short term nature of the peak construction phase, the overall impact of the construction phase accounting for all of the potential developments is considered to have a slight impact on the receiving environment. At operational phase the proposed development will necessitate a negligible number of additional movements of vehicles on the local road network. The cumulative operation of the proposed development is concluded to be imperceptible with a neutral impact on traffic and transportation quality in the local environment.

13.0 MATERIAL ASSETS

This chapter assesses ownership and access, built services and infrastructure, which have not already been addressed elsewhere in this EIA Report.

The site of the proposed development as described in Chapter 2 Description of the proposed development is owned by the Applicant.

The main site access is along the northern boundary of the Avoca River Park. Construction traffic will enter from existing gate entrances off Avoca River Park private access road. As outlined in the CEMP, warning signage will be provided for all other road users on all approaches in accordance with Chapter 12 of the Traffic Signs Manual and the Contractor's Traffic Management Plan. As part of the Construction Stage Safety Plan for the works a Construction Traffic Management Plan (CTMP) will be prepared in accordance with the principles outlined below and held on site.

A 49 kVA domestic supply is available within the existing ESB Networks medium voltage substation within the industrial estate and An Bord Pleanála (ABP) has approved the provision of a 110 kV GIS substation compound to the NW of the proposed development. There is an existing gas line and gas skid on site capable of provideing 23MW thermal. There is no foul sewer line within or surrounding the estate. An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate and runs along the southern boundary of the proposed development site. A telecommunications distribution network is in place in the area.

During construction, there will be a need for electrical (domestic) supply electricity. Water supply will be provided by tanker or connection to existing public supply. Foul water will be collected and disposed off site to an appropriate waste facility.

During operation, gas will be provided from a combination of the existing gas line (23 MW) and from the gas transmission network (250 MW), once this is available. An application has been made to Gas Networks Ireland. Welfare facilities will be required for maintenance staff only. Since there is no public sewer, treatment will be undertaken by a package treatment system and polishing filter. Water supply will be from the available mains supply.

The implementation of mitigation measures detailed above will ensure that the predicted impacts on the material assets assessed in this chapter will be *short-term, neutral* and *imperceptible* for the construction phase. The predicted impacts on power and electrical supply, telecommunications, surface water infrastructure, foul drainage infrastructure and water supply will be *long-term, neutral* and *not significant.*

14.0 WASTE MANAGEMENT

This chapter describes the assessment of the potential impacts associated with waste management during the construction and operational phases of the proposed development. The receiving environment is largely defined by Wicklow County Council as the local authority responsible for setting and administering waste management activities in the area through regional and development zone specific policies and regulations. This is governed by the requirements set out in the Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021.

As outlined in the Infrastructure Report and SSFRA, the land will be built up such that all proposed roads will be set above the 1% AEP fluvial flood level (3.20m AOD) including an appropriate freeboard:3.20m AOD +0.50m freeboard = 3.70m AOD.

All proposed highly vulnerable development will be set above the 0.1% AEP fluvial flood level (4.10m AOD) including and appropriate freeboard: 4.10m AOD +0.50m freeboard = 4.60m AOD.

Assuming a thin layer of topsoil across the site, the following volumes are anticipated:

- Topsoil (removal off site with partial storage for replacement) ~6,000 m^3

- Engineered stone fill material (import) ~42,000 m^3
- Engineering Materials (Bound and Unbound Sub-Base/Concrete/Asphalt) ~ 30,000 m^3. A further 9,000 m^3 of concrete for piling.
- Pile arisings (if required) distributed around the site (limited engineering requirement) ~9,000 m^3 (this volume will be replaced by concrete).

Demolition Phase

There will be no demolition associated with this development

Construction Phase

During the construction phase, waste produced will include surplus steel and metal materials and broken/off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials are also likely to be generated.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&D WMP included as Appendix 14.1. The C&D WMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed development and these are summarised in Table 14.1.

Table 14.1 Estimated off-site reuse, recycling and disposal estimates for construction waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	439	10	44	80	351	10	44
Timber	372	40	149	55	205	5	19
Plasterboard	133	30	40	60	80	10	13
Metals	106	5	5	90	96	5	5
Concrete	80	30	24	65	52	5	4
Other (includes cabling, ducting, conduits, packaging and plastics)	199	20	40	60	120	20	40
Total	**1329**		**302**		**902**		**125**

A carefully planned approach to waste management and adherence to the site-specific Construction and Demolition Waste Management Plan (Appendix 14.1) and the mitigation measures in section 14.6.1 of Chapter 14 (Waste Management) Chapter of the EIAR during the construction phase will ensure that the effect on the environment will be short-term, neutral and imperceptible.

Operational Phase

During the operation phase, waste will be generated from the Operator of the Development. Dedicated waste storage areas have been allocated throughout the development for the various uses and waste types. The waste storage areas have been allocated to ensure a convenient and efficient management strategy with source segregation a priority. Waste will be collected from the designated waste collection areas by permitted waste contractors and removed off-site for re-use, recycling, recovery and/or disposal.

Provided the mitigation measures outlined in Chapter 14.6.2 are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted effect of the operational phase on the environment will be long-term, imperceptible and neutral.

15.0 INTERACTIONS – INTERRELATIONSHIPS BETWEEN THE ASPECTS

This chapter of the EIA Report addresses potential interactions and inter-relationships between the environmental factors discussed in the preceding chapters. This covers both the construction and operational phase of the proposed development.

The EIA Report chapters have already included and described assessments of potential interactions between aspects however this section of the assessment presents a summary and assessment of the identified interactions. The majority of interactions are neutral. The increase in employment and benefit to the local economy is considered a positive interaction between planning and population and human beings. Negative interactions include the short term impact of construction noise, dust and traffic on human beings and biodiversity. No significant traffic delays are forecast during either construction or operation. The proposed development is well-sited on brownfield lands and has been designed to ensure that it will be integrated into its setting. Residual landscape and visual effects from the wider locality will be slight to moderate.

Environmental Impact Assessment Report

Proposed Energy Centre at Avoca River Park Industrial Estate, Co. Wicklow.

Volume 2 – EIAR Report & Appendices

Prepared by: AWN Consulting, August 2021

Prepared for: Crag Digital Avoca Limited

1 INTRODUCTION

1.1 PROPOSED DEVELOPMENT

This Environmental Impact Assessment (EIA) Report has been prepared on behalf of Crag Digital Avoca Ltd (herein referred as 'the Applicant') to accompany a planning application to Wicklow Co Co (WCC) for planning permission for the provision of a power generation facility along with associated and ancillary works as described in Chapter 2 (Description of the Proposed Development). This development will hereafter be referred to as the 'proposed development'.

The Applicant (Crag Digital Avoca Ltd) is applying to Wicklow Co Co. (WCC) for planning permission for the provision of an on site Power Generation Facility along with associated and ancillary works. Figure 1.1 shows the location of the proposed development.

A full description of the proposed development is provided in Chapter 2 (Description of the Proposed Development). The proposed development is for a gas powered energy centre facility providing grid support as a peaking plant and to provide power for development in the vicinity, including the adjacent permitted data storage facility development. Phase 1 will provide 100MW and Phase 2 an additional 150MW.



Figure 1.1 Location of the proposed development

1.2 CONTEXT

1.2.1 Legislative Requirements

The requirement for EIA for certain types and scales of development is set out in the EIA Directives (85/337/EEC, 97/11/EC, 2003/35/EC, 2008/1/EC and most recently 2014/52/EU) and given primary effect in Ireland by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, European Communities (Environmental Impact Assessment) Regulations 1989-2006, Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001-2019. It should be noted that this EIA Report is prepared in accordance with the 2014 EIA Directive (2014/52/EU) and associated Irish legislation (referred to above).

The EIA Directives list those projects for which an EIA is mandatory (Annex I) and those projects for which an EIA may be required (Annex II). With regard to Annex II projects, Member States can choose to apply thresholds or use case by case examination or a combination of both to assess where EIA is required. In Ireland, a combination of both has been applied. The proposed development is not listed under Annex I EIA Directives. An EIA Report has been provided as the proposed development is required to provide the permanent power supply for the permitted data storage facility developments (WCC Planning Application No. 18940 and the more recent permission Reg. Ref.: 201285). The adjoining permitted data storage facility development was subject to EIA.

The main objective of an EIA, as set out in Article 3(1) of the 2014 EIA Directive, is to identify, describe, and assess the direct and indirect significant impacts of a project on population and human health, biodiversity, land, soils, water, air & climate (including noise), material assets, cultural heritage and the landscape and the interaction between the aforementioned factors. The EIA Report (previously referred to as an Environmental Impact Statement or EIS) reports on the findings of the EIA process to date and informs the Planning Authority, statutory consultees, other interested parties and the public in general about the likely effects of the project on the environment.

1.2.2 Format of the EIA Report

This EIA Report has been prepared in accordance with the requirements of EIA Directives (2011/92/EU and 2014/52/EU). It is prepared in a format following the guideline structure set down in the Environmental Protection Agency (EPA) Draft "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports" (*2017) (herein referred to as the EPA Draft EIA Report Guidelines 2017).

The "*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment"* (August 2018) and the European Commission "*Guidance on the preparation of the Environmental Impact Assessment Report"* have been considered in the preparation of the EIA report.

Using the format following the guidelines in the EPA Draft EIA Report Guidelines 2017, this EIA Report examines each environmental aspect in a separate chapter. Each chapter generally covers the following:

- Receiving Environment
- Characteristics of the proposed development
- Potential Impacts of the proposed development

- Do-Nothing Scenario
- Remedial and Mitigation Measures
- Predicted Impacts of the Development
- Residual Impacts

A Non-Technical Summary of the findings of the EIA Report is provided as a separate document.

Cumulative impacts for each environmental topic are assessed in each chapter of this EIA Report.

Interactions (i.e. the interrelationships between each environmental aspect), are assessed as they occur in each chapter. The final chapter of the EIA Report, Chapter 16, shows where interactions have been identified and how they have been addressed.

1.2.3 Need for the Proposed Development

The proposal is for up to 250 MW of gas fired generation, plus battery storage of 100 MW which complements the developments local to Avoca River Park.

- The Arklow Bank Wind Park Phase Two, capacity 520 MW, is due to start construction in 2023.
- Data Centres proposed for Avoca River Park with a demand in the order of 60 MW.

In summary, the purpose of this plant is to enable the transition of the electricity network to low carbon generation and it is located in an area where demand is froecast to increase significantly, so provides capacity where it is most needed. The development includes battery storage to provide instant capacity, to offset and balance the intermittency of renewables.

In addition, the plant will be capable of providing power for the adjacent permitted datacentre (*Reg. Ref.: 201285)* and further development in the wider area. Further background is provided in the *Power Generation Plant Development Rational* prepared by Black and White Engineering.

1.3 REGULATORY CONTROL

Industrial Emissions Directive (IED)2010/75/EU
The Integrated Pollution Prevention and Control (IPPC) Directive was transposed into Irish law by the Protection of the Environment Act, 2003, and the Industrial Emissions Directive 2010/75/EU under the European Union (Industrial Emissions) Regulations 2013, S.I. 138 of 2013.

These Regulations primarily amend the EPA Act 1992 to introduce a system of licensable activities from both the Integrated Pollution Prevention and Control (IPPC) and Industrial Emissions (IE) directives. The First Schedule of EPA Act 1992 lists the activities that require an Industrial Emissions Licence from the EPA.

The Energy Centre component of the proposed development will require an IED to operate and consultation will be undertaken with the EPA regarding a licence prior to operation. The proposed Energy Centre will require a licence under *Class 2.1 Combustion of fuels in installations with a total rated thermal input of 50 MW or more.*

Emissions Trading Directive

The EU is committed to achieving a reduction of greenhouse gas emissions; this is being implemented by the EU Emissions Trading Directive (Directive 2003/87/EC). The EPA has been given the responsibility for implementing the Emissions Trading Directive in Ireland. The Directive establishes an allowance-trading scheme for emissions to promote reductions of greenhouse gases, in particular carbon dioxide. The trading scheme applies to facilities with:

Combustion installations with a rated thermal input exceeding 20 MW

The rated thermal input of relevant on-site fuel consuming equipment will exceed 20 MWth; therefore, a Greenhouse Gas (GHG) Permit is required for the operational phase of the proposed development. The GHG permit will be applied for by the operator in advance of the commissioning phase, as and when the site fuel consuming equipment exceeds a rated thermal input of 20 MW.

1.4 CONSULTATION

Consultation has been undertaken via email with the Planning Authority, and a package of pre-application documents and details was issued to WCC on the 23rd of July.

1.5 CONTRIBUTORS TO THE EIA REPORT

The preparation and co-ordination of this EIA Report has been completed by AWN in conjunction with specialist subcontractors. Specialist inputs were provided by the as per the schedule of contributors provided in Table 1.1.

Table 1.1 *Roles and Responsibilities in the EIA Report*

Role		Company
EIA Project Management		AWN Consulting
Engineering Design		DBFL
Architectural Design		Reddy Architects
Planning Consultant		John Spain Associates
EIA Chapter No.	Chapter Title	Company and Consultant
	Non-Technical Summary	AWN – Input from each specialist
Chapter 1	Introduction	AWN – Teri Hayes
Chapter 2	Description of the Proposed Development	AWN – Teri Hayes
Chapter 3	Planning and Development Context and Alternatives	AWN – Teri Hayes and Jonathan Gauntlett
Chapter 4	Population and Human Health	AWN – Colm Driver with specialist input from Damian Kelly and Dr Edward Porter
Chapter 5	Land, Soils, Geology & Hydrogeology	AWN – Pat Groves and Marcelo Allende
Chapter 6	Hydrology	AWN – Pat Groves and Marcelo Allende
Chapter 7	Biodiversity (including	Ger O Donoghue Moore Group

	AA Screening Report)	
Chapter 8	Air Quality & Climate	AWN – Dr Edward Porter
Chapter 9	Noise & Vibration	AWN – Damian Kelly
Chapter 10	Landscape and Visual	Brady Shipman Martin - John Kelly
Chapter 11	Archaeological, Architectural and Cultural Heritage	CRDS
Chapter 12	Traffic & Transportation	Philip Bayfield CST Group
Chapter 13	Material Assets	AWN – Teri Hayes
Chapter 14	Waste Management (including C&D Waste Management Plan)	AWN – Chonaill Bradley and Emma Cross
Chapter 15	Interactions-Interrelationship between the Aspects	AWN Colm Driver

Project Director, Teri Hayes**,** BSc MSc PGeo. Teri is a Director with AWN Consulting with 25 years of experience in water resource management and environmental assessment and risk analysis. Teri is a professional member of the International Association of Hydrogeologists (Irish Group) – former president and a professional member of the Institute of Geologists of Ireland She has project managed and contributed to numerous environmental impact assessments and design of appropriate mitigation measures, acted as an expert witness at public hearings, lectured in EIA for post graduate classes and providing expert advice on EIA sections for planning authorities. Teri is experienced in projects with ecological sensitivities having worked on the Ennis Flood Study, Doonbeg golf club and Kildare By-pass. She is also familiar with the design and impacts of datacentre and energy project developments having worked on similar developments for most of the datacentre operators in Ireland.

Land, Soils, Geology, Hydrogeology & Hydrology
Colm Driver (*BSc MSc MIT*). Colm is an Environmental Consultant (Hydrogeologist) with AWN Consulting with over 5 years' experience in the field of environmental sciences including hydrogeology, soils, geology, geotechnical engineering, and impact assessment. His role at AWN includes responsibility for groundwater related projects including groundwater resource management and assessment, aquifer characterisation and source protection plans, contaminated land assessments, groundwater modelling, hydrogeology and geology in EIAR. His experience also includes the provision of hydrogeological conceptual site models (CSM) and ArcGIS mapping. Colm is a member of the International Association of Hydrogeologists (Irish Group), Irish Brownfield Network and Institute of Geologists Ireland.

Teri Hayes (as above)

Biodiversity/Appropriate Assessment, Ger O'Donohoe, Ger is a Consultant Ecologist with Moore Group. Ger graduated from GMIT in 1993 with a B.Sc. in Applied Freshwater & Marine Biology and completed an M.Sc. in Environmental Sciences, graduating from TCD in 1999. Ger has over 20 years of experience as an environmental consultant with experience in the planning and management of numerous complex Environmental Impact Assessments for large scale developments nationwide. He has wide ranging experience as an expert witness at public hearings.

Air Quality & Climate, Dr. Edward Porter is Director with responsibility for Air Quality with AWN Consulting and has completed Chapter 9. He holds a BSc from the University of Sussex (Chemistry), has completed a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (MRSC CChem), the Institute of Environmental Sciences (MIEnvSc) and the Institute of Air Quality Management (MIAQM). He specialises in the fields of air quality, EIA and air dispersion modelling.

Noise & Vibration, Damian Kelly BSc MSc is a Director and Principal Acoustic Consultant with AWN Consulting. Damian holds a BSc from DCU and an MSc from Queens University Belfast. He has over 18 years' experience as an acoustic consultant. He is a member of the Institute of Acoustics. He has extensive knowledge in the field of noise modelling and prediction, having prepared the largest and most complex examples of road and industrial noise models currently in existence in Ireland. He was also co-author of the EPA document "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities" (2012)* and advised in relation to the noise limits applied to commercial developments by the various local authorities in the Dublin region.

Landscape and Visual Impact Assessment, John Kelly**,** BArch (Hons) MRIAI. John is a qualified Architect and Managing Partner of Brady Shipman Martin and has over 25 years' experience of direct involvement in the planning, design and environmental assessment of major infrastructure, industrial, educational, commercial, tourism, leisure and energy projects, as well as large scale mixed-use masterplans. John utilises and develops photographic, surveying and digital methodologies that assist in establishing a thorough understanding of the three-dimensional characteristics of sites and their context.

Archaeology, **Dr Stephen Mandal** (MIAI PGeo EurGeol) is co-founder (in 1997) and managing director of CRDS Ltd. Stephen holds an honours science degree in Geology (1991) and a PhD in Geoarchaeology He is professional member of the Institute of Archaeologists of Ireland, the Institute of Geologists of Ireland, and the European Federation of Professional Geologists. In 2009 Stephen was elected to the Royal Irish Academy Committee for Archaeology, and in September 2009 was elected as Vice Chairperson of the committee. Stephen is an experienced expert witness and has a practical approach to mitigation design. CRDS is an award-winning leader in undertaking the cultural heritage components of large-scale impact assessments and has a diverse project portfolio. CRDS has undertaken a wide variety of archaeological, architectural and cultural heritage assessments for quarries including desk-based studies, archaeological impact assessments, pre-development testing, monitoring and excavation, including: Bunratty, Co. Clare (Archaeological Assessment, Metal Detecting Survey, Monitoring & Excavation), Domard, Co. Wicklow (Cultural Heritage Component of EIS), Boyle Bypass (Archaeological Assessment Report of quarry).

Traffic & Transportation, Philip Bayfield (BE(Hons) MSc CEng MIEI MICE) is a Chartered Engineer with over 30 years' experience in the industry. He has been responsible for the traffic and transportation assessments for numerous schemes including residential, data centres and commercial developments. He has also overseen civil and structural engineering design of a variety of projects including several road and bridge schemes, commercial, educational, public and residential buildings as well as works in the public domain and has been responsible for project team management, technical proposals and account management. Projects include the Sutherland School of Law Enabling Works Contract on behalf of UCD, Thornton Hall Access Road and Thornton Hall Offsite Works projects on behalf of the Irish Prison Service, Scotch Hall Development, Kildare Civic Offices infrastructure and

Beacon Gateway. Philip is also an experienced PSDP coordinator and Road Safety Auditor.

Waste Management, Chonaill Bradley, BSc (Environmental Science) is an Associate Member of the Institute of Waste Management (AssocCIWM). He is a Senior Environmental Consultant in AWN and has over 7 years' experience in environmental consultancy experience in Waste Management and Environmental Impact Assessment. He has helped coordinated and prepare specialist inputs including the Waste Management Chapters, Operational and C&D Waste Management Plans and Construction environmental Management Plans for numerous EIS/EIA/EIAR's.

1.6 Description of Effects

The quality, magnitude and duration of potential effects are defined in accordance with the criteria provided in the EPA Draft *EIA Report Guidelines 2017* as outlined in Table 1.2.

Table 1.2 Description of Effects as per EPA Draft EIA Report Guidelines 2017

Effect Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	A change which does not affect the quality of the environment
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An impact capable of measurement but without noticeable consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
	Profound	An impact which obliterates sensitive characteristics
Duration of Effects	Momentary Effects	Effects lasting from seconds to minutes
	Brief Effects	Effects lasting less than a day
	Temporary Effects	Effects lasting less than a year
	Short-term Effects	Effects lasting one to seven years.
	Medium-term Effects	Effects lasting seven to fifteen years
	Long-term Effects	Effects lasting fifteen to sixty years
	Permanent Effects	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration
Probability of Effects	Likely Effects	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Effect Characteristic	Term	Description
Type of Effects	Indirect Effects	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out
	`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant impact is of greater significance than the sum of its constituents

1.7 ADDITIONAL ASSESSMENTS REQUIRED

This section addresses the additional approvals and assessments required under other EU Directives and legislation.

- **Appropriate Assessment Screening Report** - A screening report has been completed for the Proposed development, as required under the Habitats and Birds Directive (92/43/EEC and 79/409/EEC) by Moore Group. This is included as Appendix 7.1.

- **Flood Risk Assessment** - A Site Specific Flood Risk Assessment has been undertaken for the site by DBFL and is provided with the planning documentation.

- **Construction Environmental Management Plan (CEMP)** – A CEMP has been prepared by DBFL and is provided with the planning documentation.

1.8 FORECASTING METHODS AND DIFFICULTIES IN COMPILING THE SPECIFIED INFORMATION

Forecasting methods and evidence used to identify and assess the significant effects on the environment for each environmental aspect are set out in each chapter.

There were no significant difficulties in compiling the specified information for this EIA Report. Any issues encountered during the assessment of individual factors are noted within the relevant chapters.

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 INTRODUCTION

As described in Chapter 1 (Introduction), the Applicant (Crag Digital Avoca Ltd) is applying to Wicklow Co Co. (WCC) for planning permission for the provision of an on site Power Generation Facility along with associated and ancillary works.

The following chapter presents a description of the proposed development as required by the relevant planning legislation, Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, as amended by the 2014 EIA Directive (2014/52/EU) (herein referred to as the EIA Directive), European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, the current EPA Draft EIA Report Guidelines 2017 and the EPA Draft "Advice Notes for Preparing Environmental Impact Statements" (2015) (herein referred to as the EPA Draft Advice Notes for EIS 2015). Guidance outlined in the 'Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report'' published by the European Commission in 2017 was also considered in the preparation of this EIA Report.

2.2 CHARACTERISTICS OF THE APPLICATION

2.2.1 Description of Site

The subject site is located within the Avoca River Park Industrial Estate lands, approximately 2km northwest of Arklow, Co. Wicklow. The site location is presented is located within the townlands of Shelton Abbey and Marsh. Figure 2.1 below.



Figure 21 Site Location

The site is currently bound by the Avoca River Park Industrial Estate's private access road along its northern boundary and a gravel track and a drainage ditch along its southern boundary. A drainage ditch runs partly along the eastern boundary also. Both drainage ditches drain to the Avoca river which flows further south of the site. The Avoca River flows eastwards and into the sea at Arklow c 3.5 km to the east of the subject site. Beyond the river is the main Dublin-Rosslare railway line, which runs parallel to the river before branching southwards towards the town centre of Arklow. The built up area of Arklow town is c. 1km from the subject site as the crow flies.

Immediately to the east and west the industrial estate is bound by greenfield, undeveloped lands. Beyond an area of grassland to the west lies Shelton Abbey, a prison which is operated by the Irish Prison Service. The main building of the prison complex is a historic structure.

The closest dwelling to the subject site is located c. 160 metres from the subject site to the north, with all other dwellings in the area significantly further removed from the subject site. Access to the subject site is provided from the north via the main access road for the industrial estate, which connects to the M11 via the R772 regional road.

The site of the proposed development comprises approximately 5.01 hectares of land. The site is bound to the north by a local access road which serves Avoca River Park. To the south and to the west the site is bound by Holfield Plastics Limited. To the east the site is bound by the wider landholding that currently incorporate Harmony Timber and Stunt Drive Ireland which will cease operation and relocate prior to commencement of the construction of the data storage facility.

The subject site, is zoned 'E1 – Employment' in the LAP, for which the objective is as follows: *"To facilitate the further development and improvement of existing employment*

areas and to facilitate opportunities for the development of new high-quality employment and enterprise developments in a good quality physical environment."

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phophogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring (see chapter 5 Land Soils and Hydrogeology). The design incorporates import of additional fill material which complements the requirements for flood protection and landfill capping. Foundations within the landfill area will be undertaken in compliance with EPA licence requirements for rehabilitation of the landfill.

The site is generally fairly level, with much of the site being circa +2.0m to +2.3m OD. The western portion of the site is slightly higher at approximately +2.4m to +2.8m OD.

An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate runs along the southern boundary of the proposed development site. There are no public foul drainage systems in the vicinity of the site. The foul drainage from the existing Avoca River Park Industrial Estate discharges into several septic tanks located at the southern end with the treated effluent from the septic tanks discharging into the drainage ditch.

2.2.2 Proposed Development Description

Figure 2.2 presents an overall site layout plan. The proposed development is for a gas powered energy centre facility which will be developed as a peaking plant and to supply power to the grid and development in the vicinity, including the adjacent data storage facility development. The energy centre comprises two buildings namly, Phase 1 which is capable of providing 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. There is an existing gas line and gas skid on site capable of provideing 23MW thermal. Once the gas infrastructure is in place the primary fuel will be gas, with liquid fuel provided for stand-by in event of interruption if the gas supply.

The area allocated for Battery Storage Equipment will contain a modular array of containers plus electrical infrastructure to connect into the generation system in the range 100 MW to 200 MW output with containerised LiIon battery arrays to provide up to 4 hours of duration. The battery equipment will be used in conjunction with the generation equipment to optimise the operational profile and provide no-break power.

In summary, the purpose of this plant is to enable the transition of the electricity network to low carbon generation and it is located in an area where demand is forecast to increase significantly, so provides capacity where it is most needed.

Further information is outined in the Power Generation Plant Development Rational p repared by Black & White Engineers and provided with planning.

A new access to the proposed development, in the form of a priority junction, is proposed off the existing Avoca River Industrial Estate c. midpoint along the northern boundary at the location of an existing field entrance.

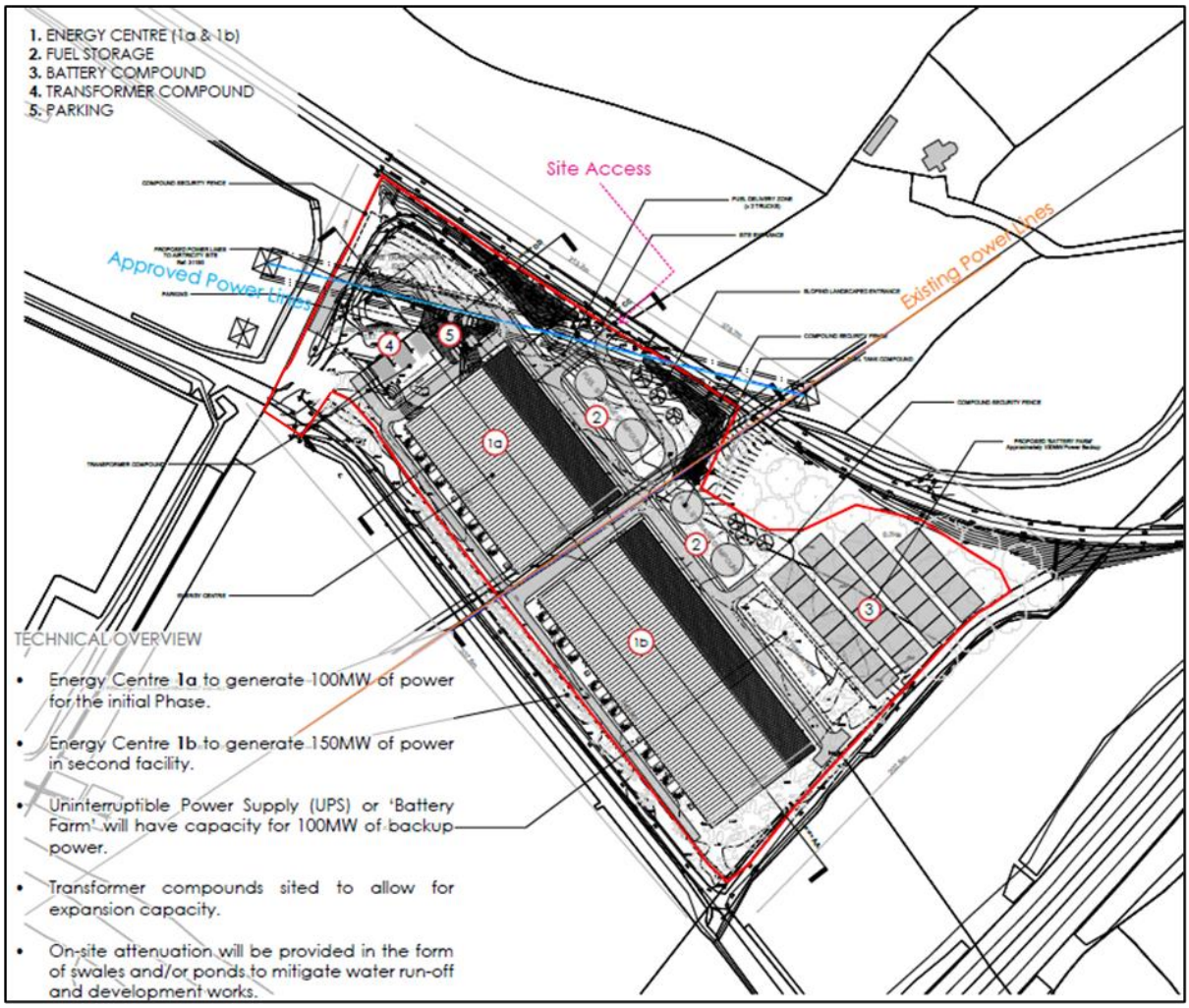


Figure 2.2 Layout outlined in red (Drawing P21-126K-02-00-XXX-DR-RAU-AR-1100) Red line = site boundary

The proposed development will comprise:

- All site clearance and enabling works required to facilitate the development.
- Construction of 2 no. energy centre buildings (Energy Centre 1 and Energy Centre 2) each with a height to parapet level of c. 13.85 metres.
- Energy Centre 1 will comprise a gross floor area (GFA) of 5,965 sq.m within a single storey building and will accommodate 12 no. generators. 4 no. flues 33 metres in height will be accommodated along the south-western elevation of the building.
- Energy Centre 2 will comprise a GFA of 9,180 sq.m within a single storey building and will accommodate 18 no. generators. 6 no. flues 33 metres in height will be accommodated along the south-western elevation of the building.
- Construction of a battery compound to provide electricity storage and backup power, located to the northeast of Energy Centre 2, to comprise 27 no. battery arrays within a compound area of c. 0.7 hectares. A single storey MV switchroom building will be provided to the west of the battery compound.
- Provision of a transformer compound (to the northwest of Energy Centre 1), along with a welfare building (38 sq.m GFA).
- Provision of fuel storage tanks (2 no.) within a bunded compound to the north of Energy Centre 2.

- Construction of a new access from the existing estate access road to the north of the site, internal road network and circulation areas, footpaths, provision of 6 no. car parking spaces and 4 no. cycle parking spaces.
- Landscaping and planting, boundary treatments, lighting, security fencing, and all associated ancillary and site works including underground foul and storm water drainage network (including on-site wastewater treatment system), and utility cables.

2.2.3 Proposed Site Infrastructure and Secondary Facilities

The infrastructure design is described in more detail in the Infrastructure Design report prepared by DBFL Consulting Engineers which is provided with planning.

2.2.3.1 Earthwork strategy

The existing capped landfill and phophogypsum pond below the proposed development imposes a constraint on excavations in this portion of the site. The levels will in fact be raised across the site as partial mitigation of the flood risk management. (The DBFL Site Specific Flood Risk Assessment (201103-DBFL-XX-XX-RP-C-0002) identified fluvial risk associated with the Arklow river and associated watercourses. The mitigation measures proposed all highly vulnerable development above the 0.1% AEP fluvial flood level and all road infrastructure above the 1% fluvial flood level). The raising of levels offers opportunity to build some sub surface infrastructure within which roads and drainage infrastructure will be accommodated. The design of the building foundations and the detailed earthworks strategy will be undertaken in compliance with EPA requirements for management of the underlying landfill as part of the existing licence requirements.

2.2.3.2 Surface Water Drainage

The management of surface water for the proposed development has been designed to comply with the policies and guideline outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of WCC objectives as far as reasonably practicable and taking due cognisance of the phosphogysum pond on the subject site. To manage peak flow rates, the discharge from the development lands will be limited to greenfield run-off rates (c. 2l/sec/ha). The flows leaving the site will be directed to existing drainage ditches at the southeast of the subject site provided outside of the landfill cell in the form of an above ground detention basin. The detention basin will have a capacity of 550m^3 storage volume for the 100-year event plus 10% climate change (DBFL drawings 210103-DBFL-CS-SP-DR-C-3310). A settling pond will be incorporated within the attenuation basin to prevent migration of possible contaminants beyond the site. The use of infiltration to the underlying hydrogeology will only be undertaken outside of the underlying cell within the site boundary. A description of the Sustainable Urban Drainage Systems (SUDS) is described within the Infrastructure report and Chapter 6 surface water.

2.2.3.3 Water Supply

An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate runs along the southern boundary of the proposed development site. The water supply requirements for the proposed development are limited to the local welfare facilities that will be required for maintenance staff only. The average daily demand is 0.012l/s and peak hour water demand is 0.075l/s. A new 50 mm diameter connection to the existing watermain is proposed, along the southwestern boundary of the proposed development. Refer to DBFL drawing no. 201103-DBFL-RD-SP-DR-C-1301 for layout. IW has confirmed the feasibility of this connection.

2.2.3.4 Foul Drainage

Similar to water supply requirements, the foul water collected will be limited to the local welfare facilities that will be required for maintenance staff only. The design foul loading is calculated as 0.059 l/s. Since there is no existing public sewer in the vicinity of the site, a new 150mm diameter foul drainage sewer is proposed to collect and convey wastewater from the welfare facility to a proposed new packaged treatment system located at the southern end of the site (drawing no 210103-DBFL-RD-SP-DR-1301 for layout). The treated effluent will discharge into a shallow soil polishing filter, which will provide a tertiary level of treatment and improve quality before being discharge into the drainage ditch at the south-eastern corner of the site.

2.2.3.5 Oil Storage

The diesel store on site has a maximum capacity of 1000 m^3. This will be stored within a bunded area which is greater than 110% of the storage capacity. Run-off water will discharge through an interceptor prior to discharge through the detention pond.

2.3 EXISTENCE OF THE PROJECT

Under the current Draft EPA Guidelines on the information to be contained in EIA Reports, the description of the existence of the project is required to define all aspects of the proposed lifecycle of the proposed development under the following headings:

- Construction
- Commissioning
- Operation
- Decommissioning; and
- Description of Other Developments.

The following sections present a description of each of these aspects.

2.3.1 Description of Construction

The construction of the proposed energy centre will comprise four main stages, namely:

- Site preparation works;
- Building Structure Construction;
- Building Envelope Construction; and fit out Including mechanical and electrical fit-outs and commissioning.

All construction works will be undertaken in compliance with the requirements of the Construction Environmental Management plan (CEMP) which has been provided with planning and will be updated with any further requirement of planning prior to commencement of works.

Working Hours

It is anticipated that the construction will be completed during normal construction hours i.e., 7am to 6 pm Monday to Friday with a half day working on Saturday (8am - 1pm).

However, it is possible that the appointed contractors may wish to carry out certain operations outside these hours i.e., evening hours during long summer days etc. Such occurrences will be notified to the local authority, where required and generally kept to

a minimum. Where they do occur, contractors will ensure they take place over as short a timeframe as possible and as such are unlikely to cause excessive disturbance.

Staffing and construction schedule

The planned construction schedule for the proposed and approved developments are shown in Table 2.1 below. The proposed schedules are subject to planning approval and assume a worst-case scenario with construction on all three developments overlapping. Peak construction staff numbers are shown.

Development	**Proposed Energy Plant**	**Data Centre Development**	**Substation Development**
Application for Planning	August 2021	Approved	Jan 2021 (awaiting planning decision
Commencement of construction	Q3 2022	Q4 2021	Q3 2021
Completion of construction Commissioning	Q4 2023 2023-32	Q4 2023	Q4 2021
Peak no of construction staff	250	450	30

A ten-year permission is sought for the proposed development. The rationale for the ten-year permission duration primarily relates to the scale of the proposed development, the need to provide adequate time for the delivery of a gas connection to the subject site (subject to a separate planning application and connection process with Gas Networks Ireland), the necessary timeline for construction, commissioning, testing, and completion of the proposed energy centre development. For example, buildings and items of plant and equipment may continue to be constructed, installed and adjusted potentially beyond the life of a normal 5-year planning permission (dependent on energy demand and delivery of gas connection infrastructure) as part of the implementation of the proposed development, thereby necessitating a longer duration of permission.

Site Preparation & Demolition Works

A temporary construction compound will be set up at commencement to facilitate office, portable sanitary facilities, equipment storage, parking etc. for contractors. It will be used for the duration of the works. The site will have site security throughout construction works.

No demolition or site clearance works are required. All remedial land works will be completed prior to commencement of construction of the energy centre. In addition to the soil cover capping required for the landfill capping, additional soil cover will be added for flood protection and to facilitate building, road and drainage works.

Building Construction Works

Foundations and Structure
The proposed civil infrastructure, including roads and drainage, will be accommodated with an element of upper layer stiffness by way of an engineering stone blanket

interlain with proprietary geogrid reinforcement. The drainage infrastructure will be placed within the engineering stone blanket and will not breach the environmental capping or waste material layers below.

For the electrical and fuel storage infrastructure, to avoid any impact with the underlying environmental capping and waste material, the initial intention is that all structural foundations for the plant and fuel storage will be deep, heavily reinforced concrete raft slabs placed on an engineering stone blanket with interlaid proprietary geogrid reinforcement. This engineering stone blanket will be placed above the landfill capping. Where piling may be required, this will be undertaken in consultation with the EPA and project environmental engineer. A preliminary procedure (following recognised guidance by Environment Agency UK National Groundwater & Contaminated Land Centre report NC/99/73 Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention) has been developed to ensure that piling operations would not increase risk on the surrounding environment. Details are provided in the Infrastructure report prepared by DBFL and submitted with planning.

Levelling/Cut and Fill

As outlined in the Infrastructure report and SSFRA, the land will be built up such that: All proposed roads will be set above the 0.1% AEP fluvial flood level (3.20m AOD) including an appropriate freeboard:3.20m AOD +0.50m freeboard = 3.70m AOD.

All proposed highly vulnerable development will be set above the 0.1% AEP fluvial flood level (4.10m AOD) including and appropriate freeboard: 4.10m AOD +0.50m freeboard = 4.60m AOD.

The cut and fill will be as follows:

- Topsoil (removal off site with partial storage for replacement) ~6,000 cubic metres
- Engineered stone fill material (import) ~42,000 cubic metres
- Engineering Materials (Bound and Unbound Sub-Base/Concrete/Asphalt) ~ 30,000 cubic meters.
- Pile arisings (if required), distributed around the site (limited engineering requirement) ~9,000 cubic metres. (This volume will be replaced by concrete).

Building Envelopes and Finishes
The articulation of the facade will be enhanced by expressing the horizontality and linear lines of the building's mass. By accentuating the long nature of the mass, the horizontal lines reduce in perspective and allow a continuous legibility of the facade.

The massing is further reduced by a louvered façade around the plant areas which will also conceal the external mechanical components of the buildings while allowing the required air flow and circulation around inlets. The colour tone of the horizontal metal louvres will complement the cladding panels.

The metal cladding will be a Kingspan metal panel façade system from the Spectrum Range of colours.

Material Sourcing, Transportation and Storage

Materials

Key materials will include steel, concrete, composite cladding, piping, electrical cabling, process equipment and architectural finishes. A 'Just in Time' delivery system will operate to minimise storage of materials on site.

Sourcing
Where possible it is proposed to source general construction materials from the Wicklow area to minimise transportation distances.

Storage
Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination. Liquid materials will be stored within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications – BS EN 1992-3:2006) to prevent spillage.

Transportation
Construction materials will be brought to site by road. Construction materials will be transported in clean vehicles. Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials and spoil to prevent the escape of material along the public roadway.

Waste Management
Chapter 14 contains a detailed description of waste management relating to construction of the proposed development. A site-specific Construction and Demolition Waste Management Plan is included as Appendix 14.1 of this EIA Report. This C&D Waste Management Plan will be refined and updated in advance of the works to ensure best practice is followed in the management of waste from the proposed development.

Noise, Vibration and Dust Nuisance Prevention
With regard to construction activities, reference will be made to BS 5228 (i.e., BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014) for noise and vibration control on construction and open sites, which offers detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development, such as:

- Limiting the hours during which site activities which are likely to create high levels of noise are permitted, e.g., soil levelling/excavations;
- Establishing channels of communication between the contractor/developer, local authority and residents.
- Appointing a site representative responsible for matters relating to noise and vibration, and;
- Monitoring typical levels of noise during critical periods and at sensitive locations.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- Selection of plant with low inherent potential for generation of noise;
- Erection of barriers as necessary around items such as generators or high duty compressors, and;
- Siting of noisy plant as far away from sensitive receptors as permitted by site constraints.

Noise and vibration control measures are discussed in detail in Chapter 9 Noise & Vibration.

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of dust produced will be deposited close to the generated source.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented including:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential site traffic only;
- If required, any area/road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. Indeed, on any un-surfaced site road, this will be 10km/hour, and on hard surfaced roads as site management dictates;
- In dry conditions vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- Wheel washing facilities will be provided for vehicles exiting the site to ensure that mud and other wastes are not tracked onto public roads;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary; and
- At all times, these procedures will be strictly monitored and assessed. In the event of dust emissions occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Dust nuisance control measures are discussed in further detail in Chapter 8 Air Quality and Climate.

Water Discharges
Portable welfare and sanitary facilities will be provided for the construction workers at the construction compound for the development.

Any surface water run-off will be adequately contained and treated prior to being discharged into the drainage network. See Chapter 6 Hydrology for a full description of mitigation measures proposed.

Construction Impacts
Each of the following EIA Report chapters (Chapters 4-14) includes an assessment of the potential impact of construction works on their individual environmental aspect and set out the relevant mitigation measures relating to those aspects.

A Construction Environmental Management Plan (CEMP) has been prepared for the proposed development, and this will be put in place by contractors to minimise the impact of all aspects of the construction works on the local environment. The CEMP includes emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. A copy of the CEMP is included with planning application documents.

The primary potential effects from construction are all short-term and are anticipated to include;

- Effects in terms of nuisances relating to the air quality of the environs due to dust and other particulate matter generated from excavation works and effects on the noise environment due to plant and equipment involved in construction;
- Effects on the land, soils, geology & hydrogeology of the site during construction due to ground disturbance; and
- Effects on the local road network and its environs due to construction workers and other staff attending site during preparation, construction and commissioning phases.

Mitigation measures to address each of these potential short-term effects are presented in each individual EIA Report chapter.

2.3.2 Description of Commissioning

As the construction phase will be complete prior to commissioning, site construction staff will be demobilised subject to the scheduling of commissioning works. The total fit out of the energy centre will require a ten-year permission duration primarily relating to the scale of the proposed development and the need to provide adequate time for the delivery of a gas connection to the subject site (subject to a separate planning application and connection process with Gas Networks Ireland).

Any hard landscaping and final soft landscaping will be completed.

2.3.3 Operation of the Project

Once operational the Energy centre will “go live”. Staff are primarily required onsite for security, ongoing monitoring and maintenance of electrical equipment. The development will be required to operate in compliance with the EPA IED licence required for operation of the facility.

Each of the following EIA Report chapters (Chapters 4-14) includes an assessment of the potential impact of operational works on their individual environmental aspect and set out the relevant mitigation measures relating to those aspects.

It is proposed that c.7 staff will be onsite during the day shift. During the night shift c.2 staff will be located in the energy centre. Six parking spaces and four cycle spaces are included in the design. The facility will operate on 2 no. 12-hour shift basis (7am to 7pm, 7pm to 7am). Working hours are expected to be 24 hours a day, 7 days a week. Traffic relating to staff movements have been assessed as part of the traffic and transportation chapter of this EIA Report (Chapter 13).

Fuel oil will be delivered to the site by HGV road tankers, with a maximum of 3 tankers expected to be travelling to and from the site per month. A dedicated tanker unloading area will be provided which will be surrounded by a drainage channel to capture any run-off. A class 1 oil-water full retention separator will be installed to capture any oil in the run-off from the pad. A standard operating procedure for fuel unloading will be in place at the site and tanks will be fitted with high level alarms to prevent overfilling.

Emissions to air as a result of operation of the dual fuel engines has been modelled (Chapter 8). SCR abatement and stack heights of 33m has been incorporated in the design to mitigate air quality emissions. Noise modelling has been undertaken (Chapter 9) in relation to building services plant for general site operation including the

gas generation plant, and the introduction of additional vehicular traffic on existing public roads. Mitigation measures including noise and vibration control measures to ensure that emissions from building services plant do not exceed the relevant criteria at nearby noise sensitive locations.

2.3.4 Decommissioning of the Project

The lifespan of the proposed development is not defined but it is anticipated that it will be maintained, and periodic upgrading undertaken over a long lifetime to meet future demand and upgrade in technology.

If the energy centre is no longer required over the long term, then full decommissioning in accordance with prevailing best practice will be undertaken.

2.3.5 Description of Other Developments

The subject lands overlap partially with the sites of one current electricity transmission applications to An Bord Pleanála under section 182 of the Planning and Development Act (ABP Ref: 310090-21) and a second (*ABP Ref.: 309252-21*) which has recently been granted approval. Previous permissions exists for a Gas Powered Peaking plant within the immediate vicinity of the proposed development at Avoca River Park in 2008 and extension of period in 2013 (WCC Reg.ref:08/426 and *ABP Ref.:138382).* In March 2021, a final grant of permission was issued by Wicklow County Council for a revised layout for a data storage facility development on the lands to the west and southwest of the current application site (*Reg. Ref.: 201285).* Planning is further discussed in Chapter 3.

2.4 HEALTH & SAFETY

2.4.1 Design and Construction Health and Safety

The proposed development has been designed in accordance with the Safety, Health and Welfare at Work Act 2005 (S.I. 10 of 2005) as amended and the Safety, Health and Welfare at Work (General Application) Regulations 2007 to 2016 (S.I. 299 of 2007, S.I. 445 of 2012, S.I. 36 of 2016) as amended and associated regulations.

The proposed development has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience based on a number of similar developments.

2.4.2 General Operational Health and Safety

Prior to start up a comprehensive set of operational health and safety procedures will be established (based on those used at other similar facilities). This will ensure a smooth roll out of operations at the facility.

An Emergency Response Plan will be developed and implemented at the energy centre in consultation with local emergency services.

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2.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The proposed development is to be located on suitably zoned lands redeveloping brownfield land (see Chapter 3). The development, when operational, will generate limited additional traffic, water wastewater emissions, wastes generation, air and noise with mitigation in place. The development will be required to operate in compliance with the EPA IED licence required for operation of the facility.

During construction, there is the potential for temporary nuisance impacts from traffic, dust, noise and construction waste, if not carefully managed. All contractors will be required to implement the CEMP to ensure each of these potential impacts are minimised.

Each chapter of this EIA Report assesses the potential impact of the construction and operation of the proposed development on the receiving environment. The residual impacts of the proposed development following the implementation of mitigation measures have been addressed in each of the following chapters. As part of the assessment of the impact of the proposed development, account has also been taken of developments that are currently permitted or under construction.

Each of the following chapters addresses the Do-Nothing scenario and required in the EPA 2017 guidelines. The Do-Nothing scenario is to retain the site as a brownfield site with likely industrial development in line with the planning for the estate.

2.6 MAJOR ACCIDENTS/DISASTERS

The 2014 EIA Directive and associated Draft EPA EIA Guidelines requires that the vulnerability of the project to major accidents, and/or natural disasters (such as earthquakes, landslides, flooding, sea level rise etc.) is considered in the EIA Report. The site has been assessed in relation to the following external natural disasters; landslides, seismic activity and volcanic activity and sea level rise/flooding as outlined below. The potential for major accidents to occur at the data storage facility has also been considered with reference to Seveso/COMAH.

Landslides, Seismic Activity and Volcanic Activity
There is a negligible risk of landslides occurring at the site and in the immediate vicinity due to the topography and soil profile of the site and surrounding areas. There is no history of seismic activity in the vicinity of the site. There are no active volcanoes in Ireland so there is no risk of volcanic activity. Further detail is provided in Chapter 5 Land, Soils, Geology & Hydrogeology.

Flooding/Sea Level Rise
The potential risk of flooding on the site was also assessed. A Stage 1 Flood Risk Assessment was carried out and it was concluded that the development is not at risk of flooding. Furthermore, it is not expected that the proposed development would adversely impact on flood risk for other neighbouring properties. Further detail is provided in Chapter 6 Hydrology and a Site Specific Flood Risk Assessment.

Minor Accidents/Leaks
There is a potential impact on the receiving environment as a result of minor accidents/leaks of fuel/oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapters 6 and 7 will ensure the risk of minor accidents/leaks of fuel/oils is low and that the residual effect on the environment is imperceptible.

Seveso/COMAH.

The only substance stored on site controlled under Seveso/COMAH will be diesel for generators. The quantity of diesel which qualifies a given establishment for the application of lower-tier and upper-tier requirements under Directive 2012/18/EU is 2,500t and 25,000t respectively.

The development is proposed to store less than 2500t of diesel at any time and therefore the facility will not be a Seveso/COMAH facility.

The only substance stored on site controlled under Seveso/COMAH will be diesel and the amounts proposed do not exceed the relevant thresholds of the Seveso directive.

There is one Notified Seveso Establishment listed within the general vicinity of the proposed development site. Sigma Aldrich Ireland Ltd (Vale Road, Arklow, Wicklow, Y14 EK18) whose HSA-listed activity is described as “production of pharmaceuticals”. The proposed development is located within the 1,000 m Seveso consultation zone for the Sigma Aldrich Ireland Ltd Arklow facility.

2.7 RELATED DEVELOPMENT AND CUMULATIVE IMPACTS

The proposed development is for a gas powered energy centre facility providing grid support as a peaking plant and to provide power for development in the vicinity, including the adjacent permitted data storage facility development and future development in the area. The cumulative impact of the proposed development with the permited and concurrent datastorage development and substation within the overall landholding have been considered in each chapter.

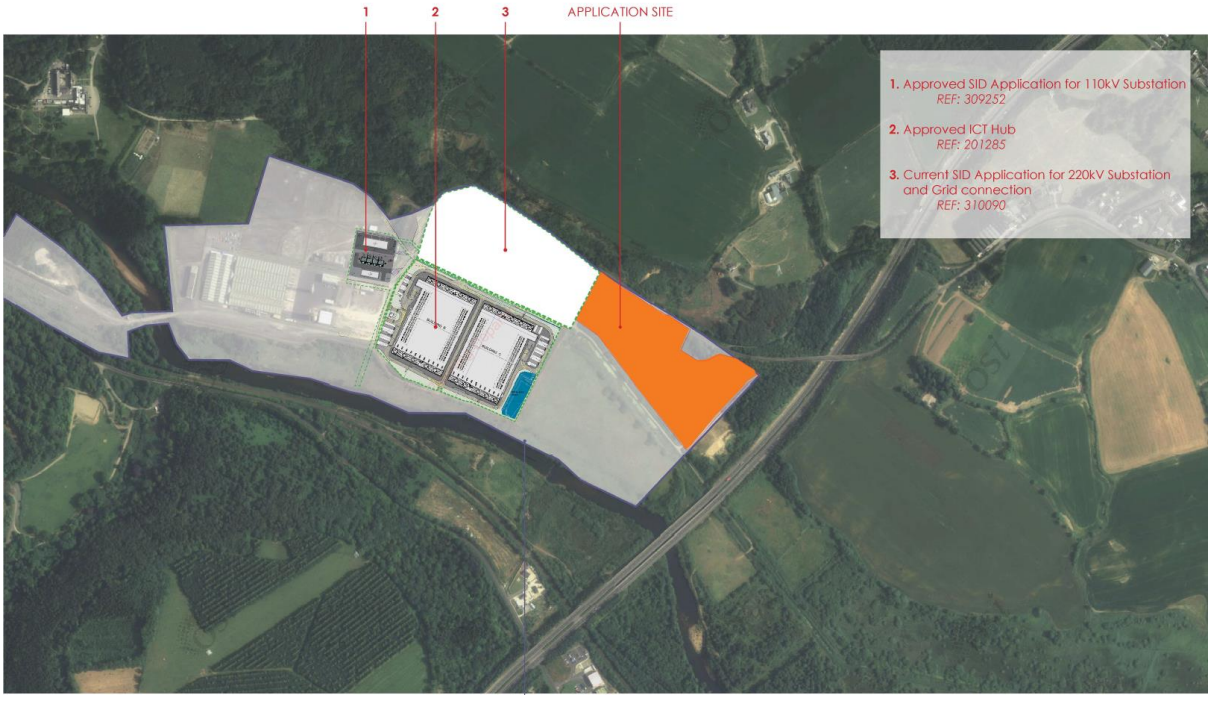


Figure 2.3 Layout showing permitted and concurrent applications.

3.0 PLANNING AND ALTERNATIVES

3.1 INTRODUCTION

This chapter describes the proposed development within the context of the relevant planning policy as it relates to the environment. The proposed development as described in Chapter 2, is located in the Local Authority area of Wicklow County Council (WCC).

The national and regional policy context provides the clear policy link between national policies and Local Authority planning policies and decisions. The relevant documents are the *National Planning Framework – Ireland 2040* and the *Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly*. This chapter will focus on the Local Planning and Development Context and the interaction with the specialist chapters of this EIA report.

The following sections describe how the proposed development complies with the stated and statutory requirements of Wicklow County Council (WCC) with respect to planning and sustainable development. The relevant local planning policy with which the proposed development complies is defined by the:

- Wicklow County Development Plan 2016 – 2022
- Arklow and Environs Local Area Plan 2018 – 2024

EIA legislation and the prevailing guidelines (as set out in Chapter 2) and best practice require that EIA Reports provide a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the Operator, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

This chapter describes the alternatives that were considered for the proposed development, where applicable, under each of the following headings and the reasons for the selection of the chosen option including consideration of environmental effects:

- Do Nothing Alternative;
- Alternative project locations;
- Alternative layouts/designs;
- Alternative processes/technologies; and
- Alternative mitigation.

3.2 DEVELOPMENT CONTEXT

The proposed development site is located north of the Avoca River, in Avoca River Park, approximately 2.5 km northwest of Arklow town centre.

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The subject lands overlap partially with the sites of one current electricity transmission applications to An Bord Pleanála under section 182 of the Planning and Development Act (ABP Ref: 310090-21). There is also one granted permission (*ABP Ref.: 309252-21*) for a substation development. Previous permissions exists for a Gas

Powered Peaking plant within the immediate vicinity of the proposed development at Avoca River Park in 2008 and extension of period in 2013 (WCC Reg.ref:08/426 and *ABP Ref.:138382).* In March 2021, a final grant of permission was issued by Wicklow County Council for a revised layout for a data storage facility development on the lands to the west and southwest of the current application site (*Reg. Ref.: 201285).* The land is zoned as '*E1 Employment'* in the Arklow and Environs Local Area Plan (Arklow LAP) 2018 – 2024 (Figure 3.1).

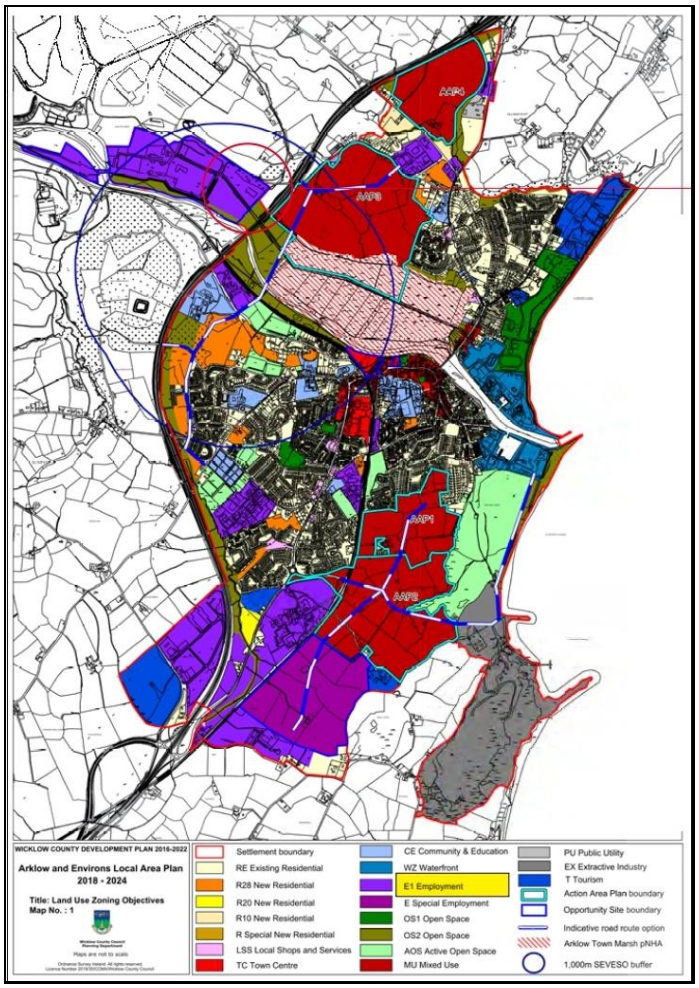


Figure 3.1 Proposed development Lands (red boundary) (*Source: Arklow and Environs Local Area Plan 2018-2024 – Land Use Zoning Objectives Map No. 1*)

The site benefits from a strategic location and is accessible from the M11 via the local road network at junction 20 approximately 5.8km metres to the north east.

The proposed development is located in Avoca River Park, the main entry to which is accessed via the R747. This main entrance is also the principal transport connection for freight and deliveries for the existing Avoca River Park.

The proposed site is connected by local road to the northern end of Arklow where residential areas including once-off ribbon developments along the road, as well as larger residential areas such as Mountain Bay lie. The proposed site is also connected to the R747 via local road. The R747 provides a direct route into Arklow town.

The county town of Wicklow is located approximately 25km north, with Dublin city centre 65 km north of the site. The M11 motorway provides an excellent transport link to the surrounding area. Arklow is also serviced by the Dublin Connolly – Rosslare train line.

The northern aspect of the proposed development site is largely defined by agricultural lands, as well as some once-off developments associated with these agricultural holding. The proposed development is located in the Avoca River Park, which is bounded by the south by the Avoca River, with the Dublin to Gorey/Rosslare Europort railway line running to the south of the Avoca River.

The main defining feature to the east of the site is the M11 motorway, with undeveloped agricultural lands and Arklow town located further east of that.

As discussed in Chapter 1 (Introduction), the proposed development is designed to as a peaking plant which will support the power demand of the permitted data storage facility development on lands adjacent to the proposed development, as permitted under *Reg. Ref.: 201285*, provide and surrounding future development.

3.3 LOCAL PLANNING CONTEXT

3.3.1 Wicklow County Council Development Plan 2016 – 2022

The Wicklow County Development Plan 2016-2022 (Wicklow CDP) sets out a coherent spatial planning framework for the County over the plan period within the context of national and regional policies. The plan covers the administrative area of Wicklow. The county occupies a land area of over 2,027 square kilometres in the east of Ireland. The county stretches from the Wicklow mountains and the Dublin county boundary in the north to the Kildare boundary in the west with Wexford and Carlow boundaries to the south. Eastwards the county is bordered by the Irish Sea.

The Wicklow CPD denotes Arklow as an economically active town and the main centre in the south of the county. It identifies the recent M11 upgrade and Arklow wastewater treatment plant (WWTP) as crucial infrastructure to allow for expanded development. Once completed it will be able to provide for the population target and commercial and business needs forecasted within the Arklow and Environs Local Area Plan 2018-2024 (Arklow LAP).

The relevant policies and objectives of the Wicklow CDP and are noted in the sections below.

Core Strategy

The Core Strategy describes Arklow as a town being *'smaller in scale but strong active growth towns, economically vibrant with high quality transport links to larger towns/city'*. It also identifies Arklow as located along a strategic development corridor, and a subsidiary attractor for inward investment.

Settlement Strategy

Chapter 3 of the Wicklow CDP sets out the settlement strategy for County Wicklow and sets out the role and function of each level within the settlement hierarchy and information on growth targets. Arklow is identified as a 'Level 3 - Large Growth Town II' within the settlement hierarchy.

The settlement strategy notes that the town should aim to attract "*a concentration of major employment generating investment and should target investment from foreign and local sources in a mixture of 'people' and 'product' intensive industries*".

Arklow is strategically located on M/N11 with ease of access to Dublin and Rosslare, with a good supply of zoned employment lands. The applicant seeks to make use of this zoning for the proposed development, and provide employment generating investment into the area.

Electricity Transmission and Distribution

The Wicklow CDP outlines specific objectives in relation to electricity transmission and distribution, as detailed in Table 3.1 below.

Table 3.1 Electricity Transmission and Distribution Objectives/Policies

Objective	Summary
CCE17	To support the development and expansion of the electricity transmission and distribution grid, including the development of new lines, pylons and substations as required.

In addition, Eirgrid policy https://www.eirgridgroup.com/site-files/library/EirGrid/Data-Centre-Connection-Offer-Process-and-Policy_v2_July-2020.pdf encourages the development of on site generation of electrical power as a route to offset the requirement for flexible demand.

Economic Development

Chapter 5 of the Wicklow CDP provides an overview of the economic vision with policies across a range of business and industry sectors. It defines the overarching strategy of sustainable economic development, competitive advantage, employment growth, and development of a highly skilled workforce supported by good quality infrastructure.

Information and communications technology is specifically identified as a sector for growth and it is stated:

> *The information and communications sector forms the second largest industrial group in Wicklow. With Ireland being a technology hub of choice for many when it comes to attracting the strategic business activities of ICT companies, significant opportunities exist to develop this sector with the County. The presence of Clermont College and its envisaged expansion as a third level centre of excellence alongside Wicklow's highly educated workforce further enhance the attractiveness of the County to prospective new companies within the ICT sector maximising the potential of the County.*

The site is subject to extant planning permission for a data storage facility (*Reg. Ref.: 201285*), with the proposed development intended to serve the power needs of the permitted development. As such, the proposed development will directly support the development of the information and communications sector in the Wicklow region, as well as the employment associated, as per the objectives of the Wicklow CDP. As a peaking plant, the development will provide stable power generation to offset the intermittency of major new renewable development, including for example the Arklow Bank windfarm, the proposed substation for which is directly adjacent to the subject site.

3.3.2 Arklow and Environs Local Area Plan 2018 – 2024

The Arklow LAP expresses Wicklow County Council's Policy to: ''*Enhance and facilitate the balancing of economic, social and environmental infrastructure in order to maintain and develop a high quality of life without compromising the protection of the environment and the needs of future generations.*''.

The location of this energy centre, provides a key component in the support of local employment and provides an anchor for attracting foreign investment or multinationals interested in large scale IT. This allows for the continued growth experienced in the area, and Arklow's position as a growth town for the surrounding environs of south County Wicklow.

The proposed development site is located within the boundary of the Arklow LAP. Under the LAP the land is zoned as '*E1: Employment'*.

The application site forms part of the employment land at Shelton Abbey which is identified as an opportunity site within the Local Area Plan. The Plan states the following:

"The site [primarily] *located in Shelton Abbey Townland, west of Arklow town and to the west of the M11 motorway. It was the site of the Irish Fertiliser's Industry (IFI) factory which operated from here from the 1960's to the 2000's. When in operation it was a thriving industry with a significant number of employees and had direct access to the rail network for freight. The site has a number of distinct businesses operating from same.*

While this site is outside of the town's 'natural' western boundary, the N11, the fact that it is a brownfield site, previously occupied by intensive industrial users and given the availability of services to the site such as a natural gas supply line, high voltage electricity supply with a direct 110kv connection to the national grid and potential direct access to the Dublin to Rosslare train line to the south, it is considered suitable for designation for significant redevelopment for employment purposes. Vehicular access is from the Beech Road/L6179 to the north.

The site also benefits from a scenic setting with Shelton Abbey ground to the west and Glenart Castle and grounds to the south. The site is zoned 'E1 Employment' and measures 48.7ha in total (including all existing buildings thereon). The site is suitable for a significant employment / industrial development. Lands are zoned 'Open Space 2' on the southern and eastern sides of the employment zone (43.7ha) to provide an undeveloped buffer along the river, for the floodplain, the Town Marsh pNHA and the set back from the motorway."

The Arklow LAP provides for site specific policies and zoning as detailed in Table 3.2 below.

Table 3.2 Zoning Objectives

Zoning	Objective	Description
E1: Employment	To provide for the development of enterprise and employment	To facilitate the further development and improvement of existing employment areas and to facilitate opportunities for the development of new high-quality employment and enterprise developments in a good quality physical environment.

Economic Development and Employment

The Arklow LAP notes that given Arklow's scale, its large growth town designation, its identification as part of the 'Wicklow / Arklow Core Economic Area', its strategic location on the M11/N11 and on the Dublin to Rosslare rail line, and its active port, the town has the capacity to act as an attractor for substantial foreign and local investment.

The proposed development will support the growth of the permitted development (*Reg. Ref.: 201285*), the growth of the established Avoca River Park, and ensure sustainable development at the location in accordance with the aims, objectives and policies of the Arklow LAP.

The Arklow LAP provides economic and development and employment objectives, the relevant of which are detailed in Table 3.3 below.

Table 3.3 Economic Development and Employment Objectives

Objective	Summary
ED1	To facilitate and support all forms of employment creation on appropriately zoned land in Arklow and to promote the intensification of activities on existing employment sites and to take advantage of the existing economic assets in order to stimulate further employment within the area.
ED4	To promote and facilitate the development of large-scale employment generating developments, including industrial, knowledge, high-technology, office and service based and science based developments, at appropriate locations.

3.4 PLANNING PERMISSIONS AND DEVELOPMENT WITHIN THE SURROUNDING AREA

As part of the assessment of the impact of the proposed development, account has been taken of relevant developments that are currently permitted, or under construction and substantial projects for which planning has been submitted within the surrounding areas. Figure 3.1 presents the current permitted and concurrent applications at the Avoca site.

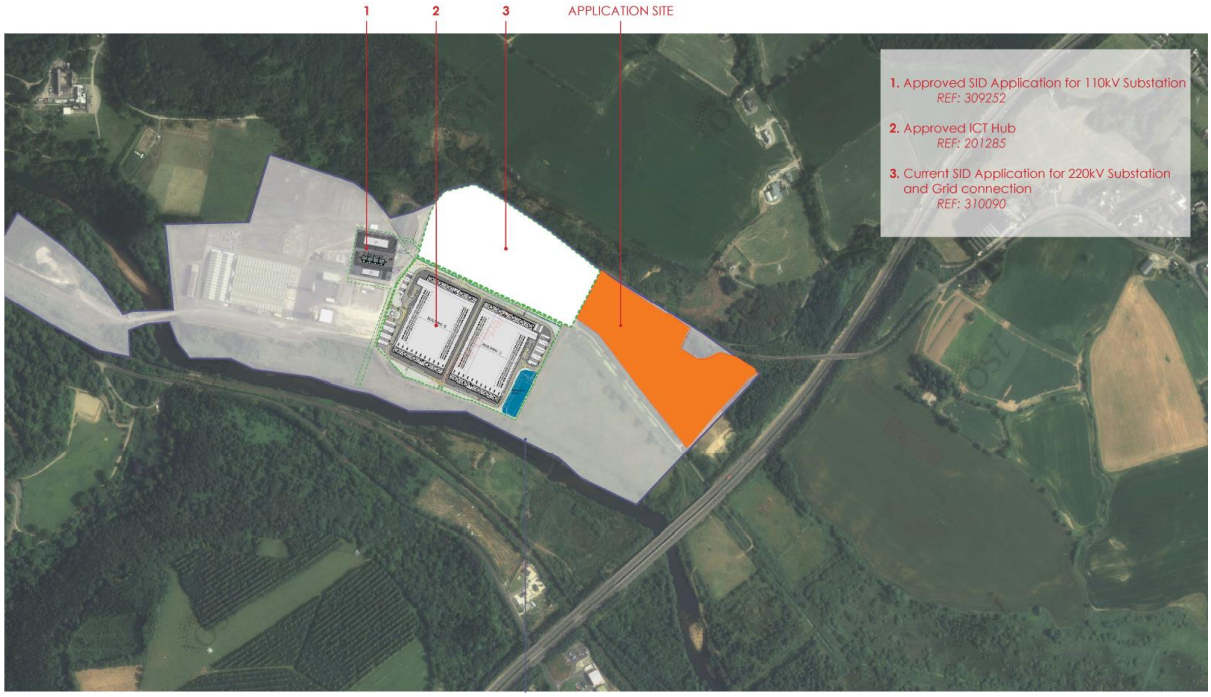


Figure 3.1 Layout showing permitted and concurrent development

The WCC online planning tool was used to generate a list of relevant planning permissions from the surrounding areas of the proposed development within the previous five years. This search omitted individual residential dwellings and works to residential dwellings. The outcome of this search is presented in Table 3.4 below.

The review of the online planning tool also showed a number of applications for small extensions, retention and other minor alterations to developments in the vicinity of the proposed development. These permissions were for established business within the vicinity of the development and have been considered as a part of the overall project impact.

Table 3.4 Relevant planning history for the last 5 years within the vicinity of the proposed development site.

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
VA27.310090	Onshore grid infrastructure-220kV onshore export circuits and fibre optic cables, from the landfall of the offshore export circuits, to a proposed new 220kV substation and connection from the new substation to the National Electricity Tranmission Network.	DECISION DUE DATE 27/10/2021
21677 Kish Renewables Limited Kish Business Park, Clogga Road, Arklow, Co. Wicklow	Construction of Biofuel facility comprising of a part 3 storey and part single storey commercial building with a total floor area of 1771m2, covered truck filling / unloading area. Pipe bridge and tank farm storage area. The overall building height is 14 metres with solar panels on the roof. The maximum height of any storage tank is 12 metres and the boiler room chimney is 15 metres. Extension of the existing Kish Business Park access road, footpaths, drainage and water supply to serve the subject site. New internal roads, footpaths, 21 no. car parking spaces, 10 no. cycle parking spaces and parking and circulation areas for 10 no. trucks; 2 no. vehicular entrances, pedestrian access, boundary treatment and landscaping, ESB substation and new underground foul and storm water drainage system for the site including rainwater harvesting, attenuation pond, full retention oil interceptor and associated works. The application site area is 1.6 hectares. An Environment Impact Assessment Report (EIAR) has been prepared and will be submitted to the Planning Authority with the planning application	RECEIVED DATE 04/06/2021 DECISION DUE DATE 29/07/2021
21647 Sunbeam House Services The Garden Centre, Ballyraine Campus, Vale Road, Arklow, Co. Wicklow. Y14 KN53	The change of use of an existing retail unit to assembly and recreation use including the provision of a coffee dock and a gift shop, removal of condition no. 5 from previous planning permission Reg. Ref. 99/785 and the installation of a playground adjacent to the building; together with associated ancillary site works	FURTHER INFORMATION REQUESTED 21/07/2021
21641 Centz Stores 7 Beech Road, Kilbride, Arklow, Co. Wicklow	Erection of a single storey storage building associated with and ancillary to an existing adjoining retail premises	PERMISSION GRANTED (with conditions) 15/07/2021
21437 Cordiva Limited	The proposed development will consist of revisions to development permitted under Reg. Ref. 08/610066 (as extended by Reg. Refs. 13/610035 and 19/373 and revised by Reg. Refs. 16/1418, 18/1033, 19/266 and 20/187 and concurrent revisions application Reg. Ref. 20/235 and shall provide for the replacement of 55 no. previously permitted units located in 'Phase3' (comprising 6 no. Type B, 16 no. Type C, 17 no. Type D and 16 no. Type X 3 bedroom semi-detached/terraced 2 storey house units) with 83 no. residential units (comprising 67 no. 2 storey houses and 16 no. apartment /duplex units arranged across 3 storeys). Permission is also being sought for the omission of 22 no. previously permitted	FURTHER INFORMATION REQUESTED 11/06/2021

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
Heatherside, Vale Road, Yardland Td., Arklow, Co. Wicklow	units comprising 6 no. houses (consisting of 2 no. 3 bedroom semi-detached 2 storey Type C house units and 4 no. 3 bedroom terraced 2 storey Type D house units) and 16 no. apartments (consisting of 8 no. 2 bedroom single storey/ground floor apartment units and 8 no. 3 bedroom 2 storey/duplex apartment units) located to the north of the site and in their place the provision of an enlarged area of public open space. The 83 no. residential units shall comprise 6 no. 2 bedroom terraced 2 storey Type A house units c.81.3 sq m each; 27 no. 3 bedroom terraced /semi-detached 2 storey Type C house units c.96.8 sq m each; 4 no. 3 bedroom semi-detached 2 storey Type D house units c.97.6 sq m each; 30 no. 2 bedroom terraced 2 storey Type F house units c. 81.8 sq m each; 8 no. 1 bedroom single storey/ground floor apartment units c.45.3 sq m each and 8 no. 2 bedroom 2 storey/duplex apartment units c.77.7 sq m each with north-east facing balconies at 2nd floor level and associated private open space throughout. All associated landscaping works, open space, boundary treatments; bin storage; car and bicycle parking; residential access roads and pedestrian access; all associated site development works and services provision. All other development within the site will remain as permitted under Reg. Ref. 08/610066 (as amended and extended)	
21238 Arklow Geraldine's Ballymoney GAA Club Pearse's Park, Vale Rd, Yardland, Arklow, Co. Wicklow	Installation of 6 no. 16m high floodlights together with associated site works	FURTHER INFORMATION REQUESTED 23/04/2021
21156 Harmony Timber Solutions Limited Avoca River Park, Glenart, Arklow, Co. Wicklow	An amendment to Block 1 permitted under PPR 19/54 consisting of a single storey extension (281sqm) and all associated site works	PERMISSION GRANTED (with conditions) 07/04/2021
SI202102	Development primarily comprises the demolition of existing structures on site and the provision of a substation compound along with associated and ancillary works and is	RECEIVED DATE

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
Crag Digital Avoca Ltd Avoca River Park, Arklow, Co. Wicklow	described as follows: The existing structures on site to be demolished comprise 4 no. industrial commercial buildings, an associated hut/outbuilding, a gas enclosure, and a tank with bund wall. The remains of a previously demolished building, areas of hard standing, and existing surface treatments will also be removed as part of the site clearance works. The proposed substation compound is subdivided into two parts. The northern part of the compound will accommodate a two storey 110kV GIS substation building (with gross floor are of c. 1,377 sqm). The southern part of the compound will accommodate four transformers and a single storey client control building (with a gross floor area c. 416sqm) and associated underground services. Both parts of the substation compound will be enclosed within 2.6metre high security fencing. The overall compound will be enclosed with a property fence 1.4 metre height. The development includes access paths, landscaping, security fencing, provision of access roads, car parking within the GIS substation compound, provision of a rural supply electricity connection (connecting to existing electrical services to the east of the proposed substation compound) for the GIS substation building, a unit substation, lightning masts, drainage and attenuation systems, services, and all associated construction works, and all ancillary works	PERMISSION GRANTED (with conditions) 19/08/2021
201282 Harmony Timber Solutions Limited Avoca River Park, Glenart, Arklow, Co. Wicklow	(i) first floor extension to existing single storey weighbridge office (ii) above ground fire water storage tank to serve this building and development permitted under PPR 19/54 (iii) omission of office building permitted under PPR 19/54 and all associated site works	PERMISSION GRANTED (with conditions) 11/02/2021
201285 Crag Digital Avoca Limited Avoca River Park, Shelton Abbey & Kilbride, Arklow, Co. Wicklow	1. Demolition of existing ind building units totalling (C.2784.4m2) comprising of a c.7.1m high Overall Main Building (c.2460m2), a c.4.2m high Sub-station (c. 107.3m2), a c.3.6m high Guardhouse (c.106.2m2), a c.3.6m high East-Building (c.39.1m2), c.5m high Water Tank (c.56.8m2) &c.2.6m high Pump House Building (c.15.1m2), assoc works. 2. Dev of 3 no. Data Centre Buildings, ancillary offices & plant comprising of: Data Centre Building A, - a single storey Data Centre Building, with mezzanine 1st floor level offices (GFA c.10,564m2, building height c.13,658m & structures c.15,137m), made up of 2 no. Data Halls & loading areas with assoc 2 no. Dock Levellers & including 10 no. c.14m high flues, & adjacent 1 no. Standby Power Generation Compounds, consisting of 10 no. HV Diesel Generators &belly tanks (GFA c.530 m2), 1 no. storage fuel tank (GFA c.15m2). Data Centre Building B – a single storey data centre building with mezzanine 1st floor level offices (GFA c.18,508m2, building height c.13,658m &structures c.15,137m), made up of 4 no. Data Halls &loading areas with associated 2 no. Dock Levellers &including 20 no. c.14m high flues, &adjacent 2 no. Standby Power Generation Compounds, consisting of 20 no. HV diesel Generators &belly tanks (GFA c.1,060 m2), 2 no. storage fuel tanks (GFA c.30m2). Data Centre Building C – a single storey data centre building with mezzanine 1st floor level offices (GFA c.18,508m2, building height c.13,658m & structures c.15,137m), made up of 4 no. Data Halls & loading areas with associated 2 no. Dock Levellers &including 20 no. c.14m high flues, &adjacent 2 no. Standby Power Generation	PERMISSION GRANTED (with conditions) 16/02/2021

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
	Compounds, consisting of 20 no. HV Diesel Generators & belly tanks (GFA c.1,060 m2), 2 no. storage fuel tanks (GFA c.30m2). 3. Upgrading of existing 110 kV Substation to comprise of Compound (c. 8539m2) consisting of 11 kV GIS Switch Room (GFA c.708m2), &4 no. External Transformers (GFA c.550m2), a grid connection, security fence & all assoc works & services. 4. Dev of 1 no. Fire Hydrant Pump Hse (GFA c.129m2) with Sprinkler Tank (c.49m2), 1 no. single storey Security Guard Hse (GFA c.48m2) &2 no. vehicular accesses, internal access rds & 224 no. surface car parking spaces. 5. An upgraded attenuation basin, a proposed ww treatment plant &polishing filter. 6. All assoc site services, with c.2.7m high palisade fence, landscaping, boundary & all assoc site development works above & below ground. An EIAR has been prepared in respect of the proposed development	
20235 Cordiva Ltd Heatherside, Vale Road, Yardland Td, Arklow, Co. Wicklow	Revisions to development permitted under Registry Reference 8/610066 (as extended by Reg Refs 13/610035 and 19/373 and revised by Reg Refs 16/1418, 18/1033 and 19/266 and concurrent revisions applications Reg Ref 20/187 and shall provide for the replacement of 55 no. previously permitted units located in 'Phase 3' (comprising 6 no type B, 16 no type C, 17 no type D and 16 no type X 3 bedroom semi-detached / terraced two storey house units), with 84 no. residential units (comprising 68 no 2 storey houses and 16 no. apartment / duplex units arranged across 3 storeys). Permission is also being sought for the omission of 22 no. previously permitted units comprising 6 no. houses (consisting of 2 no 3 bedroom semi-detached two storey type C house units and 4 no 3 bedroom terraced 2 storey type D house units) and 16 no. apartments (consisting of 8 no 2 bedroom single-storey / ground floor apartment unit and 8 no. 3 bedroom 2 storey / duplex apartment units) located to the north of the site and in their place the provision of an enlarged area of public open space	PERMISSION GRANTED (with conditions) 20/01/2021
20662 Sigma Aldrich Ireland Ltd Vale Road, Arklow, Co. Wicklow	1) A portal fame structure 20 m long by 14 m wide by 7.5 m high (floor area 280 m2). The building will be used as a store to house spare parts and maintenance equipment. 2) A single-storey office 5.0 m by 3.5 m within the proposed store to keep records and specification details of the spare parts and equipment stored. 3) Associated site works.	PERMISSION GRANTED (with conditions) 02/09/2020
19/1322 Robert Marshall Kish Business Park, Clogga Road, Arklow, Co. Wicklow	Single storey 710 sqm industrial unit, comprising of a 236 sqm metal fabrication workshop, and 474 sqm trade sales and display area, plus 272 sqm concrete surfaced yard with security fence to the side of the proposed building, connect into the existing mains sewer and storm water systems, to provide car parking, a 3.5m high sign at the site entrance and all additional site works	PERMISSION GRANTED (with conditions) 06/02/2020
ABP 302556 / SI201801 Irish Water	Proposed Waste Water Treatment Plant, Interceptor Sewers and Associated Works	PERMISSION GRANTED (with conditions) 01/08/2019

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
Ferrybank and Tinahask Lower, Arklow, Co. Wicklow		
19545 Alan Connolly Boglands, Arklow, Co. Wicklow	Demolish the existing 90 sqm substandard dwelling and all outbuilding totalling 84 sqm and erect a new 215 sqm dwelling and 84 sqm garage, upgrade the existing effluent disposal system to current EPA standards, improve the existing vehicular entrance along with all associated site development works	PERMISSION GRANTED (with conditions) 04/07/2019
19373 Ardale Property Ltd Yardland, Vale Road, Arklow, Co. Wicklow	Extend the appropriate period of a permission - 08/66 – residential development comprising a creche; 185 houses with 4 house types; 8 subject to duplex units over 8 apartments; new access/relief road and conditions infrastructure linking Vale Road to Lamberton Avenue; all services and on ancillary site development works; relocation of part of existing overhead ESB lines; with temporary effluent treatment plant and sewerage pumping station at Yardland, Vale Road.	PERMISSION GRANTED 23/05/2019
19332 Rappel Enterprises Ltd Avoca River Business Park (former IFI Facility), Shelton Abbey, Arklow, Co. Wicklow	Extend the appropriate period of a permission - 13/8823 - single-storey industrial unit with ancillary office accommodation at ground and subject to mezzanine floor level (floor area 1,611 sqm), wastewater treatment conditions plant and associated site works and drainage	PERMISSION GRANTED 16/05/2019
1954 Harmony Timber Solutions Ltd Avoca River Park, Glenart, Arklow, Co. Wicklow	Detached two storey office building (249 sqm) detached timber factory building with canteen, wcs and 1st floor office (1432 sqm) and detached timber factory building with mezzanine office / wcs / canteen (1476 sqm), site layout to include 3 no yard areas, 30 no car parking spaces, 20 no cycle spaces, 2 no bin storage area, 3 no vehicular entrance gates, boundary fence, wastewater treatment system and associated site works	PERMISSION GRANTED (with conditions) 12/03/2019
18/711 Kish Business Park Ltd Kish Business Park, Clogga Road, Arklow, Co. Wicklow	Single storey industrial unit (Gross Area 1513sqm) comprising 6 individual units for light industrial and warehousing use, 35no carparking spaces, truck unloading bay, connection to existing services and all associated site works	PERMISSION GRANTED (with conditions) 06/03/2019

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
18940 Crag Digital Avoca Ltd Avoca River Business Park, Shelton Abbey, Arklow, Co.Wicklow	Demolition of buildings & structures on site & construction of Data Storage Facility comprising 3 data storage buildings & all associated site infrastructure: data storage facility 1 (6 Pod Data Centre) located to north of site served by 1 gas generator compound to south of Data Storage building including 5 flues & 2 bunded fuel tanks located to south east & south west of Data Storage building & powered by (-part grid / - part gas) with emergency diesel fuel backup. Data storage facility 2 (8 pod data centre) located to south of Data Storage Facility 1 served by 1 gas generator compound to the south of building including 6 flues & 2 bunded fuel tanks located to south east & south west of Data Storage building & powered by (-part grid / -part gas) with emergency diesel fuel backup. Data storage 3 (8 pod data centre) located to south of site served by 1 diesel generator compound to north of building including 8 flues & 2 bunded fuel tanks, located to north east & north west of Data Storage building & powered by grid. The development will consist of upgrade of existing 100 kV substation to provide a Substation Compound comprising Gas Insulated Switchgear equipment with 4 50 mega Volt Amp bays within a singlestorey MV building 10 lighting protection masts, 4 oil filled transformers, with circa 2.4 m high palisade fence, provision of 1 single-storey security guard house at primary access to data storage facilities, provision of 4 vehicular access points off Shelton Abbey (access road) on western side (2 to serve Data Storage Facilities, 1 to serve GIS substation & 1 to serve MV building), internal access roads, surface level car parking, site services (foul & surface water drainage & water supply) including 1 pump house with 3 water tanks to south west, 1 attenuation basin to south east, waste water treatment plant to the west of Shelton Abbey (access road), landscaping, boundary & site dev works above & below ground. Accompany by EIAR.	PERMISSION GRANTED (with conditions) 15/02/2019
181404 Sigma Aldrich Ireland Ltd Vale Road, Arklow, Co. Wicklow	Portal frame structure 69m long by 15.4 m wide by 6.5m high (floor area 1063 sqm) to enclose existing drum storage bund in pharmaceutical complex	PERMISSION GRANTED (with conditions) 14/02/2019
18/1283 Armstrong Timber Engineering Ltd Unit 1 Kish Business Park, Clogga Road, Arklow, Co. Wicklow	56 sqm of existing first floor office and external window and full permission for office (gross area 120 sqm) and windows at second floor, new fire escape at ground floor, additional parking and all associated site works	RETENTION GRANTED (with conditions) 15/01/2019
18772 Robert & Alan Kennedy Kilbride, Arklow, Co.	Change of use of part of an existing commercial mushroom farm to a steel container self storage facility along with all associated site development works to include security fencing to all boundaries and upgrading of the existing site entrance	PERMISSION GRANTED (with conditions) 24/08/2018

Planning Reference, Applicant & Location	Development Description	Decision & Decision Date
Wicklow		
18/663 William Jameson Boglands, Arlow, Co. Wicklow	Extensions to dining room and play room, revision to window on West Elevation. Upgrade and replacement of existing roof, retention permission is also sought for garage/garden store all with associated site works	PERMISSION GRANTED (with conditions) 27/07/2018
1831 Sigma Aldrich Ireland Ltd Vale Road, Arklow, Co. Wicklow	Erection of 3 illuminated signs at pharmaceutical complex to reflect a rebranding of the company as a subsidiary of Merck KGaA. Two signs are to be located at the entrance to the site and will replace two existing signs at the site entrance. The third sign will be located on the south west gable of the existing distribution warehouse building	PERMISSION GRANTED (with conditions) 22/03//2018
17/941 Armstrong Timber Engineering Ltd Unit 1 Kish Business Park, Clogga Road, Arklow, Co. Wicklow	Single storey industrial unit (gross area 1523 sqm) for timber storage, revised parking layout and all associated site works and RETENTION of revised layout to eastern gable doors to existing building and boundary fence treatment	PERMISSION GRANTED (with conditions) 19/10/2017
161418 Cordiva Ltd Vale Road, Yardland Td., Vale Road, Arklow	Laying of 570m(approx.) of 100mm diameter uPVC watermain through greenfield lands and laying of 340m (approx.) of 100mmdiameter uPVC watermain along Glenart Drive including all associated valves, chambers and meters and associated site works	PERMISSION GRANTED (with conditions) 09/02/2017
161384 Sigma Aldrich Ireland Ltd Vale Road, Arklow, Co. Wicklow	Steel framed weatherproof structure to enclose existing air handling units, a cold water storage tank and ancillary equipment including utilities pipework, electrical cabling and ducting located on the roof of the existing laboratory building in pharmaceutical complex	PERMISSION GRANTED (with conditions) 01/02/2017

3.5 SEVESO AND COMAH SITES

The Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015) or 'COMAH' regulations define the "consultation distance" as a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment, including potentially significant consequences for developments such as residential areas, buildings and areas of public use, recreational areas and major transport routes.

Establishments are either lower tier establishments or upper-tier COMAH sites with above threshold quantities of dangerous substances present, and to which the provisions of the COMAH regulations apply. The proposed development does not meet the thresholds for either lower or upper tier.

The Health and Safety Authority (HSA) list of Notified Seveso Establishments has been reviewed to identify any facilities within the lands surrounding the development site. According to the Wicklow CDP and the HSA database, there is one Notified Seveso Establishments listed within the general vicinity of the proposed development site. Sigma Aldrich Ireland Ltd (Vale Road, Arklow, Wicklow, Y14 EK18) is a designated lower-tier facility, whose HSA-listed activity is described as "production of pharmaceuticals". The proposed development is located within the 1,000 m Seveso consultation zone for the Sigma Aldrich Ireland Ltd Arklow facility. The proposed development will not be a Seveso/COMAH facility. The only substance stored on site controlled under Seveso/COMAH will be small volumes of diesel for backup generators and the amounts proposed do not exceed the relevant thresholds of the Seveso Directive. The proposed development is classified as Level 1 type development which is permissible in terms of the land use planning guidelines.

The Wicklow CDP contains policies for managing Seveso sites and developments within their consultation zone, as outlined in Table 3.5 below.

Table 3.4 Seveso site policies

Objective	Summary
EMP13	The Seveso Directive 96/82/EC as amended by Directive 2003/105/EC and more recently by Directive 2012/18/EU is concerned with the prevention of major accidents that involve dangerous substances and the limitation of their consequences for humans and the environment. It applies to establishments where dangerous substances are produced, used, handled or stored. This EU directive seeks to ensure the safety of people and the environment in relation to major industrial accidents involving dangerous substances. The European Communities (Control of Major Accident Hazards Involving Dangerous Substances) (the "COMAH Regulations", (S.I. No. 209 of 2015) implement the Seveso III Directive (2012/18/EU) and are the main regulations that give effect to this Directive in Irish law. The National Authority for Occupational Safety Health (i.e. the Health and Safety Authority – HSA) has been designated as the central competent authority for enforcement of these regulations. There are two Seveso sites in County Wicklow (as of Sept 2015), located at Schering-Plough, Rathdrum and Sigma Aldrich Fine Chemicals, Arklow. In relation to the Prevention of Major Accidents (Control of Major Accident Hazards Involving Dangerous Substances) legislation, it is the objective of the Council to: • comply with the Seveso III Directive in reducing the risk and limiting the potential consequences of major industrial accidents;

Objective	Summary
	• where proposals are being considered for the following: (i) new establishments at risk of causing major accidents, (ii) the expansion of existing establishments designated under the Directive, and (iii) other developments proposed near to existing establishments; the Council will require that applicants must demonstrate that the following considerations are taken into account: (i) prevention of major accidents involving dangerous substances, (ii) public health and safeguarding of public health, and (iii) protection of the environment; • ensure that land use objectives must take account of the need to maintain appropriate distances between future major accident hazard establishments and residential areas, areas of substantial public use and areas of particular natural sensitivity or interest; and • have regard to the advice of the Health and Safety Authority when dealing with proposals relating to Seveso sites and land use plans in the vicinity of such sites

3.6 INDUSTRIAL EMISSIONS LICENCED FACILITIES

According to the EPA (2019) there are two licensed IE/IPPC facilities in the immediate vicinity of the site. There are no licensed public waste facilities in the vicinity of the proposed development. However, the development is proposed to overlie a licenced industrial landfill as outlined in Chapter 2. Details of licensed sites in the vicinity of the proposed development are presented in Table 3.6 and Figure 3.2.

Table 3.6 EPA Licenced facilities near to the proposed development site

Registration number	Name	Category	License type	Distance (km)
P0031	Avoca Park River Limited	Industry	IPPC	At development site
P0089	Sigma-Aldrich Ireland Limited	Industry	IE	1



Figure 3.2 EPA Licenced facilities in the vicinity of the proposed development site

3.7 ALTERNATIVES

3.7.1 Do Nothing Alternative

The wider landholding is subject to a permission (*Reg. Ref.: 201285*) for a data storage facility and ancillary development. It is intended that the proposed development will provide power supply will operate as a peaking plant and provide power for the permitted development and wider area and national grid. In the event that the proposed development does not proceed, development of additional data storage facilities on this site would be left without adequate permanent power supply and there would not be additional infrastructure to support the power network e.g. when wind power not available due to weather conditions. The site itself would remain as a brownfield development.

There are no environmental effects associated with the do-nothing scenario.

The Do-Nothing scenario has been considered in each chapter of the EIA Report.

3.7.2 Alternative Project Locations, Scale and Size

The proposed development is required to provide supply for the permitted datacentre and broader area. As such there is a requirement to have it adjacent to the permitted datacentre. Figure 3.4 presents the two locations considered for the proposed power generation facility at Avoca.

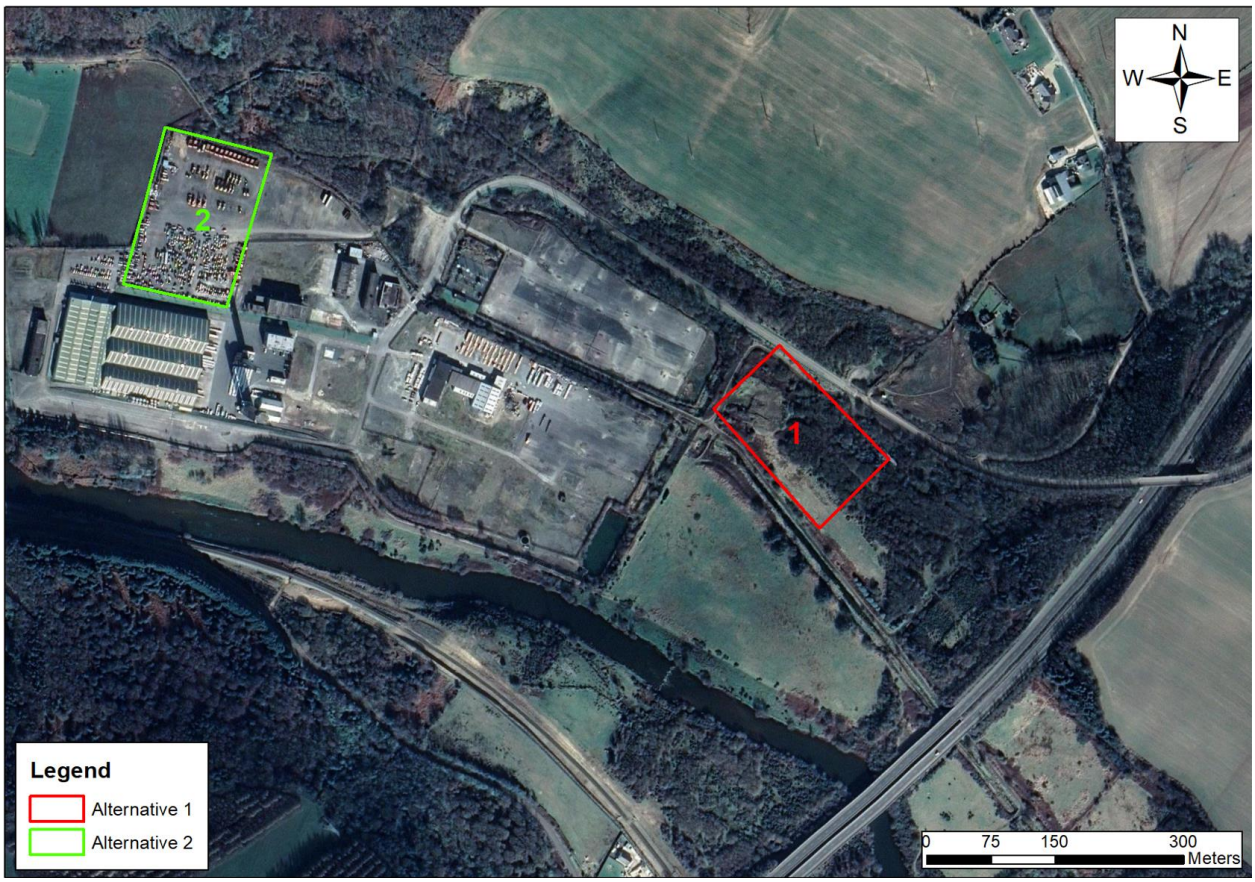


Figure 3.4 Alternative locations for Energy Centre

Proposed location 1 is the site area chosen for the development. Proposed location 2 was not chosen primarily as it did not have adequate space for both phases of the power generation facility and the battery store. In addition, location 2 was considered to have a more significant landscape impact in terms of proximity to the Shelton Abbey site. With mitigation in place there are no significant variations in terms of other environmental aspects i.e. air, noise, soils, geology water, traffic or archaeology.

3.7.3 Alternative Processes

This section typically examines the project processes in relation to likely emissions to air and water, likely generation of waste and likely effect on traffic to determine the process that is least likely to impact on these parameters.

As the proposed development will provide power to the datacentre development and broader network, it is limited in the alternate processes that can be considered. To meet the requirements for a back up supply, the engines are designed for dual fuel (diesel and gas). In addition the proposed development includes a significant battery store to facilitate storage of power and trickle feed in off peak times. The design will meet with Eirgrid's strict specifications respectively to ensure they will be seamlessly absorbed into the national grid infrastructure and can provide a reliable power supply.

3.7.4 Alternative Mitigation

For each aspect of the environment, each specialist has considered the existing environment, likely impacts of the proposed development and reviewed feasible mitigation measures to identify the most suitable measures appropriate to the environmental setting of the proposed development. In making a decision on the most suitable mitigation measure the specialist has considered relevant guidance and legislation. In each case, a comparison of environmental effects was made, and the specialist has reviewed the possible mitigation measures available and considered the use of the mitigation in terms of the likely residual impact on the environment. The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction and offsetting (not required in this Proposed development). Mitigation measures have also been considered based on the effect on quality, duration of impact, probability and significance of effects.

The selected mitigation measures are set out in each of the EIA Report Chapters.

3.8 CONCLUSIONS

The proposed development is in accordance with the policies and objectives of Wicklow County Development Plan 2016-2022, and Arklow Town and Environs Local Area Plan 2018 - 2024.

The site context does not include any Industrial Emissions licenced sites. The proposed development site lies within the consultation zone of one Seveso/COMAH site. The proposed development will not be a Seveso/COMAH facility. The proposed development is classified as Level 1 type development which is permissible in terms of the land use planning guidelines.

The development is located on lands zoned for ‘Employment’ within the Arklow Town & Environs Local Area Plan, which provide for IT infrastructure, infrastructure which the proposed development will facilitate by means of a permanent source of power.

The development is an appropriate land use for the area and meets the requirements of the WCC zoning objectives. The development will minimise the potential environmental impacts as described in various chapters of this EIA Report.

4.0 HUMAN HEALTH AND POPULATIONS

4.1 INTRODUCTION

This chapter has been prepared to assess the likely impacts associated with Human Health for the proposed development. In accordance with the *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017), and *Draft Advice Notes for Preparing Environmental Impact Statements* (EPA, 2015), this chapter has considered the *"existence, activities and health of people"* with respect to *"topics which are manifested in the environment such as employment and housing areas, amenities, extended infrastructure or resource utilisation and associated emissions"*.

- Population and Demographics;
- Socioeconomics;
- Population Health;
- Natural Resources;
- Tourism;
- Social Infrastructure;
- Health and Safety.

Impacts on humans from other issues such as natural hazards, soils, geology and hydrogeology, water, air quality, noise and vibration, traffic and landscape are discussed in their respective EIAR chapters:

- Chapter 5 - Soils, Geology and Hydrogeology;
- Chapter 6 - Hydrology;
- Chapter 8 - Air Quality and Climate;
- Chapter 10 - Noise and Vibration;
- Chapter 11 - Landscape and Visual Impact; and
- Chapter 13 - Traffic and Transportation.

Where these topics are dealt with in further detail elsewhere in this EIA Report, the relevant chapters have been cross referenced in this Chapter.

4.2 METHODOLOGY

In accordance with the *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017), this chapter has considered that:

> *"in an EIAR the assessment of impacts on population and human health should refer to the assessment of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under environmental factors of air, water soil etc".*

As per Article 3 of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU:

1) *The environmental impact assessment shall identify, describe, and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*

a) population and human health;
b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
c) land, soil, water, air and climate;
d) material assets, cultural heritage and the landscape;
e) the interaction between the factors referred to in points (a) to (d).

2) The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned."

The 2017 publication by the European Commission (EC), *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report*, considered that:

> *"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."*

This chapter will follow these EC guidelines and will examine the health effects relevant to the proposed development as they relate to a relevant, defined study area. The effects of the proposed development on the population and human health are analysed in compliance with the requirements of the EPA Guidelines.

4.2.1 Assessment of Significance & Sensitivity

The assessment of significance is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect.

Within any area, the sensitivity of individuals in a population will vary. As such, it would be neither representative of the population, nor a fair representation of the range of sensitivities in a population, were an overall sensitivity classification assigned to the population in question. As such, the precautionary principle has been adopted for this assessment, which assumes that the population within the study area is of a uniformly high sensitivity.

4.2.2 Magnitude of Impact

The magnitude of predicted impacts has been quantified in this assessment using the terms outlined in Table 4.1 below.

Table 4.1 Description of magnitude of predicted impacts

Magnitude	Description of Magnitude
High	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would result in a major change to existing baseline conditions (adverse or beneficial)
Medium	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would result in a moderate change to existing baseline conditions (adverse or beneficial)
Low	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would result in a minor change to existing baseline conditions (adverse or beneficial)
Negligible	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would not result in change to existing baseline conditions at a population level, but may still result in an individual impact (adverse or beneficial)
No change	No change would occur as a result of the proposed development which would alter the exiting baseline conditions (adverse or beneficial)

4.2.3 Significance of Effects

The assessment of significant effects in this assessment is a professional appraisal and has been based on the relationship between the magnitude of effects (Section 4.2.2) and the sensitivity of the receptor. Table 4.2 below provides a matrix on the measure of the significance of effects as determined by the relationship between the magnitude of impact and the sensitivity of receptors

Table 4.2 Significance of effects and the sensitivity of the receptor

		Magnitude of Impact			
		Negligible	Low	Medium	High
Sensitivity of Receptor	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible or minor	Minor	Moderate	Moderate or major
	High	Minor	Minor or moderate	Moderate or major	Major

4.2.4 Study Area

The proposed development site is located in County Wicklow, and in the electoral district of Kilbride (ED 15055). The area selected for the assessment of the impact on human health has been defined as the Electoral Divisions (ED) of Kilbride (ED15055), Arklow Rural (ED 15038), Arklow No. 2 Urban (ED15002) and Arklow No. 1 Urban (15001). The study area is shown in Figure 4.1 below.

The site is located within the Mid-East region, as defined by the Nomenclature of Territorial Units for Statistics developed by Eurostat. The Mid-East region comprises counties Meath, Louth, Kildare and Wicklow.

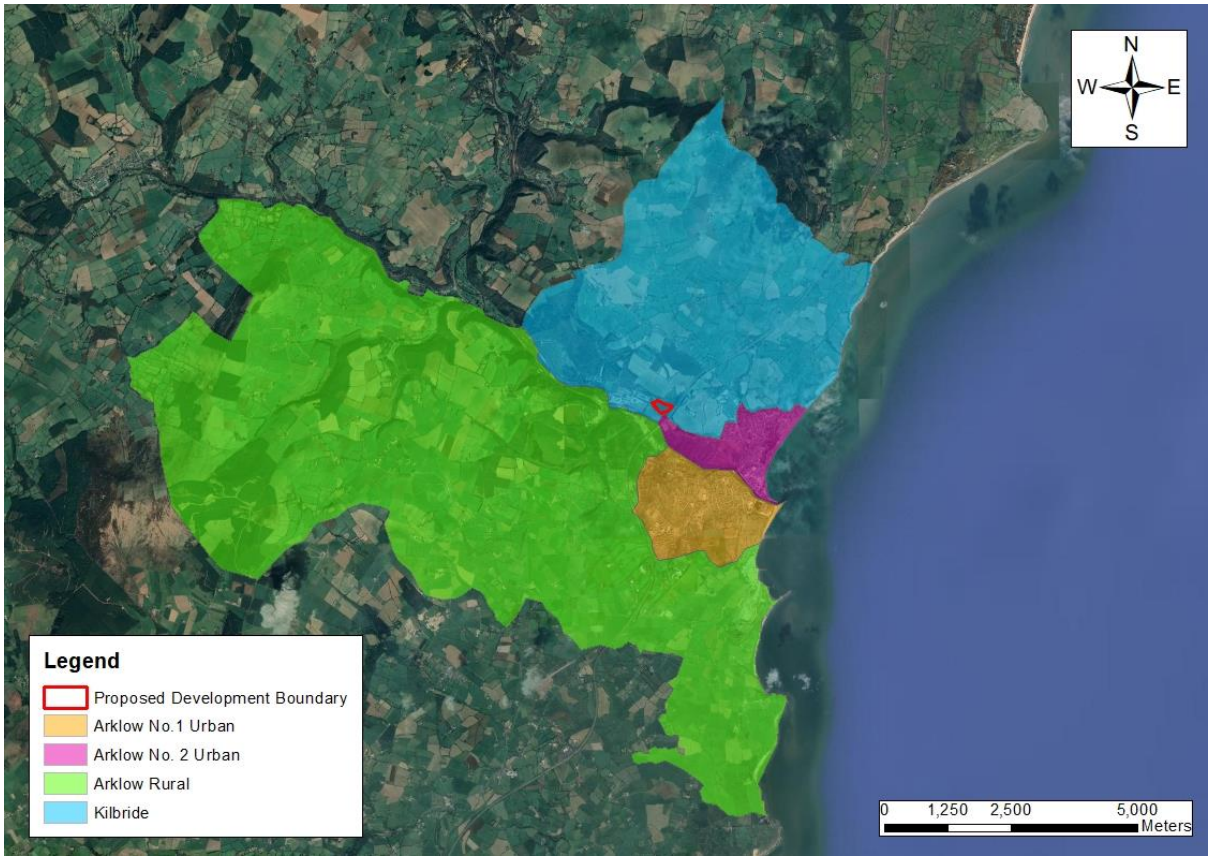


Figure 4.1. The Study Area considered for the proposed development

4.3 EXISTING BASELINE CONDITIONS

4.3.1 Development Site Context

The site of the proposed energy centre is brownfield and located in an industrial setting to the east of the main industrial estate. The estate currently comprises a timber processing facility, vehicle storage, and several warehouse / industrial / administration buildings including a plastic manufacturing facility. The industrial estate is bound to the south by the Avoca River, which flows eastwards and into the sea at Arklow c. 3.5 km to the east of the subject site. Beyond the river is the main Dublin-Rosslare railway line, which runs parallel to the river before branching southwards towards the town centre of Arklow.

To the east of the subject site is the M11 motorway, providing a strong accessibility profile for the area. The built-up area of Arklow town is c. 1km from the subject site as the crow flies. Immediately to the east and west the industrial estate is bound by greenfield, undeveloped lands. Beyond an area of grassland to the west lies Shelton Abbey, a prison which is operated by the Irish Prison Service. The main building of the prison complex is a historic structure. Originally a house which was the historic seat of the Earls of Wicklow, it was originally constructed in 1770 but remodelled in gothic style to designs by Sir Richard Morrison in 1819.

The closest dwelling to the subject site is located c. 160 metres from the subject site to the north, with all other dwellings in the area significantly further removed from the subject site.

Access to the subject site is provided from the north via the main access road for the industrial estate, which connects to the M11 via the R772 regional road.

The site of the proposed development comprises approximately 4.9 hectares of land. The lands form part of a closed landfill, previously used by an Irish Fertilizer's Industry factory, on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land over which the subject site covers was previously designated as phosphogypsum ponds.

The proposed development site zoned as is *'E1 – Employment'.*

A detailed description of the development site context is presented in Chapter 2, project description.

4.3.2 Population and Demographics

4.3.2.1 Population

The most recent census of population was carried out by the CSO on the 24th April 2016, and the previous census on the 10th of April 2011. The census compiles data for the whole state as well as smaller individual areas including counties, cities, towns, and electoral divisions. Taking into consideration the location of the proposed development, the census information on population, age profile, employment, and social class, has been analysed in relation to the development site.

Table 4.3 denotes the population change at for the state, and electoral districts for the census years 2011 and 2016. The latest census data shows that the average population in the study area grew by 1.7% between the years 2011 and 2016, a rate lower than that nationally (3.8%). The general increase in population in the study area, suggests the increasing economic role of the areas surrounding the proposed development site.

Table 4.3 Population change 2011 – 2016 (Source: www.cso.ie)

Area	2011	2016	% Change 2011-2016
State	4,588,252	4,761,865	+ 3.8%
Wicklow	136,640	142,425	+ 4.2%
Kilbride	909	889	- 2.2%
Arklow Rural	1,310	1,367	+ 4.4%
Arklow No. 1 Urban	9,817	9,976	+ 1.6%
Arklow No. 2 Urban	2,953	3,013	+ 2.0%
Study Area (Mean)	3,747	3,811	+ 1.7%

4.3.2.2 Age Profile

The age profile of the population in the area is an important parameter as it provides a good insight into the potential labour force, the demand for schools, amenities, other facilities, and the future housing demand. Table 4.4 shows the age profiles at state, and electoral districts for the census year 2016

Table 4.4 Age profile 2016 (Source: www.cso.ie)

Age	0-12	13-18	19-24	25-44	45-64	65+	Total Persons
State	18.5%	7.8%	7.0%	29.5%	23.8%	13.4%	4,761,865
Wicklow	19.7%	8.1%	6.1%	28.0%	25.0%	13.1%	142,425
Kilbride	15.6%	4.7%	4.1%	25.9%	25.6%	24.1%	889
Arklow Rural	20.9%	8.4%	6.1%	27.3%	24.4%	12.9%	1,367
Arklow No. 1 Urban	21.2%	8.2%	6.0%	29.7%	23.2%	11.8%	9,976
Arklow No. 2 Urban	20.4%	7.7%	6.9%	30.2%	24.2%	10.8%	3,013
Study Area (Mean)	19.5%	7.3%	5.8%	28.3%	24.4%	14.9%	3,811

This table shows that both nationally and in the study area, the dominant age grouping is 25-44 at 29.5%, 28.0% and 28.3% of the total population, respectively. This also reflects that the overall labour force population (12-64 age group) in the study area is reflective of the national level. This is in keeping with census data from 2011 and 2006.

4.3.3 Socioeconomics

4.3.3.1 Employment

Table 4.5 presents the employment statistics at a national, county, and study area level in 2016 compared with 2011. The data shows that unemployment decreased significantly in the county, as well as nationally, reflecting the economic recovery in recent years

Table 4.5 Employment statistics 2011 and 2016 (Source: www.cso.ie)

	At Work	Looking for first regular job	Unemployed having lost or given up previous job	Total in labour force	% Unemployment
2011 Labour Force					
State	1,807,360	34,166	390,677	2,232,203	19.0%
Wicklow	52,907	789	11,885	105,468	11.3%
Kilbride	311	6	110	766	14.4%
Arklow Rural	499	5	117	621	19.7%
Arklow No. 1 Urban	3,347	74	1,339	4,760	29.7%
Arklow No. 2 Urban	1,124	13	344	2,280	15.1%
Study Area (Mean)	1,320	25	478	2,107	19.7%
2016 Labour Force					
State	2,006,641	31,434	265,962	2,304,037	12.9%
Wicklow	59.134	791	7,812	110,158	10.1%
Kilbride	312	5	55	740	7.4%
Arklow Rural	532	4	87	623	14.6%
Arklow No. 1 Urban	3,602	73	886	4,561	21.0%
Arklow No. 2 Urban	1,184	17	274	2,313	11.9%

Study Area (Mean)	1,408	25	326	2,059	13.7%

The 2016 census data shows that the percentage of unemployed has decreased for the state and the area surrounding the development site since the 2011 census.

4.3.3.2 Education

Census data presenting the highest level of education completed for key educational levels by people living in the county and the area surrounding the development site is presented in Table 4.6. The table presents key milestone education and ignores people undertaking studies or where information was not stated.

Table 4.6 Highest level of education in 2016 (Source: www.cso.ie)

Area	No formal education	Primary education	Secondary[1]	Higher Education[2]	Undergraduate Degree[3]	Postgraduate Degree[4]	Total Persons
Wicklow	1,435	8,816	30,167	20,004	17,946	9,190	87,558
Kilbride	33	81	202	138	121	42	651
Arklow Rural	39	113	309	208	133	60	862
Arklow No. 1 Urban	134	758	2,572	1,483	785	237	5,969
Arklow No. 2 Urban	26	170	677	423	392	144	1,932
Study Area (Mean)	58	281	940	563	358	121	2,354

4.3.3.3 Labour Force Survey

The Labour Force Survey (LFS) is a large-scale, nationwide survey of households in Ireland carried out every three months. It generates labour force estimates which include the official measure of employment and unemployment for the state. The CSO is obliged to follow standard definitions and methodology when calculating the official estimates from the LFS. However, in response to the COVID-19 pandemic, the CSO implemented adjusted measures in order to take into account the economic impact of the COVID-19 pandemic in Ireland. Results for both sets of estimates are provided below.

The LFS results nationally for Q1 2021 showed that there were 2,401,100 people employed in the state with 170,500 registered as unemployed. The COVID-19 Adjusted Measure of Employment, or the lower bound for the number of employed persons aged 15 years and over, rose from 1,785,923 to 1,845,383 between the end of March 2021 and the end of April 2021. This was accompanied by a rise from 52.0% in March 2021 to 56.1% in the associated COVID-19 Adjusted Employment Rate, for those aged 15-64. In Q1 2021, the majority of people were employed in the broad occupations of 'Industry', 'Human health and social work activities' and 'wholesale and retail trade, repair of motor vehicles and motor cycles(www.cso.ie, 2021).

[1] Lower secondary and Upper secondary
[2] Higher Certificate, Advanced certificate/completed apprenticeship or Technical/vocational training
[3] Ordinary bachelor degree, Honours bachelor degree/professional qualification
[4] Postgraduate degree or Ph.D

4.3.3.4 *Income*

The below data in Table 4.7 is obtained from CSO Statbank (CIA02), this demonstrates the levels of total income and disposable income per person in the Wicklow area are 2-5% higher over the study years than the State in 2017. A similar pattern of income distribution is observed in data on disposable income per person.

Table 4.7 Income per Person (Source: CSO Statbank CIA02)

Area	Income	2015	2016	2017
State	Total Income per Person (€)	26,857	27,753	29,239
	Disposable Income per Person (€)	18,854	19,660	20,714
Wicklow	Total Income per Person (€)	27,265	28,339	30,607
	Disposable Income per Person (€)	18,856	19,709	21,375

4.3.3.5 *Deprivation*

Deprivation in small areas is mapped using the Pobal HP Deprivation Index. This Index draws on data from censuses and combines three dimensions of relative affluence and deprivation: Demographic Profile, Social Class Composition and Labour Market Situation. Figure 4.2 below shows graphical representation of how the concepts of Demographic Growth, Social Class Composition and Labour Market Situation are measured by ten key socio-economic indicators from the Census of Population. In this EIA Report, the Relative Index Score is considered as the measure for deprivation, as these Relative Index Scores are rescaled such that the mean is 0 and standard deviation is 10 at each census wave. This allows for the provision of descriptive labels with the scores, which are grouped by standard deviation as seen in Table 4.8 below.

Graphical representation of how the concepts of Demographic Growth, Social Class Composition and Labour Market Situation are measured by ten key socio-economic indicators from the Census of Population.

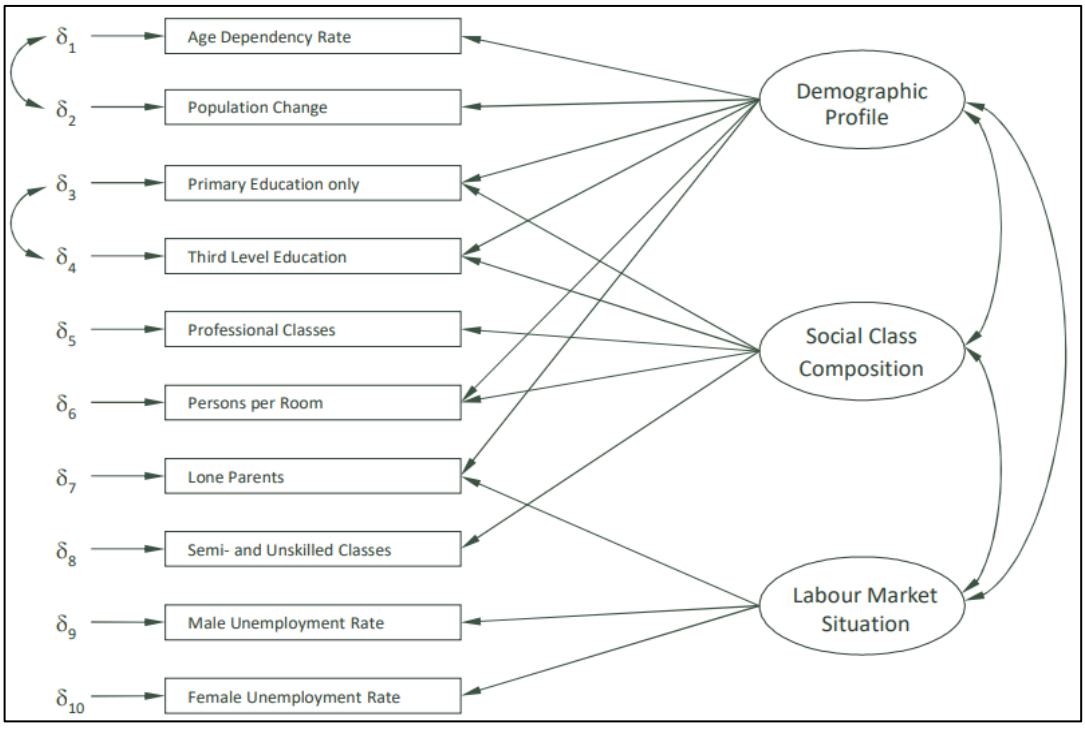


Figure 4.2 Basic Model of the Pobal HP Deprivation Index

Table 4.8 Pobal HP Index Relevant Index Score labels (Source: Pobal HP Deprivation Index)

Relative Index Score	Standard Deviation	Label
> 30	> 3	Extremely affluent
20 – 30	2 – 3	Very affluent
10 – 20	1 – 2	Affluent
0 – 10	0 – 1	Marginally above average
0 – -10	0 – -1	Marginally below average
-10 – -20	-1 – -2	Disadvantaged
-20 – -30	-2 – -3	Very disadvantaged
< -30	< -3	Extremely disadvantaged

The data in Table 4.9 show the Pobal HP Index Relevant Index Score Figures at a local and County level for the year 2016 (*Source: Pobal HP Deprivation Index).* These figures show that the population living within the Study Area are generally classified as 'Marginally below average'. The county of Wicklow is classified as classified as 'Marginally above average'. Figure 4.3 below presents the Pobal HP Index map illustrating the Study Area.

Table 4.9 Pobal HP Index Relevant Index (Source: Pobal HP Deprivation Index)

Area	Relative Index Score	Pobal HP Description 2011
Wicklow	1.43	Marginally above average
Kilbride	-4.73	Marginally below average
Arklow Rural	-2.34	Marginally below average
Arklow No. 1 Urban	-7.75	Marginally below average
Arklow No. 2 Urban	-2.90	Marginally below average
Study Area (Mean)	-4.43	Marginally below average

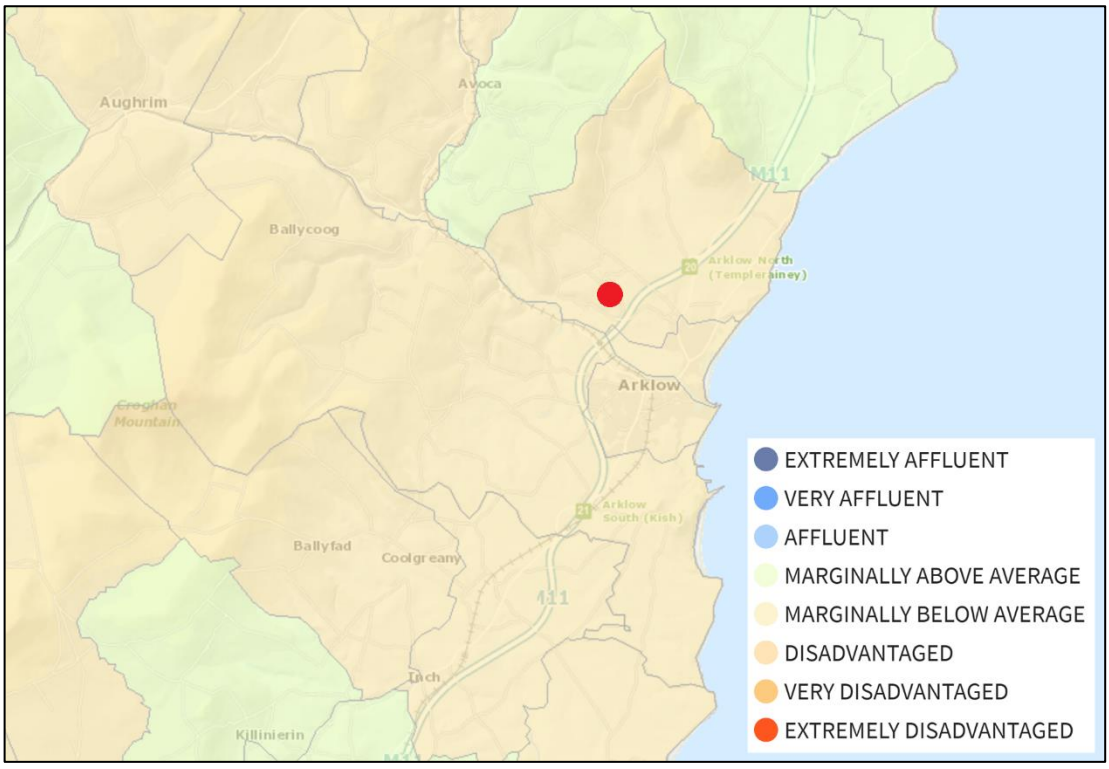


Figure 4.3 Pobal HP Index 2016. The proposed development site is indicated with a red dot (Source: Pobal HP Deprivation Index)

4.3.4 Health

4.3.4.1 Physical Health

Life expectancy in Ireland by sex is a key metric for assessing population health; data for the study area is shown in Table 4.10. Mid-East data shows that life expectancy for both males and females has increased consistently, with female life expectancy consistently higher than male.

Table 4.10 Period Life Expectancy (Source: CSO Statbank VSA30 & VSA31)

Period Life Expectancy in Ireland by sex				
Area	Sex	2002	2006	2011
Mid-East	Male	75.9	77.2	79
	Female	80.5	81.4	83

Table 4.11 shows Circulatory Diseases Admission Rate per 100,000 Population at a National and County level *(Source: Public Health Well Community Profiles).* The rate of hospital admissions in county Wicklow tend to exceed those of the State for all study years.

Table 4.11 Circulatory Diseases (Source: Public Health Well Community Profiles)

Circulatory Diseases Admission Rate per 100,000 Population					
Area	2010	2011	2013	2014	2015
State	4,308.6	4,026.8	4,495.6	4,644.6	3,794.9
Wicklow	4,334.6	4,147.3	4,643.7	5,760.7	4,473.3

Respiratory Diseases Admission Rate per 100,000 Population at a National and County level are shown in Table 4.12. The rate of hospital admissions in county Wicklow tends to fall broadly in line of that of the State.

Table 4.12 Respiratory Diseases (Source: Public Health Well Community Profiles)

Respiratory Diseases Admission Rate per 100,000 Population					
Area	2010	2011	2013	2014	2015
State	2,402.6	2,361.0	2,633.6	2,691.0	2,712.5
Wicklow	2,068.7	2,153.6	2,303.8	2,493.2	2,546.3

4.3.4.2 Mental Health

The rates of death by suicide and intentional self-harm rate per 100,000 population is shown in Table 4.13 below. The rates in Wicklow are lower than those in the State in 2013. Rates of death by suicide and intentional self-harm are generally decreasing year-on-year, this is generally in line with the pattern seen in the State.

Table 4.13 Death by Suicide and Intentional Self Harm (Source: CSO Statbank DHA12)

Death by Suicide and Intentional Self Harm Rate per 100,000 Population				
Area	2010	2011	2012	2013
State	10.87	12.11	11.8	10.34
Wicklow	10.69	12.46	7.22	3.61

The number of admissions to hospital for anxiety or depression per 1,000 people (Table 4.14) in Wicklow have followed the same pattern of the State, which shows a decline and stabilising over the 2013 – 2015 period (Table 4.14).

Table 4.14 Number of admissions to hospital for anxiety or depression (Source: Public Health Well Community Profiles)

Number of admissions to hospital for anxiety or depression per 1,000 people			
Area	2013	2014	2015
State	2	1.8	1.8
Wicklow	2	1.5	1.7

4.3.4.3 Lifestyle

In terms of lifestyle, populations in the Mid-East are broadly similar to those in the State, with rates of smoking, consumption of alcohol and prevalence of eating 5 portions or more fruit or vegetables daily for persons aged 15 and over being similar or identical across both comparative areas (Table 4.15).

Table 4.15 Prevalence of smoking, drinking alcohol and consumption of fruit and vegetables of persons aged 15 and over (Source: CSO Statbank IH079)

Area	Smoking daily	Smoking occasionally	Prevalence of drinking alcohol	Prevalence of eating 5 portions or more fruit or vegetables daily
State	15%	7%	81%	42%
Mid-East	18%	8%	81%	43%

Activity levels in the Mid-East are similar to those in the State, with the prevalence of individuals walking and cycling as a form of transport, as well as levels of participation in sports, fitness or recreational physical activities being on par in the Mid-East and the State (Table 4.16).

Table 4.16 All persons aged 15 and over by Region, Year and Physical Activity Undertaken (Source: CSO Statbank IH072)

Area	Walk to get to and from places	Cycle to get to and from places	Sports, fitness or recreational physical activities	Muscle strengthening activities
State	86	14	49	34
Mid-East	85	13	55	35

4.3.5 Natural Resources

Natural resources and land use in the hinterland of the proposed development have also been considered as they may have implications for the development of the lands.

The proposed development is located on a brownfield site in Avoca River Park Industrial Estate, and as such, there will be no loss of soil available for agricultural economic use due to the development.

In terms of extractive industries, there is one active quarry c. 4.5 km south-south-east of the proposed development site. The Arklow (Parnell) Quarry is located in Rock Big. The processing which happens at the quarry includes excavation, blasting, crushing, and grading, which involves the use of both fixed and mobile plant.

4.3.6 Tourism

Tourism is returning to strong growth and continues to play a hugely influential role in Ireland's economic success.

The development site is located within Wicklow County which has scenic hikes and a number of attractive towns as well as several centres of residential, retail and service

industries surrounding a traditional market gardening region. The Tourism Statement of the Strategy and Work Programme 2017 – 2022 describes Wicklow as:

> *"…easy to get to and provides a warm welcome for visitors seeking an escape to Irelands premier outdoor destination. Wicklow offers an unspoilt environment of stunning scenery and a wide range of outdoor, cultural and heritage experiences that will leave lasting memories."*

The development site is located next to an existing business park and is not located near any areas of significance or local tourism.

4.3.7 Social Infrastructure

Social infrastructure covers a range of services and facilities that meet local and strategic needs and contribute towards a good quality of life. In this context it includes local business, residential areas, education, health facilities, emergency services, places of worship, and green infrastructure.

4.3.7.1 Businesses

The proposed development site is currently a brownfield site located in Avoca River Park. The proposed development site is bounded to the south by Avoca River, and to the north by an industrial site and greenfield lands. The Avoca River defines the southern aspect of Avoca River Park. The urban centre to the proposed development, Arklow, is located south-east of the Proposed development site, beyond the M11 motorway.

The industrial estate is bound to the south by the Avoca River, which flows eastwards and into the sea at Arklow c. 3.5 km to the east of the subject site. Beyond the river is the main Dublin-Rosslare railway line, which runs parallel to the river before branching southwards towards the town centre of Arklow.

4.3.7.2 Residential Dwellings

The nearest residential sensitive locations are located in a small residential development c. 160 m south-south-east from the proposed development site, on an unnamed road. There exist concentrations of residential development in the environs of Arklow town, south west of the site beyond the M11.

4.3.7.3 Education

There are a number of primary and secondary schools within a 2 km vicinity of the proposed development including:

- Gaelcholáiste na Mara – c. 1.12 km southeast;
- St. John's Senior National School – c. 1.51 km southeast;
- Glenart College – c. 1.55 km south, and;
- Arklow CBS – c. 1.57 km southeast.

These schools, as well as other educational facilities located further than 1 km from the proposed development, are concentrated in the environs of Arklow town, beyond the M11 motorway.

4.3.7.4 Health

The nearest medical centre to the proposed development site is Arklow Health Centre, c. 1.87 km southeast of the site in Castle Park, Arklow. The closest hospital to the proposed development site is Gorey District Hospital c. 17.3 km southwest.

4.3.7.5 Emergency Services

The Arklow Garda Station and Arklow Fire Station located c. 2 km southeast of the proposed development site respectively.

4.3.7.6 Places of Worship

The closest place of worship to the proposed development site is Saint Brigid's Church in Kilbride, which is c. 1.25 km northwest of the site. There exist multiple places of worship within the environs of Arklow town, beyond the M11 motorway.

4.3.7.7 Green Infrastructure

In terms of landscape amenity, there are no listed or scenic views, no landscape or amenity designations or protected trees pertaining to the site, and no protected structures or National Monuments on the site.

There are no areas designated as amenity space by the Wicklow County Council in the immediate vicinity of the site. However, there is a strip of land zoned for open space use along the Avoca Riverbank to the south, however the proposed development wont encroach on this.

The site is zoned as E1 Employment, and the potential land use at this site was a consideration during the plan development process. The site is not considered to be significant or sensitive from a landscape and visual aspect.

4.3.8 Summary of Baseline Conditions

The sensitivity of the surrounding area has been considered based on the details of the published data. The local area has seen a population growth between the 2011 and 2016 census, there is a large proportion of the population within working age (24 – 44 years old) reflective of the national level. The area sees low unemployment, and a high proportion of residents with a university education. The disposable income is higher than average, and relative to the national level disposable income. The Pobal HP Deprivation Index shows the area be marginally below average. The general health of the population is on trend with the state averages.

The initial analysis indicates the site has good access to social infrastructure and emergency services within 5 km of the site and in general a lack of vulnerable persons within the immediate vicinity (schools or public amenity). There are few residential receptors within close proximity to the site as the land is located north of Kish Business Park.

It is important to note that the analysis and data used to inform this study has not fully reflected the impacts of COVID-19 this is primarily due to the time which this data was collected. It is difficult to determine the long-term impacts of the COVID-19 pandemic will have on population, socioeconomics and health. This study has assumed that when the business closures and associated restrictions once ended will see a return to the pre-restriction state.

4.4 IMPACTS OF THE PROPOSED DEVELOPMENT

The impact of construction, commissioning, operation and decommissioning of the proposed development are considered below.

4.4.1 Impacts on Businesses and Residences

The main potential impacts on local businesses and residences associated with the proposed development will be in relation to air quality, noise, visual impact and traffic. The potential impacts and mitigation measures to address them are dealt with within the corresponding chapters of this EIA Report as follows:

- Chapter 8 – Air Quality and Climate
- Chapter 10 – Noise and Vibration
- Chapter 11 – Landscape and Visual Impact
- Chapter 13 – Traffic and Transportation

It is predicted that there will be a very slight positive impact on local business activity during the construction phase with the increased presence of up to 250 no. construction workers using local facilities. The positive impact during the operational phase will be c 6 staff on site at any given time for maintenance works. In addition the availability of power will benefit development and in turn employment within the hinterland.

There may be a short term slight negative impact on the local residential population during the construction phase and the operational phase (as described in section 4.7.3.1 below and Chapter 10 – Noise and Vibration). It is also anticipated that the proposed development will have indirect positive effects on employment in terms of construction material manufacture, maintenance contracts, equipment supply, landscaping etc. It is likely that the proposed development, during both the construction and operational phases, will have a negligible significance of effects on businesses and residences with respect to human health.

4.4.2 Impacts on Amenity and Tourism

The location of the proposed development within an industrial park area and adjacent to a national motorway will have a minimal impact on the local landscape amenity. There will be no impact on the local parks.

It is not anticipated that the proposed development will have any impact on local tourism or shopping amenities.

The proposed development will not create any wastewater discharge which could have a potential impact on local amenities or the local population.

The scale and massing of the proposed development will represent an intensification of existing and permitted uses within the industrial zoned lands and give rise to landscape and visual effects ranging from slight to moderate, both during construction and in operation. It is noted that construction of the proposed development will take place within the overall construction programme for the wider permitted development and will not therefore extend the overall construction period. Cumulative effects, in combination with the permitted development, will be ***not significant***. Further discussion is presented in Chapter 11 Landscape and Visual.

The proposed development will have a ***negligible*** significance of effect, and a ***long-term, neutral*** and ***imperceptible*** impact on local amenities and tourism with respect to human health.

4.4.3 Impacts on Natural Resources and Material Assets

The proposed development will require gas, water, and diesel fuel during operations (Chapter 12 (Material Assets). The gas supply for the proposed development will be drawn directly from the national grid and there is no anticipated impact to local residential or business users. A connection to mains water for sanitary (6 staff) can be readily facilitated with Irish Water. Diesel (max capacity 1,200 m^3) will be retained on site for emergency back up operation.

Chapter 5 (Land, Soils, Geology and Hydrogeology) identified quarries in the vicinity of the site. There will be no impact to mineral resources in the area as a result of the proposed development.

The proposed development will include an onsite wastewater treatment system and percolation to ground; this system will not create a wastewater discharge which could have a potential impact on local amenities or the local population. This is further discussed in Chapter 5 (Land, Soils, Geology & Hydrogeology) and Chapter 6 (Hydrology).

There is a groundwater source within the gravel aquifer upgradient of the site. The GSI Well Card Index does not show any wells drilled or springs within the zone of potential impact for the site. The redevelopment of the site will require the importation of engineering fill and general fill to build on top of the existing capped landfill cell. In order to minimise impacts on the soils geology and water environment a number of mitigation measures will be adopted to prevent the contamination of groundwater and surface water runoff during the construction and operational phase; as described in Chapter 5 (Land, Soils, Geology & Hydrogeology and Chapter 6 (water) and outlined in the CEMP. During operation there is negligible potential for impact on soil, geology and water as low trafficking with the site and minimal storage of hydrocarbons. The cumulative impacts of the proposed development, Eirgrid connecting works, and the data storage facility have been assessed in Chapter 5 and 6. The resultant impact is ***negligible***, ***imperceptible*** and ***long-term***.

No significant impact to Natural Resources or Material Assets is predicted.

4.4.4 Impacts on Human Health from Air Quality and Climate

As outlined in Chapter 8 (Air Quality and Climate), National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are based on the protection of the environment as well as the protection of human health. Additional factors such as natural background levels, environmental conditions and socio-economic factors are also considered in the limit values which are set (see Chapter 8, Table 8.1).

4.4.4.1 Construction Phase

As detailed in Chapter 8 (Air Quality & Climate), best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the

development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be ***negative, imperceptible*** and ***short term*** with respect to human health.

4.4.4.2 Operational Phase

As detailed in Chapter 8 Air Quality & Climate, Air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, pollutant concentrations with the proposed development operational are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health. The air dispersion modelling assessment has considered the ambient air quality impact from the operation of the proposed development (the worst-case scenario) and a conservative approach was adopted when making assumptions for the air modelling inputs which over-estimates the actual levels that will arise. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

There are no predicted impacts to air quality or climate during the operational phase of the proposed development. Therefore, the operational phase is considered ***long term, neutral*** and ***imperceptible***.

It is concluded that the proposed development, during both the construction and operational phases, will have a negligible significance of effects on air quality with respect to human health.

4.4.5 Impacts on Human Health from Noise and Vibration

Noise and vibration impacts associated with the proposed development have been fully considered within Chapter 10 of the EIA Report. Commentary on the impact assessment and related noise levels are summarised below with respect to potential environmental health impacts.

4.4.5.1 Construction Phase

As detailed in Chapter 10 Noise and Vibration, during the construction phase of the proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e., as per Table 10.5, 10.6 and Section 10.2.4), along with implementation of appropriate noise and vibration control measures (as summarised in Section 10.6.1), will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise impacts will be ***slight, negative*** and ***temporary*** in nature. Also, it is considered that as the proposed development progresses from initial ground works that construction noise impacts will reduce from slight to ***not significant.***

4.4.5.2 Operational Phase

As detailed in Chapter 10 Noise and Vibration, the robust analysis of potential operational phase plant has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be a ***not significant, negative, long-term*** impact at the closest residences identified on Figure 10.4. The predicted change in background noise level due to current application is the order of 1dB during night-time

periods. Ambient noise levels are, and will continue to be, dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g., distant traffic noise).

In terms of the nearest commercial properties ***not significant, negative, long-term*** impacts are predicted as the character of the noise environment in the vicinity of this location will not be altered.

The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be an ***imperceptible, neutral, long-term*** impact at off-site noise sensitive locations considering existing traffic volumes on the local road network.

The proposed development will not generate any perceptible levels of vibration during operation and will have a negligible significance of effect with respect to human health. Therefore, there will be no impact from vibrations on human health.

4.4.6 Impacts on Human Health from Traffic and Transportation

An assessment of the additional traffic movements associated with the proposed development during the construction phase is presented in Chapter 12 Traffic and Transportation. The available data indicates that there are no location-specific road safety concerns of relevance to the proposed development.

The predicted impact of the development on human beings and in particular road users will be ***short-term, neutral*** and ***not significant*** for the construction phase and ***long-term, neutral*** and ***imperceptible*** for the operational phase.

4.4.7 Impacts on Health and Safety

The proposed development has been designed in accordance with the Safety, Health and Welfare at Work Act 2005 (S.I. 10 of 2005) as amended and the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. 299 of 2007) as amended and associated regulations. The plant has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience based on a number of similar existing facilities operated by ESB Networks.

The potential health and safety risks have been addressed for certain aspects including the vulnerability of the project to natural disasters, flooding and other hazards, air quality, noise and vibration, and traffic in Chapters 6, 8, 10 and 13 respectively.

The potential for major accidents has been considered with reference to Seveso/Control of Major Accident Hazards (COMAH) Regulations. The proposed development will not be a Seveso/COMAH facility. The only substance stored on site controlled under Seveso/COMAH will be diesel for generators and the amounts proposed do not exceed the relevant thresholds of the Seveso Directive. The proposed development is classified as Level 1 type development which is permittable in terms of the land use planning guidelines. The Health and Safety Authority (HSA) list of Notified Seveso Establishments has been reviewed to identify any facilities within the lands surrounding the development site. According to the Wicklow CDP and the HSA database, there is one Notified Seveso Establishments listed within the general vicinity of the proposed development site. Sigma Aldrich Ireland Ltd (Vale Road, Arklow, Wicklow, Y14 EK18) is a designated lower-tier facility, whose HSA-listed activity is described as “production of pharmaceuticals”. The proposed development is located

within the 1,000 m Seveso consultation zone for the Sigma Aldrich Ireland Ltd Arklow facility.

The proposed development has the potential for an impact on the health and safety of workers employed on the site, particularly during the construction phase. The activities of contractors during the construction phase will be carried out in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) as amended to minimise the likelihood of any impacts on worker's health and safety. The health and safety planning for the construction phase of the proposed development will consider any appropriate measures to safeguard workers' health and safety with regards to Covid-19.

There is a potential impact on the receiving environment as a result of minor accidents/leaks of fuel/oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapter 5 (Land, Soils, Geology and Hydrogeology) and Chapter 6 (Hydrology) of the EIA Report will ensure the risk of a minor/accident is low and that the residual effect on the environment is imperceptible. The contractor will be obliged to operate in compliance with a CEMP.

During operation, the plant will be required to operate in compliance with EPA licence requirements.

4.5 REMEDIAL AND MITIGATION MEASURES

The impacts on the local population are considered to be short-term, positive and imperceptible due to the expected short-term employment of a small number of construction workers directly employed to work on the construction of the proposed development and in turn creating a small amount of indirect additional business from using local businesses during the construction phase. The proposed development will provide a permanent power supply which will support employment in the broader area.

The remedial and mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 5 (Soils, Geology and Hydrogeology); Chapter 6 (Hydrology); Chapter 8 (Air Quality and Climate), Chapter 10 (Noise and Vibration); Chapter 11 (Landscape and Visual); and Chapter 13 (Traffic and Transportation).

4.6 POTENTIAL CUMULATIVE IMPACTS

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below. Related and permitted, concurrent, and future developments are listed in Chapter 3 (Planning and Alternatives).

4.6.1 Construction Phase

The proposed construction works for any relevant developments will be subject to their own appropriate environmental assessment and subject to a construction environmental management plan, if applicable, that will mitigate any impacts on human health. Regardless, works are anticipated to be temporary and the limited time frame for construction works in the vicinity of a specific properties reduce the cumulative impacts significantly. The construction phases of any relevant developments would be

restricted by the same binding limits for noise, dust, and emissions to water. As such it is considered that there would be no cumulative impact on human health.

The overall cumulative impact of construction is therefore concluded as ***negative, short-term*** and ***not significant*** with respect to human health.

4.6.2 Operational Stage

The individual assessments and modelling have concluded that with mitigation, there will be no significant noise emissions, emissions to air, soil or water from the operation of the energy plant. All adjacent developments (planned and permitted) will be required to operate in compliance with legislative and guideline requirements.

The traffic assessment indicates that the proposed development is will not result in significant adverse impacts either alone or in combination with any likely permitted or planned future projects. Air and noise modelling have considered adjacent planned development and with mitigation in place there are no significant adverse impacts identified for the receiving emvironment.

As the proposed development together with the Eirgrid connection works and the data storage facility will have a positive impact on the immediate hinterland and the Wicklow region through continued expanding employment and the associated economic and social benefits, it is concluded that once appropriate mitigation measures are put in place any cumulative effects on population and human health will be ***positive*** and ***long-term*** and ranging from ***imperceptible*** to ***slight***.

4.7 RESIDUAL IMPACTS

When the mitigation measures outlined in this EIAR are implemented, there will be no residual impacts of significance on human health and populations from the construction or operational phases of the proposed development.

5.0 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

5.1 INTRODUCTION

This chapter of the EIAR which assesses and evaluates the potential impacts on the land, soil, geological and hydrogeological aspects of the site and surrounding area.

In assessing likely potential and predicted impacts, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

5.2 STUDY METHODOLOGY

5.2.1 Appraisals Methodology

The appraisal methodology for the EIAR is completed in accordance with the EPA 'Guidelines on the Information to be contained in Environmental Impact Statements' (EPA, 2002). The EPA document entitled '*Advice Notes on Current Practice in the Preparation of EIS'*, 2003 and in accordance with *'Draft Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2017); are also followed in this geological assessment and classification of environmental impacts. Due consideration is also given to the guidelines provided by the Institute of Geologists of Ireland (IGI) in the document entitled 'Geology in Environmental Impact Statements, a Guide', (IGI, 2002) and 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI 2013).

In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate.

In this assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute.

The rating of potential environmental impacts on the soils and geology environment is based on the matrix presented in Chapter 1 (Introduction) Table 1.2 which takes account of the quality, significance, duration and type of impact characteristic identified.

The IGI and NRA criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment and are presented in Table 1 and 2 (see Appendix 5.1).

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

- The extent of topsoil and subsoil cover and the potential use of this material on site or requirement to remove it off-site as waste for disposal or recovery;
- The residual landfill;
- High yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the proposed development;

- Classification (regionally important, locally important) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the proposed development associated with aspects such as for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes and/or change in groundwater quality;
- Natural hydrogeological/ karst features in the area and potential for increased risk presented by the activities at the site;
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally; and,
- Presence of area of geological heritage and potential to impact on same.

5.2.2 Sources of Information

Ground conditions at the subject site have been proved by historical site investigations conducted in 1994 and 1997 as well as an Environmental Risk Assessment carried out by OCM in 2011 as part of the IPPC Licence process undertaken by Holfeld in 2011 (refer to Section 5.3.5 below for further details).

Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the area in which the site is located was obtained through accessing databases and other archives where available. Data was sourced from the following:

- The Geological Survey of Ireland (GSI) well card, groundwater body descriptions, aquifer type, vulnerability, groundwater boreholes, geological heritage database and source protection zones for the area were inspected,
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information.

Information on the proposed design is based on the following sources:

- Infrastructure Design Report. Proposed Energy Centre at Avoca River Park Industrial Estate. DBFL Consulting Engineers (July 2021);
- Environmental Risk Assessment. Former Irish Fertilizer Industries Site, Arklow Co. Wicklow. OCM (June 2011);
- 2018 Annual Environmental Report. Avoca River Park Ltd. Licence Register Number P0031-02;
- 2019 Annual Environmental Report. Avoca River Park Ltd. Licence Register Number P0031-02;
- 2020 Annual Environmental Report. Avoca River Park Ltd. Licence Register Number P0031-02.
- Various design plans and drawings.

5.3 RECEIVING ENVIRONMENT

5.3.1 Site Area Description

The subject site is located within the Avoca River Park Industrial Estate lands, approximately 2km northwest of Arklow, Co. Wicklow. The site location is presented in Figure 5.1 below.

The site is currently bound by the Avoca River Park Industrial Estate's private access road along its northern boundary and a gravel track and a drainage ditch along its southern boundary. A drainage ditch runs partly along the eastern boundary also. Both drainage ditches drain to the Avoca river which flows further south of the site. The Avoca river flows eastwards and into the sea at Arklow c 3.5 km to the east of the subject site. Beyond the river is the main Dublin-Rosslare railway line, which runs parallel to the river before branching southwards towards the town centre of Arklow. The built up area of Arklow town is c. 1km from the subject site as the crow flies. The site is located within the townland of Shelton Abbey.

Immediately to the east and west the industrial estate is bound by greenfield, undeveloped lands. Beyond an area of grassland to the west lies Shelton Abbey, a prison which is operated by the Irish Prison Service. The main building of the prison complex is a historic structure.

The closest dwelling to the subject site is located c. 160 metres from the subject site, to the north, with all other dwellings in the area significantly further removed from the subject site. Access to the subject site is provided from the north via the main access road for the industrial estate, which connects to the M11 via the R772 regional road.

The site of the proposed development comprises approximately 5.01 hectares of land.

The site is bound to the north by a local access road which serves Avoca River Park. To the south and to the west the site is bound by Holfield Plastics Limited. To the east the site is bound by the wider landholding that currently incorporate Harmony Timber and Stunt Drive Ireland which will cease operation and relocate prior to commencement of the construction of the data storage facility.

The existing site currently comprises brownfield lands as described below. The Avoca River Park is well developed, current operations include timber fabrication plant, a plastic manufacturing plant, an existing substation and a storage area for scrapped vehicles. The lands in the immediate vicinity surrounding the industrial park comprise a mix of agricultural, forested, residential, commercial and institutional development. Shelton Abbey Prison is located to the north-west, Glenart Castle to the south-west and Sigma Aldrich facility to the south-east.

An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate runs along the southern boundary of the proposed development site. There are no public foul drainage systems in the vicinity of the site. The foul drainage from the existing Avoca River Park Industrial Estate discharges into several septic tanks located at the southern end with the treated effluent from the septic tanks discharging into the drainage ditch.

The Environmental Protection Agency (EPA) designated watercourses in the vicinity of the subject site include, the Arklow River at its closest point it is approximately 140 m south of the site, and a stream or drainage ditch bounding the site to the east. The Avoca River Valley and the Arklow Town Marsh pNHA are located c. 990 m and c. 370 m to the northwest and southeast of the subject site, respectively. Refer to figure 5.1 below for further details.



Figure 5.1 Subject site outlined in red

The subject site slopes towards the drainage ditch at the south western boundary. The survey indicates existing highest ground levels range from 9.77m AOD at the northern boundary to 3.50m AOD and the southern end.

At local level, there are existing surface water features in the vicinity of the subject site. These include drainage ditches along the south-west and south-east boundaries, both of which ultimately drain to the Avoca River by way of marshlands further downstream (refer to Chapter 6).

The receiving environment in terms of land, soils, geology and hydrogeology is described in the following sections.

5.3.2 Land Use

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phophogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring. In October 2005 the Licence was transferred to Holfeld Plastics Ltd (Holfeld).

The subject site, is zoned 'E1 – Employment' in the LAP, for which the objective is as follows: "*To facilitate the further development and improvement of existing employment*

areas and to facilitate opportunities for the development of new high-quality employment and enterprise developments in a good quality physical environment".

As mentioned above, the subject site was the former Irish Fertiliser's Industry (IFI) factory which operated from here from the 1960's to 2002. According to Historical Ordnance Survey (O.S) maps, the previous use of the site was primarily greenfield (refer to Figures 5.2 to 5.4 below)



Figure 5.2 Historic 6" Mapping (subject site outlined in orange)



Figure 5.3 Historic 1837-1842 Mapping (subject site outlined in orange)



Figure 5.4 Aerial 1995 Map (subject site outlined in orange)

5.3.3 Soils

The EPA soil map of Ireland shows that at the location and surrounding area, the soil types found are predominantly AlluvMIN (Alluvial – Mineral) soils which can be associated with the historic Avoca River riverbed. See Figure 5.5 below.

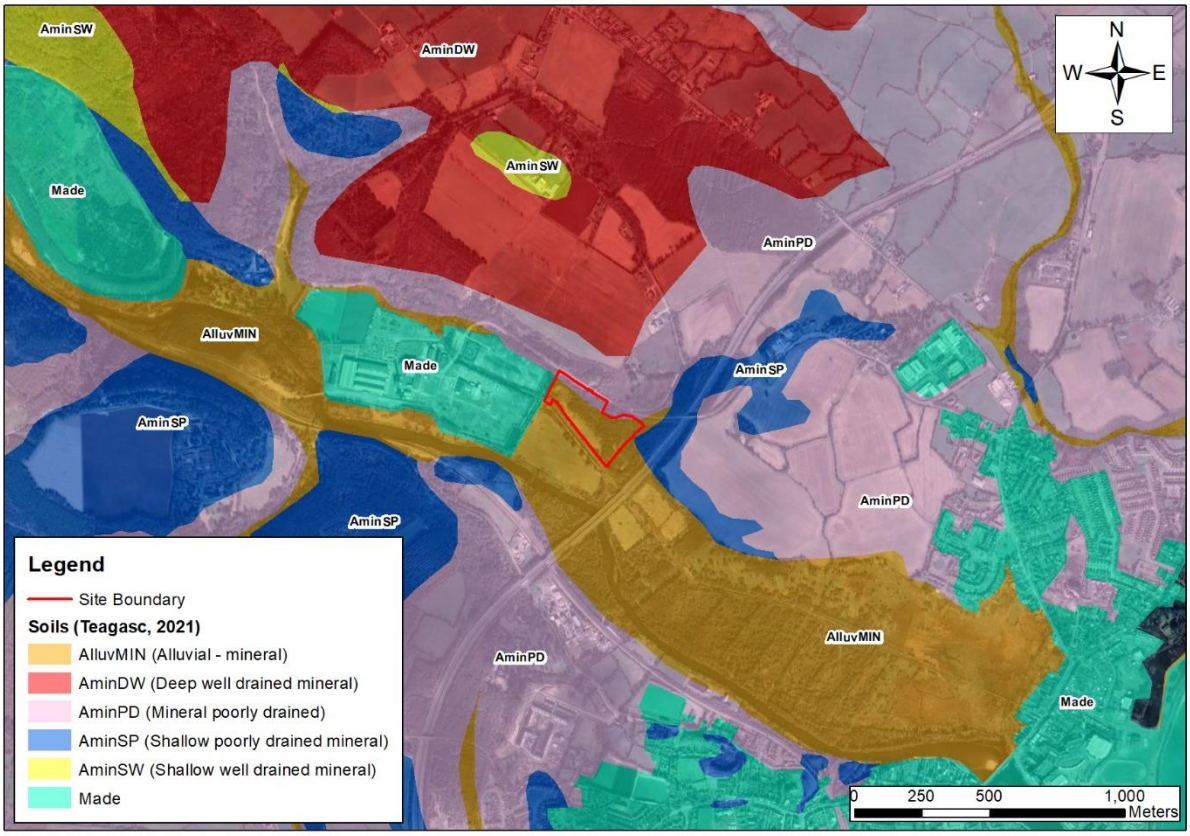


Figure 5.5 Soils (Source: Teagasc, 2021)

5.3.4 Quaternary Deposits

The Quaternary Period is the final stage of the geological time scale. This period includes the start of the Ice Age (approximately 1.6 million years ago), known as the Pleistocene Epoch right through to the postglacial period, known as the Holocene Epoch, which began 10,000 years ago and extends from the Pleistocene to the present day.

The Pleistocene Epoch in Ireland began when there was a significant cooling of the Earth's climate and was characterised by alternating extended periods of very cold conditions, during which time much of the country was covered by an ice sheet. These colder periods were interspaced with warmer periods, known as interglacial, which lasted for approximately 10,000 years at a time.

A subsoil map, produced by the GSI, indicates that the majority of the site and surrounding area is underlain Alluvium sediments located along the Avoca River. Figure 5.6 below shows the subsoils underlying the site.

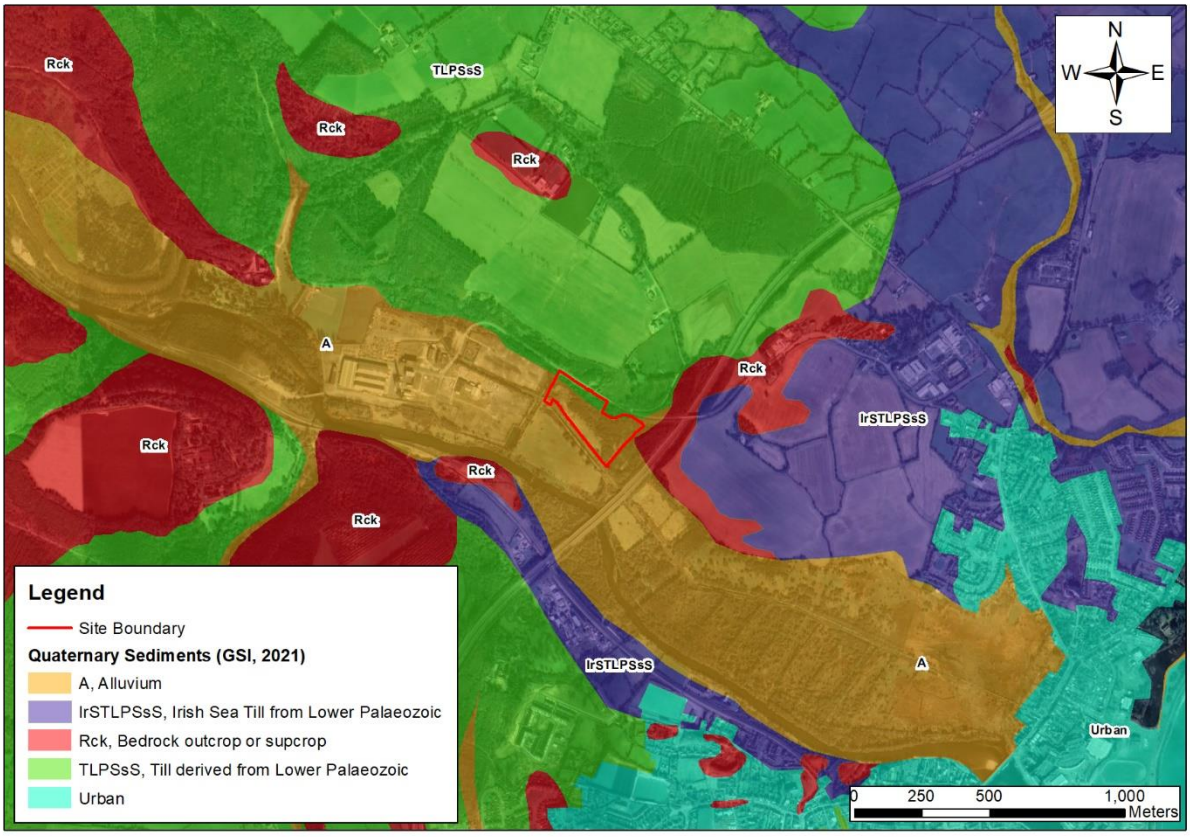


Figure 5.6 Subsoils (Source: GSI, 2020)

5.3.5 Site Investigation

As mentioned above, the lands form part of a closed landfill previously used by an IFI factory on the west side of an Integrated Pollution Control (IPC) licenced landfill facility. Although fertiliser production ended in 2002, the environmental monitoring programme at the former fertiliser production and landfill areas continued due to the presence of groundwater contamination beneath both areas. This was initially identified during site investigations undertaken in 1994 and subsequent investigations in 1997.

In 2011 Holfeld applied to the Agency to amend the IPPC Licence area to exclude the Production Area. As part of this information, an Environmental Risk Assessment was undertaken by OCM in June 2011. This report compiled the information from the 1994 and 1997 site investigations, creating an updated hydrogeological conceptual model. All these reports are publicly available in the IPCC licence documents on the EPA website. The historical site investigation points are presented in the Figure 5.7 below.

In addition, a recent initial intrusive site investigation has been directed from a geotechnical perspective by Atkins Limited and from an environmental perspective by OCM.

5.3.6 Ground Conditions

The historical site investigations abovementioned confirmed the presence of between 1 to 3m of fill comprising topsoil, coarse gravels and cobbles in the vicinity of the subject site. Beneath this is a clay layer containing sandy silt with intermittent peat ranging in thickness from 3-7m. The peat is thicker toward the south-eastern end of the former Production Area (i.e, to the southwest of the subject site) and increases in thickness moving further southeast under the Landfill Area (i.e., increases towards the subject site).

The clay and peat is underlain by fine to coarse gravels with occasional large cobbles and bolder, probably indicating the presence of ancient river channels. The gravels range in thickness from 15- 8m and extend in depth to 24m below ground level and comprise an upper, middle and lower zone, separated by thin lenses of poorly permeable clays and silts. The total subsoil thickness ranges from at least 22m beneath the former Production Area, to greater than 24m beneath the Landfill Area (i.e., the subject site).

A cross sections of the site geology can be seen in the following figures below.

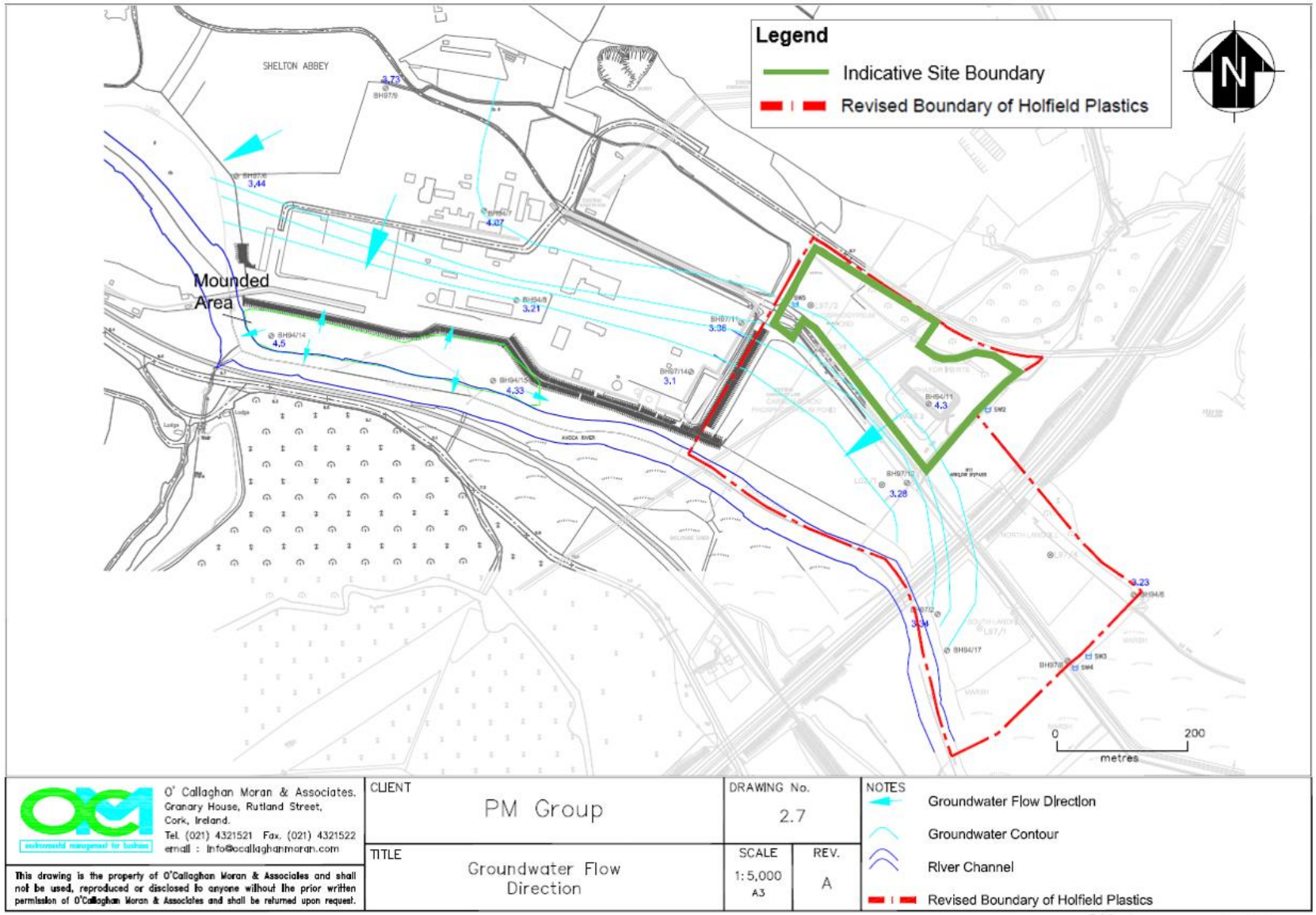
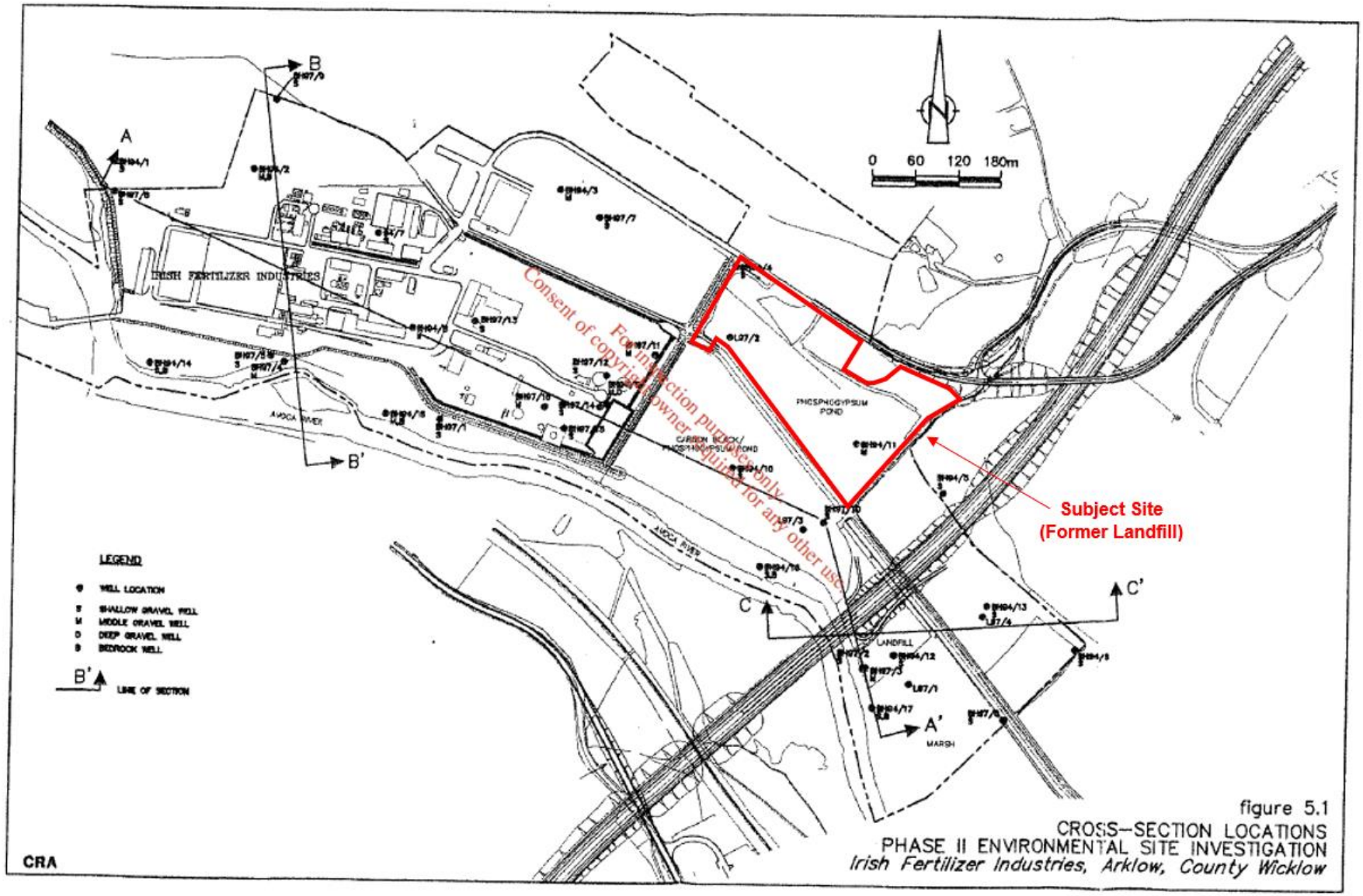


Figure 5.7 Historical site investigation locations and groundwater flow direction (Source : OCM, 2011)



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Figure 5.8 Cross Sections and Site Investigation points (Source: IFI, 1998).

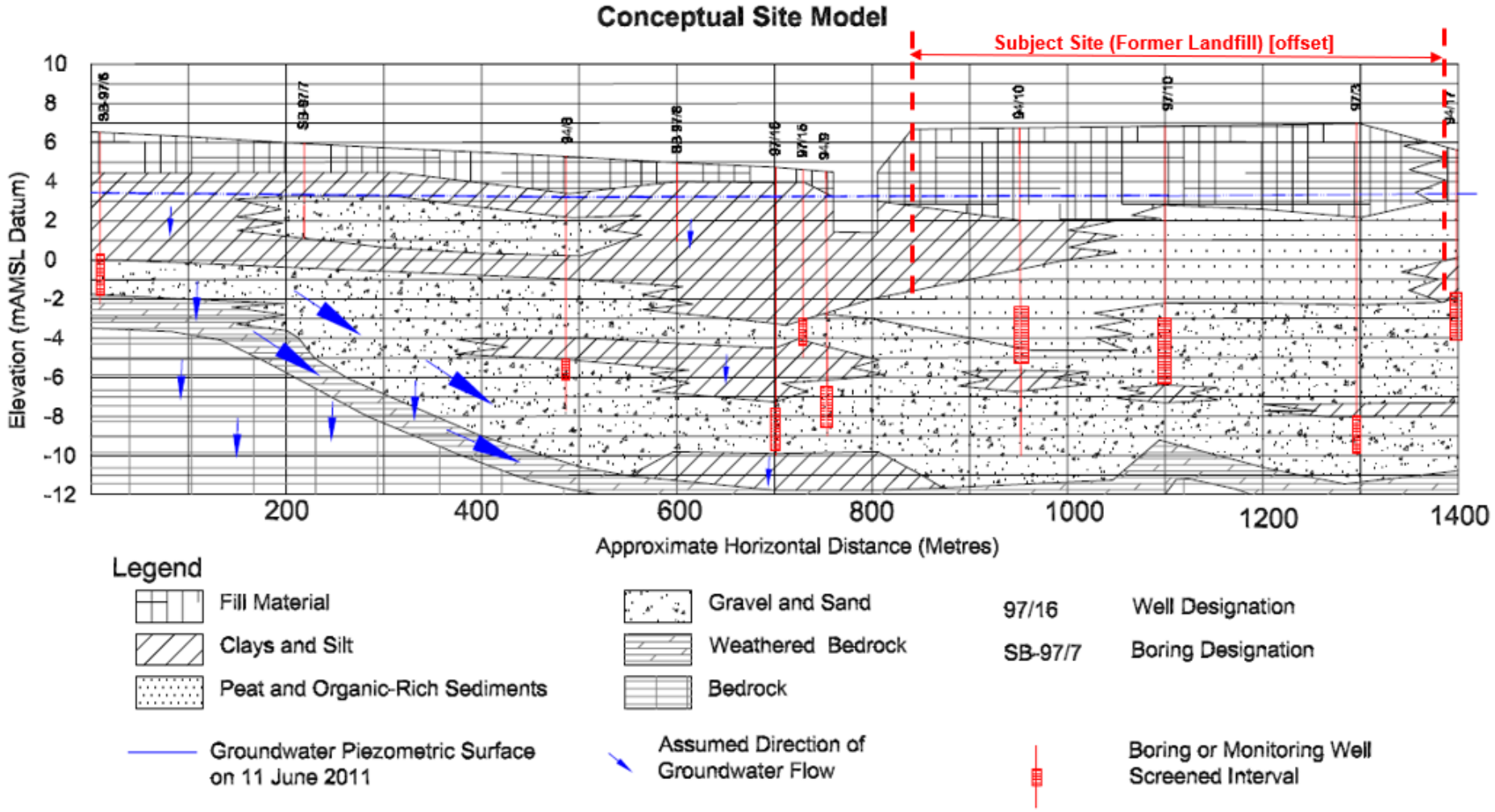


Figure 5.9 Representative cross section A-A' of the proposed development site (Source: OCM, 2011).

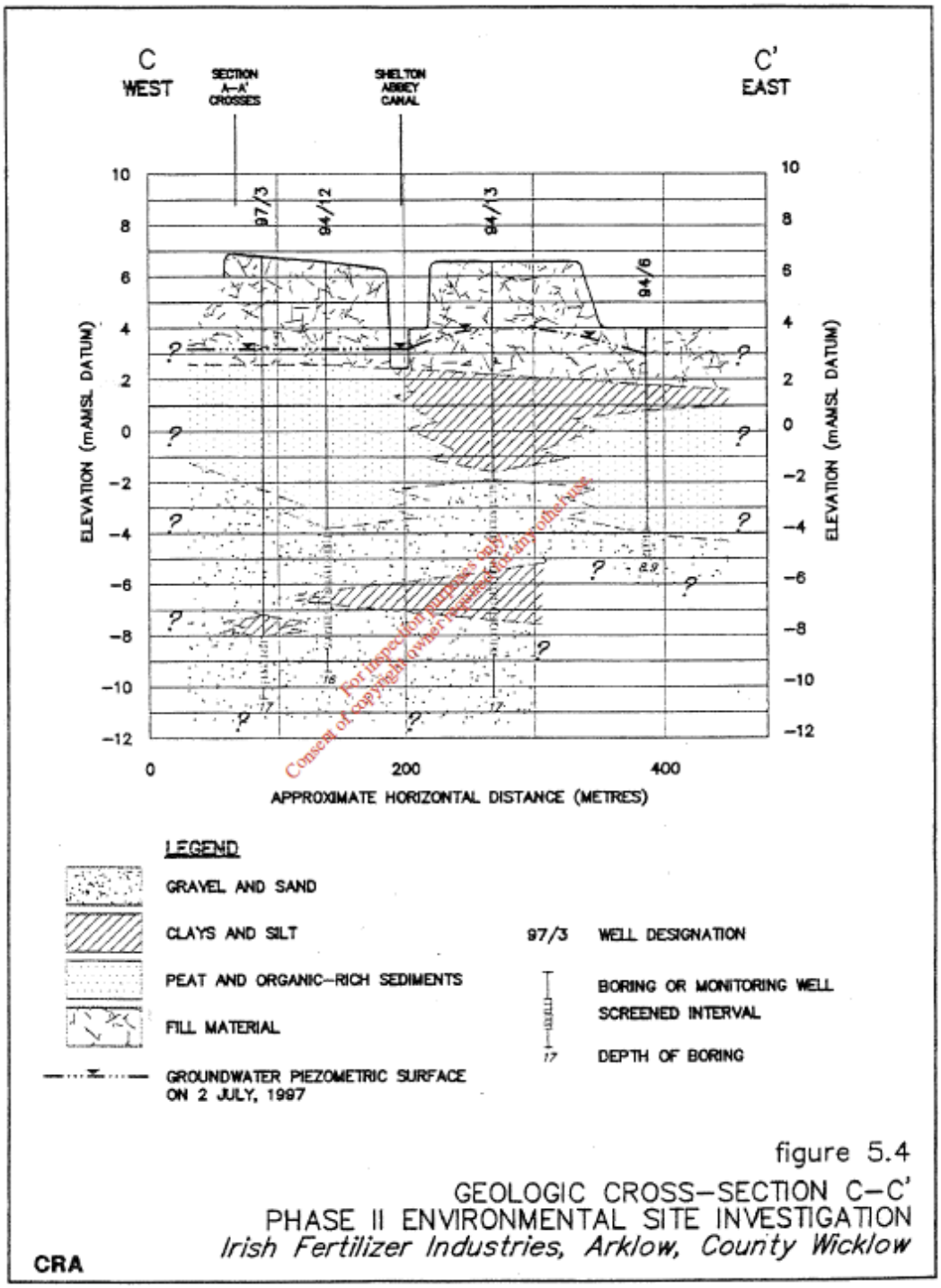


Figure 5.10 Representative cross section C-C' of the proposed development site (Source: IFI, 1998).

According to the initial intrusive site investigation undertaken by Atkins and OCM, it was found that the underlying waste matrix was a mix of phospho-gypsum, carbon black and landfill waste (made up of plastics etc.). This mix of wastes is not in accordance with the EPA IPPC License. It is also not conducive to a stable structure and would likely lead to differential settlement. The problem is further exacerbated by the fact that there are layers of alluvial silts and peat below the waste products.

5.3.7 Groundwater Wells

The GSI Well Card Index is a record of wells drilled in Ireland. This Index shows a number of wells in the vicinity of the site. While much useful information can be obtained from this Index, it is important to note that it is by no means exhaustive, as it requires individual drillers to submit details of wells in each area.

The well card data presented in Table 5.1 shows the occurrence of recorded wells within a 2km radius of the site area, information regarding the depth to bedrock, and hence the depth of overburden is noted for each well where available. See Figure 5.6 below for locations. From the GSI well card data presented in Table 5.1, it can be seen that abstractions of up to 160 m^3/day are obtained from the bedrock and gravel aquifer at well 3217SWW52, which is located approx. 2km to the southeast from the site, in Arklow town. In the surrounding area of the site, yield class ranges 'Poor' to 'Moderate' as it can be seen in the boreholes 3217SWW29, 3217SWW30, 3217SWW31, 3217SWW32 and 3217SWW38, which are located in Shelton Abbey townland c. 700 m to the northwest of the site.

Table 5.1 GSI Well Card Data for the Site location and Surrounding Areas (Source: GSI, 2020)

GSI Name	Type	Depth (mbgl)	Depth to Bedrock (mbgl)	Drilling Year	Easting (Irish Grid)	Northing (Irish Grid)	Location Accuracy	Townland	Usage	Yield Class	Yield (m3/d)
3217SWW037	Dug Well	3.7	3.7	1972	322,550	176,250	Within 20 m	Raheen	Domestic		
3217SWW042	Borehole	61	Unknown	1983	323,130	173,960	Within 20 m	Ballyraine Lower	Domestic	Poor	35
3217SWW061	Borehole	23.8	15.2	1993	324,880	174,980	Within 20 m	Ticknock		Poor	22
3217SWW081	Borehole	3.5	3.5	1997	323,120	176,320	Within 20 m	Shelton			
3217SWW098	Borehole	36.6	27.4	1999	324,610	175,240	Within 20 m	Coolboy	Agricultural and domestic	Moderate	43.6
3217SWW101	Borehole	31.4	20.7	1999	323,570	175,950	Within 20 m	Shelton	Agricultural and domestic	Moderate	87.3
3217SWW043	Borehole	61	Unknown	1996	324,080	174,790	Within 100 m	Kilbride	Domestic	Poor	22
3217SWW044	Borehole	30.5	Not met	1996	323,130	175,840	Within 100 m	Shelton	Domestic	Poor	33
3217SWW057	Borehole	48.8	Unknown	1995	322,410	176,140	Within 100 m	Raheen	Domestic	Moderate	55
3217SWW039	Borehole	91	0	1996	321,630	174,820	Within 200 m	Glenart	Domestic	Poor	30
3217SWW040	Borehole	120	4.5	1996	323,170	174,080	Within 200 m	Ballyraine Lower	Other	Poor	3
3217SWW041	Borehole	61	12	-	323,180	174,180	Within 200 m	Ballyraine Lower	Industrial	Good	120
3217SWW029	Borehole	21.6	6.7	1956	322,130	175,630	Within 500 m	Shelton Abbey		Moderate	55
3217SWW030	Borehole	30.5	13.7	1956	322,130	175,580	Within 500 m	Shelton Abbey		Moderate	65
3217SWW031	Borehole	27.7	4.5	1956	322,130	175,540	Within 500 m	Shelton Abbey		Moderate	65
3217SWW032	Borehole	23.4	7	1956	322,130	175,520	Within 500 m	Shelton Abbey		Moderate	65
3217SWW003	Borehole	29.6	3.1	1962	325,050	176,480	Within 1 km	Templerainy	Domestic	Poor	27
3217SWW005	Borehole	27.4	2.7	1975	320,610	175,430	Within 1 km	Kilcarra	Domestic	Poor	28
3217SWW006	Borehole	31.7	9.1	1961	325,260	175,310	Within 1 km	Killiniskyduff	Domestic	Poor	21.8
3217SWW010	Borehole	30.5	6.1	1974	324,390	175,570	Within 1 km	Coolboy	Domestic	Moderate	44
3217SWW012	Borehole	27.4	3.1	1962	323,360	176,370	Within 1 km	Ballinaheese	Domestic	Poor	27
3217SWW033	Dug Well	1.2	1.2	-	320,220	175,920	Within 1 km	Kilcarra			
3217SWW038	Borehole	47.2	3.1	1956	322,040	175,460	Within 1 km	Shelton Abbey	Domestic	Poor	33
3217SWW048	Borehole	48.7	21.3	1983	324,600	173,400	Within 1 km	Arklow	Industrial	Moderate	55
3217SWW052	Borehole	53.3	12	1996	324,580	173,320	Within 1 km	Arklow	Domestic	Good	160
3217SWW053	Borehole	45.7	3.6	1996	324,560	173,250	Within 1 km	Arklow	Domestic	Moderate	55

The well card data shows that the wells recorded close to the site location indications the depth of overburden to range from 3.1 to 13.7 mbgl, with an average depth of 7.0 mbgl.

In addition, there is a wellfield which is not recorded on the GSI Well Card and is located c. 2.7 km to the northwest of the site (i.e., upgradient) known as the Woodenbridge Wellfield, which is the public water supply source for the Arklow area. The source consists of five bored wells which together provide approximately 10,000 m^3 of water per day. The wells are between 12.5m and 20.6m deep and are bored into a sequence of alluvial clays, gravels and clays. The alluvial gravels are approx. 10m deep, with the gravels underlain by clay, and the depth to bedrock at the site is greater than 20m. Collectively these boreholes are potentially some of the best yielding wells in Ireland (refer to Figure 5.11 below). These are c. 1 km upgradient of the proposed development.

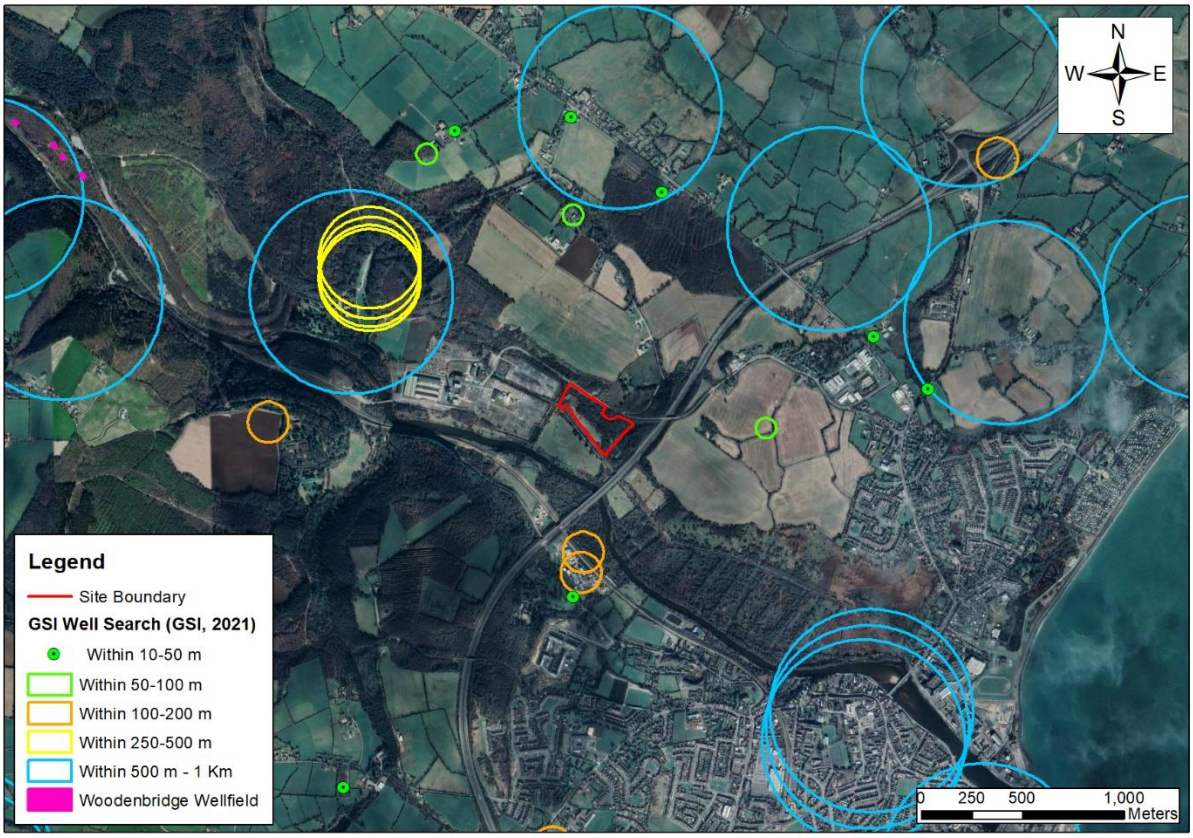


Figure 5.11 GSI Well Locations (Source: GSI, 202*1*) Note the circles show general location of wells only.

There are no sites of geological heritage within the immediate vicinity of the site. However, as mentioned above, the closest site of geological heritage is located approximately 2.7 km to the northwest of the site (i.e., upgradient of the site) and is the Woodenbridge wellfield (IGH 16 Hydrogeology), which consist of very productive bored wells which are high yielding wells and are a public water supply source for the Arklow area. To note these wells are c. 2.7 km upgradient of the proposed development.

5.3.8 Geology (Bedrock)

The bedrock geology of the site is classified as Kilmacrea Formation, which is described as dark grey slate, minor pale sandstone of Ordovician period. See Figure 5.7 below.

The historical site investigation found that the depth to bedrock in the vicinity of the subject site is c. 24 mbgl. The GSI well card data (Table 5.1 above) indicated the depth to bedrock in the wider area ranges from 3.1 to 13.7 mbgl.

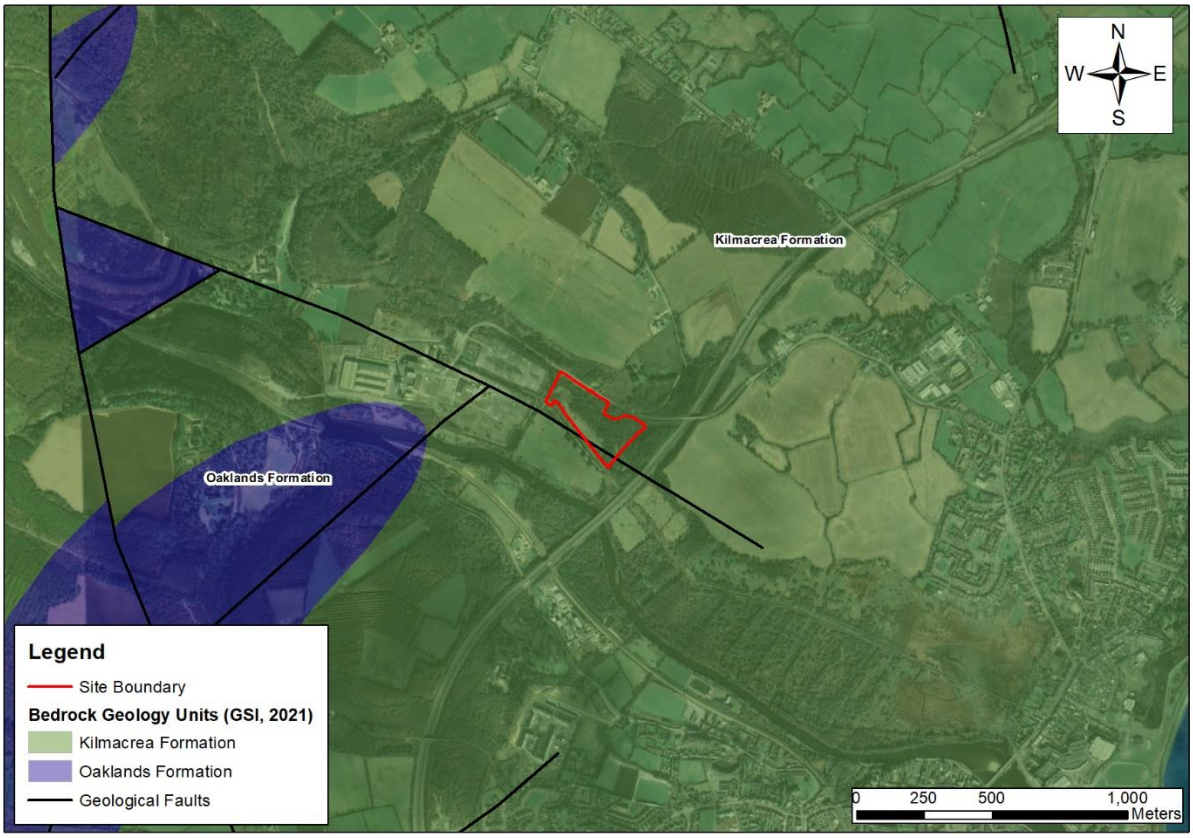


Figure 5.12 Bedrock Geology (Source: GSI, 2020)

As it can be seen above, GSI maps show a geological fault crossing the site in the NW-SE direction.

5.3.9 Aquifer Classification and Water Body Status

Groundwater can be defined as water that is stored in, or moves through, pores and cracks in sub-soils. Aquifers are rocks or granular deposits that contain sufficient void spaces, and which are permeable enough, to allow water to flow through them in significant quantities. The potential of rock or deposits to store and transport water is governed by permeability of which there are two types, intergranular and fissure permeability.

Intergranular permeability is found in sediments, sands, gravels and clays and fissure permeability is found in bedrock, where water moves through (and is stored in) cracks, fissures, planes and solution openings. The aquifer underlying the study area is a gravel aquifer and therefore the primary characteristic of this aquifer is defined by intergranular permeability which apply in the case of a quaternary aquifer.

The major gravel aquifer underlying the site are part of the broader Arklow gravels and has been classified by the GSI as a Locally Important (Lg) Gravel Aquifer.

The Woodenbridge wellfield abovementioned, which represents potentially some of the best yielding wells in Ireland, belongs to these Arklow gravels. With regard to this wellfield, it is considered that the Avoca River, which is only a few tens of metres from the boreholes laterally, is perched within the alluvial clay deposits. The gravel deposit (which are underlain by clay deposits) is therefore acting like a saturated ‘funnel’ of groundwater set in the valley, constrained by high bedrock ridges on either side, and with water levels just below ground level.

The major bedrock aquifer surrounding the site has been classified by the GSI as a Locally Important (LI) Aquifer which is moderately productive in local zones only (refer to Figure 5.13).

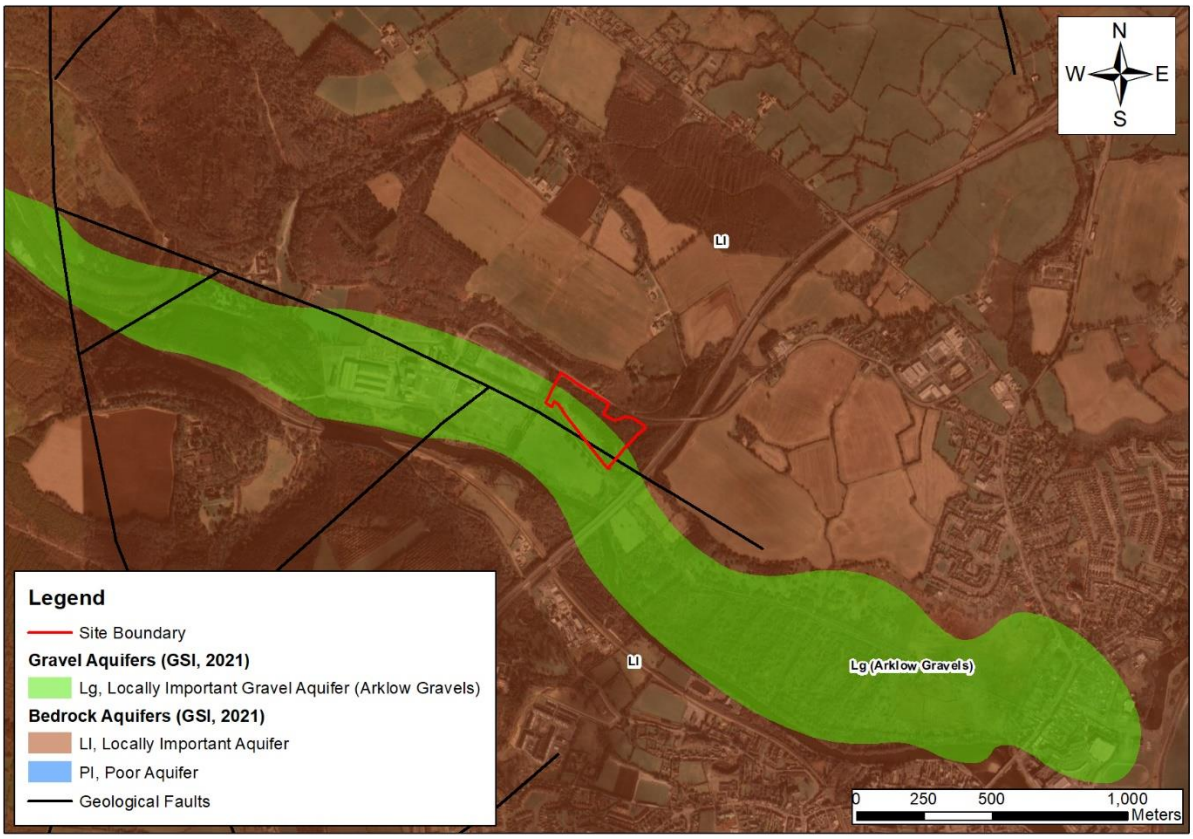


Figure 5.13 Bedrock and Gravel Aquifers (Source: GSI, 2021).

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 proposed development is within the 'Wicklow' groundwater body which most recent WFD groundwater status (2013-2018) is 'Good' with a current WFD risk score under 'Review'.

There are no karst features identified in the area.

5.3.10 Aquifer Vulnerability

The GSI, EPA, and the Department of Environment, Heritage and Local Government (DoEHLG) have developed a programme of Groundwater Protection Schemes, with the aim of maintaining the quantity and quality of groundwater in Ireland, and in some cases improving groundwater quality, by applying a risk assessment approach to groundwater protection and sustainable development.

As part of this scheme, the GSI have mapped the vulnerability of the country's aquifers. Reference to the GSI Vulnerability data indicates that the proposed development site is classified as having a 'Moderate' to 'High' aquifer vulnerability which indicates that the soil cover is >3.0m of moderate permeability soil at the site, given by the cohesive and granular deposits which overlay the gravel aquifer (Refer to Figure 5.14 and Table 5.2 below). Comparison with the site investigation results and GSI Well Card Data (Table 5.1) shows that the surrounding area can be classified as 'Moderate' to 'High'. However, according to the historical site investigation undertaken in the former IFI site, the bedrock was encountered at a depth of 24 mbgl in the subject site, which is representative of a 'Low Vulnerability' condition.

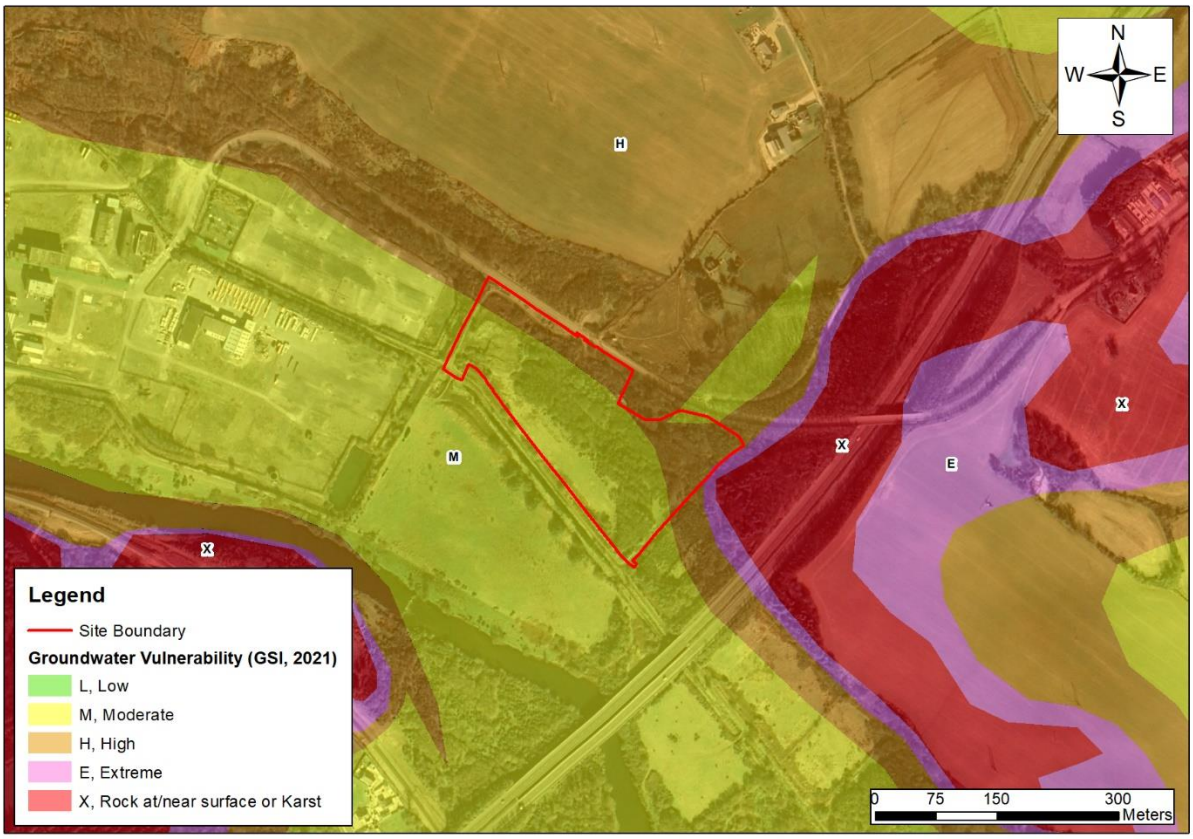


Figure 5.14 Groundwater Vulnerability (Source: GSI, 2021)

Table 5.2 Vulnerability Mapping Guidelines (Source: GSI, 2020)

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

5.3.11 Geo-Hazards

In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities.

Based on the GSI spatial map viewer, the proposed development site is not in an area susceptible to landslides. This is consistent with the topography and the geology across the site. There are no active volcanoes in Ireland.

5.3.12 Groundwater Quality Monitoring

As mentioned above, the landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility (License register number P0031-02). As part of its rehabilitation works, and in accordance with EPA requirements, biannual monitoring on stormwater, groundwater and leachate has been carried out to date to confirm the natural attenuation of the legacy pollutant plumes at the site. This monitoring includes historical boreholes within and in the vicinity of the landfill area and of the subject area in particular. The boreholes involved are:

- Upgradient: L97/2, L97/4 and BH97/6;
- Downgradient: L97/1, BH94/14 and BH94/15

Of this group of boreholes, L97/2, L97/4 and L97/1 are directly related to the subject area (refer to Figures 5.7 above and 5.15 below).

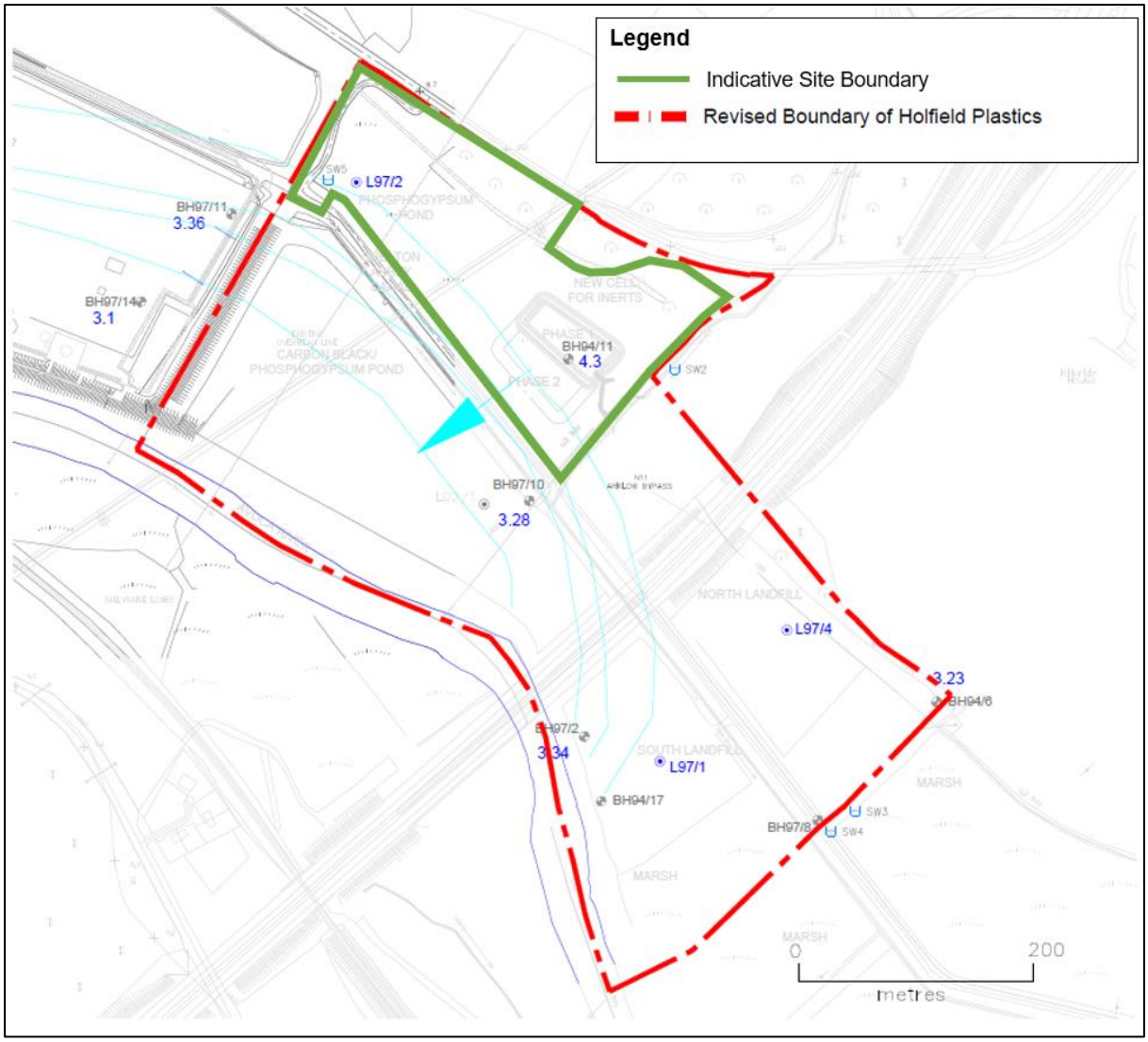


Figure 5.15 Groundwater Monitoring Points Licence Number P0031-02 (Source: OCM, 2011)

Refer to Chapter 6 – Water for further information on surface water points along the Avoca River and also in the local drainage network.

During the operation of the former production area and landfill, the primary contaminant sources included the handling and storage of the compounds used in the fertiliser manufacture (anhydrite, ammonia, dolomite and gypsum); oil storage, and PCB containing electrical equipment. The oil and PCB contaminated subsoils were removed from the site in 2006, which eliminated this source. All fertiliser manufacturing compounds and finished product were removed from the site during the decommissioning process, thereby eliminating this primary source.

According to the OCM Risk Assessment (2011) following the presence of elevated ammonia and nitrates in the groundwater after production shutdown, there has been a significant reduction in levels since 2007, proving that natural attenuation has been effective.

The 2020, 2019 and 2018 Annual Environmental Reports (AER) associated with the aforementioned monitoring programme for Licence P0031-02 have been reviewed in order to assess local groundwater quality in and around the subject site. The monitoring has considered the following parameters:

- Ammonia as NH4 (L97/1 and L97/4);
- COD (L97/1 and L97/4);
- Nitrate (L97/2 and L97/4);
- Sulphate (L97/2);
- VOC suite of parameters (L97/1 and L97/4).

Tables 5.3 and 5.4 below show the available results from 2018 and 2019 AER. The 2020 AER does not provide specific information on groundwater quality information, but only comments on observed trends. The results were compared with the Interim Guideline Values (IGV) published by the EPA (2003) and the Groundwater Threshold Values (GTV) set out in the European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016).

Table 5.3 2018 Groundwater Quality (Source: 2018 AER; P0031-02)

Groundwater				Site		Downgradient			
Sample ID	Details			**L97/2**		**L97/4**		**L97/1**	
Report				AER 2018		AER 2018		AER 2018	
Concentration Value				Maximum	Average	Maximum	Average	Maximum	Average
Sample Date				26/04/2018 & 26/09/2018		26/04/2018 & 26/09/2018		26/04/2018 & 26/09/2018	
Parameters	**Units**	**GTV**	**IGV**						
Ammonia as NH4	mg/l	0.175 Note 1	0.15	*nv*	*nv*	704	592.5	23	20
COD	mg/l	37.5	25	*nv*	*nv*	2	1.25	1	0.75
Nitrate	mg/l	*nv*	*nv*	77	51	144	130	*nv*	*nv*
Sulphate	mg/l	187.5	200	1,592	1,071	*nv*	*nv*	*nv*	*nv*
VOC's									
1,1,1,2-tetrachloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1,1-trichloroethane	ug/l	*nv*	500	*nv*	*nv*	-	-	-	-
1,1,2,2-tetrachloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1,2-trichloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1-dichloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	12	10	-	-
1,1-dichloroethylene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1-dichloropropene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2,3-trichlorobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2,3-trichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2,4-trichlorobenzene	ug/l	*nv*	0.4	*nv*	*nv*	-	-	-	-
1,2,4-trimethylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	4	3.5	-	-
1,2-dibromo-3-chloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2-dibromoethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2-dichlorobenzene	ug/l	*nv*	nv	*nv*	*nv*	-	-	-	-
1,2-dichloroethane	ug/l	*nv*	3	*nv*	*nv*	-	-	-	-
1,2-dichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,3,5-trimethylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	2	1.5	-	-
1,3-dichlorobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,3-dichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,4-dichlorobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	1	1	-	-
2,2-dichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
2-chlorotoluene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
4-chlorotoluene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Benzene	ug/l	0.75	1	*nv*	*nv*	5	4.5	-	-
Bromobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromochloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromodichloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromoform	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromomethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Carbon tetrachloride	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Chlorobenzene	ug/l	*nv*	1	*nv*	*nv*	-	-	-	-
Chloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Chloroform	ug/l	*nv*	12	*nv*	*nv*	-	-	-	-
Chloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Cis-1,2-dichloroethylene	ug/l	*nv*	*nv*	*nv*	*nv*	6	5	-	-
cis-1,3-dichloropropene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Dibromochloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Dibromomethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Dichlorofluoromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Ethylbenzene	ug/l	*nv*	10	*nv*	*nv*	17	13.5	-	-
Hexachlorobutadiene	ug/l	*nv*	0.1	*nv*	*nv*	-	-	-	-
Isopropylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
m+p-Xylene	ug/l	*nv*	10	*nv*	*nv*	19	15	-	-
Methylene Chloride	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
MTBE	ug/l	10	30	*nv*	*nv*	-	-	-	-
Naphthalene	ug/l	*nv*	1	*nv*	*nv*	3	2.5	-	-
n-butylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
n-propylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
o-Xylene	ug/l	*nv*	10	*nv*	*nv*	9	6.5	-	-
p-isopropyltoluene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
sec-butylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Styrene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Tert-butylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Tetrachloroethylene	ug/l	*nv*	10	*nv*	*nv*	-	-	-	-
Toluene	ug/l	525	10	*nv*	*nv*	12	9	19	10
Trans-1,2-dichloroethylene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
trans-1,3-dichloropropene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Trichloroethylene	ug/l	*nv*	10	*nv*	*nv*	1	1	-	-
Trichlorofluoromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Vinyl Chloride	ug/l	0.375	*nv*	*nv*	*nv*	4	4	-	-

Notes: *1. Threshold value for Ammonium as N.*

Key

	Value exceeds the Guideline Value (GTV)
Underlined	Value exceeds Interim Guideline Value (EPA, 2003)
GTV	Groundwater Threshold Value (S.I. No. 9, 2010 Groundwater Regulations)
	Groundwater Threshold Value (S.I. No. 366, 2016 Groundwater (Amendment) Regulations)
IGV	Interim Guideline Value (EPA, 2003)
-	Value less than laboratory Method Detection Limit
nv	No Value

Table 5.3 2019 Groundwater Quality (Source: 2019 AER; P0031-02)

Groundwater				Site		Downgradient			
Sample ID	Details			**L97/2**		**L97/4**		**L97/1**	
Report				AER 2019		AER 2019		AER 2019	
Concentration Value				Maximum	Average	Maximum	Average	Maximum	Average
Sample Date				12/04/2019 & 01/11/2019		12/04/2019 & 01/11/2019		12/04/2019 & 01/11/2019	
Parameters	**Units**	**GTV**	**IGV**						
Ammonia as NH4	mg/l	0.175 Note 1	0.15	*nv*	*nv*	528	468.5	44	38
Nitrate	mg/l	37.5	25	*nv*	*nv*	1	0.75	-	-
COD	mg/l	*nv*	*nv*	48	35	196	175.5	*nv*	*nv*
Sulphate	mg/l	187.5	200	1,350	1,213	*nv*	*nv*	*nv*	*nv*
VOC's									
1,1,1,2-tetrachloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1,1-trichloroethane	ug/l	*nv*	500	*nv*	*nv*	-	-	-	-
1,1,2,2-tetrachloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1,2-trichloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1-dichloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	8	4.5	10	5.5
1,1-dichloroethylene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,1-dichloropropene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2,3-trichlorobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2,3-trichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2,4-trichlorobenzene	ug/l	*nv*	0.4	*nv*	*nv*	-	-	-	-
1,2,4-trimethylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	2	1.5	-	-
1,2-dibromo-3-chloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2-dibromoethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,2-dichlorobenzene	ug/l	*nv*	nv	*nv*	*nv*	-	-	-	-
1,2-dichloroethane	ug/l	*nv*	3	*nv*	*nv*	-	-	-	-
1,2-dichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,3,5-trimethylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	1	1	7	4
1,3-dichlorobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,3-dichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
1,4-dichlorobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	1	1	2	1.5
2,2-dichloropropane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
2-chlorotoluene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
4-chlorotoluene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Benzene	ug/l	0.75	1	*nv*	*nv*	4	2.5	5	3
Bromobenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromochloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromodichloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	8	6	-	-
Bromoform	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Bromomethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Carbon tetrachloride	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Chlorobenzene	ug/l	*nv*	1	*nv*	*nv*	-	-	-	-
Chloroethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Chloroform	ug/l	*nv*	12	*nv*	*nv*	-	-	-	-
Chloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Cis-1,2-dichloroethylene	ug/l	*nv*	*nv*	*nv*	*nv*	3	2	5	3
cis-1,3-dichloropropene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Dibromochloromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Dibromomethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Dichlorofluoromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Ethylbenzene	ug/l	*nv*	10	*nv*	*nv*	10	5.5	18	9.5
Hexachlorobutadiene	ug/l	*nv*	0.1	*nv*	*nv*	-	-	-	-
Isopropylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
m+p-Xylene	ug/l	*nv*	10	*nv*	*nv*	8	5	21	11.5
Methylene Chloride	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
MTBE	ug/l	10	30	*nv*	*nv*	-	-	-	-
Naphthalene	ug/l	*nv*	1	*nv*	*nv*	1	1	2	1.5
n-butylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
n-propylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
o-Xylene	ug/l	*nv*	10	*nv*	*nv*	4	2.5	9	5
p-isopropyltoluene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
sec-butylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Styrene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Tert-butylbenzene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Tetrachloroethylene	ug/l	*nv*	10	*nv*	*nv*	-	-	-	-
Toluene	ug/l	525	10	*nv*	*nv*	3	2	6	3.5
Trans-1,2-dichloroethylene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
trans-1,3-dichloropropene	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Trichloroethylene	ug/l	*nv*	10	*nv*	*nv*	1	1	2	1.5
Trichlorofluoromethane	ug/l	*nv*	*nv*	*nv*	*nv*	-	-	-	-
Vinyl Chloride	ug/l	0.375	*nv*	*nv*	*nv*	1	1	3	2

Notes: *1. Threshold value for Ammonium as N.*

Key

	Value exceeds the Guideline Value (GTV)
Underlined	Value exceeds Interim Guideline Value (EPA, 2003)
GTV	Groundwater Threshold Value (S.I. No. 9, 2010 Groundwater Regulations)
	Groundwater Threshold Value (S.I. No. 366, 2016 Groundwater (Amendment) Regulations)
IGV	Interim Guideline Value (EPA, 2003)
-	Value less than laboratory Method Detection Limit
nv	No Value

As can be seen above, some exceedances are observed for Ammonia, Sulphate and a few VOC parameters.

According to the 2020 AER, groundwater and leachate monitoring results fluctuate from year to year. While there has been a slight increasing trend in Ammonia, Sulphate, COD and some VOCs over the last five years, there are overall long term decreasing trends in groundwater pollution in the site area. The results of borehole testing to date has shown long term decreasing trends in ammonia, nitrate and sulphate levels at the site with no discernible increasing or decreasing trend in COD levels. The results of leachate testing to date has also shown long term decreasing trends in ammonia, nitrate, sulphate and COD levels in the site area.

Volatile Organic Compounds levels recorded in the leachate samples in 2020 were consistent with the low levels recorded in previous years. At the Southern Landfill area, Vinyl Chloride, 1,1-dichloroethane, Cis-1,2-dichloroethylene, Trichloroethylene, Toluene, Ethylbenzene, m+p-Xylene, o-Xylene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, Naphthalene which were recorded in low levels in the 2019 monitoring but have not been detected in 2020. Benzene also decreased from 5 ug/l in 2019 3ug/l in 2020, while 1,2,3-trichloropropane was not recorded in 2019 but was found to be 18ug/l in November 2020.

At the Northern landfill area (i.e., the subject site), the levels of VOCs recorded in 2020 were found to increase slightly from 2019 levels for, 1,1-dichloroethane (max. 16 ug/l), Cis-1,2-dichloroethylene (max. 11 ug/l), Benzene (max. 9ug/l), Trichloroethylene (max. 2 ug/l), Toluene (max. 15 ug/l), Ethylbenzene (max.27 ug/l), m+p-Xylene (max. 40 ug/l), o-Xylene (max. 15 ug/l), Naphthalene (max. 2 ug/l). There was a decrease in Bromodichloromethane below the limits of detection in 2020 from 8ug/l in 2019.

In 2020 Trans-1,2-dichloroethylene and Styrene increased from below limit of detection in 2019 to 1ug/l. The levels recorded for Benzene, Trichloroethylene, Toluene, Ethylbenzene, m+p-Xylene, o-Xylene and Naphtalene remain in exceedance of the respective IGVs for these VOCs.

5.3.13 Landfills

As mentioned throughout the report, the subject site forms part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phophogypsum ponds.

5.3.14 Rating of site importance of the geological and hydrogeological features

Based on the NRA/IGI methodology (refer to Appendix 5.1), the criteria for rating the importance of geological features, the importance of the geological features at this site is rated as ***Medium Importance***. This is based on the presence of contaminated soil on the subject site due to the historical fertiliser production process in the Avoca Park, whose degree or extent of soil contamination is considered to be moderate on a local scale, according to the IPC licence information.

Based on the NRA/IGI methodology (refer to Appendix 5.1), the criteria for rating the importance of hydrogeological features, the importance of the hydrogeological features at this site is rated as ***High Importance***. This is based on the assessment that the attribute has a medium quality significance or value on a local scale. The aquifer is a

locally important (Lg) gravel aquifer over site and is used for public water supply in Arklow (Woodenbridge wellfield which, however, is located upgradient of the site). In addition, it does host the Arklow Town Marsh pNHA, located 370 m downgradient of the subject site (refer to Figure 5.1 above).

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is for a gas powered energy centre facility which will be developed to supply power as a peaking plant and to development in the vicinity, including adjacent data storage facility development. The project is designed to support the power demand of development on adjoining lands at Avoca River Park. Phase 1 will provide 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. Liquid fuel is provided for stand-by in event of interruption of the gas supply.

The existing capped landfill and phophogypsum pond below the proposed development restricts the potential for excavation on that portion of the site. The levels will in fact be raised across the site as partial mitigation of the flood risk management. The DBFL Site Specific Flood Risk Assessment (201103-DBFL-XX-XX-RP-C-0002) identified fluvial risk associated with the Avoca river and associated watercourses. The mitigation measures proposed all highly vulnerable development above the 0.1% AEP fluvial flood level and all road infrastructure above the 1% fluvial flood level. The raising of levels also offers opportunity to build some sub surface infrastructure.

Ground works for foundations and drainage works will be required however, the final design will be completed in accordance with the EPA licence requirements.

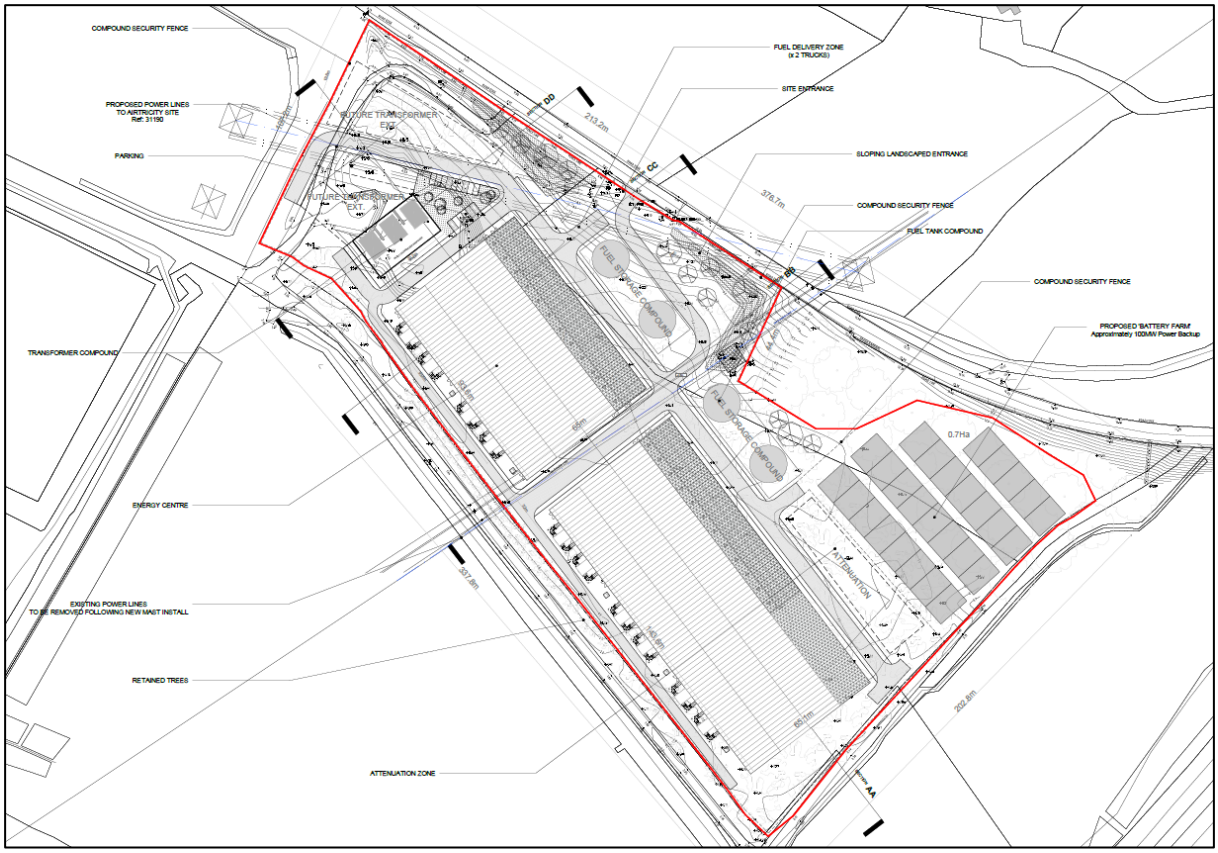


Figure 5.10 Layout outlined in red (Drawing P21-126K-02-00-XXX-DR-RAU-AR-1100)

The activities of the proposed development with regard to the land, soil, geological and hydrogeological environment are outlined below.

5.4.1 Construction Activities

In view of the conditions at the site, a specification for ground works will be prepared in conjunction with the environmental engineer for approval by the EPA in order to ensure that works are in compliance with any licence conditions.

5.4.1.1 Site Preparation & Demolition Works

The site preparation required for the proposed development will be limited.

A temporary construction compound will be set up at commencement to facilitate office, portable sanitary facilities, equipment storage, parking etc. for contractors. It will be used for the duration of the works. The site will have site security throughout construction works.

No demolition or site clearance works are required. All remedial land works (capping) will be completed in accordance with licence requirements prior to commencement of construction of the energy centre. In addition to the sol cover capping required for the landfill capping, additional soil cover will be added for flood protection.

5.4.1.2 Building Construction Works - Foundations and Structure

The proposed civil infrastructure, including roads and drainage, will be accommodated with an element of upper layer stiffness by way of an engineering stone blanket interlain with proprietary geogrid reinforcement. The drainage infrastructure will be placed within the engineering stone blanket and will not breach the environmental capping or waste material layers below.

For the electrical and fuel storage infrastructure, to avoid any impact with the underlying environmental capping and waste material, the initial intention is that all structural foundations for the plant and fuel storage will be deep, heavily reinforced concrete raft slabs placed on an engineering stone blanket with interlaid proprietary geogrid reinforcement. This engineering stone blanket will be placed above the landfill capping. Where piling may be required, this will be undertaken in consultation with the EPA and project environmental engineer. A preliminary procedure (following recognised guidance by Environment Agency UK National Groundwater & Contaminated Land Centre report NC/99/73 Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention) has been developed to ensure that piling operations would not increase risk on the surrounding environment. Details are provided in the Infrastructure Report.

5.4.1.3 Levelling/Cut and Fill

As outlined in the Infrastructure report and SSFRA, the land will be built up such that all proposed roads will be set above the 1% AEP fluvial flood level (3.20m AOD) including an appropriate freeboard:3.20m AOD +0.50m freeboard = 3.70m AOD.

All proposed highly vulnerable development will be set above the 0.1% AEP fluvial flood level (4.10m AOD) including and appropriate freeboard: 4.10m AOD +0.50m freeboard = 4.60m AOD.

Assuming a thin layer of topsoil across the site, the following volumes are anticipated:

- Topsoil (removal off site with partial storage for replacement) ~6,000 m^3
- Engineered stone fill material (import) ~42,000 m^3
- Engineering Materials (Bound and Unbound Sub-Base/Concrete/Asphalt) ~ 30,000 m^3. A further 9,000 m^3 of concrete for piling.
- Pile arisings distributed around the site (limited engineering requirement) ~9,000 m^3 (this volume will be replaced by concrete).

A Construction Environmental Management Plan (CEMP) has been prepared for the proposed development, and this will be put in place by contractors to minimise the impact of all aspects of the construction works on the local environment. The CEMP includes emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. A copy of the CEMP is included with planning application documents.

All construction works will be undertaken in compliance with the requirements of the CEMP which will be updated with any further requirement of planning prior to commencement of works.

5.4.2 Operational Activities

During operation there is no discharge to ground apart from a small sewage treatment plant. With regard to foul sewage, since there are no existing public sewers in the vicinity of the site, a new on-site packaged treatment system is proposed to treat wastewater from the proposed development's welfare facility and will be located at the west part of the site.

The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage receptor, along the western boundary, is in compliance with the EPA Code of Practice Domestic Waste Water Treatment Systems (Population Equivalent ≤ 10). A site suitability assessment will be undertaken in accordance with Section 5 of this Code of Practice to determine the exact sizing of the percolation area and design of the polishing filter.

The land is currently zoned for industrial development and comprises brownfield development so there is no loss of agricultural or amenity value.

In addition, the levelling works and increasing of hard stand area and will reduce local recharge to ground.

It is proposed that c.7 staff will be onsite during the day shift. During the night shift c.2 staff will be located in the energy centre.

Fuel oil will be delivered to the site by HGV road tankers, with a maximum of three tankers expected to be travelling to and from the site per month. A dedicated tanker unloading area will be provided which will be surrounded by a drainage channel to capture any run-off. A class 1 oil-water full retention separator will be installed to capture any oil in the run-off from the pad. A standard operating procedure for fuel unloading will be in place at the site and tanks will be fitted with high level alarms to prevent overfilling.

The diesel store on site has a maximum capacity of 1000 m^3. This will be stored within a bunded area which is greater than 110% of the storage capacity. Run-off water will discharge through an interceptor prior to discharge through the detention pond.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

An analysis of the potential impacts of the proposed development on the land, soils, geology and hydrogeological environment during the construction and operation is outlined below. Due to the inter-relationship between land, soils, geology and hydrogeology and surface water (water & hydrology chapter) the following impacts discussed will be considered applicable to Chapter 6 of the EIAR. Waste Management is also considered an interaction.

5.5.1 Construction Phase

Potential impacts considered during construction are as follows:

Excavation and Infilling

The engineering strategy mentioned in section 5.4.1.2 above shall be applied in order to level the ground to the required level, to found the structure to give it adequate stability and to ensure that piling operations will not increase the risk of extended contamination of the surrounding environment. Based on site conditions, no rock breaking or dewatering will be necessary.

It is envisaged that the excavated waste material will be reused to backfill the required liner and compact it in accordance with the project engineer's specification. In addition, the waste capping material will be placed and compacted (replacing with new as required) over the waste product in accordance with the project engineer's specification.

It is anticipated that excavation for piling (if required), foundations, and structural components will generate c. 6,000m^3 of topsoil. It is also envisaged that the importation of 42,000 m^3 of granular infill will be required to facilitate construction.

Further soil sampling will be undertaken during pre-development works however, it is anticipated that all excavated material will be reused on site. In the event that potentially contaminated soils are encountered, they should be segregated, tested and classified as hazardous or non-hazardous in accordance with the EPA Guidance Document: Waste Classification – List of Waste and Determining if Waste is Hazardous or Non-Hazardous (2015) and Council Decision 2003/33/EC. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.

Accidental Spills and Leaks

During construction of the development, there is a risk of accidental pollution incidences from the following sources if not adequately mitigated:

- Spillage or leakage of oils and fuels stored on site.
- Spillage or leakage of oils and fuels from construction machinery or site vehicles.
- The use of concrete and cement during pad foundation construction.

5.5.2 Operation Phase

As mentioned above, a new on-site wastewater treatment system will be located at the south western part of the site. The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage ditch, along the western boundary, is of sufficient quality. A site suitability

assessment will be undertaken in accordance with Annex C of EPA Code of Practice Part 1 2010 to determine the exact sizing of the percolation area and design of the polishing filter in order to minimise any potential localised contamination into the subsoil.

There is a requirement for diesel store on site which will have a maximum capacity of 1000 m^3. This will be stored within a bunded area which is greater than 110% of the storage capacity. Any accidental emissions during storage, transfer, or delivery or leakage in the car parks could cause localised contamination if the emissions enter the soil and groundwater environment without adequate mitigation. However, it is noted that any accidental discharge will more likely impact stormwater drainage due to the hardstand and drainage infrastructure proposed.

Incorporation of hard stand area and levelling/ compaction of ground level and the use of limited (due to underlying landfill conditions) SUDs techniques will have a minor effect on local recharge to ground; however, the impact on the overall groundwater regime will be insignificant.

As the land was previously used as a landfill, there will no loss of amenity/agricultural land as a result of the proposed development.

5.6 DO NOTHING SCENARIO

Should neither the approved development nor the proposed development take place, the land, soils, geology and hydrogeology will remain in their current state. The site will remain as a brownfield development.

5.7 REMEDIAL & MITIGATION MEASURES

The design has taken account of the potential impacts of the development on the land, soils, geology and hydrogeology environment local to the area where construction is taking place. Measures have been incorporated in the design and CEMP during construction to mitigate the potential effects on the surrounding land, soils, geology and hydrogeology. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

Due to the inter-relationship between land, soils, geology and hydrogeology and water (hydrology) the following mitigation measures discussed will be considered applicable to both.

5.7.1 Construction Phase

Construction Environmental Management Plan

A project-specific Construction and Environmental Management Plan (CEMP) has been included as part of the present application. This CEMP will be maintained by the contractors during the construction and operational phases and covers all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures.

All ground works will be undertaken following preparation of a specification with the environmental engineer and following approval that works are in compliance with any licence conditions.

Soil Handling, Removal and Compaction

The excavated waste material will be reused on site. However, further testing will be required should any soils be required to be removed from site. All soils removed from site will be disposed of by a licenced contractor to a licenced facility.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. Stockpiles of soil/subsoil will be restricted to less than 3m in height.

With regard to the imported material, it is recommended early discussions with demolition and waste recycling contractors to understand availability of compliant general fill material. This material should be chemically inert and insoluble which poses no threat to human health or the environment but offers an appropriate level of engineering capability without contributing to further contamination

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.

Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction machinery and vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated refuelling areas using a prescribed re-fuelling procedure. Plant nappies or absorbent mats to be place under refuelling point during all refuelling to absorb drips. 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.

Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility

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. The pouring of concrete will take place within a designated area using a geosynthetic material to prevent concrete runoff into the soil/groundwater media. Pours will not take place during forecasted heavy rainfall. Washout of concrete transporting vehicles will not take place on site. Concrete trucks will be washed out off site at the source quarry.

To reduce the volume of cementitious water, only concrete truck chutes will be washed down on site. The concrete trucks will wash down their chutes at a designated chute wash down area in the site compound. The wash down area will consist of a polythene

lined bunded area with a capacity of about 20m^3. The location of the chute washdown area will be appropriately located. The system is sealed with no overflow discharge to the drainage system.

In the event of a spillage on site, the dirty water drains in the immediate area will temporarily be blocked and the pH levels of the water in the associated settlement ponds will be monitored and if necessary, will adjust the pH levels using CO_2 entrainment. Any spillage will be cleared immediately and deposited in the Chute wash down area

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

5.7.2 Operational Phase

The energy centre will be required to operate in compliance with an EPA IED licence. The following containment measures are included within the design to reduce potential for environmental impact.

During the operation phase, a new on-site wastewater treatment system will be operating at the southwestern part of the site. The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage ditch, along the western boundary, is of sufficient quality. A site suitability assessment will be undertaken in accordance with Annex C of EPA Code of Practice Part 1 2010.

In addition, there is a requirement for diesel store for a maximum storage c. 1,000 m^3; this will be stored within a bunded area which is greater than 110% of the storage capacity.

An environmental management plan will apply to the overall development during the operational phase incorporating mitigation measures and emergency response measures.

Hydrocarbon interceptors will be installed to capture any potential hydrocarbon contamination prior to discharge into the attenuation system on site. This together with hardstand cover will minimise the potential for any impact to the underlying aquifer.

5.8 PREDICTED IMPACT OF THE PROPOSED DEVELOPMENT

Based on the natural conditions present and with appropriate mitigation measures (refer to Section 5.7 above) to reduce the potential for any impact of accidental discharges to ground or mobilisation of residual contamination during this phase, the potential impact on land soils, geology and hydrogeology during construction (following EPA, 2017) is considered to have a **short term, imperceptible significance**, with a **neutral** impact on quality.

In the case of the proposed development the predicted impact during operation is considered to be **long term**, **neutral** in terms of quality and of an **imperceptible significance** as a result of this proposed development on the surrounding land, soils, geology and hydrogeological environment.

5.9 MONITORING

Construction Phase

Regular inspection of surface water run-off and sediments controls e.g., silt traps will be carried during the construction phase.

Soil sampling to confirm disposal options or suitability for reuse on site for excavated soils.

Regular inspection of construction/mitigation measures will be undertaken e.g., concrete pouring, refuelling etc.

Operational Phase

There will be no requirement for groundwater monitoring as there is no likely discharge to ground. To note monitoring may be required in relation to the overall EPA licence conditions.

5.10 RESIDUAL IMPACTS

There are no likely significant impacts on the land, geological or hydrogeological environment associated with the proposed operational development of the site with mitigation in place. As such the impact is considered to have a **long term, imperceptible significance** with a **neutral impact on quality** i.e., an impact capable of measurement but without noticeable consequences.

5.11 POTENTIAL CUMULATIVE IMPACTS

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below. Related permitted, concurrent, developments are listed in Chapter 2 (Project Description) and Chapter 3 (Planning and Development Context).

The current permitted and concurrent applications at the Avoca site are identified as follows

- Approved SID Application for 110 kV (REF: 309252);
- Approved ICT Facility (Ref: 201285);
- Current SID Application for 220 kV Substation and Grid Connection (Ref: 310090)

5.11.1 Construction Phase

In relation to the potential cumulative impact on the land, geological or hydrogeological environment during the construction phases, those key engineering works which would have additional impacts above are:

Run-off containing large amounts of silt could cause damage to surface water systems and receiving watercourses. Run-off for the development and the Future Avoca Park development will therefore need to be managed using similar methods described for the proposed development.

Contamination of soils and groundwater underlying the site from accidental spillage and leakage from construction traffic and construction materials may occur unless project-specific Construction Environmental Management Plans (CEMPs) are put in place and complied with. It is proposed that project-specific CEMP's will be put in place for the Future Avoca Park development.

The proposed development does not require dewatering and with standard mitigation in place (as outlined in Section 5.6) for management of accidental discharges, the effect due to construction in this area is considered to be a ***neutral*** on quality and an ***imperceptible*** significance.

Contractors for the proposed development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016). As a result, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be ***neutral*** *and* ***imperceptible***.

5.11.2 Operational Phase

In relation to the potential cumulative impacts from the operational stages, the following would apply:

Overall, there will be a local change in recharge pattern due to the increase in hardstand from the proposed development and surrounding planned or permitted developments (e.g., Avoca Park development). However, based on the overall size of the underlying aquifer and measures required by all developments to protect soil and water quality there will be no overall change on the groundwater body status. There is no requirement for bulk chemical storage at the proposed development.

Accidental releases from fuel storage/unloading could contaminate groundwater or soil environments unless mitigated adequately i.e. bunded tanks and delivery areas. Localised accidental discharge of hydrocarbons could occur in car parking areas and along roads unless diverted to surface water drainage system with petrol interceptors. However, all developments are required to ensure they do not have an impact on the receiving water environment in accordance with relevant legislation (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016). such that they would be required to manage runoff and fuel leakages.

As such there will be no cumulative impact to groundwater quality. The cumulative impact is concluded to have a ***long-term, imperceptible*** significance *with a* ***neutral*** impact on soil and water quality.

As the local area is currently developed and zoned for development, the cumulative impact on the land is considered to be ***long-term, imperceptible*** significance *with a* ***neutral*** impact.

5.12 REFERENCES

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APPENDIX 5.1

CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS AT EIA STAGE NATIONAL ROADS AUTHORITY (NRA-TII, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (NRA)

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Table 2 Criteria for Rating Site Attributes – Estimation of Importance of Hydrogeological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 3 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Soil/ Geology Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage feature. Requirement to excavate/remediate entire waste site. Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves. Removal of part of geological heritage feature. Irreversible loss of moderate proportion of local high fertility soils. Requirement to excavate/remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate/remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table 4 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually.

Table 5 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

6.0 HYDROLOGY

6.1 INTRODUCTION

This chapter presents an assessment of the existing environment and the likely impacts of the proposed development on hydrology of the site and the surrounding area. The impact on land, soils, geology and hydrogeology is addressed in Chapter 5 (Lands, Soils, Geology and Hydrogeology).

In assessing likely potential and predicted impacts, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

6.2 STUDY METHODOLOGY

This assessment was considered in the context of the available baseline information; potential impacts; consultations with statutory bodies and other parties and other available relevant information. The assessment was carried out according to the methodology specified in the following guidance documents:

- Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Statements (2002);
- EPA Advice Notes on Current Practice (in the Preparation of EIS) (2003).
- 'Draft Guidelines on the Information to be contained in Environmental Impact Statements' (EPA, 2017);

The following sources of information were consulted:

- Latest EPA Envision water quality monitoring data for watercourses in the area;
- Eastern River Basin District (ERBD) Management Plan – Liffey Water Management Unit and Programme of Measures – ERBD;
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites (Eastern Regional Fisheries Board (ERFB);
- Dublin City Council (2005) Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council;
- Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0 (Wicklow County Council, South Dublin County Council (SDCC), Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire- Rathdown County Council & Dublin City Council);
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001).

The quality, magnitude and duration of potential impacts are defined in accordance with the criteria provided in the EPA Guidelines (Chapter 1, Table 1.2).

In addition, due cognisance is also given to the document entitled '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*' by the National Roads Authority (NRA, 2009) where appropriate. The NRA criteria for rating the magnitude and significance of impacts at

EIA stage are also relevant in determining impact assessment and are presented in Appendix 6.1.

Information on the proposed design is based on the following sources:

- Infrastructure Design Report. Proposed Energy Centre at Avoca River Park Industrial Estate. DBFL Consulting Engineers (July 2021);
- Site Specific Flood risk Assessment. Proposed Energy Centre at Avoca River Park Industrial Estate. DBFL Consulting Engineers (July 2021);
- Environmental Risk Assessment. Former Irish Fertilizer Industries Site, Arklow Co. Wicklow. OCM (June 2011);
- 2018 Annual Environmental Report. Avoca River Park Ltd. Licence Register Number P0031-02;
- 2019 Annual Environmental Report. Avoca River Park Ltd. Licence Register Number P0031-02;
- 2020 Annual Environmental Report. Avoca River Park Ltd. Licence Register Number P0031-02.
- Various design plans and drawings.

6.3 RECEIVING ENVIRONMENT

6.3.1 Site Area Description

The subject site is located within the Avoca River Park Industrial Estate lands, approximately 2km northwest of Arklow, Co. Wicklow.

The site is currently bound by the Avoca River Park Industrial Estate's private access road along its northern boundary and a gravel track and a drainage ditch along its southern boundary. A drainage ditch runs partly along the eastern boundary also. Both drainage ditches drain to the Avoca river which flows further south of the site. The Avoca river flows eastwards and into the sea at Arklow c 3.5 km to the east of the subject site. Beyond the river is the main Dublin-Rosslare railway line, which runs parallel to the river before branching southwards towards the town centre of Arklow. The built up area of Arklow town is c. 1km from the subject site as the crow flies. The site is located within the townland of Shelton Abbey.

Immediately to the east and west the industrial estate is bound by greenfield, undeveloped lands. Beyond an area of grassland to the west lies Shelton Abbey, a prison which is operated by the Irish Prison Service. The main building of the prison complex is a historic structure.

The site of the proposed development comprises approximately 5.01 hectares of land.

The site is bound to the north by a local access road which serves Avoca River Park. To the south and to the west the site is bound by Holifield Plastics Limited. To the east the site is bound by the wider landholding that currently incorporate Harmony Timber and Stunt Drive Ireland which will cease operation and relocate prior to commencement of the construction of the data storage facility.

The existing site currently comprises brownfield lands as described in Chapter 5. The Avoca River Park is well developed, current operations include timber fabrication plant, a plastic manufacturing plant, an existing substation and a storage area for scrapped vehicles. The lands in the immediate vicinity surrounding the industrial park comprise a mix of agricultural, forested, residential, commercial and institutional development.

Shelton Abbey Prison is located to the north-west, Glenart Castle to the south-west and Sigma Aldrich facility to the south-east.

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as Phosphogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring.

An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate runs along the southern boundary of the proposed development site. There are no public foul drainage systems in the vicinity of the site. The foul drainage from the existing Avoca River Park Industrial Estate discharges into several septic tanks located at the southern end of the Park.

The Environmental Protection Agency (EPA) designated watercourses in the vicinity of the subject site include, the Avoca River at its closest point it is approximately 140 m south of the site, and the Sheepwalk River is bounding the site to the east. The Avoca River Valley and the Arklow Town Marsh pNHA are located c. 990 m and c. 370 m to the northwest and southeast of the subject site, respectively.

The subject site slopes towards the drainage ditch at the south western boundary. The survey indicates existing highest ground levels range from 9.77m AOD at the northern boundary to 3.50m AOD and the southern end.

6.3.2 Hydrology

The Avoca River is the primary watercourse/surface water body in the local region. The Avoca is situated approximately 140 m south of the site and flows west to east. The Sheepwalk River borders the site along its eastern side. The development is located within Hydrometric Area No. 10 of the Irish River Network (Avoca-Vartry). It is within the Avoca River WFD Sub Catchment (Avoca_030, WFD code IE_EA_10A031140).

The Avoca River is formed by the confluence of the Avonmore and Avonbeg Rivers, which converge approximately 10.8 km upstream, to the northwest of the subject site; and a further convergence with the Aughrim River at Woodenbridge approximately 3.7 km northwest and upstream of the site. The Avoca River contributing catchment is approximately 650 km^2 which produces a long-term average flow rate of 22 m^3/s. The river catchment drains the south-eastern slopes of the Wicklow Mountains and ultimately discharges to the Irish Sea at Arklow Harbour, approximately 2.9 km southeast of the site.

The Avoca catchment contains some of the most polluted stretches of river in Ireland as a result of acid mine drainage, which originates upstream of the site, having a profound impact on the lower 15 km of the river.

The Sheepwalk River borders the western and eastern side of the subject site and flows into the Avoca river. The Shelton Abbey Canal runs from the eastern site

boundary of the Avoca River Park through the former landfill / lagoons east of the site before discharging into the Avoca River (refer to Figure 6.1 below).



Figure 6.1 Hydrological Environment

At local level, there are existing surface water features in the vicinity of the subject site. These include drainage ditches along the south-west and south-east boundaries, both of which ultimately drain to the Avoca River by way of marshlands further downstream (refer to Figure 6.2 below).

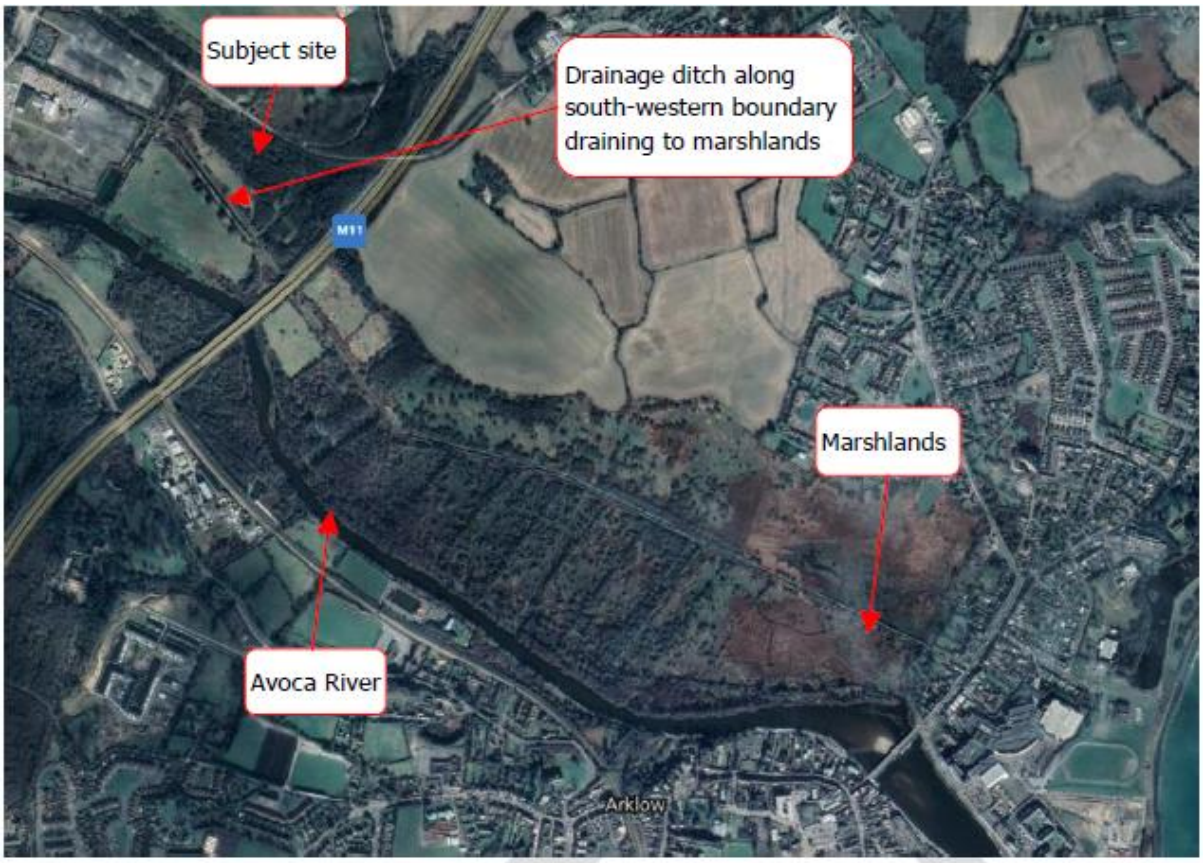


Figure 6.2 Local Hydrological Environment (Source: DBFL, 2021)

The Avoca River Valley and the Arklow Town Marsh are two proposed Natural heritage Areas, (pNHAs) which are located c. 990m and 370m to the northwest and southeast of the subject site, respectively and are dependent on the hydrological regime of the Avoca River (Figure 6.3 below).



Figure 6.3 Natura Sites in the Surrounding Area

6.3.3 Water Quality

The existing site is within the Avoca River WFD Sub catchment, which is the main hydrological feature in the study area, as shown in Figure 6.1.

The development is located within the ERBD, as defined under the EU Water Framework Directive (2000/60EC) European Communities Directive 2000/60EC, establishing a framework for community action in the field of water policy, (commonly known as the Water Framework Directive [WFD]).

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 River Avoca downstream the confluence with the Ballyduff Stream belongs to the AVOCA_030 WFD Surface Waterbody (European Code IE_EA_10A031140). Upstream it is associated with the AVOCA_020 WFD Surface Waterbody (EC: IE_EA_10A031050).

The current status for the River Avoca downstream of Ballyduff Stream (i.e. AVOCA_030) is 'Unassigned' and its risk of not achieve Good status is under 'Review'. Upstream the confluence with the Ballyduff Stream (i.e., AVOCA_020 surface waterbody), the Avoca River has a 'Bad' status and is risk is also under review. This 'Bad' status is related to its biological (fish) status and specific pollutant conditions. The most recent data (2013-2021) show recurring exceedances of the threshold values

defined to achieve 'Good Status' (EU Environmental Objectives Regulations, SI 272/2009 and amendment SI 77/2019) for Copper and Zinc[1].

Downstream of the site, the Avoca river surface waterbody discharges into the Avoca Estuary Transitional Waterbody (EC: IE_EA_150_0100) which finally outfalls into the Southwestern Irish Sea - Brittas Bay Coastal Waterbody (EC: IE_EA_140_0000). The Avoca Estuary has a '*Moderate*' status and is '*At risk of not achieve Good status*'. Brittas Bay does not have an assigned WFD status currently whilst its risk status is advised as '*Not at risk*'.

Surface Water Quality Results

Q Values are used to express the biological water quality by the EPA, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. Q1 indicates a seriously polluted water body, Q5 indicates unpolluted water of high quality.

Q Values for the River Avoca and its tributaries (for which data are available) are shown in Table 6.1 below and the descriptions of each of the Q Ratings are shown in Table 6.2. The Avoca Bridge EPA station is located c. 6.5 upstream of the subject site. The Aughrim river outfalls into the Avoca River c. 3.3 Km upstream of the site (i.e. c. 3.2 Km downstream the Avoca Bridge EPA station) and its EPA Station (Wooden bridge) is located c. 750 m upstream the confluence between both rivers. Refer to Figure 6.3 below for location of these points.

Table 6.1 EPA Biological Q Ratings for the Avoca River

RIVER	Station No.	Location	Biological Quality Ratings (Q Values)															
			1990	1994	1997	1999	2000	2003	2006	2007	2008	2009	2010	2011	2012	2015	2018	2019	2020
Avoca	RS10A030700	Avoca Bridge	1	1			1		4	1	2		4	3	3	3	2	2-3	3
Aughrim (Wicklow)	RS10A020400	Wooden Bridge	5	4-5	4-5	4		4	4			4			3-4	3-4	3-4		4

Table 6.2 EPA Biological Q Ratings

Quality Ratings	Quality Class	Pollution Status	Condition
Q5, Q4-5, Q4	Class A	Unpolluted	Satisfactory
Q3-4	Class B	Slightly Polluted	Unsatisfactory
Q3, Q2-3	Class C	Moderately Polluted	Unsatisfactory
Q2, Q1-2, Q1	Class D	Seriously Polluted	Unsatisfactory

[1] These exceedances are related with the Annual average – Environmental Quality Standard (EQS) defined in S.I. 272/2009, Table 10 – Psycho-chemicals conditions supporting the biological elements; Specific pollutants.

The water quality at the nearest gauging stations which were tested in 2020 (Avoca Bridge and Wooden Bridge) are classified as 3 (slightly polluted) and 4 (unpolluted) respectively. Both stations are upgradient of the proposed development.



Figure 6.3 EPA Water Quality Stations

As mentioned above, the site is located within the area of a former landfill, which is part of an Integrated Pollution Control (IPC) licenced landfill facility (License register number P0031-02). As part of its rehabilitation works, and in accordance with EPA requirements, biannual monitoring on stormwater, groundwater and leachate has been carried out to date to confirm the natural attenuation of the legacy pollutant plumes at the site. This monitoring includes 4 no. surface water points in the local drainage (SW2 to SW5 located at the Sheepwalk and Marsh rivers; refer to Figure 6.4 below).

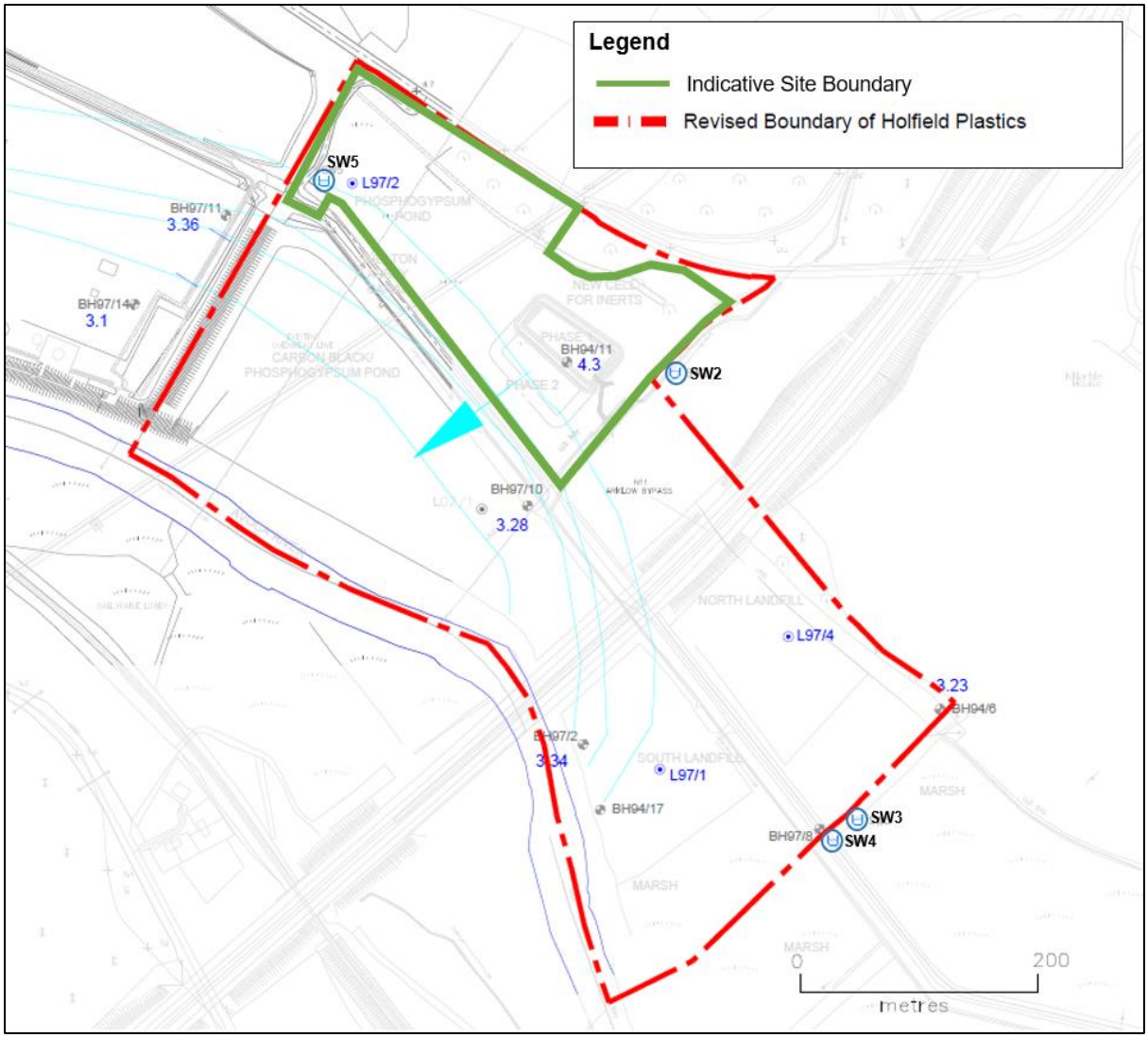


Figure 6.4 Surface Water Monitoring Points Licence Number P0031-02 (Source: OCM, 2011)

The 2020, 2019 and 2018 Annual Environmental Reports (AER) associated with the aforementioned monitoring programme for Licence P0031-02 have been reviewed in order to assess local groundwater quality in and around the subject site. The monitoring has considered the following parameters: Ammonia as N; COD; Nitrate as N and pH.

Tables 6.3 and 6.4 below show the available results from 2018 and 2019 AER. The 2020 AER does not provide specific information on groundwater quality information, but only comments on observed trends. The results were compared with the Surface Water Threshold Values (SWTV) set out in the European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019).

Table 6.3 2018 Surface Water Quality (Source: 2018 AER; P0031-02)

Surface Water			Site		Marsh		Marsh		Site	
Sample ID	Details		SW2		SW3		SW4		SW5	
Report			AER 2018		AER 2018		AER 2018		AER 2018	
Sample Date			26/04/2018	26/09/2018	26/04/2018	26/09/2018	26/04/2018	26/09/2018	26/04/2018	26/09/2018
Parameters	Units	SWTV								
Ammonia as N	mg/l	0.065 Note 1	0.14	-	54	10	0.77	-	-	*nv*
COD	mg/l	*nv*	18	-	59	57	20	-	16	*nv*
Nitrate as N	mg/l	*nv*	26	21	64	103	32	18	24	*nv*
pH	pH units	6.0-9.0 Note 2	7.6	7.3	7.0	6.9	7.2	7	6.8	*nv*

Notes:

1. Threshold value for Ammonia to reach 'Good' Status - mean value

2. Threshold value for hard water (i.e., considering water hardness > 100 mg/l $CaCO_3$)

Key

	Value exceeds the Guideline Value (SWTV)
SWTV	Surface Water Threshold Value (S.I. No. 272, 2009 Surface Water Regulations)
	Surface Water Threshold Value (S.I. No. 77, 2019 Surface Water (Amendment) Regulations)
-	Value less than laboratory Method Detection Limit
nv	No Value

Table 6.4 2019 Surface Water Quality (Source: 2018 AER; P0031-02)

Surface Water			Site		Marsh		Marsh		Site	
Sample ID	Details		SW2		SW3		SW4		SW5	
Report			AER 2019		AER 2019		AER 2019		AER 2019	
Sample Date			12/04/2019	29/10/2019	12/04/2019	29/10/2019	12/04/2019	29/10/2019	12/04/2019	29/10/2019
Parameters	Units	SWTV								
Ammonia as N	mg/l	0.065 Note 1	0.26	0.26	60	37	0.46	0.2	-	0.11
COD	mg/l	*nv*	18	5	33	44	18	13	22	-
Nitrate as N	mg/l	*nv*	27	25	136	77	24	19	16	19
pH	pH units	6.0-9.0 Note 2	7.7	7.6	6.9	6.8	7.5	7	6.7	6.5

Notes:

1. Threshold value for Ammonia to reach 'Good' Status - mean value

2. Threshold value for hard water (i.e., considering water hardness > 100 mg/l $CaCO_3$)

Key

	Value exceeds the Guideline Value (SWTV)
SWTV	Surface Water Threshold Value (S.I. No. 272, 2009 Surface Water Regulations)
	Surface Water Threshold Value (S.I. No. 77, 2019 Surface Water (Amendment) Regulations)
-	Value less than laboratory Method Detection Limit
nv	No Value

As can be seen above, Ammonia SWTV is consistently exceeded. According to the 2020 AER, the results from monitoring of the stormwater parameters have remained consistent with recent years.

6.3.4 Flooding

A Flood Risk Assessment for the site has been undertaken by DBFL and is included as a separate stand-alone report which in turn is included in the present planning documents. A summary of the flood risk for the site is provided in below.

The proposed type of development for this site is to be electricity generation (essential infrastructure) and is categorised as highly vulnerable development.

Portions of the subject site falls within the 1% and 0.1% AEP fluvial flood extents from the Avoca River and associated watercourses. This was identified as the primary source of flooding. All proposed development is located well outside Flood Zone A when site levels are raised (refer to Figure 6.5 below).



Figure 6.5 Development proposals superimposed on 0.1% AEP Fluvial Flood Extent (Source: DBFL, 2021)

Raising the levels within the site will have a negligible impact on the surrounding environment. Therefore, as part of the design measures to reduce the associated flood risk for site users, all 'highly vulnerable' finished floor levels are located above the 0.1% AEP fluvial flood level plus 500mm freeboard i.e. 4.10m AOD + 0.50m freeboard = 4.60m AOD. All proposed roads will be set above the 1% AEP fluvial flood level (3.20m AOD) including an appropriate freeboard: 3.20m AOD + 0.50m freeboard = 3.70m AOD.

In addition, the proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage. In the event of storms exceeding the 100-year design capacity of the drainage system, then possible flood routing for overland flows towards the drainage ditch should not be blocked. Overland flows expected to pass from the site into the drainage ditch following the topography of the land (refer to Figure 6.6 below).



Figure 6.6 Overland Flow Route in Exceedance Event (> 100 year) (i.e. with flood mitigation measures in place) (Source: DBFL, 2021)

It is noted that the OPW web site (www.floodmaps.ie), shows no record of flooding events in the vicinity of the site. The closest recorded flooding event took place further downstream in the Avoca River c. 2.2 km to the south east.

Therefore, it is concluded that the proposed development is located appropriately with regard to flooding.

6.3.5 Rating of Site Importance of the Hydrological Features

Based on the TII/NRA methodology (refer to Appendix 6.1), the site importance of hydrological features at this site is rated **Medium Importance** based on the following:

- There is direct connectivity with the Arklow Marsh proposed NHA, and the receiving waterbodies Avoca Estuary and Brittas Bay through the Avoca River.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

6.4.1 Water Supply

A new 50mm diameter connection to the existing two-inch watermain, on the southwest boundary, is proposed.

The water supply requirements for the proposed development are limited to the local welfare facilities that will be required for maintenance staff only. The peak water demand is calculated at 0.075 l/s.

Irish Water has confirmed the feasibility of this connection based on a pre-connection enquiry submitted 14/07/2021. The enquiry was submitted to Irish Water in order to assess the capacity available in the network, subject to a valid connection agreement.

6.4.2 Foul Sewage

The wastewater loading for the proposed development was calculated in accordance with the principles and methods set out in the Building Regulations and Irish Water's Code of Practice for Wastewater Infrastructure Connections and Developer Services Design & Construction Requirements for Self-Lay Developments July 2020.

Similar to water supply requirements for the proposed development, the waste water collected will be limited to the local welfare facilities that will be required for periodic maintenance staff only. The peak design foul flow is calculated at 0.059 l/s.

Since there are no existing public sewers in the vicinity of the site, a new on-site packaged treatment system is proposed to treat wastewater from the proposed development's welfare facility and will be located at the west part of the site in close proximity to the welfare facilities. The plant will require periodic maintenance and will have a warning system capable of offsite notification.

The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage receptor, along the western boundary, is in compliance with the EPA Code of Practice Domestic Waste Water Treatment Systems (Population Equivalent ≤ 10). A site suitability assessment will be undertaken in accordance with Section 5 of this Code of Practice to determine the exact sizing of the percolation area and design of the polishing filter a condition would be accepted requiring the agreement of these details with the Planning Authority prior to commencement.

6.4.3 Surface Water Drainage

Construction

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

- Excavations are required for foundations of the projected buildings and installation of associated services included within the development.
- Possible discharge of collected rainwater during excavation works and groundworks (the extent of which is dependent on the time of year development works are carried out); and
- Construction activities will necessitate storage of cement and concrete materials, temporary oils, and fuels on site. Small localised accidental releases of contaminating substances including hydrocarbons have the potential to occur from construction traffic and vehicles operating on site.
- Localised excavations (cuts) and infill (build-up) as part of the designed elevation changes across the proposed development site.

Operation

Surface water is provisionally designed using Sustainable Urban Drainage Systems (SUDS) principles and industry best practice, where reasonable practicable, in order to meet the objectives of Wicklow County Council and the Greater Dublin Strategic Drainage Study (GDSDS). The measures outlined will control the quantity and quality of the surface water runoff to best mimic the greenfield scenario and provide a flood resilient solution for the development site.

An assessment of the potential SUDS that could be incorporated within the site was conducted using the SUDS Manual, CIRIA 753. The SUDS elements which were found applicable to the proposed scheme design and layout include the following:

- Above ground rain gardens and raised beds with low maintenance shrubs overflowing to the road drainage conveyance network, limiting flow migration into the capped waste matrix. This will be subject to agreement.

- Online attenuation storage with above ground detention basin .

The incorporation of the above SUDS elements will provide an element of sustainable surface water management for the site given the strict constraints required for development on a former landfill area. Further measures may be employed in agreement with the environmental engineer, once landfill capping has been approved.

To manage peak flow rates, the discharge from the development lands will be limited to greenfield run-off rates (typically 2 litres/second/hectare). The resulting excess volumes will be attenuated within the site in attenuation areas (further detail provided subsequently). The flows leaving the site will be directed to existing drainage ditches at the southeast corner of the subject site which ultimately discharge to the Avoca River via marshlands.

Surface water attenuation will be provided in 2 no. geocellular attenuation storage systems and a detention basin located at the southeast corner of the site. The total storage volume required is for the 30-year event plus 10% climate change; this volume can be contained within the proposed attenuation. Outflow from the site will be controlled using a vortex flow control device (hydrobrake or similar approved).

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

The potential impacts during construction and operation phases of the proposed development on the surface water environment are outlined in the following paragraphs.

6.5.1 Construction Phase

The key civil engineering works at the proposed development will involve the excavation of material for foundations and deliveries of imported engineering fill, crushed stone, concrete, reinforcement and other construction materials. Other construction activities will include site storage of cement and concrete materials, fuels for construction vehicles.

Increased Run-off and Sediment Loading

Surface water run-off from site preparation, levelling, landscape contouring and excavations during the construction phase may contain increased silt levels or become

polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from 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 introduction of impermeable surfaces and 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. Previous uses of the site as a former landfill suggest potential of soil contamination at the site.

There is a possible direct pathway from the excavations works area to the surface water drainage ditches onsite and the Avoca River via the drainage system if it is not adequately mitigated on site. Mitigation measures highlighted in Section *6*.7 will be employed to remove the risk to affect the Avoca River regime.

Uncontrolled Discharges, Fuel and Other Accidental Spills

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

- Spillage or leakage of fuels (and oils) stored on site.
- Spillage or leakage of fuels (and oils) from construction machinery or site vehicles.
- Spillage of oil or fuel from refuelling machinery on site.
- The use of concrete and cement.

Machinery activities on site during the construction phase may result in contamination of runoff into surface water. Potential impacts could arise from accidental spillage of fuels, oils, paints etc. which could impact surface water if allowed to runoff into surface water systems and/or receiving watercourses.

Concreting operations carried out near surface water drainage points during construction activities have the potential to 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.

Wastewater

Welfare facilities will be provided for the contractors on site during the construction works. During construction, portable sanitary facilities will be provided with waste collected and disposed of appropriately. There are no predicted adverse impacts on wastewater during construction.

6.5.2 Operational Phase

During operation measures there is no requirement for bulk fuels or chemical storage (apart from the small bunded storage of diesel for the transformer), no requirement for discharge to ground and no requirement for abstraction of groundwater. The site will be frequented by a maximum of 6-8 personnel and therefore the potential wastewater loading and water requirement is very low. Potential impacts which have been considered are outlined below:

Surface Water Runoff

Without proper control measures, increase in hard stand would result in increase in the rate of run-off. The Wicklow County Council Development Plan requires all new developments to adhere to the practice of Sustainable Urban Drainage Systems (SuDS) for the control of surface water on site. This is highlighted in the Greater Dublin Strategic Drainage Strategy and the design has incorporated SUDs within the drainage design for the proposed development.

Uncontrolled Discharges, Fuel and Other Accidental Spills

There is a low potential for leaks and spillages during operation and maintenance of the development as no bulk fuel or chemicals required for operation. There is a requirement for diesel store on site which will have a maximum capacity of 1000 m3. This will be stored within a bunded area which is greater than 110% of the storage capacity. Any accidental emissions during storage, transfer, or delivery or leakage in the car parks could cause localised contamination if the emissions enter the soil and groundwater environment without adequate mitigation. However, it is noted that any accidental discharge will more likely impact stormwater drainage due to the hardstand and drainage infrastructure proposed.

Incorporation of hard stand area and levelling/ compaction of ground level and the use of SUDs techniques will have a minor effect on local recharge to ground; however, the impact on the overall groundwater regime will be insignificant. There is an indirect pathway to the Avoca River from this site through the drainage ditches at the southeast corner of the subject site which ultimately discharge to the Avoca River via marshlands, however mitigation measures mentioned above and below in section 6.7 will avoid potential impact on offsite and onsite watercourses.

Foul Water

The proposed development will not increase the foul water discharge in the public sewer as the proposed substation will be served by a new on-site packaged treatment system which will be located at the south western part of the site.

The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage ditch, along the western boundary, is of sufficient quality. A similar design is incorporated in the adjacent permitted datacentre development.

Water Supply

The proposed development will increase the demand for water from the public water supply system to cater for a maximum of 10 persons (the local welfare facilities that will be required for maintenance staff only). Irish Water has confirmed the feasibility of this connection, therefore there would be no significant effect on public water supply.

6.6 DO NOTHING SCENARIO

Should the proposed development not take place, the runoff from the site will continue to directly enter the existing drainage system.

It is noted that the proposed redevelopment for the site should have a positive gain for the receiving waters as the drainage design will comply with GDSDS Guidelines resulting in attenuated run-off from the site and improved water quality management.

6.7 REMEDIAL AND MITIGATION MEASURES

The design of the proposed development has taken account of the potential impacts of the development and the risks to the water environment. Measures have been developed to mitigate the potential effects on the local water environment. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

The following mitigation measures are designed to address the impacts associated with the construction and operational phase of the project. Due to the inter-relationship between this section and Section 5.0 (Soils, Geology and Hydrogeology) the following mitigation measures discussed will be considered applicable to both.

6.7.1 Construction Phase

During the construction phase, mitigation measures have been applied for the following potential impacts:

- Increased runoff and sediment loading
- Fuel and Chemical Handling

These mitigation measures will ensure that no contaminated runoff or untreated wastewater will enter any watercourses during construction of the proposed development.

A Construction Environmental Management Plan (CEMP) will be developed by the Applicant and the construction contractor prior to commencement of construction. The CEMP will incorporate the mitigation measures outlined below as they relate to the construction phase. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. This is an active document which is continuously updated to manage risk during the construction programme. All relevant personnel working on the site will be trained in the implementation of the procedures.

As a minimum, the manual will be formulated in consideration of the standard best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors.
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005.
- 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.
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

Management of sediment loading and water quality

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 foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt 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. It is therefore proposed that the water be discharged directed to existing drainage ditches at the subject site which ultimately discharge to the Avoca River via marshlands. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the local drainage network. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the characteristics of the ground conditions 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 surface water drains will be maintained.

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.

Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction machinery and vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated refuelling areas using a prescribed re-fuelling procedure. Plant nappies or absorbent mats to be place under refuelling point during all refuelling to absorb drips. 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.

Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility.

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. The pouring of concrete will take place within a designated area using a geosynthetic material to prevent concrete runoff into the soil/groundwater media. Pours will not take place during forecasted heavy rainfall. Washout of concrete transporting vehicles will not take place on site. Concrete trucks will be washed out off site at the source quarry.

To reduce the volume of cementitious water, only concrete truck chutes will be washed down on site. The concrete trucks will wash down their chutes at a designated chute wash down area in the site compound. The wash down area will consist of a polythene lined bunded area with a capacity of about $20m^3$. The system is sealed with no overflow discharge to the drainage system.

In the event of a spillage on site, the dirty water drains in the immediate area will temporarily be blocked and the pH levels of the water in the associated settlement ponds will be monitored and if necessary will adjust the pH levels using CO_2 entrainment. Any spillage will be cleared immediately and deposited in the Chute wash down area

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

6.7.2 Operational Phase

The following containment measures are included within the design to reduce potential for environmental impact. The energy centre will be required to operate in compliance with an EPA IED licence.

Environmental Procedures

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.

Fuel and Chemical Handling

During operation measures there is no requirement for bulk fuels or chemical storage, no requirement for discharge to ground and no requirement for abstraction of groundwater. There is a requirement for diesel store on site which will have a maximum capacity of 1000 m^3. This will be stored within a bunded area which is greater than 110% of the storage capacity in line with the requirements of the *Guidance to Storage and Transfer of Materials for Scheduled Activities* (EPA, 2005).

A standard operating procedure for fuel unloading will be in place at the site and tanks will be fitted with high level alarms to prevent overfilling. All staff should be trained in spill containment measures and emergency response.

Surface Water Drainage

The proposed development will provide a significant improvement to the local drainage catchment as it is proposed to provide an attenuation system prior to discharge into the Avoca River.

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.

A Flood Risk Assessment for the site has been undertaken by DBFL in accordance with the OPW's 'The Planning System and Flood Risk Management Guidelines for Planning Authorities'. According to this report, portions of the subject site falls within the 1% and 0.1% AEP fluvial flood extents from the Avoca River and associated watercourses. The design considered raising the levels within the site in order to have a negligible impact on the surround environment due to potential flooding.

Foul Water

The proposed development will be served by a new on-site packaged treatment system which will be located at the south western part of the site. The treated effluent from the wastewater treatment plant will discharge into a soil polishing filter to ensure that the final discharge into the drainage ditch, along the western boundary, is of sufficient quality.

Water Supply

The proposed development will increase the demand for water from the public water supply system to cater for a maximum of 10 persons (the local welfare facilities that will be required for maintenance staff only). Irish Water has confirmed the feasibility of this connection, therefore there would be no significant effect on public water supply.

6.8 PREDICTED IMPACT OF THE PROPOSED DEVELOPMENT

This section describes the predicted impact of the proposed development following the implementation of the remedial and mitigation measures.

6.8.1 Construction Phase

The implementation of mitigation measures highlighted in Section 6.7.1 will ensure that the predicted impacts on the surface water environment do not occur during the construction phase and that the residual impact will be ***short term-imperceptible-neutral***.

6.8.2 Operational Phase

The implementation of mitigation measures highlighted in Section 6.7.2 will ensure that the predicted impacts on the surface water environment do not occur during the operational phase and that the residual impact will be ***long term-imperceptible-neutral***.

6.9 MONITORING

Visual inspection of the surface water run-off controls (settlement ponds, silt filters, drains) and water quality monitoring of the discharge from on-site sediment and erosion controls will be undertaken during the construction phase to confirm that there is no impact on surface water during the construction of the development.

No monitoring is proposed specifically for the operational phase. However, monitoring be a requirement of the existing or future licence conditions.

6.10 RESIDUAL IMPACTS

The residual impacts are those that would occur after the mitigation measures, as outlined in Section 6.7 above have taken effect.

6.10.1 Construction Phase

In relation to the construction phase the impact on the water during construction (EPA, 2002) is considered to be have a ***Short term, Imperceptible Impact with a neutral impact on quality*****,** i.e. an impact capable of measurement but without noticeable consequences. This is based on the following assessments.

There will be no significant increase in runoff from the site during construction and run-off quality will be mitigated if required.

6.10.2 Operational Phase

There are no likely significant impacts on the hydrological environment associated with the proposed development of the site and considering cumulative impact. It is not anticipated that any impacts will arise following the implementation of the mitigation measures discussed in Section 6.7 above. As such the impact (EPA, 2002) is considered to have a ***Long term- imperceptible significance with a neutral impact on quality*** i.e. an impact capable of measurement but without noticeable consequences.

- The proposed development will not negatively impact on any surface waterbody during operation.
- There will be no increase in flood risk as result of the site operation.

6.11 CUMULATIVE IMPACTS

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below. Related permitted, concurrent, developments are listed in Chapter 2 (Project Description) and Chapter 3 (Planning and Development Context).

The current permitted and concurrent applications at the Avoca site are identified as follows

- Permitted SID Application for 110 kV (REF: 309252);
- Approved ICT Club (Ref: 201285);
- Current SID Application for 220 kV Substation and Grid Connection (Ref: 310090)

6.11.1 Construction Phase

In relation to the potential cumulative impact on hydrology during the construction phases, the construction works which would have potential cumulative impacts include:

- Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses.
- Contamination of local water sources from accidental spillage and leakage from construction traffic and construction materials unless project-specific CEMPs are put in place for each development and complied with.
- There is a potential for contamination of watercourses during mitigation measures are required to manage sediment run-off and fuel leakages during construction and operation. All developments are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislation (S.I No 77/2019 EU Environmental Objectives (Surface Waters) Amendment Regulations 2019) such that they would be required to manage runoff and fuel leakages.

The residual cumulative impact on water and hydrology for the construction phase is anticipated to be ***short-term***, ***neutral*** in terms of quality and of ***not significant*** significance, once appropriate mitigation measures to manage water quality runoff in compliance with legislative requirement are put in place for each development.

6.11.2 Operational Phase

Potential cumulative impacts included in the operational phase include:

- Increased hard standing areas will reduce local recharge to ground and increase surface water run-off potential if not limited to the green field run-off rate from the site;
- Increased risk of accidental releases from fuel storage/delivery unless mitigated adequately

- Increased risk of accidental discharge of hydrocarbons from car parking areas and along roads and unless diverted to surface water system with petrol interceptor; and
- Any additional foul discharges should be treated where appropriate and/or diverted to the foul sewer system and not directly to ground.

Similar mitigation measures to those described in Section 6.7 will need to be implemented to protect water quality.

Increase in wastewater loading and water supply requirement is an impact of all development: Each development will require approval from IW confirming available capacity in the water and wastewater infrastructure. The surface water and foul drainage infrastructure and water supply requirements for the proposed development has been designed to accommodate the future indicative substation development.

Development will result in an increase in hard standing which will result in localised reduced recharge to ground and increase in run-off rate. However, each permitted development is required by the Local Authority to comply with the Greater Dublin Strategic Drainage Strategy (GDSDS) and Local Authority requirements by providing suitable attenuation on site to ensure greenfield run-off rates and ensure that there is no increase in offsite flooding as a result of development.

The residual cumulative impact on water and hydrology for the operational phases is anticipated to be ***long-term***, ***neutral*** in terms of quality and ***not significant*** significance, once appropriate mitigation measures to manage water quality runoff in compliance with legislative requirement are put in place for each development.

APPENDIX 6.1

CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS AT EIA STAGE NATIONAL ROADS AUTHORITY (NRA-TII, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Hydrological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 2 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 3 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

7.0 BIODIVERSITY; FLORA & FAUNA

7.1 INTRODUCTION

This chapter provides an assessment of the impacts of the proposed development on the ecological environment, i.e. biodiversity, flora and fauna. It has been compiled in compliance with the European Communities Legal requirements with regard to Environmental Impact Assessment and follows the revised Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017) and Draft Advice Notes for preparing Environmental Impact Statements (EPA, 2015).

7.2 METHODOLOGY

This chapter of the EIA Report concentrates on ecological features within the development area of particular significance, primarily designated habitats and species. This includes habitats/species listed in Annex I, II and IV of the EU Habitats Directive, rare plants listed in the Flora Protection Order and other semi-natural habitats of conservation value.

A Report for the purposes of Appropriate Assessment Screening was undertaken by Moore Group for the proposed development which is presented as Appendix 7.1 to this chapter.

In order to screen out a project, it must be *excluded*, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

7.2.1 Policy & Guidance

7.2.1.1 EU Habitats Directive

The “Habitats Directive” (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) is the main legislative instrument for the protection and conservation of biodiversity within the European Union and lists certain habitats and species that must be protected within wildlife conservation areas, considered to be important at a European as well as at a national level. A “Special Conservation Area” or SAC is a designation under the Habitats Directive. The Habitats Directive sets out the protocol for the protection and management of SACs.

The Directive sets out key elements of the system of protection including the requirement for “Appropriate Assessment” of plans and projects.

Both the Habitats Directive and the Birds Directive have been transposed into Irish law by one set of regulations (i.e. The European Communities (Birds and Natural Habitats) Regulations 2011 to 2015 (S.I. No. 477/2011 as amended by S.I. No. 355 of 2015)).

7.2.1.2 Birds Directive

The “Birds Directive” (Council Directive 2009/147/EC on the Conservation of Wild Birds) provides for a network of sites in all member states to protect birds at their breeding, feeding, roosting and wintering areas. This directive identifies species that are rare, in danger of extinction or vulnerable to changes in habitat and which need protection (Annex I species). Appendix 1 indicates Annex I bird species as listed on the Birds Directive. A “Special Protection Area” or SPA, is a designation under The Birds Directive.

Special Areas of Conservation and Special Protection Areas form a pan-European network of protected sites known as Natura 2000 sites and European sites.

7.2.1.3 Wildlife Acts (1976 - 2012)

The primary domestic legislation providing for the protection of wildlife in general, and the control of some activities adversely impacting upon wildlife is the Wildlife Act of 1976. The aims of the wildlife act according to the National Parks and Wildlife Service are "... to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims." All bird species are protected under the act. The Wildlife (Amendment) Act of 2000 amended the original Act to improve the effectiveness of the Act to achieve its aims.

7.2.2 Habitat Survey

The habitat survey was carried out in three stages, firstly through desktop research to determine existing records in relation to habitats and species present in the study area. This included research on the National Parks and Wildlife Service (NPWS) metadata website, the National Biodiversity Data Centre (NBDC) database and a literature review of published information on flora and fauna occurring in the proposed development area.

Other environmental information for the area was reviewed, e.g. in relation to soils, geology, hydrogeology and hydrology. Interactions in terms of the chapters on these topics presented in this EIA Report were important in the determination of source vector pathways and links with potentially hydrologically connected areas outside the proposed development site.

The second phase of the survey involved site visits in July and August 2021 to establish the existing environment in the footprint of the proposed development area. Areas which were highlighted during desktop assessment were investigated in closer detail according to the Heritage Council Best Practice Guidance for Habitat Survey and Mapping (Smith *et al*., 2011). Habitats in the proposed development area were classified according to the Heritage Council publication "A Guide to Habitats in Ireland" (Fossitt, 2000). This publication sets out a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. This form of classification uses codes to classify different habitats based on the plant species present. Species recorded in this report are given in both their Latin and English names. Latin names for plant species follow the nomenclature of "An Irish Flora" (Parnell & Curtis, 2012).

Habitats were surveyed on 29 July and 10 August 2021 by conducting study area walkovers covering the main ecological areas identified in the desktop assessment. The survey dates are toward the end of the optimal survey periods for botanical species, but adequate given the industrial nature of the site. A photographic record was made of features of interest.

Signs of mammals such as badgers and otters were searched for while surveying the study area noting any sights, signs or any activity in the vicinity especially along adjacent boundaries and in woodland areas.

Site specific bat surveys were carried out during fieldwork on the night of both site visits. A dusk mobile detector survey was carried out each night completing looped transects of the site during the dusk period to survey for commuting, feeding and potential roost sites.

The survey on 29 July commenced at 20:30 with sunset at Arklow occurring at c. 21:21. Conditions on the night of the survey were fair with 90% cloud cover and the air temperature varied during the evening of the survey between 22.0C at 20:00 to 17C at 21:30. However, the survey was postponed after heavy rain commenced at 10pm.

The survey on 10 August commenced at 20:20 with sunset at Arklow occurring at c. 21:01. Conditions on the night of the survey were excellent with 20% cloud cover and the air temperature varied during the evening of the survey between 22.0C at 20:00 to 17C at 23:30. No rain occurred during the survey with overall conditions being good for bat survey work.

The bat detectors used during the walked surveys were a Pettersson D230 bat detector and an Echo Meter Touch 2 Pro. A contact describes a bat observed by the surveyor. This contact can range from a commuter passing quickly to a foraging bat circling a feature lasting for several minutes. Some observations contain multiple bats. When several bats of the same species are encountered together, they are recorded under the one contact. A separate contact is recorded for each species. A contact finishes when the recorder assumes the bat is no longer present. It is likely that the same bat is recorded in several contacts throughout the night. This survey type cannot estimate abundance of bats, rather activity; the amount of use bats make of an area / feature. The survey followed the guidelines as set out in bat conservation Ireland's 'Bat Survey Guidelines'.

The survey undertaken is in line with recommendations of the Bat Conservation Trust 'Good Practice Guidelines', 3rd edition, 2016 (Collins, J (ed)(2016) and Irish Wildlife Manual No. 25' (Kelleher, C. & Marnell, F. 2006).

Birds were surveyed using standard transect methodology and signs were recorded where encountered during the field walkover surveys.

Following desktop assessment an evaluation of the development area and determination of the potential impacts on the flora and fauna of the area is based on the following guidelines and publications:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019).
- EPA Draft EIA Report Guidelines 2017;
- Assessment of plans and projects significantly affecting Natura 2000 sites (EC, 2002);
- Managing Natura 2000 Sites (EC, 2000) Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC (EC, 2000);
- Managing Natura 2000 Sites (EC, 2017) Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC (EC, 2018);
- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, Rev. Feb. 2010); and

The following resources assisted in the production of this chapter of the report:

- Ordnance Survey Ireland maps;
- OSI, Google and Bing Aerial photography (1995 – 2020);
- NPWS Mapviewer: http://www.npws.ie/en/MapsData/;
- Designated sites (SACs, SPAs, NHAs);
- Records of protected species from 10km squares; and
- National Biodiversity Data Centre Records and Maps.

7.3 RECEIVING ENVIRONMENT

The site comprises a mosaic of disturbed ground which is heavily recolonised with ruderal species and Rosebay Willowherb scrub, Willow and Bramble Scrub (WS1) and neutral grassland (GS1) which has been left fallow and outgrown, surrounded by areas of mixed broadleaved woodland (WD1).

The following is a description of the flora and fauna of the existing environment in the study area.

7.3.1 Designated Conservation Areas

The Department of Housing, Planning and Local Government (previously DoEHLG)'s Guidance on Appropriate Assessment (2009) recommends an assessment of European sites within a Zone of Influence (ZoI) of 15km. This distance is a guidance only and a potential Zone of Influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source- Pathway-Receptor framework and not by arbitrary distances (such as 15km).
The Zone of Influence may be determined by connectivity to the Proposed Development in terms of:

- Nature, scale, timing and duration of works and possible impacts, nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Sensitivity and location of ecological features.

The potential for source pathway receptor connectivity is firstly identified and detailed information is then provided on sites with connectivity. European sites that are located within the potential Zone of Influence of the Proposed Development are listed in Table 7.1 and presented in Figure 7.1 below. Spatial boundary data on the Natura 2000 network was extracted from the NPWS website (www.npws.ie) on 20 August 2021.

Table 7.1 Details of European sites within the potential zone of influence of the project.

Site Code	Site name	Distance (km)[1]
000729	Buckroney-Brittas Dunes and Fen SAC	4.93
001742	Kilpatrick Sandhills SAC	8.16

The proposed development is to take place on a partly brownfield site within the catchment of the Avoca River which discharges to the Irish Sea at Arklow c. 3 river km to the east.

The nearest European sites to the proposed development Buckroney-Brittas Dunes and Fen SAC (Site Code 000729) which is located approximately 5km to the north of the discharge point of the Avoca River.

Potential impacts on the distant coastal site of Buckroney-Brittas Dunes and Fen SAC are unlikely due to the large distance of removal on the Avoca River (over 8km

[1] Distances indicated are the closest geographical distance between the proposed development and the European site boundary, as made available by the NPWS. Connectivity along hydrological pathways may be significantly greater.

hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated site over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site.

Therefore it is considered to be outside the potential Zone of Influence of the proposed development. Similarly, the Kilpatrick Sandhills SAC located even further south on the coast (over 10km hydrologically from the site) is also outside the potential Zone of Influence of the proposed development.

There is no connectivity to any other European sites.

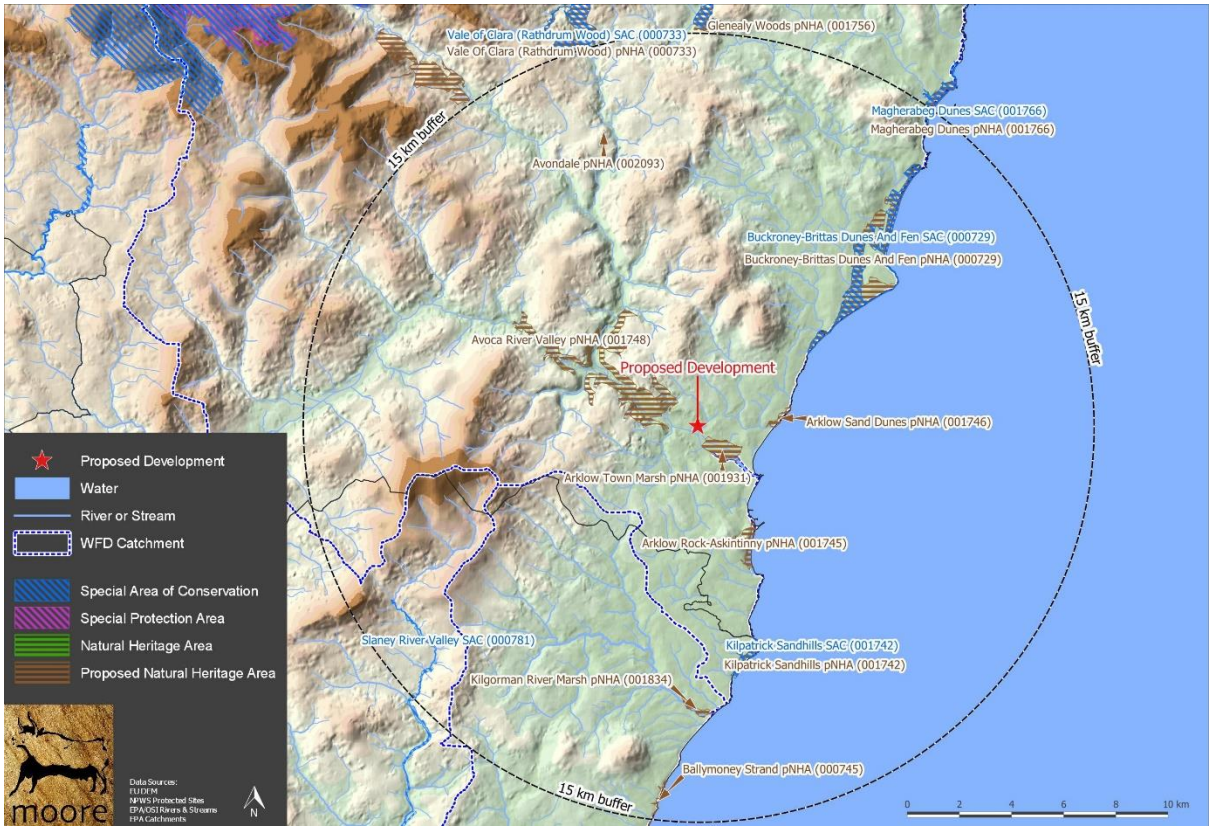


Figure 7.1 Showing European sites and NHAs/pNHAs within the wider Potential Zone of Influence of the Proposed Development.

7.3.2 Non-Designated Habitats

The site comprises a brownfield development.The main habitats are presented in Figure 7.2.

A list of habitats recorded and their corresponding Fossitt codes is presented in Table 7.2.

Table 7.2 Details of habitats recorded and their corresponding Fossitt codes.

Habitat	Habitat Category	Habitat Type
(F) Freshwater	(FW) Water courses	(FW1) Eroding upland rivers
		(FW3) Canals
(G) Grassland	(GS) Semi-natural grassland	(GS1) Neutral Grassland
(W) Woodland	(WD) Modified Woodland	(WD1) Mixed broadleaved woodland
	(WS) Scrub/Transitional Woodland	(WS1) Scrub
(E) Exposed rock and disturbed ground	(E) Disturbed ground	(ED3) Recolonising bare ground
(B) Cultivated and Built land	(BL) Built land	(BL3) Buildings and artificial surfaces

7.3.2.1 Sheepwalk Stream (FW1)

The woodland to the east of the site is drained by a small stream named by the EPA as 'Sheepwalk10' which flows from farmland to the north and is culverted under the Shelton Canal and parts of the Industrial Estate to the Avoca River. The stream is outside the boundary of the site on its eastern boundary and enclosed by dense woodland except for small sections were it can be seen from a track at the easter extent of the site. It is shallow and meandering through gravel, bud and sandy courses in places. It has no fisheries value and is not suitable for otters.

7.3.2.2 Shelton Abbey Canal (FW3)

This habitat refers to the canal that runs along outside the southern boundary of the site, referred to as the Shelton Abbey Canal as it extends from Shelton Abbey toward Arklow Town. It appears to be a contained system. The banks are heavily colonised with tall herbs including abundant Great willowherb (*Epilobium hirsutum*) and Nettle (*Urtica diocia*) with frequent Hogweed (*Heracleum sphondylium*) as well as scattered invasive Giant Hogweed (*H. mantegazzianum*). The banks are also populated with Willow (*Salix spp.*), Alder (*Alnus glutinosa*), Silver birch (*Betula pendula*), Hazel (*Corylus avellana*) and Hawthorn (*Crataegus monogyna*).

7.3.2.3 Neutral Grassland (GS1)

The south central area of the site appears once to have been managed grassland fields prior to 1995. According to the OSI aerial photography from 2000 these fields were stripped and the grassland that subsequently developed has become tall and rank over time with encroaching scrub from the surrounding woodland the north of the site. Species include abundant False Oat grass (*Arrhenatherum elatius*), Red Fescue (*Festuca rubra* agg.), Soft rush (*juncus effuses*), Hogweed (*Heracleum sphondylium*), Wild Angelica (*Angelica sylvestris*), Cow parsley (*Anthriscus sylvestris*), Rosebay Willowherb (*Chamerion angustifolium*), Creeping Thistle (*Cirsium arvense*) and Nettle. The Rosebay willowherb is forming large patches and along with Nettle and Bramble merging to scrub patches.

7.3.2.4 Mixed broadleaved woodland (WD1)

The woodland habitat refers to the area to the north and east of the proposed development site and comprises mixed species with many mature trees of high local value (WD1), particularly to the eastern portion of the site where less human disturbance has occurred. Species include Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*), Scot's pine (*Pinus sylvestris*), Alder (*Alnus glutinosa*), Silver birch (*Betula pendula*), Willow (*Salix spp.*), Hazel (*Corylus avellana*) and Hawthorn (*Crataegus monogyna*).

7.3.2.5 Scrub (WS1)

There are large patches of scrub associated with the woodland described above and these habitats together form a dense mosaic with predominant Bramble (*Rubus fruticosus* agg.) along with Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Rosebay Willowherb

7.3.2.6 Recolonising bare ground (ED3)

This category refers to the central western area of the site associated with landfill activity left to recolonise. Species present are typical ruderal species including Thistles (Cirsium spp.), Ragwort (*Senecio jacobaea*), Cat's-ear (*Hypochaeris radicata*), Smooth sow-thistle (*Sonchus asper*), Dandelion (*Taraxacum officinale* agg.) and Great willowherb (*Epilobium hirsutum*).

7.3.2.7 Buildings and artificial surfaces (BL3)

This category refers to four buildings and hard surfaces on site. These are not mapped on the habitat map but are obvious on the baseline arial photography. .

7.3.2.8 Invasive Species

There is a planted line of Cherry Laurel at the south-eastern extent of the site along the track on the northern side of the canal. Toward the south-eastern corner along this track and turning north into the woodland there is a large spread of known Himalayan Knotweed (*Persicaria wallichii*).

As mentioned, Giant Hogweed occurs frequently on the bank of the canal in this area also, increasing in number approaching the Motorway end of the canal.

It is noted that Connacht Weed Control Ltd have undertaken an invasive weed site survey and provided a plan for appropriate removal.

7.3.3 Fauna

7.3.3.1 Badgers

The NBDC database was consulted for details on badger records held for a site specific polygon covering the Avoca River Park. The database was consulted on the 20/08/2021 for details on historical records from the site. There are no records for badgers within the proposed development site.

There were no signs of badgers or setts within the proposed development area. The area is curtailed by intervening wire mesh fences and road development with the canal to the south restricting badger movement into the site.

7.3.3.2 Otters

There were no signs of otters in the study area. The nearest NBDC records refer to records on the Avoca River upstream of Arklow town near Arklow Bridge, c.3km downstream from 09/02/2015.

7.3.3.3 Bats

The NBDC database was consulted for details on bat records held for a site specific polygon covering the Avoca River Park. There are no records of bat species from the selected polygon.

Three species of bats were recorded during roving bat detector surveys; Leisler's (*Nyctalus leisleri*), Common pipistrelles (*Pipistrellus pipistrellus*) and Soprano pipistrelles (*P. pygmaeus*).

Leisler's bats were recorded on both nights and appeared to fly from the direction of Arklow Town and were heard as distant calls in the woodland to the south of the Avoca River. The pipistrelles emerged typically later after sunset and came from may directions, all feeding over the rank grassland toward the southern centre of the site. The mature trees of the eastern section of the site were examined for potential roosts and were determined to have low to moderate roost potential with the large more mature Sycamore having more ivy cover and potential for summer roosting.

7.3.3.4 Birds

All nesting birds are protected under the Wildlife Acts. Species recorded included regular urban species such as Blackbird, Magpie and Woodpigeon. A list of breeding bird species recorded during fieldwork is presented in Table 7.3.

Table 7.3 Details of birds encountered during fieldwork in July and August.

Birds	Scientific Name	BWI	Habitat Type
Blackbird	*Turdus merula*	Green	Dense woodland to open moorland, common in gardens
Magpie	*Pica pica*	Green	Open woodland, gardens and farmland
Woodpigeon	*Columba palumbus*	Green	Open woodland, gardens and farmland

Moorhen and Mallard were also observed in the Shelton Abbey Canal. These re common water fowl and found in similar urban and rural habitats alike.

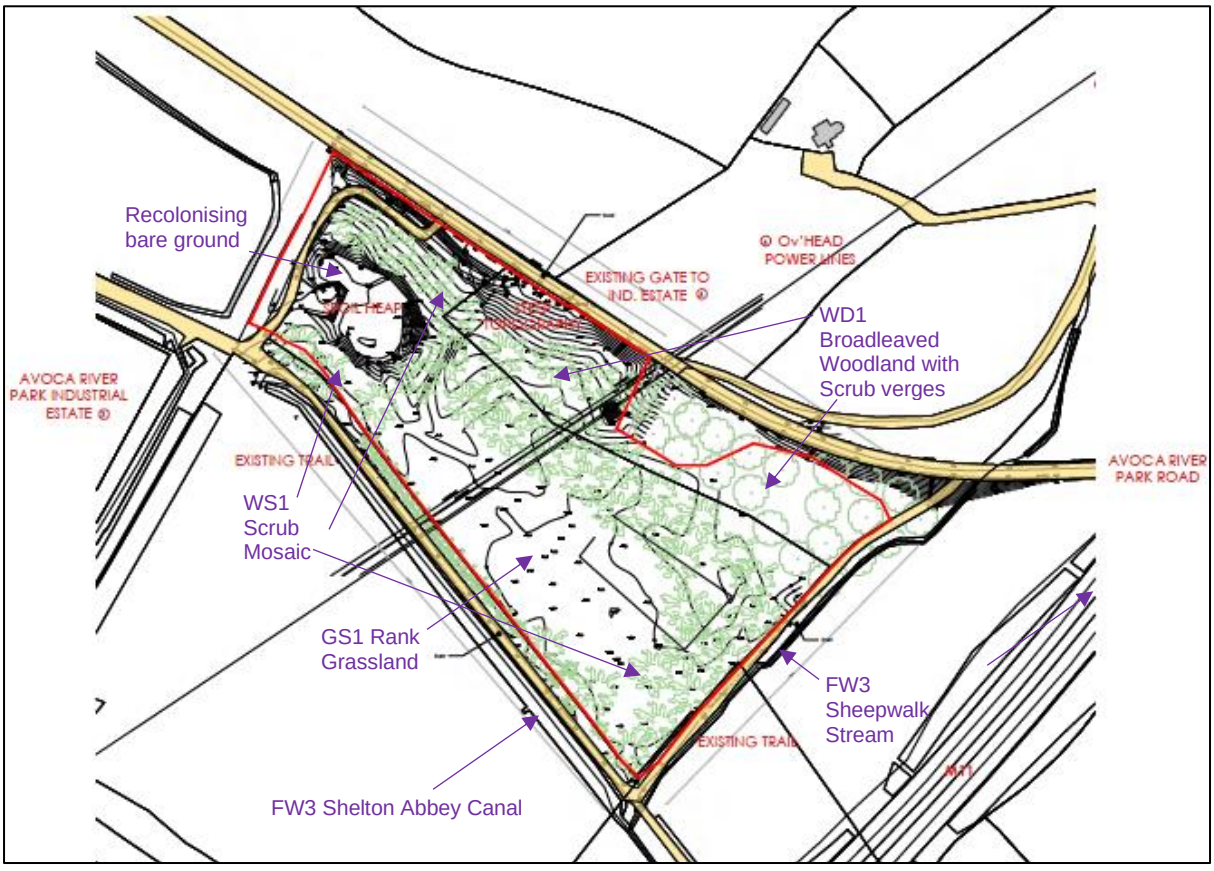


Figure 7.2 Habitats recorded in the proposed development area.

7.3.5 Habitat Evaluation

The ecological value of the site was assessed following the guidelines set out in the Institute of Ecology and Environmental Management's Guidelines for Ecological Impact Assessment (CIEEM, 2019) and according to the Natura Scheme for evaluating

ecological sites (after Nairn & Fossitt, 2004). Additionally, the TII Guidelines (formerly NRA) for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) outlines the methodology for evaluating ecological impacts. Judgements on the evaluation were made using geographic frames of reference, e.g. European, National, Regional or Local, see Table 7.4 below.

Table 7.4 Details of , the TII Guidelines (formerly NRA) for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009).

Ecological valuation: Examples

International Importance:

- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.[4]
- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level)[5] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[6]

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)[7] of the following:
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing 'viable areas'[8] of the habitat types listed in Annex I of the Habitats Directive.

County Importance:

- Area of Special Amenity.[9]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)[10] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP,[11] if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)[12] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

8.4.1 CHARACTERISTICS OF THE DEVELOPMENT

The proposed development is for a gas powered energy centre facility which will be developed to supply power to development in the vicinity, including adjacent data storage facility development. The project is designed to support the power demand of development on adjoining lands at Avoca River Park. Phase 1 will provide 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. There is an existing gas line and gas skid on site capable of providing 23MWThe primary fuel will be gas, with liquid fuel provided for stand-by in event of interruption of the gas supply.

The area allocated for Battery Storage Equipment will contain a modular array of containers plus electrical infrastructure to connect into the generation system in the range 100 MW to 200 MW output with containerised LiIon battery arrays to provide up

to 4 hours of duration. The battery equipment will be used in conjunction with the generation equipment to optimise the operational profile and provide no-break power. A new access to the proposed development, in the form of a priority junction, is proposed off the existing Avoca River Industrial Estate c. midpoint along the northern boundary at the location of an existing field entrance.

The management of surface water for the proposed development has been designed to comply with the policies and guideline outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of WCC objectives as far as reasonably practicable and taking due cognisance of the phosphogysum pond on the subject site. To manage peak flow rates, the discharge from the development lands will be limited to greenfield run-off rates (c. 2l/sec/ha). The flows leaving the site will be directed to existing drainage ditches at the southeast of the subject site provided outside of the landfill cell in the form of an above ground detention basin. The detention basin will have a capacity of 550m^3 storage volume for the 100 year event plus 10% climate change (DBFL drawings 210103-DBFL-CS-SP-DR-C-3310). A settling pond will be incorporated within the attenuation basin to prevent migration of possible contaminants beyond the site. The use of infiltration to the underlying hydrogeology will only be undertaken outside of the underlying cell within the site boundary.

A full description of the proposed development is provided in Chapter 2 (Description of the proposed development).

7.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

There are no rare or protected habitats recorded in the study area inside the proposed development boundary. The development area may be considered of Low Local Ecological Value.

There are no predicted emissions from dust, noise or to air or water that could have a significant effect on the European sites located in the potential Zone of Influence.

Potential impacts on the distant coastal sites of Buckroney-Brittas Dunes and Fen SAC and the Kilpatrick Sandhills SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated sites over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore they are considered to be outside the potential Zone of Influence of the proposed development.

Having considered the above, significant effects on any European sites as a result of the proposed development can be ruled out and potential significant effects on European sites can be excluded at screening stage.

7.5.1 Construction Phase Impacts on Habitats

7.5.1.1 Sheepwalk Stream (FW1)

There will be no direct or indirect effects on the Sheepwalk Stream.

7.5.1.2 Shelton Abbey Canal (FW3)
There will be a no direct or indirect effects on the Shelton Abbey Canal.

7.5.1.1 Neutral Grassland (GS1)
There will be a loss of c. 1.5 Ha of rank grassland . The potential effects on local ecology are ***neutral*** and ***imperceptible*** for the construction phase.

7.5.1.1 Mixed broadleaved woodland (WD1)
There will be a loss of c. 2 Ha of surrounding broadleaved woodland. The potential effects on local ecology are ***neutral*** and ***slight*** for the construction phase.

7.5.1.2 Scrub (WS1)
There will be a loss of associated woodland fringe scrub and succeeding willowherb and bramble scrub on the proposed development site. The potential effects on local ecology are ***neutral*** and ***imperceptible*** for the construction phase.

7.5.1.3 Recolonising bare ground (ED3)
Recolonising bare ground is of low ecological value. The potential effects on local ecology are **neutral** and **imperceptible** for the construction phase.

7.5.1.2 Buildings and artificial surfaces (BL3)
The site tracks are of low ecological value. The potential effects on local ecology are ***neutral*** and ***imperceptible*** for the construction phase.

7.5.2 Construction Phase Impacts on Fauna

7.5.2.1 Badgers
There were no badgers recorded on site and there are no potential impacts on badgers during the construction phase.

7.5.2.2 Otters
There were no otters recorded and no suitable otter habitats recorded on site and there are no potential impacts on otters during the construction phase.

7.5.2.3 Bats
Potential roost features in mature trees were identified within the site boundary toward the eastern portion of the site, so there is a minor risk of direct impacts on summer roosts during the construction phase.

7.5.2.4 Birds
There will be a loss of woodland habitat and risk of direct impacts on birds during the construction phase can be avoided by timing.

7.5.1 Operational Phase Impacts on Habitats

Overall site development will result in a neutral modification of habitats of light industrial nature.

The potential effects on local ecology are ***neutral*** and ***imperceptible*** for the operational phase.

7.5.3 Operational Phase Impacts on Fauna

7.5.3.1 Badgers
There will be no loss of feeding habitat for badgers and the potential effect on badgers is ***neutral*** and ***imperceptible*** for the operational phase.

7.5.3.2 Otters

There were no otters recorded and no suitable otter habitats recorded on site and there are no predicted impacts on otters for the operational phase.

7.5.3.3 Bats

There are some potential roost features in the vicinity of the site in the surrounding woodland habitats. If any lights were projected towards these features, roosting bats could potentially be displaced or disturbed. However, the risk of impacts is considered to be relatively low, as there are no plans for lighting to be directed toward the woodland areas.

7.5.3.4 Birds

The potential effects on birds are neutral and imperceptible for the operational phases.

7.5.4 Do Nothing Scenario

If the proposed development were no to proceed the habitats would remain as per the existing scrub and woodland succession of the site.

Given the proposed development areas are located in an area of relatively low ecological value within the site, the do nothing scenario would have a neutral impact on biodiversity.

7.6 REMEDIAL AND MITIGATION MEASURES

7.6.1 Habitats

In line with standard engineering design to comply with the Surface Water Regulations, the construction of the proposed development will be subject to specific construction management measures to avoid direct and indirect impacts on the water courses adjacent to the site . These measures are specific to the protection of water quality in the Sheepwalk Stream, Shelton Abbey Canal and Avoca River and have no bearing on the European site located on the coast.

Potential impacts on birds will be avoided by cutting of vegetation outside the bird nesting season March 1 to August 31.

7.6.2 Badgers

There are no mitigation measures proposed for badgers.

7.6.3 Otters

There are no mitigation measures proposed for otters.

7.6.4 Bats

The mature trees identified for removal on the eastern section of the site will be surveyed for roosing bats prior to felling and if required appropriate mitigation measures will be presented by a bat specialist prior to the construction phase.

‘Bat-sensitive lighting’ for this development would have the following design principles:

- If lighting is required near site boundaries, the lighting poles will be installed on the boundary and will face inwards (i.e. towards the centre of the site). This will ensure that lighting is not directed outside the site boundaries.

- All lights around the site boundary will be fitted with directional hoods and/or luminaires to direct the light downwards onto targeted areas and to prevent unnecessary light-spill.
- The intensity of lighting will be kept to the minimum level required for safety and security.
- Low-UV LEDs or low / high pressure sodium lamps will be the preferred bulb type, as they have least adverse effect on bats. Mercury, metal halide or high-UV LED bulbs will not be used.

These measures will apply both to temporary lighting during the construction of the proposed development, and to permanent lighting during the operation of the development.

7.6.5 Birds

Potential impacts on birds will be avoided by cutting of vegetation outside the bird nesting season March 1 to August 31.

7.6.6 Invasive Species

A site specific weed management plan will be prepared for the site prior to any construction works being undertaken.

Measures include appropriate signage and fencing off to secure areas affected.

- Proposed treatments are :
- Herbicide Treatment prior to construction commencing
- Creation of a bund on site with a schedules herbicide treatment program
- Deep burial using a membrane geotextile to capsulate the invasive material underground
- Off site disposal (licence required by NPWS)

7.7 RESIDUAL IMPACTS

7.7.1 Construction Phase Residual Impacts on Habitats

The predicted residual effects after mitigation measure are successfully employed on local ecology are ***neutral*** and ***imperceptible*** for the construction phase.

7.7.2 Construction Phase Residual Impacts on Fauna

7.7.2.1 Bats

The predicted residual effects after mitigation measure are successfully employed on bats are ***neutral*** and ***imperceptible*** for the construction phase.

7.7.2.2 Birds

The predicted residual effects after mitigation measure are successfully employed on birds are ***neutral*** and ***imperceptible*** for the construction phase.

7.7.3 Operational Phase Residual Impacts on Habitats

Overall site development will result in a neutral modification of habitats of light industrial nature.

The predicted residual effects after mitigation measure are successfully employed on local ecology are ***neutral*** and ***imperceptible*** for the operational phase.

7.7.4 Operational Phase Residual Impacts on Fauna

7.7.4.1 Bats

Bat-sensitive lighting techniques will be implemented near the site boundaries in order to avoid light-spill onto nearby woodland areas.

The predicted residual effects after mitigation measure are successfully employed on bats are ***neutral*** and ***imperceptible*** for the operational phase.

7.7.4.4 Birds

The predicted residual effects after mitigation measure are successfully employed on birds are ***neutral*** and ***imperceptible*** for the operational phase.

7.8 CUMULATIVE EFFECTS

A list of the permitted and proposed developments are outlined in Chapter 3. The subject lands overlap partially with the sites of one current electricity transmission applications to An Bord Pleanála under section 182 of the Planning and Development Act (ABP Ref: 310090-21) and a second (*ABP Ref.: 309252-21*) which has recently been granted approval. Previous permissions exists for a Gas Powered Peaking plant within the immediate vicinity of the proposed development at Avoca River Park in 2008 and extension of period in 2013 (WCC Reg.ref:08/426 and *ABP Ref.:138382).* In March 2021, a final grant of permission was issued by Wicklow County Council for a revised layout for a data storage facility development on the lands to the west and southwest of the current application site (*Reg. Ref.: 201285).*

- If constructed, the above developments will result in loss of some localised woodland/hedgerow habitats, potentially spread of invasive species and disturbance, injury or mortality to protected species including nesting birds, badger, common lizard or other protected species. The cumulative developments would also increase traffic volumes (and associated noise and lighting), an the potential for downgradient pollution (particularly during construction).
- As there are no habitats above local importance in the area of the proposed development, and the abundance of these common habitats in the wider area, in combination impacts ae unlikely to be elevated above Local levels taking account of in combination effects.
- Potential impacts to nationally protected fauna species are not predicted to be raised above the geographic scale of significance for the proposed development alone based on the site surveys competed. With mitigation in place as outlined in each of the EIARs presented for the permitted and proposed developments, the potential cumulative impacts to nationally protected fauna species are not predicted to be raised above the geographic scale of significance.
- The cumulative impact is considered to be not significant (following EIA guidance).

7.9 REFERENCES

- CIEEM (2019) Guidelines for Ecological Impact Assessment in The UK and Ireland Terrestrial, Freshwater, Coastal and Marine September 2018 Version 1.1 - Updated September 2019.
- Department of the Environment, Heritage and Local Government (2010) Guidance on Appropriate Assessment of Plans and Projects in Ireland (as amended February 2010).
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- EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43EEC. European Commission, Brussels.
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive '92/43/EEC: Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interests, compensatory measures, overall coherence and opinion of the Commission. European Commission, Brussels.
- EPA (2017) Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, May 2017.
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APPENDIX 7.1

Report for Appropriate Assessment Screening

Moore Group August 2021

Report for the purposes of Appropriate Assessment Screening

as required under Article 6(3) of the Habitats Directive
(Council Directive 92/43/EEC)

Avoca Energy Centre Facility

Prepared by: Moore Group – Environmental Services

20 August 2021

On behalf of
Crag Digital Avoca Ltd.
& Wicklow County Council

Project Proponent	Crag Digital Avoca Ltd.
Project	Avoca Power Generation Facility
Title	Report for the purposes of Appropriate Assessment Screening Avoca Power Generation Facility

Project Number	20250	**Document Ref**	20250 DUB20 AAS1 Rev0	
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Appendix A – Finding of No Significant Effects Report

Abbreviations

AA	Appropriate Assessment
EEC	European Economic Community
EPA	Environmental Protection Agency
EU	European Union
GIS	Geographical Information System
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OSI	Ordnance Survey Ireland
pNHA	proposed Natural Heritage Area
SAC	Special Area of Conservation
SPA	Special Protection Area

1. Introduction

1.1. General Introduction

This Appropriate Assessment screening report has been prepared to support an application for planning permission for the Proposed Development (described in Section 3 below). The report contains information required for the competent authority to undertake screening for Appropriate Assessment (AA) for the provision of a Power Generation Facility, along with associated and ancillary works at Avoca River Park, Arklow Co. Wicklow (hereafter referred to as the 'Proposed Development') to significantly affect European sites.

Screening is the process that addresses the first two tests of Article 6(3) of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (referred to as the Habitats Directive):

I). whether a plan or project is directly connected to or necessary for the management of the site, and

II). whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

Having regard to the provisions of the Planning and Development Act 2000 (section 177U and 177V), the purpose of a screening exercise under section 177U of the PDA 2000 is to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on a European site.

If it cannot be *excluded* on the basis of objective information that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site then it is necessary to carry out a Stage 2 appropriate assessment.

When screening the project, there are two possible outcomes:

- the project poses no risk of a significant effect and as such requires no further assessment; and
- the project has potential to have a significant effect (or this is uncertain) and AA of the project is necessary.

This report has been prepared by Moore Group - Environmental Services to support an application for planning permission for the Proposed Development to allow Wicklow County Council to carry out AA screening in relation to the Proposed Development. The report was compiled by Ger O'Donohoe (B.Sc. Applied Aquatic Sciences (GMIT, 1993) & M.Sc. Environmental Sciences (TCD, 1999)) who has 25 years' experience in environmental impact assessment and has completed numerous Appropriate Assessment Screening Reports and Natura Impact Statements on terrestrial and aquatic habitats for various development types.

1.2. Legislative Background - The Habitats and Birds Directives

It is necessary that the Proposed Development has regard to Article 6 of the Habitats Directive. This is transposed into Irish Law by the European Communities (Birds and Natural Habitats) Regulations, 2011 to 2015 (referred to as the Habitats Regulations). The Planning and Development Act 2000 (section 177U and 177V) govern the requirement to carry out appropriate assessment per Section 1.1 above.

The Habitats Directive is the main legislative instrument for the protection and conservation of biodiversity in the European Union (EU). Under the Habitats Directive, Member States are obliged to designate Special Areas of Conservation (SACs) which contain habitats or species considered important for protection and conservation in a EU context.

The Birds Directive (Council Directive 2009/147/EC on the Conservation of Wild Birds), transposed into Irish law by the Habitats Regulations 2011, is concerned with the long-term protection and management of all wild bird species and their habitats in the EU. Among other things, the Birds Directive requires that Special Protection Areas (SPAs) be established to protect migratory species and species which are rare, vulnerable, in danger of extinction, or otherwise require special attention.

SACs designated under the Habitats Directive and SPAs, designated under the Birds Directive, form a pan-European network of protected sites known as Natura 2000. The Habitats Directive sets out a unified system for the protection and management of SACs and SPAs. These sites are also referred to as European sites.

Articles 6(3) and 6(4) of the Habitats Directive set out the requirement for an assessment of proposed plans and projects likely to affect Natura 2000 sites.

Article 6(3) establishes the requirement to screen all plans and projects and to carry out a further assessment if required (Appropriate Assessment (AA)). Article 6(4) establishes requirements in cases of imperative reasons of overriding public interest:

> ***Article 6(3):*** *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to an appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*
>
> ***Article 6(4):*** *"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all*

compensatory measures necessary to ensure that the overall coherence of the Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to the beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest."

2. Methodology

The Commission's methodological guidance (EC, 2002 & 2018, see Section 2.1 below) promotes a four-stage process to complete the AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

Stages 1 and 2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of Article 6(3) or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Stage 1 Screening: This stage examines the likely effects of a project either alone or in combination with other projects upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant. In order to screen out a project, it must be excluded, on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.

Stage 2 Appropriate Assessment: In this stage, there is a consideration of the impact of the project with a view to ascertain whether there will be any adverse effect on the integrity of the Natura 2000 site either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are predicted impacts, an assessment of the potential mitigation of those impacts is considered.

Stage 3 Assessment of Alternative Solutions: This stage examines alternative ways of implementing the project that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site.

Stage 4 Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the sites will be necessary.

To ensure that the Proposed Development complies fully with the requirements of Article 6 of the Habitats Directive and all relevant Irish transposing legislation, Moore Group compiled this report to support an application for planning permission for the Proposed Development to allow Wicklow County Council to carry out AA screening in relation to the Proposed Development to determine whether the Proposed Development, individually or in combination with another plan or project will have a significant effect on a Natura 2000 site.

2.1. Guidance

This report has been compiled in accordance with guidance contained in the following documents:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. (Department of Environment, Heritage and Local Government, 2010 rev.).
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 & PSSP 2/10.
- Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General, 2001); hereafter referred to as the EC Article Guidance Document.
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC Environment Directorate-General, 2000); hereafter referred to as MN2000.
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC, 2018).
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management (OPR, 2021).

2.2. Data Sources

Sources of information that were used to collect data on the Natura 2000 network of sites, and the environment within which they are located, are listed below:

- The following mapping and Geographical Information Systems (GIS) data sources, as required:
    - National Parks & Wildlife (NPWS) protected site boundary data;
    - Ordnance Survey of Ireland (OSI) mapping and aerial photography;
    - OSI/Environmental Protection Agency (EPA) rivers and streams, and catchments;
    - Open Street Maps;
    - Digital Elevation Model over Europe (EU-DEM);
    - Google Earth and Bing aerial photography 1995-2021;
- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie including:
    - Natura 2000 - Standard Data Form;
    - Conservation Objectives;
    - Site Synopses;
- National Biodiversity Data Centre records;
    - Online database of rare, threatened and protected species;
    - Publicly accessible biodiversity datasets.
- Status of EU Protected Habitats in Ireland. (National Parks & Wildlife Service, 2019); and
- Relevant Development Plans;

- Wicklow County Development Plan 2016-2022
- Arklow and Environs Local Area Plan 2018-2024

3. Description of the Proposed Development

The proposed development is for a gas powered energy centre facility which will be developed to supply power to development in the vicinity, including adjacent data storage facility development. The project is designed to support the power demand of development on adjoining lands at Avoca River Park. Phase 1 will provide 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. There is an existing gas line and gas skid on site capable of providing 23MW. Once the gas infrastructure is in place the primary fuel will be gas, with liquid fuel provided for stand-by in event of interruption of the gas supply.

The area allocated for Battery Storage Equipment will contain a modular array of containers plus electrical infrastructure to connect into the generation system in the range 100 MW to 200 MW output with containerised LiIon battery arrays to provide up to 4 hours of duration. The battery equipment will be used in conjunction with the generation equipment to optimise the operational profile and provide no-break power.

A new access to the proposed development, in the form of a priority junction, is proposed off the existing Avoca River Industrial Estate c. midpoint along the northern boundary at the location of an existing field entrance.

The management of surface water for the proposed development has been designed to comply with the policies and guideline outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of WCC objectives as far as reasonably practicable and taking due cognisance of the phosphogysum pond on the subject site. To manage peak flow rates, the discharge from the development lands will be limited to greenfield run-off rates (c. 2l/sec/ha). The flows leaving the site will be directed to existing drainage ditches at the southeast of the subject site provided outside of the landfill cell in the form of an above ground detention basin. The detention basin will have a capacity of 550m^3 storage volume for the 100 year event plus 10% climate change (DBFL drawings 210103-DBFL-CS-SP-DR-C-3310). A settling pond will be incorporated within the attenuation basin to prevent migration of possible contaminants beyond the site. The use of infiltration to the underlying hydrogeology will only be undertaken outside of the underlying cell within the site boundary.

Figure 1 shows the Proposed Development location and Figure 2 shows a detailed view of the Proposed Development boundary on recent aerial photography. The layout of the Proposed Development is presented in Figure 3.

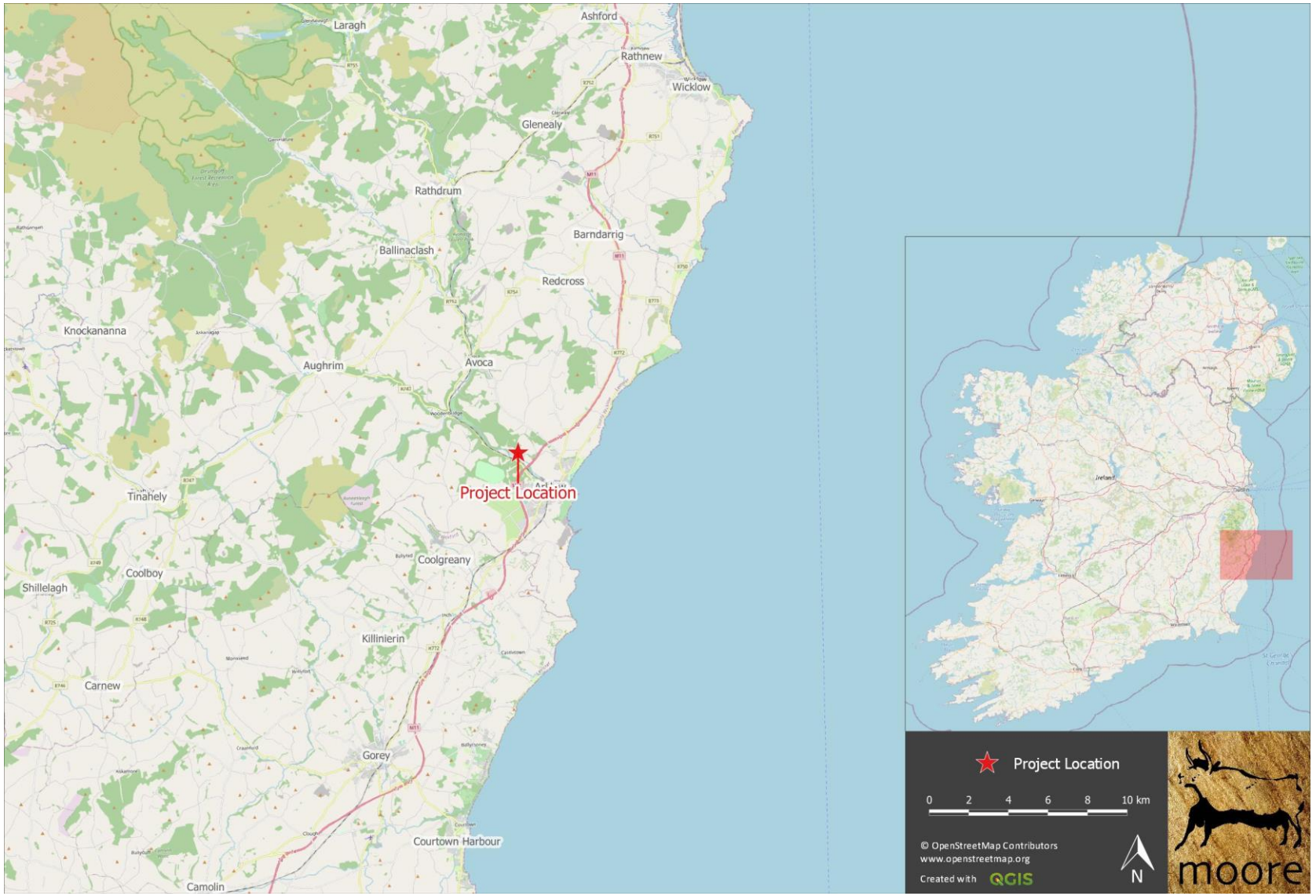


Figure 1. Showing the Proposed Development location on the outskirts of Arklow, County Wicklow.



Figure 2. Showing the proposed development site on recent aerial photography.

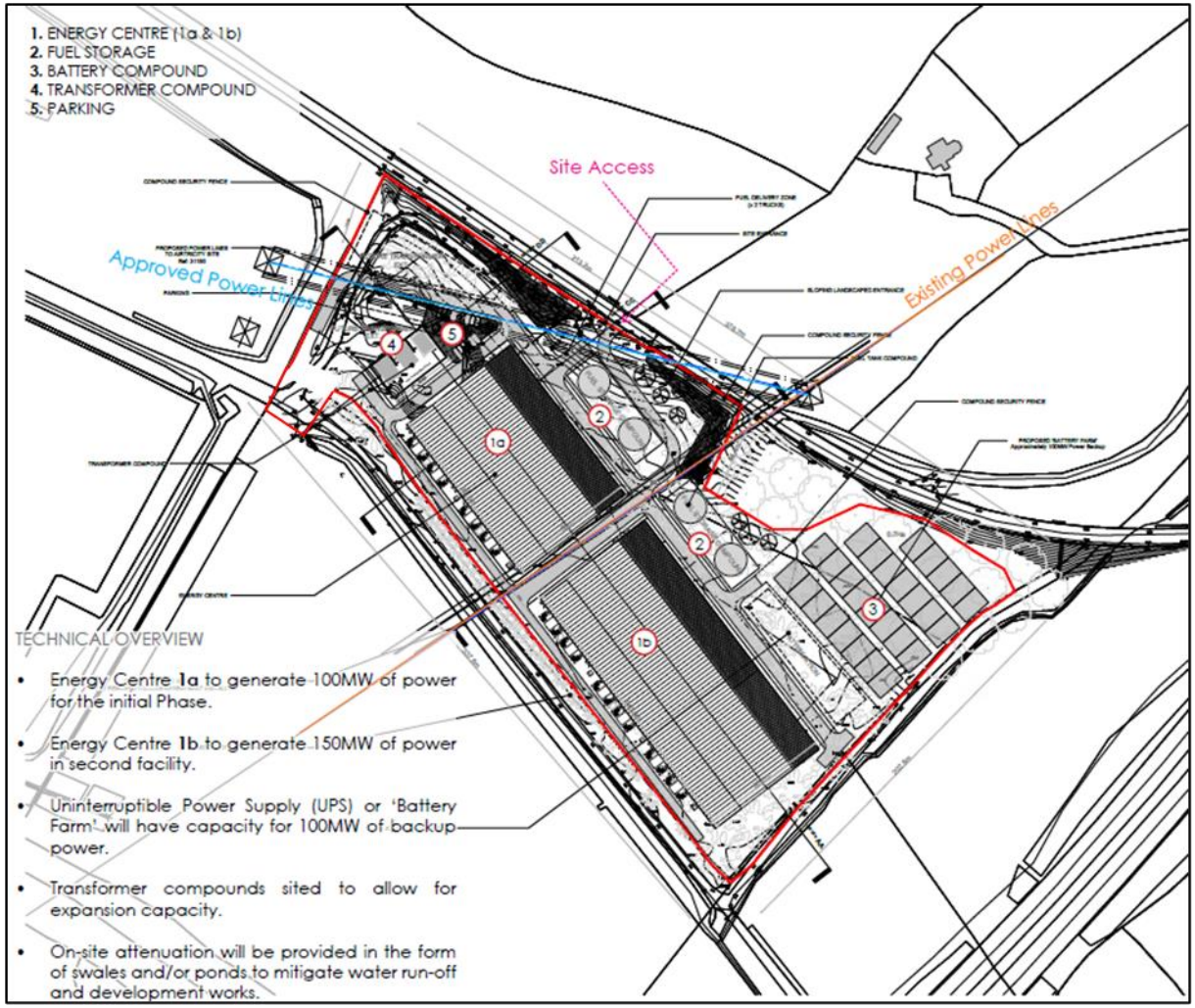


Figure 3. Showing the layout of the Proposed Development.

4. Identification of Natura 2000 Sites

4.1. Description of Natura Sites Potentially Affected

The Department of Housing, Planning and Local Government (previously DoEHLG)'s Guidance on Appropriate Assessment (2009) recommends an assessment of European sites within a Zone of Influence (ZoI) of 15km. This distance is a guidance only and a potential Zone of Influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15km).

The Zone of Influence may be determined by connectivity to the Proposed Development in terms of:

- Nature, scale, timing and duration of works and possible impacts, nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Sensitivity and location of ecological features.

The potential for source pathway receptor connectivity is firstly identified and detailed information is then provided on sites with connectivity. European sites that are located within the potential Zone of Influence of the Proposed Development are listed in Table 1 and presented in Figures 4 and 5, below. Spatial boundary data on the Natura 2000 network was extracted from the NPWS website (www.npws.ie) on the 20 August 2021.

Table 1 European Sites located within the potential Zone of Influence of the Proposed Development.

Site Code	Site name	Distance (km)[1]
000729	Buckroney-Brittas Dunes and Fen SAC	4.93
001742	Kilpatrick Sandhills SAC	8.16

The proposed development is to take place on a partly brownfield site within the catchment of the Avoca River which discharges to the Irish Sea at Arklow c. 3 river km to the east.

The nearest European sites to the proposed development Buckroney-Brittas Dunes and Fen SAC (Site Code 000729) which is located approximately 5km to the north of the discharge point of the Avoca River.

Potential impacts on the distant coastal site of Buckroney-Brittas Dunes and Fen SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated site over which it is anticipated

[1] Distances indicated are the closest geographical distance between the Proposed Development and the European site boundary, as made available by the NPWS. Connectivity along hydrological pathways may be significantly greater.

that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore it is considered to be outside the potential Zone of Influence of the proposed development. Similarly, the Kilpatrick Sandhills SAC located even further south on the coast (over 10km hydrologically from the site) is also outside the potential Zone of Influence of the proposed development.

There is no connectivity to any other European sites.

The Qualifying Interests (QIs) and Special Conservation Interests (SCIs) of the European sites in the vicinity of the Proposed Development are provided in Table 2 below.

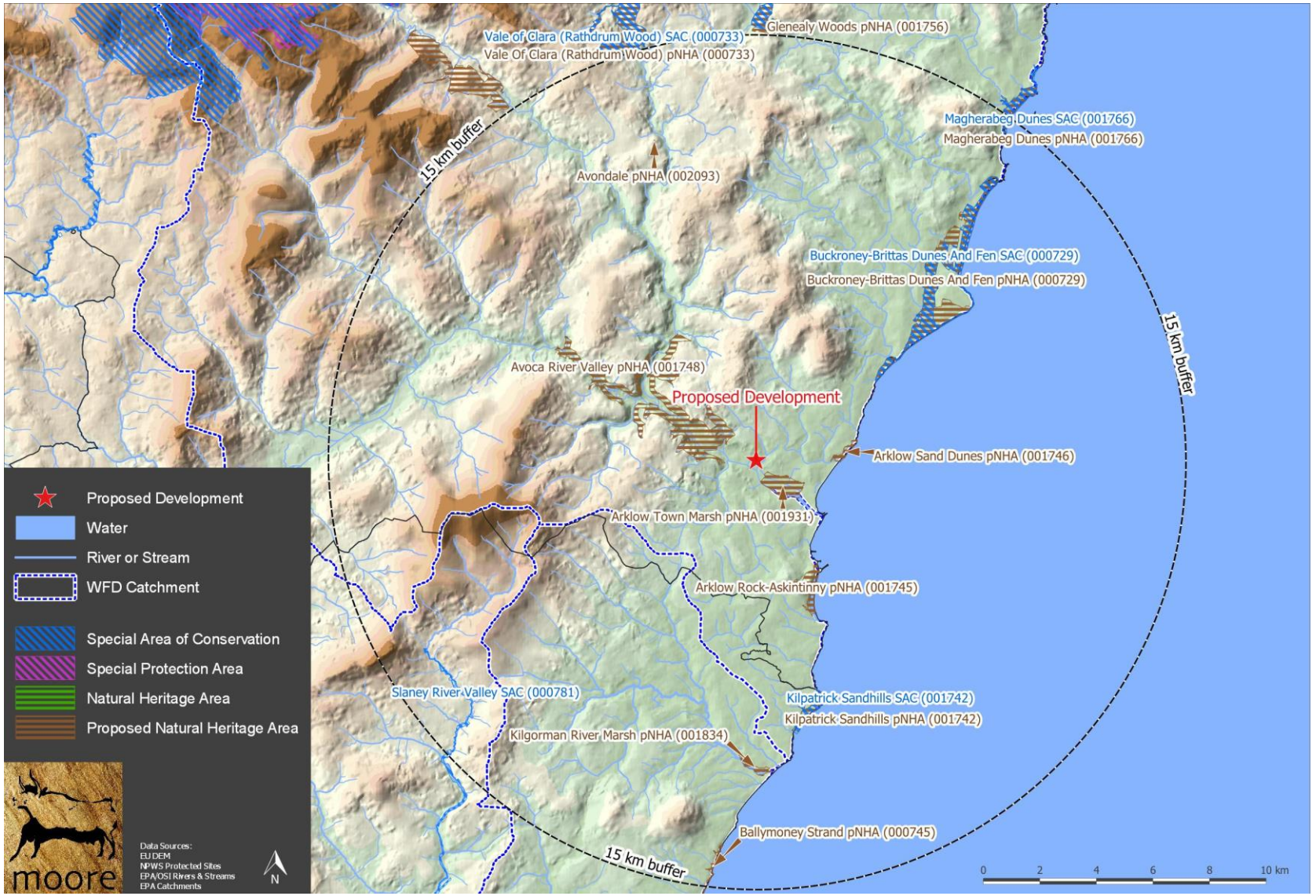


Figure 4. Showing European sites and NHAs/pNHAs within the wider Potential Zone of Influence of the Proposed Development.

Table 2 Identification of relevant European sites using Source-Pathway-Receptor model and compilation of information QIs and conservation objectives.

European site name & Site code	Location Relative to the Proposed Development Site	Connectivity – Source-Pathway-Receptor	Considered further in Screening – Y/N
Buckroney-Brittas Dunes And Fen SAC (000729) 10 Qualifying Interests including the Priority Habitats:- [2130] Fixed coastal dunes and [2150] Atlantic decalcified fixed dunes https://npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000729.pdf	4.93km to the northeast of the Proposed Development	No There are no pathways or connectivity to the habitats or species of this site.	N
Kilpatrick Sandhills SAC (001742) 5 Qualifying Interests including the Priority Habitats:- [2130] Fixed coastal dunes and [2150] Atlantic decalcified fixed dunes https://npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001742.pdf	8.16km to the southeast of the Proposed Development	No There are no pathways or connectivity to the habitats or species of this site.	N

4.2. Ecological Network Supporting Natura 2000 Sites

An analysis of the proposed Natural Heritage Areas and designated Natural Heritage Areas in terms of their role in supporting the species using Natura 2000 sites was undertaken. It was assumed that these supporting roles mainly related to mobile fauna such as mammals and birds which may use pNHAs and NHAs as "stepping stones" between Natura 2000 sites.

Article 10 of the Habitats Directive and the Habitats Regulations 2011 place a high degree of importance on such non-Natura 2000 areas as features that connect the Natura 2000 network. Features such as ponds, woodlands and important hedgerows were taken into account during the rest of the AA process.

The Avoca River Valley pNHA is located c. 0.5km to the west and the Arklow Town Marsh pNHA is located just downstream to the east on the Avoca River. However, there are no predicted impacts on these sites given the proposed treatment of surface water and the inclusion of SuDS for the proposed development.

5. Identification of Potential Impacts & Assessment of Significance

The Proposed Development is not directly connected with or necessary to the management of the sites considered in the assessment and therefore potential impacts must be identified and considered.

5.1. Potential Impacts

Potential impacts on the distant coastal sites of Buckroney-Brittas Dunes and Fen SAC and the Kilpatrick Sandhills SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated sites over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore they are considered to be outside the potential Zone of Influence of the proposed development.

The consideration of all potential direct and indirect impacts that may result in significant effects on the conservation objectives of a European site, taking into account the size and scale of the Proposed Development are presented in Table 3.

Table 3 Assessment of Likely Significant Effects.

Identification of all potential direct and indirect impacts that may result in significant effects on the conservation objectives of a European site, taking into account the size and scale of the project.	
Impacts:	**Significance of Impacts:**
Construction phase e.g. Vegetation clearance Demolition Surface water runoff from soil excavation/infill/landscaping (including borrow pits) Dust, noise, vibration Lighting disturbance Impact on groundwater/dewatering Storage of excavated/construction materials Access to site Pests	The Proposed Development site is located within the boundary of the partially brownfield site. None Earth movement works will take place within the confines of the site and site clearance will be controlled with no discharges of surface water to the Avoca River.

Operational phase e.g. Direct emission to air and water Surface water runoff containing contaminant or sediment Lighting disturbance Noise/vibration Changes to water/groundwater due to drainage or abstraction Presence of people, vehicles and activities Physical presence of structures (e.g. collision risks) Potential for accidents or incidents	All foul and surface water runoff, once the facility is operational, will be contained on site and discharged to urban drainage systems. There is no real likelihood of any significant effects on European Sites in the wider catchment area. The facility is located at a distance of removal such that there will be no disturbance to qualifying interest species in any European sites.
In-combination/Other	No likely significant in-combination effects are identified, see Section 5.2.
Describe any likely changes to the European site:	
Examples of the type of changes to give consideration to include: Reduction or fragmentation of habitat area Disturbance to QI species Habitat or species fragmentation Reduction or fragmentation in species density Changes in key indicators of conservation status value (water quality etc.) Changes to areas of sensitivity or threats to QI Interference with the key relationships that define the structure or ecological function of the site Climate change	None. The Proposed Development site is not located adjacent or within a European site, therefore there is no risk of habitat loss or fragmentation or any effects on QI habitats or species directly or ex-situ.
Are 'mitigation' measures necessary to reach a conclusion that likely significant effects can be ruled out at screening?	
No	While best practice construction methods may be included these are not required to avoid or reduce any effects on a European

	site. These measures are not relied upon to reach a conclusion of no likely significant effects on any European site.

On the basis of the information supplied, which is considered adequate to undertake a screening determination and having regard to:

- the nature and scale of the proposed development,
- the intervening land uses and distance from European sites,
- the lack of direct connections with regard to the Source-Pathway-Receptor model,

It may be concluded that the proposed development, individually or in-combination with other plans or projects, would not be likely to have a significant effect on the above listed European sites or any other European site, in view of the said sites' conservation objectives.

5.2. Assessment of Potential In-Combination Effects

Cumulative impacts or in-combination effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative impacts can be thought of as occurring through two main pathways: first, through persistent additions or losses of the same materials or resource, and second, through the compounding effects as a result of the coming together of two or more effects.

As part of the Screening for an Appropriate Assessment, in addition to the Proposed Development, other relevant plans and projects in the area must also be considered at this stage. This step aims to identify at this early stage any possible significant in-combination effects of the proposed development with other such plans and projects on European sites.

A review of the National Planning Application Database was undertaken. The first stage of this review confirmed that there were no data outages in the area where the Proposed Development is located. The database was then queried for developments granted planning permission within 1km of the Proposed Development within the last three years, these are presented in Table 4 below.

Table 4.Planning applications granted permission in the vicinity of the Proposed Development.

Planning Ref.	Description of development	Comments
1831	Erection of 3 illuminated signs at pharmaceutical complex to reflect a rebranding of the company as a subsidiary of Merck KGaA. Two signs are to be located at the entrance to the site and will replace two existing signs at the site entrance. The third sign will be located on the south west gable of the existing distribution warehouse building	No potential for in-combination effects given the scale and location of the project.

Planning Ref.	Description of development	Comments
181404	Portal frame structure 69m long by 15.4 m wide by 6.5m high (floor area 1063 sqm) to enclose existing drum storage bund in pharmaceutical complex	As above. No potential for in-combination effects given the scale and location of the project.
1954	Detached two storey office building (249 sqm) detached timber factory building with canteen, wcs and 1st floor office (1432 sqm) and detached timber factory building with mezzanine office / wcs / canteen (1476 sqm), site layout to include 3 no yard areas, 30 no car parking spaces, 20 no cycle spaces, 2 no bin storage area, 3 no vehicular entrance gates, boundary fence, wastewater treatment system and associated site works	No potential for in-combination effects given the scale and location of the project.
20662	1) A portal fame structure 20 metres long by 14 metres wide by 7.5 metres high (floor area 280m2). The building will be used as a store to house spare parts and maintenance equipment. 2) A single storey office 5.0m by 3.5m within the proposed store to keep records and specification details of the spare parts and equipment stored. 3) Associated site works	No potential for in-combination effects given the scale and location of the project.
APB Case reference: VA27.310090	Proposed development will comprise of onshore grid infrastructure including 220kV export cable circuits and fibre optic cables, new 220kV GIS substation at Shelton Abbey and overhead line connection and all associated ancillary works.	Connection to the proposed onshore 220kV substation at Shelton Abbey will be made by two 220kV high voltage alternating current (HVAC) circuits with associated fibre optic communication and earth cables, laid underground from the landfall location at Johnstown North. In this way there will be no interaction with the proposed subject development. The application was accompanied by an NIS which concluded that objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the construction, operation and decommissioning of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects.
ICT HUB Ref. 201285	Approved ICT HUB adjacent development.	AA Screening determined that there will be no significant impacts on any European sites.
Ref. 309252	Current SID Application adjacent development for a 110kV Substation	AA Screening determined that there will be no significant impacts on any European sites.
Ref. 310090	Current SID Application adjacent development for a 110kV Substation and Grid Connection	AA Screening determined that there will be no significant impacts on any European sites.

There are no predicted in-combination effects given that the reasons discussed in the 'Comments' column of Table 4, above, and given that the Proposed Development is unlikely to have any adverse effects on the distant coastal European sites.

The Wicklow County Development Plan in complying with the requirements of the Habitats Directive requires that all Projects and Plans that could affect the Natura 2000 sites in the same zone of impact of the Proposed Development site would be initially screened for Appropriate Assessment and if requiring Stage 2 AA, that appropriate employable mitigation measures would be put in place to avoid, reduce or ameliorate negative impacts. In this way any, in-combination impacts with Plans or Projects for the development area and surrounding townlands in which the development site is located, would be avoided.

The listed developments have been granted permission in most cases with conditions relating to sustainable development by the consenting authority in compliance with the relevant Local Authority Development Plan and in compliance with the Local Authority requirement for regard to the Habitats Directive. The development cannot have received planning permission without having met the consenting authority requirement in this regard. There are no predicted in-combination effects given that it is predicted that the Proposed Development will have no effect on any European site.

Any new applications for the Proposed Development area will be assessed on a case by case basis *initially* by Wicklow County Council which will determine the requirement for AA Screening as per the requirements of Article 6(3) of the Habitats Directive.

6. Conclusion

Potential impacts on the distant coastal sites of Buckroney-Brittas Dunes and Fen SAC and the Kilpatrick Sandhills SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated sites over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore they are considered to be outside the potential Zone of Influence of the proposed development.

It has been objectively concluded by Moore Group Environmental Services that:

1. The Proposed Development is not directly connected with, or necessary to the conservation management of the European sites considered in this assessment.
2. The Proposed Development is unlikely to significantly affect the Qualifying interests or Conservation Objectives of the European sites considered in this assessment.

3. The Proposed Development, alone or in combination with other projects, is not likely to have significant effects on the European sites considered in this assessment in view of their conservation objectives.
4. It is possible to conclude that there would be no significant effects, no potentially significant effects and no uncertain effects if the Proposed Development were to proceed.

It can be *excluded*, on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.

An appropriate assessment is not, therefore, required.

A finding of no significant effects report is presented in Appendix A in accordance with the EU Commission's methodological guidance (European Commission, 2001).

7. References

Department of the Environment, Heritage and Local Government (2010) Guidance on Appropriate Assessment of Plans and Projects in Ireland (as amended February 2010).

European Commission (2000) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

European Commission Environment DG (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43EEC. European Commission, Brussels.

European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive '92/43/EEC: Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interests, compensatory measures, overall coherence and opinion of the Commission. European Commission, Brussels.

European Commission (2018) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

NPWS (2019) The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

NPWS (2020) National Parks and Wildlife Service Metadata available online at https://www.npws.ie/maps-and-data.

Office-of-the-Planning-Regulator (2021) Appropriate Assessment Screening for Development Management OPR Practice Note PN01. March 2021

Appendix A

FINDING OF NO SIGNIFICANT EFFECTS REPORT

Finding no significant effects report matrix

Name of project or plan

Avoca Power Generation Facility

Name and location of the Natura 2000 site(s)

The proposed development is to take place on a partly brownfield site within the catchment of the Avoca River which discharges to the Irish Sea at Arklow c. 3 river km to the east.

The nearest European sites to the proposed development Buckroney-Brittas Dunes and Fen SAC (Site Code 000729) which is located approximately 5km to the north of the discharge point of the Avoca River.

Potential impacts on the distant coastal site of Buckroney-Brittas Dunes and Fen SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated site over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore it is considered to be outside the potential Zone of Influence of the proposed development. Similarly, the Kilpatrick Sandhills SAC located even further south on the coast (over 10km hydrologically from the site) is also outside the potential Zone of Influence of the proposed development.

There is no connectivity to any other European sites.

Description of the project or plan

The proposed development is for a gas powered energy centre facility which will be developed to supply power to development in the vicinity, including adjacent data storage facility development. The project is designed to support the power demand of development on adjoining lands at Avoca River Park. Phase 1 will provide 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. There is an existing gas line and gas skid on site capable of providing 23MW. Once the gas infrastructure is in place the primary fuel will be gas, with liquid fuel provided for stand-by in event of interruption if the gas supply.

The area allocated for Battery Storage Equipment will contain a modular array of containers plus electrical infrastructure to connect into the generation system in the range 100 MW to 200 MW output with containerised LiIon battery arrays to provide up to 4 hours of duration. The battery equipment will be used in conjunction with the generation equipment to optimise the operational profile and provide no-break power.

A new access to the proposed development, in the form of a priority junction, is proposed off the existing Avoca River Industrial Estate c. midpoint along the northern boundary at the location of an existing field entrance.

The management of surface water for the proposed development has been designed to comply with the policies and guideline outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of WCC objectives as far as reasonably practicable and taking due cognisance of the phosphogysum pond on the subject site. To manage peak flow rates, the discharge from the development lands will be limited to greenfield run-off rates (c. 2l/sec/ha). The flows leaving the site will be directed to existing drainage ditches at the southeast of the subject site provided outside of the landfill cell in the form of an above ground detention basin. The detention basin will have a capacity of 550m^3 storage volume for the 100 year event plus 10% climate change (DBFL drawings 210103-DBFL-CS-SP-DR-C-3310). A settling pond will be incorporated within the attenuation basin to prevent migration of possible contaminants beyond the site. The use of infiltration to the underlying hydrogeology will only be undertaken outside of the underlying cell within the site boundary.

Is the project or plan directly connected with or necessary to the management of the site(s)

No

Are there other projects or plans that together with the projects or plan being assessed could affect the site

A review of the National Planning Application Database was undertaken. The first stage of this review confirmed that there were no data outages in the area where the Proposed Development is located. The database was then queried for developments granted planning permission within 1km of the Proposed Development within the last three years, these are presented in the Table below.

Planning Ref.	Description of development	Comments
1831	Erection of 3 illuminated signs at pharmaceutical complex to reflect a rebranding of the company as a subsidiary of Merck KGaA. Two signs are to be located at the entrance to the site and will replace two existing signs at the site entrance. The third sign will be located on the south west gable of the existing distribution warehouse building	No potential for in-combination effects given the scale and location of the project.
181404	Portal frame structure 69m long by 15.4 m wide by 6.5m high (floor area 1063 sqm) to enclose existing drum storage bund in pharmaceutical complex	As above. No potential for in-combination effects given the scale and location of the project.
1954	Detached two storey office building (249 sqm) detached timber factory building with canteen, wcs and 1st floor office (1432 sqm) and detached timber factory building with mezzanine office / wcs / canteen (1476 sqm), site layout to include 3 no yard areas, 30 no car parking spaces, 20 no cycle spaces, 2 no bin storage area, 3 no vehicular entrance gates, boundary fence, wastewater treatment system and associated site works	No potential for in-combination effects given the scale and location of the project.
20662	1) A portal fame structure 20 metres long by 14 metres wide by 7.5 metres high (floor area 280m2). The building will be used as a store to house spare parts and maintenance equipment. 2) A single storey office 5.0m by 3.5m within the proposed store to keep records and specification details of the spare parts and equipment stored. 3) Associated site works	No potential for in-combination effects given the scale and location of the project.
APB Case reference: VA27.310090	Proposed development will comprise of onshore grid infrastructure including 220kV export cable circuits and fibre optic cables, new 220kV GIS substation at Shelton Abbey and overhead line connection and all associated ancillary works.	Connection to the proposed onshore 220kV substation at Shelton Abbey will be made by two 220kV high voltage alternating current (HVAC) circuits with associated fibre optic communication and earth cables, laid underground from the landfall location at Johnstown North. In this way there will be no interaction with the proposed subject development. The application was accompanied by an NIS which concluded that objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the

Planning Ref.	Description of development	Comments
		construction, operation and decommissioning of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects.
ICT HUB Ref. 201285	Approved ICT HUB adjacent development.	AA Screening determined that there will be no significant impacts on any European sites.
Ref. 309252	Current SID Application adjacent development for a 110kV Substation	AA Screening determined that there will be no significant impacts on any European sites.
Ref. 310090	Current SID Application adjacent development for a 110kV Substation and Grid Connection	AA Screening determined that there will be no significant impacts on any European sites.

There are no predicted in-combination effects given that the reasons discussed in the 'Comments' column of the Table above and given that the Proposed Development is unlikely to have any adverse effects on the distant coastal European sites.

The Wicklow County Development Plan in complying with the requirements of the Habitats Directive requires that all Projects and Plans that could affect the Natura 2000 sites in the same zone of impact of the Proposed Development site would be initially screened for Appropriate Assessment and if requiring Stage 2 AA, that appropriate employable mitigation measures would be put in place to avoid, reduce or ameliorate negative impacts. In this way any, in-combination impacts with Plans or Projects for the development area and surrounding townlands in which the development site is located, would be avoided.

The listed developments have been granted permission in most cases with conditions relating to sustainable development by the consenting authority in compliance with the relevant Local Authority Development Plan and in compliance with the Local Authority requirement for regard to the Habitats Directive. The development cannot have received planning permission without having met the consenting authority requirement in this regard. There are no predicted in-combination effects given that it is predicted that the Proposed Development will have no effect on any European site.

Any new applications for the Proposed Development area will be assessed on a case by case basis *initially* by Wicklow County Council which will determine the requirement for AA Screening as per the requirements of Article 6(3) of the Habitats Directive.

THE ASSESSMENT OF SIGNIFICANCE OF EFFECTS

Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site.

The proposed development is to take place on a brownfield site within the catchment of the Avoca River which discharges to the Irish Sea at Arklow over 3 river km to the east.

The nearest European sites to the proposed development Buckroney-Brittas Dunes and Fen SAC (Site Code 000729) which is located approximately 5km to the north of the discharge point of the Avoca River.

Explain why these effects are not considered significant.

The Potential impacts on the distant coastal site of Buckroney-Brittas Dunes and Fen SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated site over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore it is considered to be outside the potential Zone of Influence of the proposed development. Similarly, the Kilpatrick Sandhills SAC located even further south on the coast (over 10km hydrologically from the site) is also outside the potential Zone of Influence of the proposed development.

There is no connectivity to any other European sites.

List of agencies consulted: provide contact name and telephone or e-mail address

N/A.

Response to consultation

N/A.

DATA COLLECTED TO CARRY OUT THE ASSESSMENT

Who carried out the assessment

Moore Group Environmental Services.

Sources of data

NPWS database of designated sites at www.npws.ie

National Biodiversity Data Centre database http://maps.biodiversityireland.ie

Level of assessment completed

Desktop Assessment with Biodiversity & Habitats fieldwork.

Where can the full results of the assessment be accessed and viewed

Wicklow County Council Web Portal

OVERALL CONCLUSIONS

Potential impacts on the distant coastal site of Buckroney-Brittas Dunes and Fen SAC are unlikely due to the large distance of removal on the Avoca River (over 8km hydrologically from the site) and the large receiving marine water buffer separating the proposed development from the designated site over which it is anticipated that any potential pollutants would be absorbed and diluted to an extent that they would not be perceptible at the designated site. Therefore it is considered to be outside the potential Zone of Influence of the proposed development. Similarly, the Kilpatrick Sandhills SAC located even further south on the coast (over 10km hydrologically from the site) is also outside the potential Zone of Influence of the proposed development.

It has been objectively concluded by Moore Group Environmental Services that:

1. The Proposed Development is not directly connected with, or necessary to the conservation management of the European sites considered in this assessment.
2. The Proposed Development is unlikely to significantly affect the Qualifying interests or Conservation Objectives of the European sites considered in this assessment.
3. The Proposed Development, alone or in combination with other projects, is not likely to have significant effects on the European sites considered in this assessment in view of their conservation objectives.
4. It is possible to conclude that there would be no significant effects, no potentially significant effects and no uncertain effects if the Proposed Development were to proceed.

It can be *excluded*, on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.

An appropriate assessment is not, therefore, required.

8.0 AIR QUALITY & CLIMATE

8.1 INTRODUCTION

This chapter evaluates the impacts which the proposed development may have on Air Quality & Climate during the construction and operational stages as defined in the Environmental Protection Agency (EPA) documents *Guidelines on the Information to be contained in Environmental Impact Statements* (EPA, 2017) and *Advice Notes for Preparing Environmental Impact Statements* (EPA, 2015).

An assessment of the likely dust related impacts as a result of construction activities was undertaken and used to inform a series of mitigation measures. Air dispersion modelling of operational stage emissions from the engines was carried out using the United States Environmental Protection Agency's regulated model AERMOD as recommended by the EPA (EPA, 2020a). The modelling of air emissions from the site was carried out to assess concentrations of nitrogen dioxide (NO_2) at a variety of locations beyond the site boundary. The modelling was undertaken to assess the impact to ambient air quality from the operation of the engines.

8.2 METHODOLOGY

8.2.1 Criteria for Rating of Impacts

8.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies 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. The applicable standards in Ireland include the Air Quality Standards Regulations 2011 (S.I. 180 of 2011), which incorporate EU Directive 2008/50/EC (see Table 8.1). The ambient air quality standards applicable for NO_2, PM_{10} and $PM_{2.5}$ are outlined in this Directive.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. These standards have been used in the current assessment to determine the potential impact of NO_2, PM_{10} and $PM_{2.5}$ emissions from the proposed development on ambient air quality.

Table 8.1 *Ambient Air Quality Standards*

Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$

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

8.2.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$); the EU ambient air quality standards outlined in section 8.2.1.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

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 phase of a development in Ireland.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible immission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the proposed development.

8.2.1.3 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). 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 $PM_{2.5}$.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2004; 2007). The data available from the EPA in 2020 (EPA, 2020a) indicated that Ireland complied with the emissions ceiling for SO_2 in recent years but failed to comply with the ceilings

for NH_3, NO_X and 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 SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 10.9 kt (85% below 2005 levels) for SO_2, 40.7 kt (69% reduction) for NO_X, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH_3 and 11.2 kt (41% reduction) for $PM_{2.5}$.

8.2.1.4 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.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the 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 Act makes provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The *Climate Action Plan* (CAP) (Government of Ireland, 2019), 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.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland, 2020). The General Scheme was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) was published in July 2021 (Government of Ireland, 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 Bill 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.

The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, alumina manufacturing and heavy industry. 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. Ireland's obligation under the Regulations is a 30% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels. The ETS is a "*cap and trade*" system where an EU-wide limit, or cap, is set for participating installations. Thus, the geographical location of a given development within the EU is not relevant as there is only one EU-wide target which is applicable to the ETS and thus the cumulative direct and indirect climate assessment of relevance in this context is the GHG emissions associated with the EU under the ETS. On an EU-wide basis, the ETS market in 2019 was approximately 1,390 million tonnes CO_{2eq}.

Following on from the recently published European Climate Law (European Commission, 2021a), 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 (European Commission, 2021b) 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 (European Commission, 2021c).

8.2.2 Construction Phase

8.2.2.1 Air Quality

The current assessment focused firstly 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.

8.2.2.2 Climate

The impact of the construction phase of the 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.

8.2.3 Operational Phase

8.2.3.1 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)*" (2020b).

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 cumulative 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 2016 – 2020 from Johnston Castle 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 years. This study adopted a conservative approach which will lead to an over-estimation of the actual levels that will arise.

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 8.1. 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:

A receptor grid and discrete receptors were identified 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 measured 10 x 10 km with the site at the centre and with concentrations calculated at 250m intervals. A smaller, denser grid measured 2 x 2km with concentrations calculated at 50m intervals. Boundary receptor locations were also placed along the boundary of the site, at 25m intervals, giving a total of 3,449 calculation points for the model. The impact of the engines was also measured at nearby residential receptors which were added to the model as discrete receptors.

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.

Hourly-sequenced meteorological information has been used in the model covering the years 2016 – 2020 from Johnstown Castle as shown in Figure 8.1. 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 8.2).

Terrain has been mapped out in the model as using SRTM (Shuttle Radar Topography Mission) data with 30m resolution. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP.

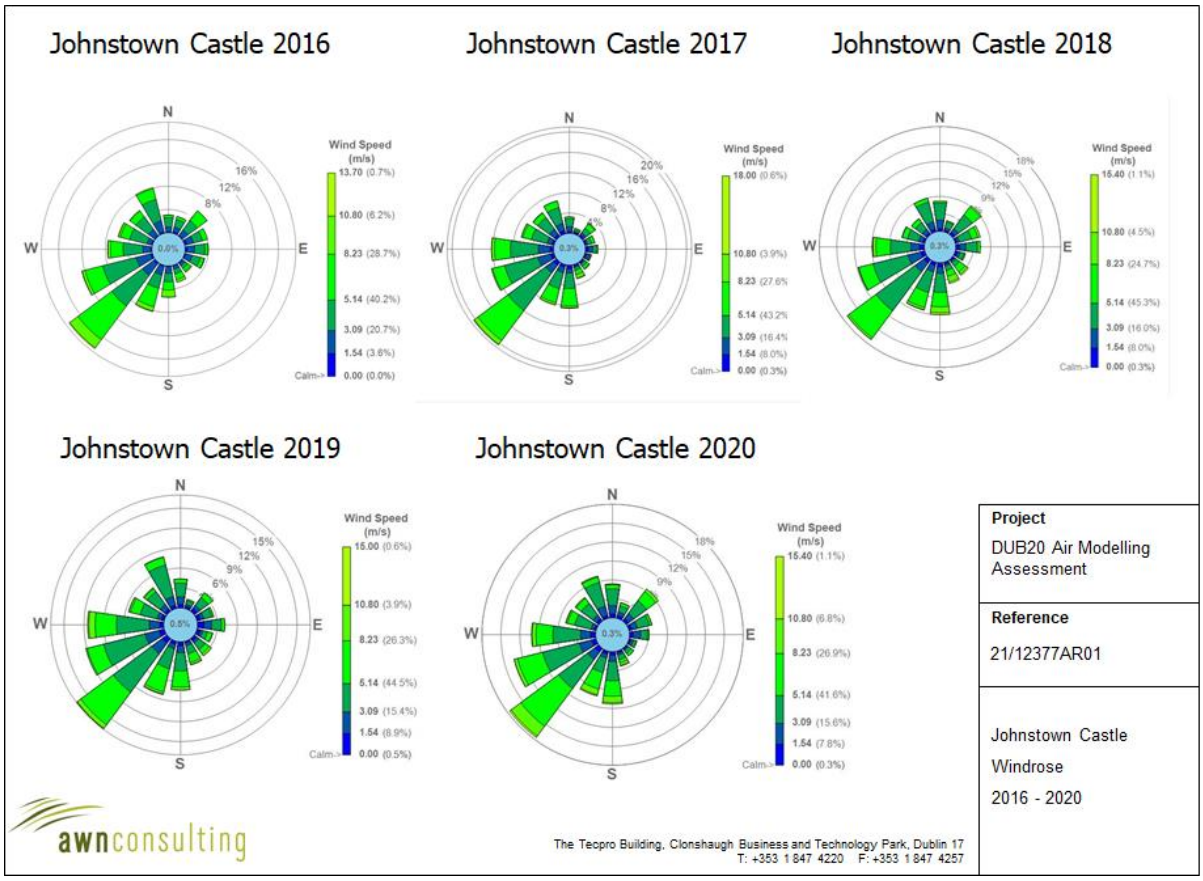


Figure 8.1 *Johnstown Castle Windrose 2016 – 2020*

Process Emissions

The proposed development will have 30 no. engines in total, with Building 1 having 12 engines (with 10 in operation and two on standby) and Building 2 having 18 engines (with 15 in operation and three on standby). Each engine will have an associated stack which will be clustered in groups of three, and the stacks for all engines in Buildings 1 and 2 will have a minimum height above ground level of 33m.

The engines will be dual fuelled engines, meaning they can operate on both natural gas and diesel. The normal, day-to-day operation of the engines will be with natural gas. Diesel will be used as a back-up fuel in the even that there is an interruption to the natural gas supply to the site. The potential for the natural gas supply to be interrupted is very rare if occurring at all and therefore the potential for the engines to operate using diesel will be a rare occurrence and will be an infrequent, emergency scenario, therefore diesel operations have been screened out of the air modelling assessment. The focus of this assessment is on normal operations of the engines using natural gas.

The engines will have emissions of NO_2, CO and particulate matter (PM_{10}/$PM_{2.5}$). Modelling for NO_2 was undertaken in detail. In relation to CO, PM_{10} and $PM_{2.5}$ no detailed modelling was undertaken. Emissions of these pollutants are significantly lower than the NO_X emissions from the engines relative to their ambient air quality standards and thus ensuring compliance with the NO_2 ambient limit value will ensure compliance for all other pollutants. For example, the emission of CO from the engines will be of the same order of magnitude as NO_X whilst the CO ambient air quality standard is 10,000 µg/m^3 compared to the 1-hour NO_2 standard of 200 µg/m^3. Similarly, levels of PM_{10}/$PM_{2.5}$ emitted from the engines will be at least ten times lower whilst the ambient air quality standards are comparable.

The methodology for converting NO_X to NO_2 was based on the ozone limiting method (OLM) approach based on an initial NO_2/NO_X ratio of 0.1 and a background ozone level of 60 µg/m^3 based on a review of EPA data for similar Zone D locations.

The modelling was undertaken to assess the impact to ambient air quality from the following two operational scenarios:

- **Proposed Development Scenario:** The proposed development impact assessment involved the continuous operation of 25 of the 30 no. engines in the facility on the site. 5 of the engines have been modelled as 'back-up' engines to provide redundancy to the other 25 engines should one fail. The process emissions used for the Proposed Development Scenario are outlined in Table 8.2.

- **Cumulative Scenario:** The cumulative impact assessment assessed the combined impact of the proposed development as described above in addition to the emergency operation of 50 standby diesel generators at the adjacent permitted data centre facility (Reg. Ref.: 201285) for up to 50 hours per year. The scheduled testing of the generators on a weekly basis was also included. The process emissions associated with the emergency generators are outlined in Table 8.2.

Table 8.2 *Summary of Process Emission Information for Proposed Development Scenario & Cumulative Scenario*

Stack Reference	Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Volume Flow (Nm^3/hr at 15% Ref. O_2)	Exit Velocity (m/sec actual)	NO_x	
							Concentration (mg/Nm^3 at 15% Ref. O_2)	Mass Emission (g/s)
Gas Engines	33	1.00	0.79	641.15	43,912	23.4	65	0.79
Dub20 Emergency Operation of Standby Diesel Generators (75% load)	20	0.356	0.10	733.9	4.91 kg/s	30	n/a	0.093 Note 2
Dub20 Testing of Standby Diesel Generators (100% load)	20	0.356	0.10	833.15	5.54 kg/s	30	n/a	7.53 Note 3

Note 1 Emissions referenced to 273.15K, 101.3Pa, 15% O_2, dry gas

Note 2 Reduced emission rates based on USEPA protocol (assuming 50 hours / annum) used to model emissions during emergency operation of generators (75% load)

Note 3 Emission rates used to model scheduled emissions during testing at 100% load conducted once per week. The generators are assumed to be tested in triplicate for one hour.

8.2.3.2 Climate & Transboundary Pollution

The facility will be required operates under the ETS as the facility will have greater than 20MW thermal input installed onsite.

Any associated GHG emissions associated with the operation of the engines will be captured under the ETS which will have to meet a target of a 61% reduction by 2030 based on annual reductions of 4.2% compared to the previous annual reduction level of 2.2% per year (European Commission, 2021c) and thus it is likely that there will be a gradual reduction in GHG emissions from the facility under the facility's ETS Permit.

The impact of the operational phase of the proposed development on climate was determined by an assessment of the CO_2 emissions associated with the operation of the engines. The details and results of the assessment are provided in section 8.9.2.3.

8.3 RECEIVING ENVIRONMENT

8.3.1 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality in Ireland 2019*" (EPA 2020c) 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 (EPA 2020d). 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, Arklow and its surroundings are categorised as Zone D (EPA 2020d).

NO_2

NO_2 monitoring was carried out at two rural Zone D locations in 2019, Emo and Kilkitt and in two urban areas, Enniscorthy and Castlebar (EPA 2020c). The NO_2 annual average in 2019 for both rural sites were 4.5 µg/m^3 with the results for urban stations averaging 8 µg/m^3. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. The average results over the last five years at a range of rural Zone D locations suggest an upper average of no more than 8 µg/m^3 as a background concentration as shown in Table 8.3. Based on the above information a conservative estimate of the background NO_2 concentration in the region of the facility is 8 µg/m^3.

Table 8.3 *Trends In Zone D Air Quality – Nitrogen Dioxide (µg/m³)*

Year	Enniscorthy (µg/m³)	Kilkitt (µg/m³)	Emo Court (µg/m³)	Castlebar (µg/m³)
2015	9	2	3	8
2016	10	3	4	9
2017	-	2	3	7
2018	-	3	3	8
2019	-	5	4	8
Average	10	3	3	8

PM_{10}

Long-term PM_{10} monitoring was carried out at the urban Zone D locations of Castlebar, Enniscorthy and Claremorris over the period 2015 – 2019 and the rural location of Kilkitt (EPA 2020c). The annual average results over the last five years at rural Zone D locations suggests an average of 9 µg/m³ as an annual average rural background concentration as shown in Table 8.4 and 18 µg/m³ for the urban sites. Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the facility is 12 µg/m³.

Table 8.4 *Trends in Zone D Air Quality – PM_{10} (µg/m³)*

Year	Castlebar	Kilkitt	Claremorris	Enniscorthy
2015	13	9	10	18
2016	12	8	10	17
2017	11	8	11	-
2018	11	9	12	-
2019	16	7	11	18
Average	**12.6**	**8.2**	**10.8**	**17.7**

$PM_{2.5}$

Continuous $PM_{2.5}$ monitoring carried out at the Zone D location of Claremorris showed $PM_{2.5}/PM_{10}$ ratios ranging from 0.50 – 0.60 over the period 2015 – 2019. Based on this information, a conservative ratio of 0.7 was used to generate a background $PM_{2.5}$ concentration in the region of the facility of 8.4 µg/m³.

Levels of NO_2, PM_{10} and $PM_{2.5}$ will continue to follow recent trends in future years.

8.3.2 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 (EPA, 2021b). 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 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 2019 are 4.4% lower than those recorded in 2018. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for four years in a row. Emissions from 2016 – 2019 exceeded the annual EU targets by 0.29 $MtCO_2eq$, 2.94 $MtCO_2eq$, 5.57 $MtCO_2eq$ and 6.85 $MtCO_2eq$ 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 2020 GHG Emissions Projections Report for 2020 – 2040 (EPA, 2021c) 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 (EPA, 2021c). 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.

8.4 CHARACTERISTICS OF THE DEVELOPMENT

8.4.1 Construction Phase

The key civil engineering works which will have a potential impact on air quality and climate during construction are summarised below:

i) During construction, an amount of soil will be generated as part of the site preparation works and for construction of roads, car parking areas, foundations, installation of drainage services and ancillary infrastructure.

ii) Infilling and landscaping will be undertaken. Spoil generated during site preparation will be re-used in landscaping and levelling of the site where possible.

iii) Temporary storage of construction materials.

iv) Construction traffic accessing the site will emit air pollutants and greenhouse gases during transport.

As outlined in Section 8.7, a dust minimisation plan will be formulated for the construction phase of the project to ensure no dust nuisance occurs at nearby sensitive receptors.

8.4.2 Operational Phase

The key works which will have a potential impact on air quality and climate during operation of the proposed development are summarised below:

i) The emissions from the engines (primarily NO_x emissions as well as lower levels of CO, and particulate emissions).

ii) Road traffic accessing the site will emit air pollutants and greenhouse gases. However, the operational phase of the proposed development is not expected to contribute a significant volume of additional traffic on the local road network. Therefore, no local air quality assessment of the traffic impact is required for this development.

8.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

8.5.1 Construction Phase

8.5.1.1 Air Quality & Climate

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 350m of a construction site, the majority of the deposition occurs within the first 50m. 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.

Construction traffic would be expected to be the dominant source of greenhouse gas emissions as a result of the proposed development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the proposed development. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate.

It is important to note that the potential impacts associated with the construction phase of the proposed development are short-term in nature. When the dust minimisation measures detailed in the mitigation section (see Section 8.7) of this chapter are implemented, fugitive emissions of dust from the site will not be significant and will pose no nuisance at nearby receptors. Due to the duration and nature of the construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a short-term and imperceptible impact on climate.

8.5.2 Operational Phase

8.5.2.1 Air Quality

The potential impact to air quality during the operational phase of the proposed development is a breach of the ambient air quality standards as a result of air emissions from the engines. Selective catalytic reduction (SCR) technology will be employed on the engines to ensure the NOx emissions comply with the ambient air quality standards. In addition, as outlined in Section 8.7, an iterative stack height determination was undertaken as part of the air dispersion modelling study to ensure that an adequate release height was selected for all emission points to aid dispersion of the plumes and ensure compliance with the ambient air quality limit values at all locations beyond the site boundary.

8.5.2.2 Climate

The engines modelled for the purpose of this assessment will operate under the ETS as the facility will have greater than 20MW thermal input installed onsite.

The proposed development has been designed to minimise the impact to climate

where possible.

8.6 DO NOTHING SCENARIO

The Do-Nothing scenario includes site vacancy without the proposed development in place. In this scenario, 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 in the surrounding area, changes in road traffic, etc). The Do Nothing Scenario is considered neutral in relation to air quality and climate.

8.7 REMEDIAL AND MITIGATION MEASURES

8.7.1 Construction Phase

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), The Scottish Office (1996), UK Office of Deputy Prime Minister (2002) and BRE (2003)) and the USA (USEPA (1997)).

8.7.1.1 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 8.1 for the windrose for Johnstown Castle). As the prevailing wind is predominantly south-westerly, locating construction compounds and storage piles downwind (to the north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures should be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;

- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board will also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

8.7.1.2 Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

8.7.1.3 Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

8.7.1.4 Storage Piles

- The location and moisture content of storage piles are important factors which determine their potential for dust emissions.
- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK Office of Deputy Prime Minister, 2002);
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

8.7.1.5 Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

8.7.1.6 Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed;
- The specification of effective measures to deal with any complaints received.

8.7.2 Operational Phase

The stack heights of the engines for the proposed development have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations). In addition, SCR technology will be installed on the engines to ensure the NOx emissions comply with the ambient air quality standards. No additional mitigation measures are proposed for the operational phase of the development.

8.8 MONITORING

8.8.1 Construction Phase

Monitoring is not proposed for the construction phase of the proposed development as impacts are predicted to be imperceptible. In addition, due to the nature of the immediate site area, there are no high sensitivity receptors (residential properties) in close proximity to the site (within 50m) at which monitoring would be required. Once the dust mitigation measures outlined in Section 8.7.1 are implemented construction dust emissions will be imperceptible.

8.8.2 Operational Phase

The facility will require an Industrial Emissions (IE) Licence to be granted by the EPA as the total rated thermal input for the site will exceed 50 MW. The facility will be required to undertake monitoring of emissions from the engines as required under the licence requirements once granted.

8.9 PREDICTED IMPACTS OF THE DEVELOPMENT

8.9.1 Construction Phase

8.9.1.1 Air Quality

When the dust mitigation measures detailed in the mitigation section (Section 8.7.1) of this report are implemented, fugitive emissions of dust and particulate matter from the site will be ***negative, not significant*** and ***short term*** in nature, posing no nuisance at nearby receptors.

8.9.1.2 Climate

Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the potential impact on climate change and transboundary pollution from the proposed development is deemed to be ***negative, imperceptible*** and ***short term*** in relation to Ireland's obligations under the EU 2030 target.

8.9.1.3 Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be ***negative, imperceptible*** and ***short term*** with respect to human health.

8.9.2 Operational Phase

8.9.2.1 Proposed Development Scenario

The NO_2 modelling results at the worst-case location at and beyond the site boundary are detailed in Table 8.5 based on the Proposed Development Scenario. This scenario involved the continuous operation 25 of the 30 no. engines for the proposed development for a full year based on a NOx emission limit of 65 mg/Nm^3 (at 15% O_2).

The results indicate that the ambient ground level concentrations are in compliance with the relevant air quality standards for NO_2. For the worst-case year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 60% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 84% of the annual limit value at the worst-case off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Proposed Development Scenario are illustrated as concentration contours in Figures 8.2 and 8.3.

The operational phase impact of the proposed development, based on natural gas, is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Table 8.5 *NO_2 Dispersion Model Results – Proposed Development Scenario*

Pollutant / Meteorological Year	Background (µg/m^3)	Averaging period	Process Concentration NO_2	Predicted Environmental Concentration NO_2 (µg/m^3)	Standard (µg/m^3) Note 1
NO_2 / 2016	16	99.8th%ile of 1-Hr Means	103.0	119.0	200
	8	Annual mean	25.3	33.3	40
NO_2 / 2017	16	99.8th%ile of 1-Hr Means	101.8	117.8	200
	8	Annual mean	24.3	32.3	40
NO_2 / 2018	16	99.8th%ile of 1-Hr Means	99.7	115.7	200
	8	Annual mean	23.2	31.2	40
NO_2 / 2019	16	99.8th%ile of 1-Hr Means	102.2	118.2	200
	8	Annual mean	25.4	33.4	40
NO_2 / 2020	16	99.8th%ile of 1-Hr Means	102.5	118.5	200
	8	Annual mean	23.6	31.6	40

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

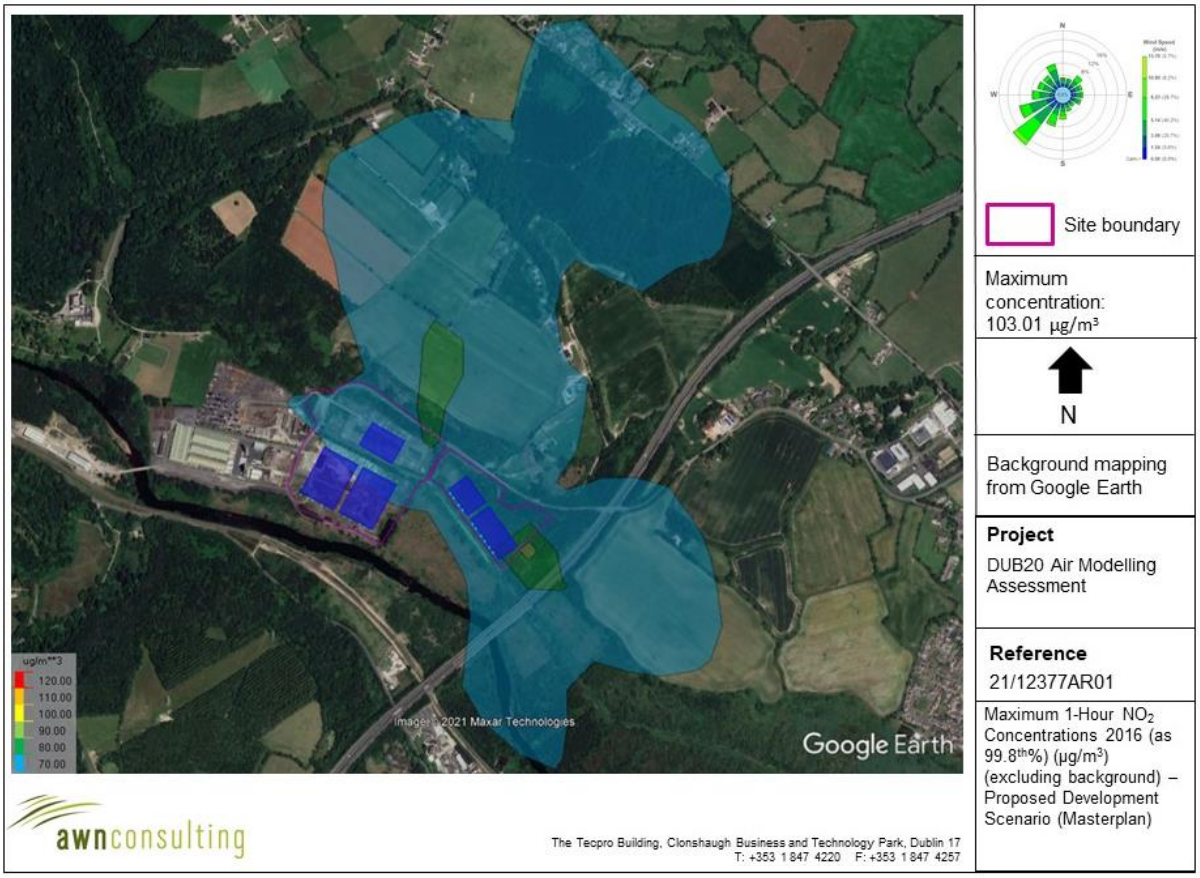


Figure 8.2 *Maximum 1-Hour NO_2 Concentrations 2016 (as 99.8th percentile) (µg/m^3) (excluding background concentrations) – Proposed Development Scenario*

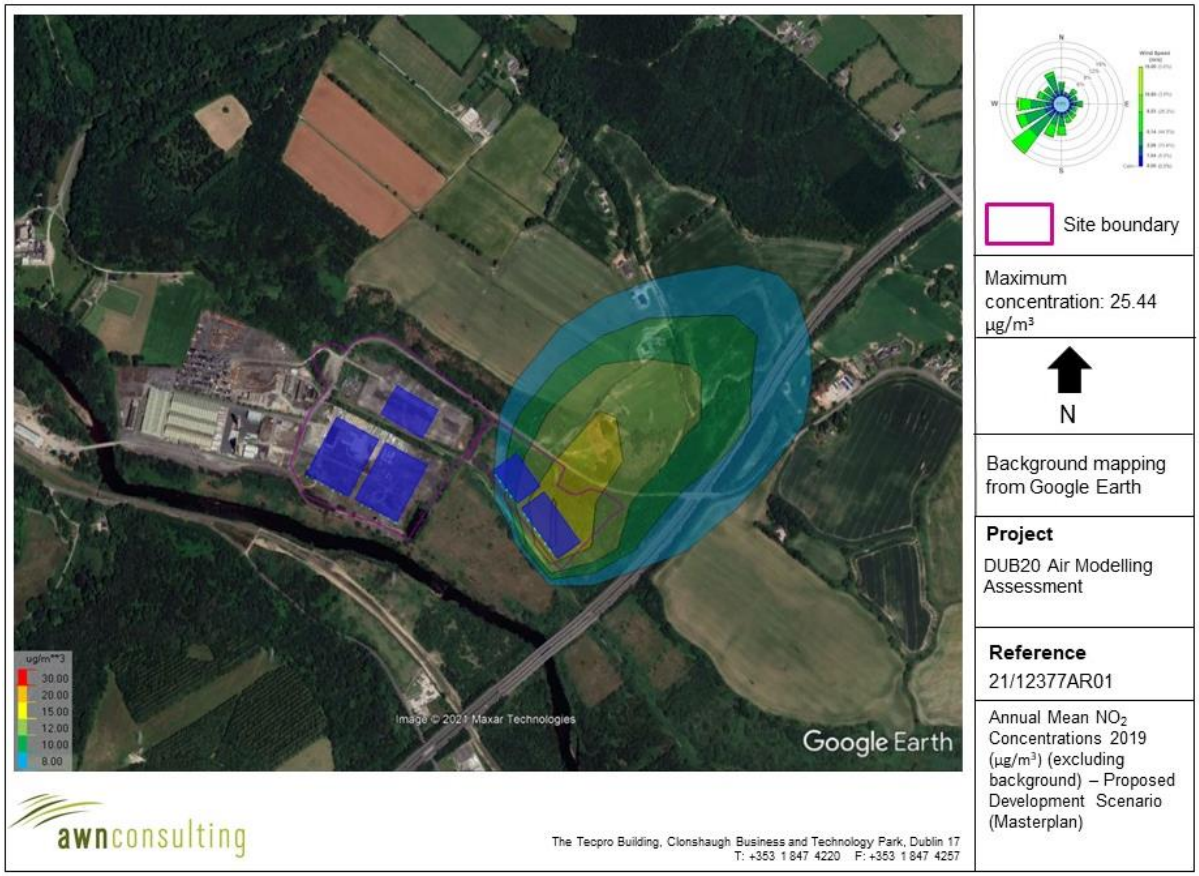


Figure 8.3 *Annual Mean NO_2 Concentrations 2019 (µg/m³) (excluding background concentrations) – Proposed Development Scenario*

8.9.2.2 Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A detailed flood risk assessment has been undertaken as part of this planning application and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the impact will be imperceptible.

The direct CO_2 emissions from the operation of the facility will not be significant in relation to the EU-wide ETS CO_2 emissions. On the basis that the proposed development will produce 250MW of power this equates to 2,190 GWh annually with CO_{2eq} emissions of 448.3 kilotonnes per annum based on natural gas.

On an EU-wide basis, the ETS market in 2019 was approximately 1,390 million tonnes CO_{2eq}, the impact of the emissions, which are regulated under the ETS, associated with the facility is less than 0.032% of the total EU-wide ETS market, based on the proposed development emissions.

The overall combined operational phase GHG emissions, after mitigation, due to the operational phase of the proposed development will be ***direct***, ***long-term, negative*** and ***slight***.

As the proposed development is over 20 MW, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading Scheme (ETS). The facility will form part of the ETS and thus greenhouse gas

emissions from the facility is not included when determining compliance with the targeted 30% reduction in the non-ETS sector i.e. electricity associated greenhouse gas emissions will not count towards the Effort Sharing Decision target. Thus, any GHG emissions due to facility will have no impact on Ireland's obligation to meet the EU Effort Sharing Decision.

8.9.2.3 Regional Air Quality

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 National Emission Ceiling Directive limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3 and $PM_{2.5}$ as detailed in Section 8.2.1.3.

The direct NO_X emissions from the proposed development based on 250MW of power (2,190 GWh) annually using natural gas as a fuel are 625 tonnes,which is 0.96% of the National Emission Ceiling limit for Ireland from 2020 onwards. Similarly, SO_2 emissions are 48 tonnes per annum using natural gas which is 0.11% of the National Emission Ceiling limit for Ireland from 2020 onwards. Additionally, NMVOC emissions are 96 tonnes per annum using natural gas which is 0.17% of the National Emission Ceiling limit for Ireland from 2020 onwards. Thus, the NO_X, SO_2 and NMVOC direct emissions associated with the operation of the proposed development are ***negative***, ***slight*** and ***long-term*** with regards to regional air quality.

8.9.2.4 Human Health

Air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, pollutant concentrations with the proposed development operational are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health. The air dispersion modelling assessment has considered the ambient air quality impact from the operation of the proposed development (the worst-case scenario) and a conservative approach was adopted when making assumptions for the air modelling inputs which over-estimates the actual levels that will arise. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

8.10 CUMULATIVE IMPACTS OF THE DEVELOPMENT

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments (including the substation and subsurface grid connection and permitted development as outlined in Chapter 2) are discussed in Sections 8.10.1, 8.10.2 and 8.10.3.

8.10.1 Cumulative Impacts of the Proposed Development and Substation and Subsurface Grid Connection

The cumulative impact of the proposed development and the substation and subsurface grid connection as outlined in Chapter 2 is discussed below.

8.10.1.1 Construction Phase

There is the potential for the construction phase of the proposed development to coincide with the construction of the grid connection and substation developments. In

this scenario there is the potential for cumulative dust emissions to impact nearby sensitive receptors. Dust mitigation measures have been outlined in Section 8.7.1, provided these measures are implemented throughout the construction phase of the proposed development the potential for significant dust impacts will be avoided. Therefore, the cumulative impact of the proposed development and the substation and subsurface grid connection is ***short-term***, ***negative*** and ***imperceptible***.

8.10.1.2 Operational Phase

Cumulative operational phase impacts are not predicted as the grid connection will be buried underground once operational and there are no emissions to atmosphere associated with it or the substation development.

8.10.2 Cumulative Impacts of the Proposed Development and Permitted Development

The cumulative impact of the proposed development and the permitted adjacent data centre development (planning ref. *201285*) as outlined in Chapter 2 is discussed below.

8.10.2.1 Construction Phase

There is the potential for the construction phase of the proposed development to coincide with the construction of the adjacent permitted data centre development. In this scenario there is the potential for cumulative dust emissions to impact nearby sensitive receptors. Dust mitigation measures have been outlined in Section 8.7.1, provided these measures are implemented throughout the construction phase of the proposed development the potential for significant dust impacts will be avoided. Therefore, the cumulative impact of the proposed development and the data centre development is ***short-term***, ***localised***, ***negative*** and ***imperceptible***.

8.10.2.2 Cumulative Operational Phase

The cumulative NO_2 modelling results at the worst-case location at and beyond the site boundary are detailed in Table 8.6 based on the Cumulative Operational Scenario. This scenario involved the continuous operation of the engines for a full year operating on natural gas and based on a NOx emission limit of 65 mg/Nm^3 (at 15% O_2) and the operation of the adjacent data centreemergency diesel generators.

In relation to the adjacent data centre generators, USEPA Guidance suggests that for emergency operations, an average hourly emission rate should be used rather than the maximum hourly rate (USEPA, 2011). For modelling purposes only, a figure of 50 hours in total per year of operation has been applied to the adjacent development's emergency generators. However, in reality, and based on recent experience over the past number of years, generators are rarely used other than during testing and maintenance. As a result, the maximum hourly emission rates from all the standby generators were reduced by a factor of (50/8760) to give an average hourly emission rate (in line with USEPA protocol) and the generators were modelled over a period of one full year. In addition, scheduled testing of the generators on a weekly basis, based on one generator on full load for one hour sequentially over the period 08:00 – 16:00, Monday – Friday, was also included in the modelling.

The results indicate that the ambient ground level concentrations are in compliance with the relevant air quality standards for NO_2. For the worst-case year modelled, cumulative emissions lead to an ambient NO_2 concentration (including background) which is 72% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 90% of the annual limit value at the worst-case off-site receptor. Concentrations decrease with distance from the site boundary. The geographical

variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Proposed Development Scenario - Cumulative are illustrated as concentration contours in Figures 8.4 and 8.5.

The cumulative operational phase impact of the proposed development is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Table 8.6 *NO_2 Dispersion Model Results – Cumulative Scenario*

Pollutant / Meteorological Year	**Background (µg/m^3)**	**Averaging period**	**Process Concentration NO_2**	**Predicted Environmental Concentration NO_2 (µg/m^3)**	**Standard (µg/m^3)** Note 1
NO_2 / 2016	16	99.8th%ile of 1-Hr Means	121.3	137.3	200
	8	Annual mean	27.8	35.8	40
NO_2 / 2017	16	99.8th%ile of 1-Hr Means	125.4	141.4	200
	8	Annual mean	27.2	35.2	40
NO_2 / 2018	16	99.8th%ile of 1-Hr Means	126.1	142.1	200
	8	Annual mean	25.3	33.3	40
NO_2 / 2019	16	99.8th%ile of 1-Hr Means	127.7	143.7	200
	8	Annual mean	27.8	35.8	40
NO_2 / 2020	16	99.8th%ile of 1-Hr Means	124.5	140.5	200
	8	Annual mean	26.0	34.0	40

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

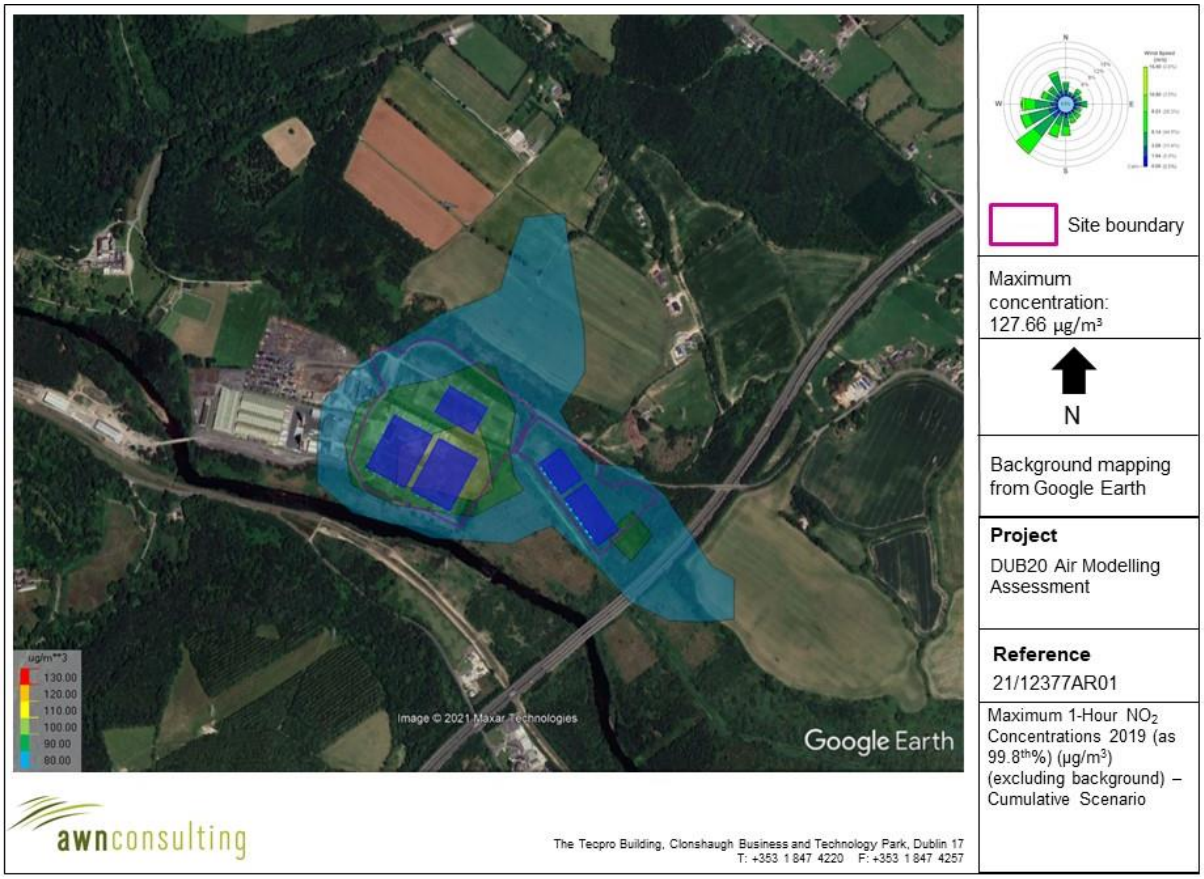


Figure 8.4 *Maximum 1-Hour NO_2 Concentrations 2019 (as 99.8th percentile) (µg/m^3) (excluding background concentrations) – Cumulative Development Scenario*

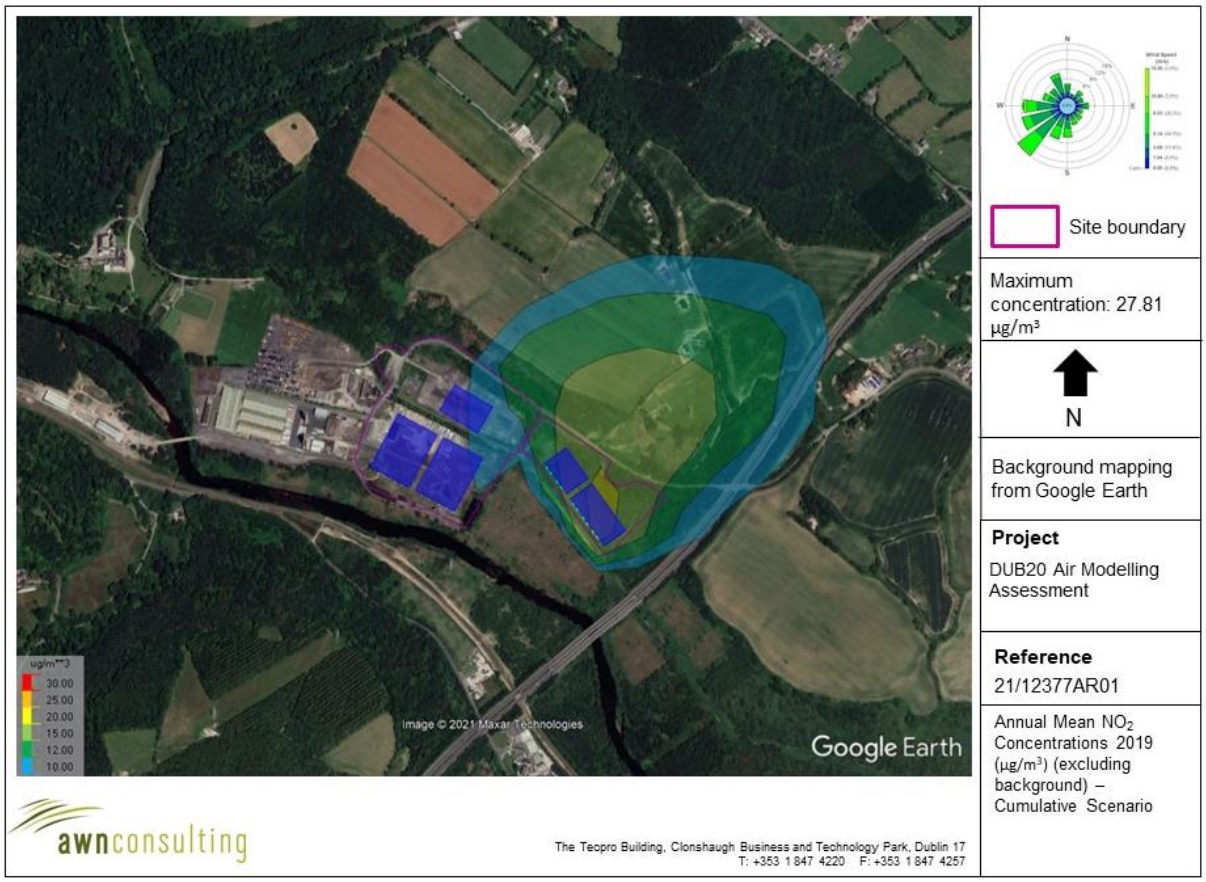


Figure 8.5 *Annual Mean NO_2 Concentrations 2019 (µg/m³) (excluding background concentrations) – Cumulative Development Scenario*

8.10.3 Cumulative Impacts of the Proposed Development, Substation and Subsurface Grid Connection, Permitted Development and Other Nearby Developments

The cumulative impact of the proposed development, the substation and subsurface grid connection, and permitted development as outlined in Chapter 2, and all other nearby development as described in Chapter 3 are outlined below.

8.10.3.1 Construction Phase

There is the potential for cumulative dust emissions from the proposed development and the simultaneous construction of other developments within 350m of the site, according to the IAQM guidance (2014). As the predicted impacts to air quality and climate are deemed short-term and not significant for construction of the proposed development assuming dust mitigation measures are implemented, the cumulative impacts from simultaneous construction of the proposed development and any external developments within 350m of the site are deemed short-term and not significant with appropriate mitigation measures in place. Cumulative impacts to climate are not predicted to be significant due to the short-term duration of the construction stage.

8.10.3.2 Operational Phase

A review of industrial emissions licences (IED licences) issued by the EPA for the area surrounding the proposed development show that there is one licenced facility with NO_X emissions to the atmosphere within 1km of the site boundary; Sigma-Aldrich Ireland Ltd (Licence No. P0089-05) which is located approximately 500m south-east of the boundary of the facility. However, the only main emission point from Sigma-Aldrich which releases NO_X is A1-7 which has a maximum mass emission of 12.2

tonnes/annum which is significantly below the threshold for a cumulative assessment as outlined in EPA AG4 Guidelines of 100 tonnes per annum and thus no cumulative modelling assessment is merited (EPA, 2020c). Cumulative emissions associated with the adjacent DUB20 data centre facility on the site are discussed in Section 8.10.2. For any future development with emissions to atmosphere which may occur within the vicinity of the site, the proposed facility would be required to apply for, and comply with, emissions limit values as stipulated in an IED licence.

8.11 RESIDUAL IMPACTS

If the mitigation measures outlined in Section 8.7 are implemented, there will be no residual impacts of significance on air quality or climate from the construction or operational phases of the proposed development.

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APPENDIX 8.1

DESCRIPTION OF THE AERMOD MODEL

AWN CONSULTING, 2021

DESCRIPTION OF THE AERMOD MODEL

The AERMOD dispersion model has been developed in part by the U.S. Environmental Protection Agency (USEPA) (USEPA, 1998; 2019). The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD with PRIME, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD (precursor to AERMOD with PRIME) performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets (USEPA, 1999).

Due to the proximity to surrounding buildings, the PRIME (Plume Rise Model Enhancements) building downwash algorithm has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered. The PRIME algorithm takes into account the position of the stack relative to the building in calculating building downwash. In the absence of the building, the plume from the stack will rise due to momentum and/or buoyancy forces. Wind streamlines act on the plume leads to the bending over of the plume as it disperses. However, due to the presence of the building, wind streamlines are disrupted leading to a lowering of the plume centreline.

When there are multiple buildings, the building tier leading to the largest cavity height is used to determine building downwash. The cavity height calculation is an empirical formula based on building height, the length scale (which is a factor of building height & width) and the cavity length (which is based on building width, length and height). As the direction of the wind will lead to the identification of differing dominant tiers, calculations are carried out in intervals of 10 degrees.

In PRIME, the nature of the wind streamline disruption as it passes over the dominant building tier is a function of the exact dimensions of the building and the angle at which the wind approaches the building. Once the streamline encounters the zone of influence of the building, two forces act on the plume. Firstly, the disruption caused by the building leads to increased turbulence and enhances horizontal and vertical dispersion. Secondly, the streamline descends in the lee of the building due to the reduced pressure and drags the plume (or part of) nearer to the ground, leading to higher ground level concentrations. The model calculates the descent of the plume as a function of the building shape and, using a numerical plume rise model, calculates the change in the plume centreline location with distance downwind.

The immediate zone in the lee of the building is termed the cavity or near wake and is characterised by high intensity turbulence and an area of uniform low pressure. Plume mass captured by the cavity region is re-emitted to the far wake as a ground-level volume source. The volume source is located at the base of the lee wall of the building, but is only evaluated near the end of the near wake and beyond. In this region, the disruption caused by the building downwash gradually fades with distance to ambient values downwind of the building.

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3 (USEPA, 1995; 1999). ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height (USEPA, 1995; 1999). The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also has the capability of modelling both unstable (convective) conditions and stable (inversion) conditions. The stability of the atmosphere is defined by the sign of the sensible heat flux. Where the sensible heat flux is positive, the atmosphere is unstable whereas when the sensible heat flux is negative the atmosphere is defined as stable. The sensible heat flux is dependent on the net radiation and the available surface moisture (Bowen Ratio). Under stable (inversion) conditions, AERMOD has specific algorithms to account for plume rise under stable conditions, mechanical mixing heights under stable conditions and vertical and lateral dispersion in the stable boundary layer.

AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

APPENDIX 8.2

METEOROLOGICAL DATA – AERMET

AWN CONSULTING, 2021

METEOROLOGICAL DATA – AERMET

AERMOD incorporates a meteorological pre-processor AERMET (version 19191) (USEPA, 2019). AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

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 types was carried out in line with USEPA recommendations (USEPA, 1995) and using the detailed methodology outlined by the Alaska Department of Environmental Conservation (2008). AERMET has also been updated to allow for an adjustment of the surface friction velocity (u*) for low wind speed stable conditions based on the work of Qian and Venkatram (BLM, 2011). Previously, the model had a tendency to over-predict concentrations produced by near-ground sources in stable conditions.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use classification within a radius of 1km from Johnstown Castle Meteorological Station is shown in Table A1.

Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
0-360	100% Grassland	0.050	0.100	0.010	0.010

Note 1: Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal, 1983). Thus for the current location autumn more accurately defines "winter" conditions at the proposed facility.

Table A1 Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Johnstown Castle Meteorological Station.

Albedo

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10km x 10km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Johnstown Castle Meteorological Station is shown in Table A2.

Area-weighted Land Use Classification	Spring	Summer	Autumn	Winter[1]
10% Water	0.012	0.010	0.014	0.014
5% Urban	0.007	0.008	0.009	0.009
75% Grassland	0.135	0.135	0.150	0.150
10% Cultivated Land	0.014	0.020	0.018	0.018

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A2 Albedo based on a simple average of the land use within a 10km × 10km grid centred on Johnstown Castle Meteorological Station.

Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10km x 10km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Johnstown Castle Meteorological Station is shown in Table A3.

Area-weighted Land Use Classification	Spring	Summer	Autumn	Winter[1]
10% Water	0.1	0.1	0.1	0.1
5% Urban	1.0	2.0	2.0	2.0
75% Grassland	0.4	0.8	1.0	1.0
10% Cultivated Land	0.3	0.5	0.7	0.7

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A3 Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Johnstown Castle Meteorological Station.

9.0 NOISE & VIBRATION

9.1 INTRODUCTION

As described in Chapter 1 (Introduction), the Applicant is applying for planning permission for the provision of an energy centre and battery storage facility along with associated transformer units hereafter referred to as the 'proposed development'). The subject site is illustrated in Figure 9.1 below.

Residential noise sensitive locations are located to the north, south, east and west of the site typically consisting of single residence ribbon development along secondary local roads.



Figure 9.1 Site Location and Context

This proposed development has been assessed and discussed in terms of potential noise and vibration impacts on the surrounding environment.

9.2 METHODOLOGY

9.2.1 Proposed Approach

The following methodology has been adopted for this assessment:

- review appropriate guidance, typical local authority/An Bord Pleanála (ABP) planning conditions, etc. in order to identify appropriate noise criteria for the site operations;
- review of noise monitoring at a number of locations (e.g. in the vicinity of nearest sensitive properties/boundaries) to identify existing levels of noise in the vicinity of the development;
- prepare construction noise calculations associated with the key construction activities to consider the potential noise impact of the proposed development;
- prepare operational noise calculations associated with day to day operations to consider the potential noise impact of the proposed development, and;
- comment on predicted noise levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

Appendix 9.1 of this document presents a glossary of the acoustic terminology used throughout this document. In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

9.2.2 Fundamentals of Acoustics

In order to provide a broader understanding of some of the technical discussion in this report, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0 dB (for the threshold of hearing) to 120 dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10 dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3 dB.

The frequency of sound is the rate at which a sound wave oscillates and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250 Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the ‘A-weighting’ system has been found to provide one of the best correlations with perceived loudness. SPLs measured using ‘A-weighting’ are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 9.2.

The ‘A’ subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well

developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

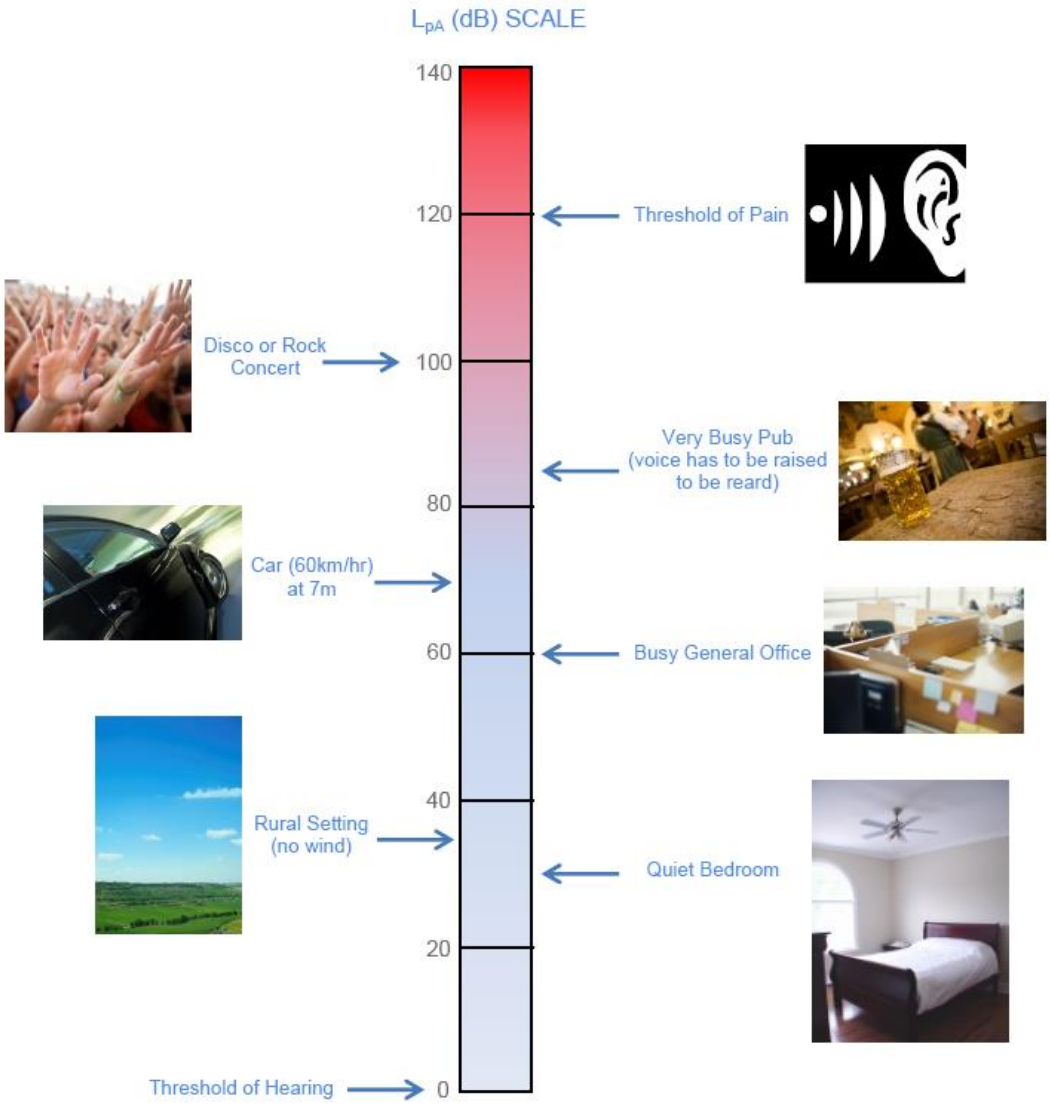


Figure 9.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2012))

9.2.3 Significance of Impacts

The significance of noise and vibration impacts has been assessed in accordance with the EPA's *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports* 2017 and the EPA's Draft *Advice Notes for Preparing Environmental Impact Statements* 2015, see Tables 9.1 to 9.3 below. As these guidelines do not quantify the impacts in decibel terms, further reference has been made to the '*Guidelines for Environmental Noise Impact Assessment*' produced by the Institute of Environmental Management and Assessment (IEMA) (2014).

With regard to the quality of the impact, ratings may have positive, neutral or negative applications where:

Table 9.1 Quality of Potential Effects

Quality of Effects	Definition
Negative	A change which reduces the quality of the environment (e.g. by causing a nuisance).
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment (e.g. by removing a nuisance).

The significance of an effect on the receiving environment are described as follows:

Table 9.2 Significance of Effects

Significance of Effects on the Receiving Environment	Description of Potential Effects
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

The duration of effects as described in the Draft EPA Guidelines are:

Table 9.3 Duration of Effects

Duration of Impact	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

9.2.4 Construction Phase Guidance

Criteria for Rating Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the *British*

Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise.

The approach adopted in BS5228 – 1 calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

BS5228 – 1 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.4 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS 5228 – 1. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 9.4 Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A Note A	Category B Note B	Category C Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends Note D	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

It should be noted that this assessment method is only valid for residential properties.

For the appropriate period (e.g. daytime) the ambient noise level is determined and rounded to the nearest 5 dB. Based on review of baseline noise monitoring to hand the relevant BS5228-1 threshold values at the various assessment locations are discussed in the relevant section of this report.

Guidance on the degree of significance is presented the UK document Design Manual for Roads and Bridges (2020) *LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2*. The approach is as follows:

- to determine the threshold value for construction noise according to the method from BS5228 described above and
- to compare the predicted construction noise level with the existing noise levels and the threshold value according to the criteria in the Table 9.5 below.

Potentially this procedure is to be followed separately for each noise-sensitive location, however in this instance as the existing noise levels at all survey locations correspond to Category A[1] according to table above, all noise-sensitive locations are considered together.

Similarly, for this proposed development the vast majority of construction works will take place within the 'Daytime' period, i.e. 07:00 – 19:00 on Mondays to Fridays and 07:00 – 13:00 on Saturdays.

[1] Once consideration is given to the additional distance from the actual noise monitoring location and its proximity to a dominant noise source and the actual noise sensitive locations.

The magnitude of the construction noise impact according the DMRB is mapped to the EPA significance terms as detailed in Table 9.5:

Table 9.5 Description of the magnitude of impacts. Adapted from DMRB Table 3.16

Predicted Construction Noise Level is	Magnitude of Impact (DMRB)	EPA Significance of Effect
Below or equal Baseline Noise Level	Negligible	Not Significant
Above Baseline and below or equal to threshold	Minor	Slight – Moderate
Above threshold and below or equal to threshold + 5dB	Moderate	Moderate – Significant
Above threshold + 5dB	Major	Significant – Very Significant

Baseline monitoring carried out as part of this assessment would indicate that the categories detailed in Table 10.6 are appropriate in terms of the nearest noise sensitive locations being considered in this instance.

Table 9.6 Rounded Baseline Noise Levels and Associated Categories

Period	Baseline Noise Category	Construction Noise Threshold Value $L_{Aeq,1hr}$ (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	A	65
Evening (19:00 to 23:00hrs)	A	55
Night-time (23:00 to 07:00hrs)	A	45

See Section 9.5.1 for the assessment in relation to this site. If the construction noise level exceeds the appropriate category value, then a significant effect is deemed to occur.

This assessment process determines whether a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise are set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[2], which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.7 sets out these levels.

Table 9.7 Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Days and Times	Noise Levels (dB re. $2x10^{-5}$ Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

Therefore, based on the above the following construction noise criteria are proposed for the site in relation to day to day works during the stated construction hours:

70 dB $L_{Aeq,1hr}$ at noise sensitive location
75 dB $L_{Aeq,1hr}$ at commercial property

[2] *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland

In exceptional circumstances there may be a requirement that certain construction works are carried out during night-time periods. In these instances, the relevant evening (60 dB $L_{Aeq,1hr}$) and night-time (50 dB $L_{Aeq,1hr}$) will apply.

Criteria for Rating Vibration Impacts

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, rock breaking and piling, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12 mm/s and 5 mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*, and;
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

BS 5228 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5288-2 also comments that important buildings which are difficult to repair might require special consideration on a case by case basis.

The TII document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* also contains information on the permissible construction vibration levels as follows:

Table 9.8 Allowable Vibration during Construction Phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10 Hz	10 to 50 Hz	50 to 10 Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

9.2.5 Operational Phase – Noise Guidance

Relevant Planning Condition Review

ABP and subsequently Wicklow County Council have granted[3] permission for the development of a datacentre facility on adjacent lands to that of the proposed development. It is noted that the proposed development will also support these permitted data centres, in addition to functioning as a peaking plant to provide power to the national grid when required. It is important to consider the noise conditions contained within this decision to grant.

The main data centre development that the proposed development will support has the following day to day operational noise criteria condition associated with it:

> *"16. (a) The noise level arising from the operation of the proposed development shall be in accordance with the predicted noise limits for daytime, evening and night time detailed in the Environmental Impact Assessment Report and in any case shall not exceed ambient noise levels by more than 5 dB(A) ($L_{eq,15min}$) at noise sensitive receptors."*

It is proposed to adopt these criteria for the cumulative noise levels associated with the permitted data centre and the proposed development under consideration here. Review of the EIAR associated with the adjoining project confirms the following noise criteria were put forward:

> *"the applicable noise limit criteria are as provided in Table 10-6.*

Table 10-6: Noise Limit Criteria

	Daytime	Evening	Night-time
Noise Limit Criterion ($L_{Ar,T}$)	55	50	45

Source: 'Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' (January 2016).

> *Given the continuous nature of the operation of the proposed development and the fact that any tonal issues associated with external plant would be addressed during the detailed design, it is judged that no adjustments are appropriate and the $L_{Ar,T}$, is equal to the L_{Aeq} value.*
>
> *The proposed development would operate 24 hours per day. Consequently, it is the night-time noise limit which would drive the specification of any required mitigation.*
>
> *In the event of loss of grid power, emergency generators, located externally, would come into operation. As this is a highly unlikely emergency scenario, it is not bound by the noise limit values for Standard Operation, as agreed with WCC (of course the generators would be tested according to a defined programme during the daytime period only).*
>
> *A night-time noise limit of 55 dB L_{Aeq} at noise sensitive receptors is judged to be appropriate for the emergency operation, providing reasonable internal noise levels with windows closed."*

[3] ABP-303938-19 - PA Reg Ref: 181940, and WCC Reg. Ref.: 201285

It is considered appropriate, considering the same noise sensitive locations are potentially impacted by the permitted data centres and the proposed development that the cumulative noise levels should satisfy those level outlined in the ABP condition.

Assessment of Significance

The '*Guidelines for Environmental Noise Impact Assessment*' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the proposed development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 9.9 below is based on an example scale within the IEMA guidelines. The corresponding significance of impact presented in the Draft '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' (EPA, 2017) is also presented.

Table 9.9 Noise Impact Scale – Operational Noise Sources

Noise Level Change dB(A)	Subjective Response	Long Term Impact Classification (IEMA, 2014)	Impact Guidelines on the Information to be contained in EIA Reports (EPA)
≥ 0	No change	Negligible	Imperceptible
≥ 0 and < 3	Barely perceptible		Not Significant
≥ 3 and < 5	Noticeable	Minor	Slight – Moderate
≥ 5 and < 10	Up to a doubling or halving of loudness	Moderate	Moderate – Significant
≥10	More than a doubling or halving of loudness	Major	Significant – Profound

The significance table reflects the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the ratings specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

Commercial Properties

A number of commercial / industrial properties are located in the vicinity of the site. In terms of noise emissions from the site it is considered that an appropriate noise criterion at these locations is 55 dB $L_{Aeq,15min}$. This criterion has been derived with consideration of BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* which recommends that for *Study and work requiring concentrations* in an *Executive office* a design range of 35 to 40 dB L_{Aeq} is desirable internally. Arriving at

an external noise level of 55 dB $L_{Aeq,15min}$ would ensure that this range of internal noise levels will be achieved.

Recommended Criteria

Following review of relevant guidance, the following noise criteria are proposed for the development along with the permitted data centres and proposed substation facility:

55dB $L_{Aeq,15min}$ (daytime)
50dB $L_{Aeq,15min}$ (evening)
45dB $L_{Aeq,15min}$ (night-time)

Note plant noise emissions are to be designed and plant selected such that they are not tonal and do not have impulsive characteristics at the nearest noise sensitive locations.

9.2.6 Operational Phase – Vibration Guidance

Criteria for Rating Vibration Impacts

There are no vibration emissions associated with the operation of the proposed development. Consequently, there is no requirement to set operational vibration criteria.

9.2.7 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise.*

Prediction calculations for operational building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.*

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

9.3 RECEIVING ENVIRONMENT

A review of noise surveys completed in the immediate area has been completed. Table 9.10 reviews the findings of these surveys.[4]

9.3.1 Survey & Review Locations

Figure 9.3 illustrates the noise sensitive locations in the vicinity of the proposed development site at which noise monitoring was undertaken as part of the assessment prepared for the permitted data centre.



Figure 9.3 Noise Sensitive Locations

Location N1 Private residence on Vale Road (L747)

Location N2 Monitoring point on Private road to Shelton Abbey

[4] Source: Avoca River Park Proposed Data Centre Development – Environmental Impact Assessment Report – Volume 2: Main Report – Crag Digital Avoca Limited – Project number: PR-289532 – August 2020

9.3.2 Comment on Noise Levels

Table 9.10 reviews the typical ambient and background noise levels at the monitoring locations discussed above.

Table 9.10 Review of Typical Noise Levels

Location	Period	Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		Comments
			L_{Aeq} (Ambient)	L_{AF90} (Background)	
N1	Day	16:25	72	51	Busy traffic on R747 and continuous on M11, foliage noise and birdsong in lulls
	Evening	22:07	66	39	Local passing traffic and continuous noise from M11, factory noise audible with whine perceptible. Foliage noise in lulls
	Night	23:00	62	37	M11 traffic audible throughout, Whine from factory audible as per evening survey, vehicle reversing warning audible form factory site.
N2	Day	15:30	67	47	Continuous road traffic noise form M11, occasional local passing traffic, birdsong in trees
	Evening	21:18	55	48	Continuous road traffic noise form M11, occasional local passing traffic, birdsong in trees
	Night	23:44	66	41	Continuous noise from M11, occasional local traffic, automatic gates ban each time a vehicle enters leaves Shelton Abbey

Traffic noise from the M11 and other local roads in the study area dictated noise levels at the two locations during the survey periods in question. These typical noise levels were considered when discussing appropriate noise criteria in relation to the permitted data centre as discussed in Section 9.2.5. As noted above, the same criteria adopted for the cumulative noise levels associated with the permitted data centre and the proposed development under consideration here ensures robust criteria for the overall development.

9.4 CHARACTERISTICS OF THE DEVELOPMENT

Chapter 2 provides a full description of the proposed development. A variety of items of plant will be in use for the purposes of site preparation, construction and site works. Construction activities will mostly be carried out during normal daytime working hours. Normal construction hours will be specified by planning conditions of a grant of permission for the proposed development, or by the local authority.

Once operational the primary sources of outward noise in the operational context are deemed long term and will involve:

- power plant noise;
- additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections.

9.5 ` POTENTIAL IMPACTS OF THE DEVELOPMENT

9.5.1 Construction Phase

Construction noise predictions have been carried out using guidance set out in British Standard *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise*. Construction works associated with the works will be temporary in duration. Table 9.11 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme. For the purposes of the assessment we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this report.

Table 9.11 Typical Noise Levels associated with Construction Plant Items (BS5228-1)

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB $L_{Aeq,1hr}$)
1 – Site Preparation	Pneumatic Breaker (C5.6)	95
	Rock Breaker (C9.12)	85
	Wheeled Loader Lorry (C2 28)	74
	Tracked Semi-Mobile Crusher (C9.14)	90
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
2 – Foundations	Large Rotary Bored Piling Rig – Cast In-Situ (C3.14)	83
	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (C3 19)	75
	Poker Vibrator (C4 33)	78
3 – Steel Erection	Tower Crane (C4.48)	76
	Sarens SCG 120 Crane	86
	Articulated lorry (C11.10)	77
4 – General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
5 - Landscaping	Dozer (C2.13)	78

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB $L_{Aeq,1hr}$)
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

A number of representative noise sensitive locations have been considered in relation to the proposed development as illustrated in Figure 9.4.

Table 9.12 presents the predicted daytime noise levels from an indicative construction period on site. Note construction noise sources are assumed to be running 66% of the time.

Table 9.12 Review of Potential Daytime Construction Noise Impact

Ref.	Baseline Noise Level dB $L_{Aeq,1hr}$[5]	BS5228-1 Threshold dB $L_{Aeq,1hr}$	Predicted Construction Noise Level for Various Phases (dB $L_{Aeq,1hr}$)				
			Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
R01	55	65	50	40	41	36	35
R02	55	65	49	38	39	35	34
R03	55	65	49	38	39	35	33
R04	55	65	49	39	40	35	34
R05	55	65	49	38	39	35	33
R06	55	65	49	38	39	35	34
R07	55	65	50	39	40	36	35
R08	65	65	51	40	41	36	35
R09	65	65	53	42	44	39	38
R10	65	65	50	39	40	36	35

Table 9.12 details the baseline noise level measured at the nearest survey noise monitoring location or based on expected ambient noise levels in the vicinity of the location based on proximity to an existing noise source (e.g. road). If the predicted construction noise level is below this value, the associated impact is deemed to be 'Not Significant'.

Where the predicted construction noise level is above the baseline noise level but below the stated BS5228-1 threshold value the associated impact is deemed be between 'Slight' and 'Moderate'. If a predicted noise level is below or equal to the BS5228-1 threshold value, the impact is deemed to be 'Not Significant'. Where the predicted construction noise level is 5dB or mode higher than theBS5228-1 threshold value the impact is assumed to be 'Moderate' to 'Significant'.

[5] Estimated based on location of property from existing sources.

Based on the above rationale, and the predicted noise levels presented the assigned impacts are summarised as follows:

Table 9.13 Review of Potential Daytime Construction Noise Impact

Ref.	Predicted Construction Noise Impacts for Various Phases				
	Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
R01	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R02	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R03	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R04	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R05	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R06	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R07	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R08	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R09	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
R10	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

In the all cases, the construction noise impact is Not Significant.

9.5.2 Construction Traffic

In terms of the additional construction traffic on local roads that will be generated as a result of this development the following comment is presented. In order to increase traffic noise levels by 1 dB traffic volumes would need to increase by the order of 25% along the local road network. As outlined in the relevant sections of Chapter 13 relating to traffic, additional traffic introduced onto the local road network due to the construction phase of the proposed development will not result in a significant noise impact.

9.5.3 Review of Construction Impacts

In terms of noise associated with these construction activities the associated effect is stated to be:

Quality	***Significance***	***Duration***
Negative	Not Significant	Temporary

In terms of vibration, due to the distance of activities from the site to the nearest sensitive locations and controlling vibration levels to those detailed in 9.7 the associated effect is stated to be:

Quality	***Significance***	***Duration***
Neutral	Imperceptible	Temporary



Figure 9.4 Noise Sensitive Locations Considered for Assessment

9.5.4 Operational Phase

As part of this review the cumulative impact of the permitted data centre to the west the proposed substation/transformers and the Proposed Development has been considered. The predicted noise levels associated with the datacentre have been obtained from the submitted EIAR associated with the development[6] and the substation/transformers from the EIAR associated with the development[7].

Figure 9.4 highlights the nearest noise sensitive locations at which predictions have been carried out. The noise contours for the Proposed Development are presented in order to demonstrate the noise impact of the proposed development over a wider area.

The following are considered the significant noise sources associated with the operation of the proposed development:

Table 9.14 L_w levels Utilised for proposed development

Item	Octave Band Sound Power Level dB L_w									dB	dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000		
Intake Air (Opening) [1]	88	77	74	66	60	70	69	66	64	85	75
Exhaust Stack Outlet [1]	107	100	94	92	86	83	81	82	84	108	91
Radiator Coolers [2]	--	62	69	72	78	80	76	70	64	84	83
Roof [3]	64	57	55	51	44	36	31	19	16	61	47
Walls [3]	62	55	52	49	42	33	28	16	13	63	44
Transformers [4]	--	99	88	85	80	71	63	55	61	100	82
Battery Units [5]	--	50	55	54	52	43	34	24	14	59	52

Note 1 30 in number. Data based on a similar project and assuming the following additional attenuation to the levels stated in Table 9.12. Specific design to be confirmed as part of detailed design,

Description	Insertion Loss (dB) per Octave Band								
	31.5	63	125	250	500	1000	2000	4000	8000
Attenuator Performance 3m Length 25% Free Aera[8]	12	21	37	52	55	55	55	55	47

Note 2 Based on CAT data from a similar project. Note a screen 0.5m above the radiator units is assumed as illustrated below. Barrier facing the radiator units is to be absorptive in nature.

25°C ambient
Sound Power Spectrum

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Total
Sound Power (LwA)	36	53	63	75	80	77	71	60	83

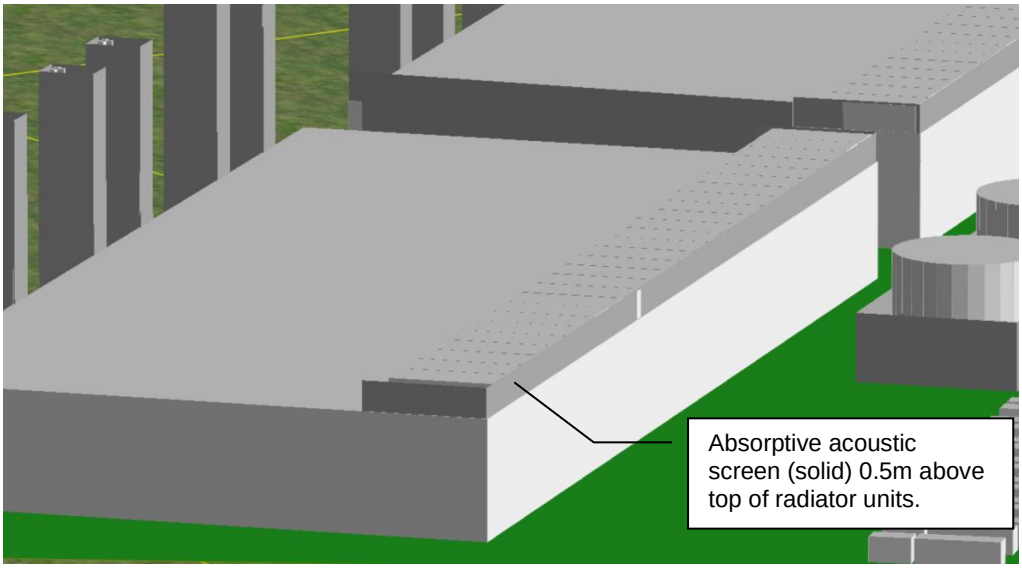
Sound pressure (LpA) : 62.5 at 1m calculated in accordance with BS EN 13487:2019 Parallel Pipe Method.

Levels are quoted for single units. Where multiple units are required due allowance must be made for the overall sound pressure level.

6 Avoca River Park Proposed Data Centre Development – Environmental Impact Assessment Report – Volume 2: Main Report – Crag Digital Avoca Limited – Project number: PR-289532 – August 2020. The levels reported in Table 9.8 have been corrected considering the mitigation outlined in Section 9.5.2. These levels have been assumed for the datacentre operations.

7 Environmental Impact Assessment Report – Proposed 110 kV GIS substation compound and associated and ancillary works, Arklow, Co. Wicklow - Prepared by AWN Consulting – December 2020. The levels reported in Table 9.8 have been assumed for these operations.

8 Assumed from a similar project



Note 3 L_w level per m^2. Based on the 'L_p Level in Hall' assumed as follows (i.e. 105dB(A)):

Description	Sound Pressure Level (dB) per Octave Band								
	31.5	63	125	250	500	1000	2000	4000	8000
Reverberant Noise Level Assumed in Hall	105	104	100	100	101	99	99	92	89

Assumed that the roof and walls offer the following sound reduction performance (as advised from a similar project).

Description	Sound Pressure Level (dB) per Octave Band								
	31.5	63	125	250	500	1000	2000	4000	8000
Walls (e.g. 215 mm thick solid block)	37	43	42	45	53	60	65	70	70
Roof (e.g. 250 mm hollow core concrete)	35	41	39	43	51	57	62	67	67

Note 4 3 units in total. Overall L_w level assumed from similar project.

Note 5 Overall L_w level assumed from each facade and roof of each battery unit.

See Appendix 9.2 for details of the noise modelling undertaken for this assessment and associated assumptions.

The results of the noise calculations are presented in Table 9.13. Note all plant will be selected such that no tonal noise emissions are evident at noise sensitive locations.

Table 9.15 Predicted Plant Noise Levels for Various Scenarios

Location	Predicted dB $L_{Aeq,T}$			
	Proposed Development	Permitted Development (Datacentres)	Transformer & Substation)	Cumulative
R01	35	45	19	45
R02	28	42	18	42
R03	27	41	18	41
R04	27	41	18	41
R05	27	41	18	41
R06	24	41	18	41
R07	24	39	19	39
R08	18	40	19	40
R09	20	43	21	43
R10	29	45	19	45

The above predicted levels are based on a situation where the receiver is downwind of all noise sources. For the purposes of the assessment against the adopted criteria this is a robust worst-case assumption. Review of Table 9.15 confirms that noise associated with the operation of the proposed development does not have a material effect on the predicted noise levels associated with the permitted data centre.

Comment on Adopted Noise Criteria Day to Day Operations

The predicted noise levels presented in Table 9.15 have been compared to the relevant daytime, evening and night noise criteria as adopted for this assessment.

Figure 9.5 presents the predicted noise contour for the Proposed Development itself.

Table 9.16 Comparison of Predicted Noise Levels vs. Adopted Noise Criteria

Location	Scenario A			Scenario B		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?
R01	45	55 (Day)	✓	55	55	✓
		50 (Evening)	✓			
		45 (Night)	✓			
R02	42	55 (Day)	✓	51		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R03	41	55 (Day)	✓	52		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R04	41	55 (Day)	✓	52		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R05	41	55 (Day)	✓	50		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R06	41	55 (Day)	✓	50		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R07	39	55 (Day)	✓	48		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R08	40	55 (Day)	✓	50		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R09	43	55 (Day)	✓	53		✓
		50 (Evening)	✓			
		45 (Night)	✓			
R10	45	55 (Day)	✓	55		✓
		50 (Evening)	✓			
		45 (Night)	✓			

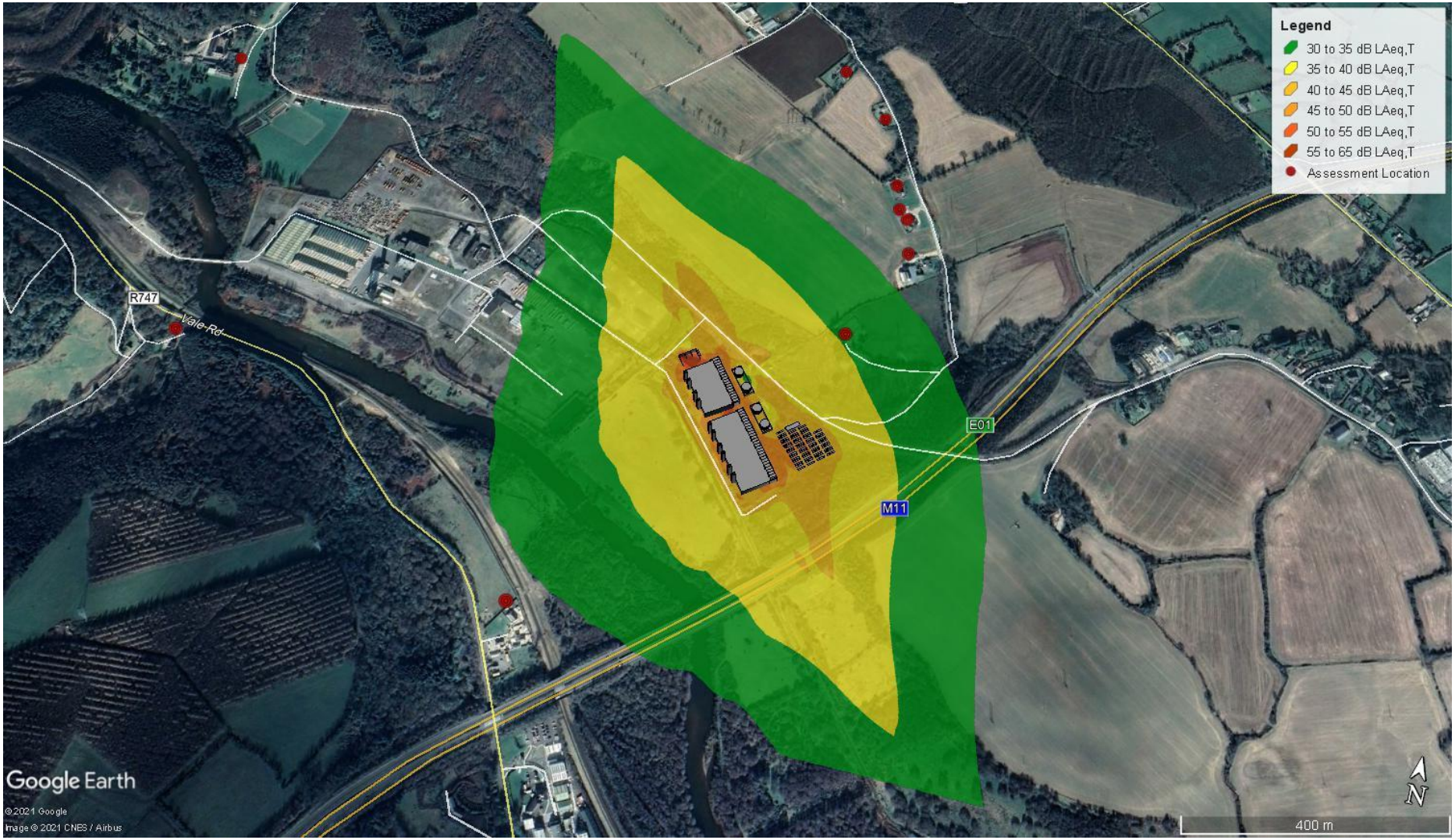


Figure 9.5 Predicted Noise Contour for the Proposed Development

Summary

The scenario presented is representative of the typical day to day operations envisioned for the site. Review of the predicted noise levels confirms that the site-specific levels comply with the noise criteria adopted for this assessment and permitted in relation to nearby developments.

Review of Increases in Noise Level

Table 9.17 presents the predicted changes in noise level associated with the proposed development at the nearest noise sensitive locations to the site.

Table 9.17 Review of Predicted Changes in Existing Noise Levels

Loc.	Scenario A – Typical Operation – Night				
	Predicted dB $L_{Aeq,T}$	Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Impacts
R01	35	41 Note A	42	+1	Not Significant
R02	28	41 Note A	41	0	Imperceptible
R03	27	41 Note A	41	0	Imperceptible
R04	27	41 Note A	41	0	Imperceptible
R05	27	41 Note A	41	0	Imperceptible
R06	24	41 Note A	41	0	Imperceptible
R07	24	41 Note A	41	0	Imperceptible
R08	18	37 Note B	37	0	Imperceptible
R09	20	37 Note B	37	0	Imperceptible
R10	29	37 Note B	38	+1	Not Significant

Note A Night time background level at Location N2 assumed.
Note B Night time background level at Location N1 assumed.

Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is '*imperceptible'* or '*not significant*' at all locations during night-time periods.

In terms of noise associated with day to day activities the associated effect is stated to be as follows:

Quality	*Significance*	*Duration*
Negative	*Not Significant*	*Long Term*

Additional Vehicular Traffic on Public Roads

In terms of the additional traffic on local roads that will be generated as a result of this development the following comment is presented: Considering that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to this development will not result in a significant noise impact. The resultant noise impact is ***neutral, imperceptible*** and ***long-term***.

Vibration

There is no source of vibration associated with the day to day operation of the development that will give rise to impacts at nearby sensitive locations. In terms of these the operational phase of the development the associated effect is stated to be:

Quality	*Significance*	*Duration*
Neutral	*Imperceptible*	*Long Term*

9.6 REMEDIAL AND MITIGATION MEASURES

In order to sufficiently ameliorate the likely noise impact, a schedule of noise control measures has been formulated for both construction and operational phases associated with the proposed development.

9.6.1 Construction Phase

With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development. As an example, the following measures will be implemented on site:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring levels of noise and/or vibration during critical periods and at critical sensitive locations; and
- all site access roads will be kept even so as to mitigate the potential for vibration from lorries.

Furthermore, a variety of practicable noise control measures will be employed, such as:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- erection of barriers as necessary around items such as generators or high duty compressors;
- situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

It is recommended that vibration from construction activities to off-site residences be limited to the values set out in Table 9.7. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Note Appendix 9.3 presents an indicative construction noise and vibration management plan that will be implemented in terms of the day to day operation of

the site. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place (e.g. rock breaking) that have an increased potential in giving rise to issues off site (Note: no rock breaking is anticipated as part of the proposed development).

9.6.2 Operational Phase

Building Services Noise

Once operational, there are no noise or vibration mitigation measures required once consideration is given to the assumed noise levels and associated notes outlined in section 9.5.4.

With due consideration as part of the detailed design process, this approach will result in the site operating well within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment.

Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

9.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section summarises the likely noise and vibration impact associated with the proposed development, taking into account the mitigation measures.

9.7.1 Construction Phase

During the construction phase of the proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 9.5, 9.6 and Section 9.2.4), along with implementation of appropriate noise and vibration control measures (as summarised in Section 9.6.1), will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise impacts will be ***slight, negative*** and ***temporary*** in nature. Also, it is considered that as the proposed development progresses from initial ground works that construction noise impacts will reduce from slight to ***not significant.***

9.7.2 Operational Phase

Building Services Noise / Emergency Site Operation

Proprietary noise and vibration control measures will be employed in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise impact is ***negative***, ***not significant*** and ***long-term***.

Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is expected to be ***imperceptible*.** The resultant noise impact is ***neutral, imperceptible*** and ***long-term.***

9.7.3 Cumulative Impact

During construction of the proposed development it is anticipated that noise and vibration associated with construction work will typically be lower than those generated by existing traffic movements on the local road network that are in closer proximity to the nearest noise sensitive locations. The noise environments at the nearest noise sensitive locations to the proposed works are and will continue to be dominated by road traffic noise.

Construction being completed on the proposed development, the permitted datacentre on the adjoining site and the proposed sub station development, whilst potentially significant at locations in close proximity will effectively be masked by the existing traffic noise at the nearest noise sensitive locations identified in this assessment. This is primarily due to the distance between the various construction works and noise sensitive locations (i.e. at least 500m distant). Such works would not be expected to increase ambient noise levels in the vicinity of the noise sensitive locations that are in the proximity of the works under consideration here. All sites will be expected to work within conditioned and/or best practice noise and vibration limits such that the associated noise and vibration impacts are controlled. Based on this, it is reiterated that any construction noise impacts will be ***slight, negative*** and ***temporary*** in nature.

Once the mitigation measures outlined above are implemented there should be no significant cumulative impact as a result of the proposed development.

The cumulative noise impacts of the proposed development and the permitted data centre have been outlined in the assessment presented here. The resultant noise impact is ***negative***, ***not significant*** and ***long-term***.

There are no operational vibration impacts associated with the proposed development or the permitted data centre, hence cumulative impacts do not arise in this instance.

9.8 RESIDUAL IMPACTS

The construction noise assessment has shown that in accordance with the 'significance' thresholds presented in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise* there is not a significant impact at residential locations, subject to the implementation of the mitigation measures outlined in Section 9.6.1.

The robust analysis of potential operational phase plant has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be a ***not significant, negative, long term*** impact at the closest residences identified on Figure 9.4. The predicted change in background noise level due to current application is the order of 1dB during night-time periods. Ambient noise levels are, and will continue to be, dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g. distant traffic noise).

In terms of the nearest commercial properties ***not significant, negative, long-term*** impacts are predicted as the character of the noise environment in the vicinity of this location will not be altered.

The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be an ***imperceptible, neutral, long-term*** impact at off-site noise sensitive locations considering existing traffic volumes on the local road network.

The cumulative impact assessment is addressed Chapter 16 of this EIA Report.

9.9 INTERACTIONS

Interactions are addressed in Chapter 15 of this EIA Report.

9.10 REFERENCES

- EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIA Reports) (2017) and draft revised Guidelines on information to be contained in Environmental Impact Statements; and Advice Notes for preparing EIS (2015).
- '*Guidelines for Environmental Noise Impact Assessment*' produced by the Institute of Environmental Management and Assessment (IEMA) (2014).
- *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise*.
- Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes.*
- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.
- British Standard BS 4142:2014+A1:2019: *Methods for rating and assessing industrial and commercial sound.*
- BS 8233:2014: *Guidance on sound insulation and noise reduction for buildings.*
- Environmental Protection Agencies *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (January 2016).
- ISO 1996-2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.*
- British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz).*
- ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.*
- *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

APPENDIX 9.1

GLOSSARY OF ACOUSTIC TERMINOLOGY

PREPARED BY AWN CONSULTING LIMITED

ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
broadband	Sounds that contain energy distributed across a wide range of frequencies.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB L_{pA}	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'-weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
impulsive noise	A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.
L_{AT}(DW)	equivalent continuous downwind sound pressure level.

L_{fT}(DW) equivalent continuous downwind octave-band sound pressure level.

L_{day} L_{day} is the average noise level during the daytime period of 07:00hrs to 19:00hrs

L_{night} L_{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.

low frequency noise LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.

noise Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.

noise sensitive location NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

rating level See $L_{Ar,T}$.

sound power level The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2 where:

$$Lw = 10Log\frac{P}{P_0}\ \text{dB}$$

Where: p is the rms value of sound power in pascals; and
P_0 is 1 pW.

sound pressure level The sound pressure level at a point is defined as:

$$Lp = 20Log\frac{P}{P_0}\ \text{dB}$$

specific noise level A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: ‘the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq,\,T}$)’.

tonal	Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.
$^1/_3$ octave analysis	Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one-third of an octave each.

APPENDIX 9.2

NOISE MODELLING DETAILS & ASSUMPTIONS

PREPARED BY AWN CONSULTING LIMITED

Noise Model

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the proposed building. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. iNoise calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (L_{WA});
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately $1ms^{-1}$ and $5ms^{-1}$, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear calm nights.

The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = LW + Dc - A \qquad \textbf{Eqn. A}$$

Where:

$L_{fT}(DW)$ is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to $2x10^{-5}Pa$;
L_W is the octave band sound power of the point source;
D_c is the directivity correction for the point source;
A is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table 9.2.1 below:

Table 9.2.1 Estimated Accuracy for Broadband Noise of L_{AT}(DW)

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

* h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.
N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Input Data and Assumptions

The noise model has been constructed using data from various source as follows:

Site Layout The general site layout has been obtained from the drawings forwarded by B+W Engineering.

Local Area The location of noise sensitive locations has been obtained from a combination of site drawings provided by B+W Engineering and others obtained from Ordinance Survey Ireland (OSI).

Heights The heights of buildings on site have been obtained from site drawings forwarded by B+W Engineering. Off-site buildings have been assumed to be 8m high for houses with the exception of industrial buildings where a default height of 15m has been assumed.

Contours Site ground contours/heights have been obtained from site drawings forwarded by B+W Engineering where available.

The final critical aspect of the noise model development is the inclusion of the various plant noise sources. Details are presented in the following section.

Source Sound Power Data

The noise modelling competed indicates the following limits in relation to various items of plant associated with the overall site development. Plant items will be selected in order to achieve the stated noise levels and or appropriate attenuation will be incorporated into the design of the plant/building in order that the plant noise emission levels are achieved on site (including any system regenerated noise).

Table 9.2.2 L_w levels Utilised in Noise Model

Item	Octave Band Sound Power Level dB L_w									dB	dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000		
Intake Air (Opening) [1]	88	77	74	66	60	70	69	66	64	85	75
Exhaust Stack Outlet [1]	107	100	94	92	86	83	81	82	84	108	91
Radiator Coolers [2]	--	62	69	72	78	80	76	70	64	84	83
Roof [3]	64	57	55	51	44	36	31	19	16	61	47
Walls [3]	62	55	52	49	42	33	28	16	13	63	44
Transformers [4]	--	99	88	85	80	71	63	55	61	100	82
Battery Units [5]	--	50	55	54	52	43	34	24	14	59	52

Note 1 30 in number. Data based on a similar project and assuming the following additional attenuation to the levels stated in Table 9.2.2. Specific design to be confirmed as part of detailed design,

Description	Insertion Loss (dB) per Octave Band								
	31.5	63	125	250	500	1000	2000	4000	8000
Attenuator Performance 3m Length 25% Free Aera[9]	12	21	37	52	55	55	55	55	47

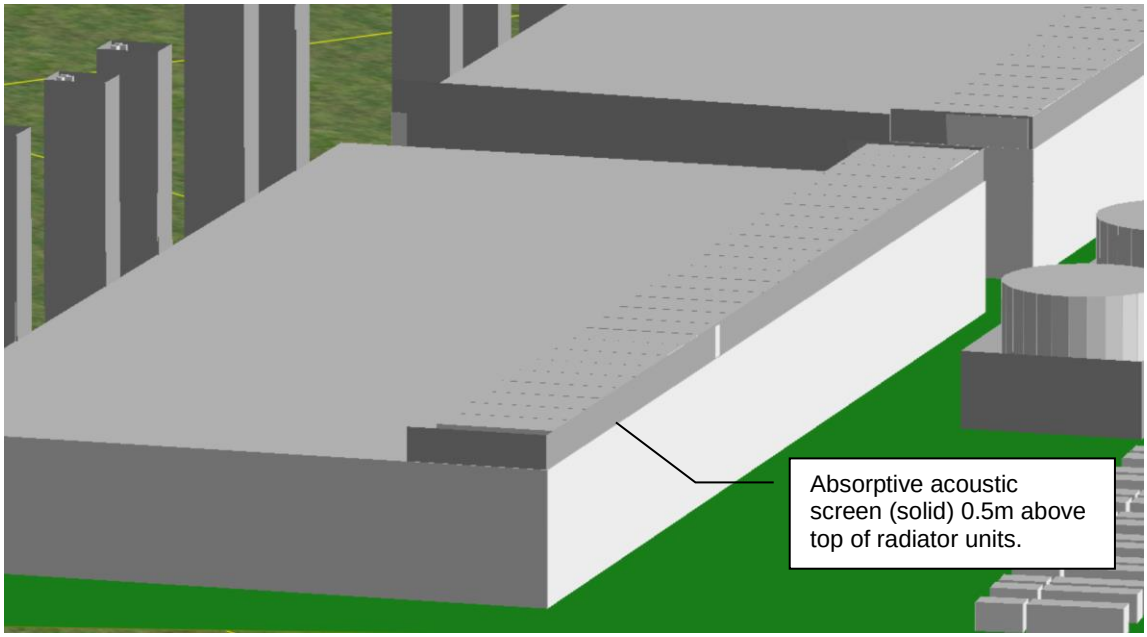
Note 2 Based on CAT data from a similar project. Note a screen 0.5m above the radiator units is assumed as illustrated below. Barrier facing the radiator units is to be absorptive in nature.

25°C ambient
Sound Power Spectrum

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Total
Sound Power (LwA)	36	53	63	75	80	77	71	60	83

Sound pressure (LpA) : 62.5 at 1m calculated in accordance with BS EN 13487:2019 Parallel Pipe Method.

Levels are quoted for single units. Where multiple units are required due allowance must be made for the overall sound pressure level.



Note 3 L_w level per m^2. Based on the 'L_p Level in Hall' assumed as follows (i.e. 105dB(A)):

Description	Sound Pressure Level (dB) per Octave Band								
	31.5	63	125	250	500	1000	2000	4000	8000
Reverberant Noise Level Assumed in Hall	105	104	100	100	101	99	99	92	89

Assumed that the roof and walls offer the following sound reduction performance (as advised from a similar project).

Description	Sound Pressure Level (dB) per Octave Band								
	31.5	63	125	250	500	1000	2000	4000	8000
Walls (e.g. 215 mm thick solid block)	37	43	42	45	53	60	65	70	70
Roof (e.g. 250 mm hollow core concrete)	35	41	39	43	51	57	62	67	67

Note 4 3 units in total. Overall L_w level assumed from similar project.

Note 5 Overall L_w level assumed from each facade and roof of each battery unit.

Note 6 The following extract from *the "EirGrid Evidence Based Environmental Studies Study 8: Noise – Literature review and evidence-based field study on the noise effects of high voltage transmission*

9 Assumed from a similar project

development (May 2016) states the following in relation to noise impacts associated with 110KvA transformer installations:

"The survey on the 110kV substation at Dunfirth indicated that measured noise levels (L_{Aeq}) were less than 40dB(A) at 5m from each of the boundaries of the substation. This is below the WHO night-time free-field threshold limit of 42dB for preventing effects on sleep and well below the WHO daytime threshold limits for serious and moderate annoyance in outdoor living areas (i.e. 55dB and 50dB respectively). Spectral analysis of the data recorded at this site demonstrated that there were no distinct tonal elements to the recorded noise level. To avoid any noise impacts from 110kV substations at sensitive receptors, it is recommended that a minimum distance of 5m is maintained between 110kV substations and the land boundary of any noise sensitive property."

Assuming the proposed substation installation has comparable noise emissions to the 110kV unit discussed above and considering the distance between the 110kV substation and the nearest off site locations (i.e. >250m) noise from this installation is not predicted to be an issue off site.

Considering the above, it is concluded that there will be no significant noise emissions from the operation of the cable installations or substation. Consequently, there is no requirement to assess any operational noise emissions.

It is assumed that the plant parapets will be at least 0.5m higher than the highest dimension of the roof mounted plant.

Figure 9.2.1 presents a 3D render of the developed site noise model for the current proposals.

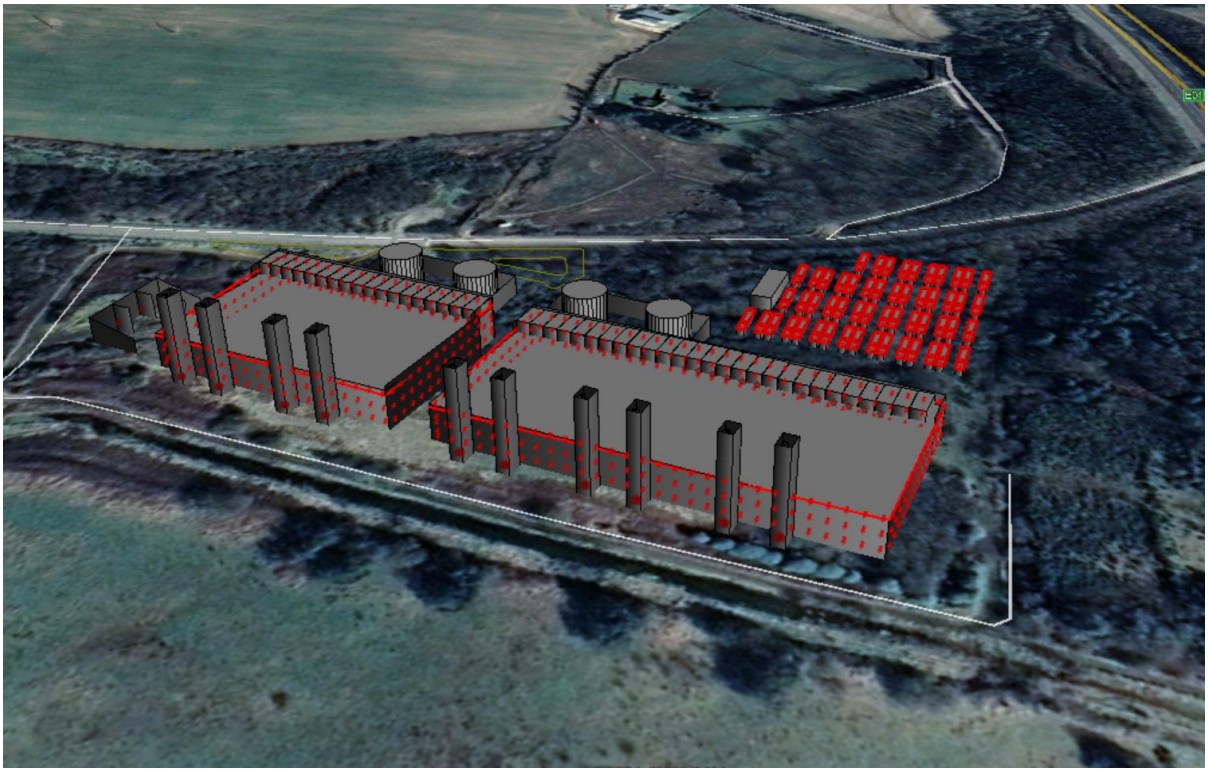


Figure 9.2.1 Images of Developed Noise Model – View of Site

Modelling Calculation Parameters[10]

Prediction calculations for plant noise have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

Ground attenuation factors of 1.0 have been assumed. No metrological corrections were assumed for the calculations. The atmospheric attenuation outlined in Table 9.2.3 has been assumed for all calculations.

Table 9.2.3 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (ºC)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.92	3.66	9.70	33.06	118.4

[10] See Appendix 9.4 for further discussion of calculation parameters.

APPENDIX 9.3

INDICATIVE CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN

PREPARED BY AWN CONSULTING LIMITED

This Noise and Vibration Management Plan (NVMP) details a *'Best Practice'* approach to dealing with potential noise and vibration emissions during the construction phase of the development. The Plan should be adopted by all contractors and sub-contractors involved in construction activities on the site. The Site Manager should ensure that adequate instruction is provided to contractors regarding the noise and vibration control measures contained within this document.

The environmental impact assessment (EIA) Report conducted for the construction activity has highlighted that the construction noise and vibration levels can be controlled to within the adopted criteria. However, mitigation measures should be implemented, where necessary, in order to control impacts to nearby sensitive areas within acceptable levels.

Nearby sensitive properties in the vicinity of the proposed development are summarised in Figure 9.3.1 below:

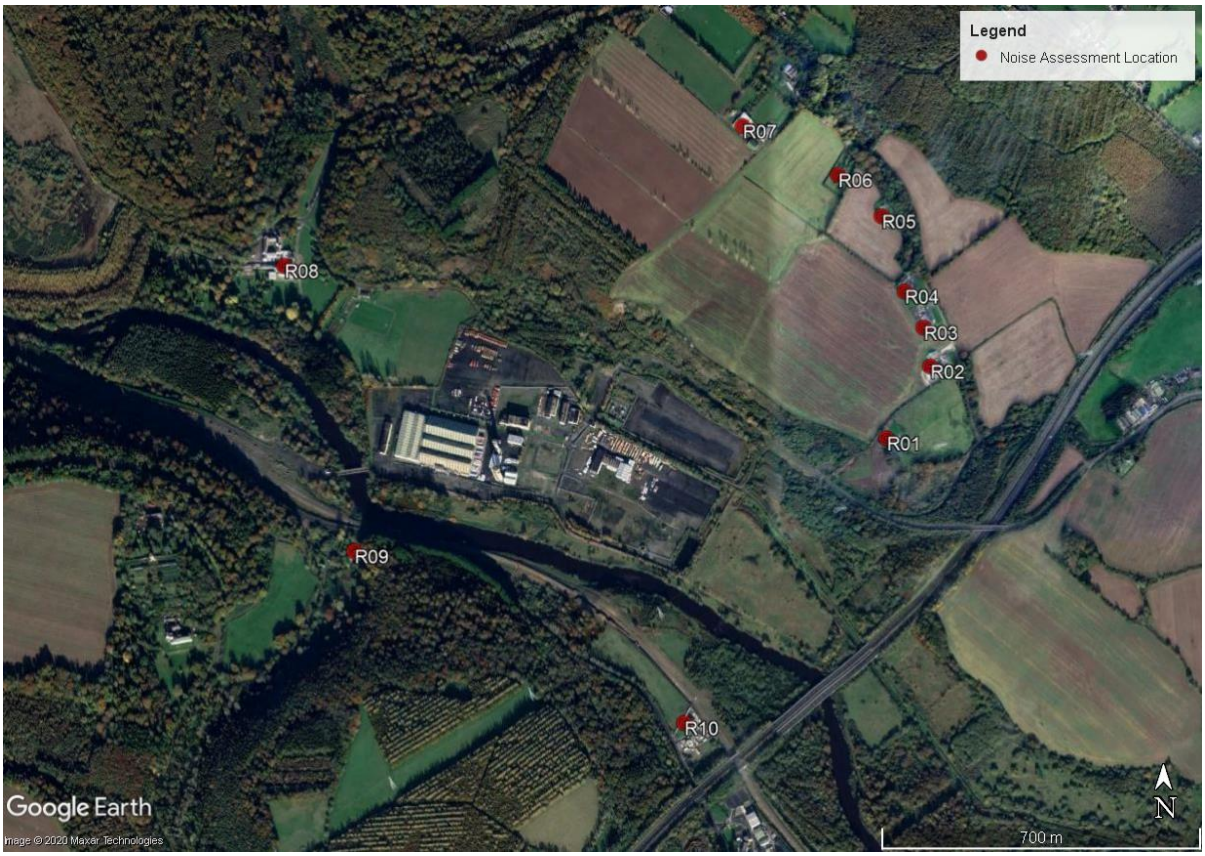


Figure 9.3.1 Sensitive Receptors

Construction Noise Criteria

As referenced in the EIA Report prepared for the proposed development, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[11] which indicates the following criteria and hours of operation.

[11] *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland

Table 9.3.1 Construction Noise Limit Values

Days and Times	Noise Levels (dB re. 2x10-5 Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00hrs to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00hrs to 13:00hrs	65	75

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

Construction Vibration Criteria

It is recommended in this EIA Report that vibration from construction activities to off-site residences be limited to the values set out in Table 9.2.2. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Table 9.3.2 Construction Vibration Limit Values

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Hours of Work

The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays. However, weekday evening works may also be required from time to time.

Weekday evening activities should be significantly reduced and generally only involve internal activities and concrete pouring which will be required during certain phases of the development. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Best Practice Guidelines for the Control of Noise & Vibration

BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- control of noise sources;
- screening;
- hours of work;
- liaison with the public, and;
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise and vibration control measures that will be considered include the selection of suitable plant, enclosures and screens around noise sources, limiting the hours of work and monitoring.

Selection of Quiet Plant

This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that *"as far as reasonably practicable sources of significant noise should be enclosed"*. In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures will also be used to screen operatives using hand tools and will be moved around site as necessary.

In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. As with Ireland's Environmental Protection Act legislation, we propose that the concept of *"best available techniques not entailing excessive cost"* (BATNEEC) be adopted. Furthermore, proposed noise control techniques should be evaluated in light of their potential effect on occupational safety etc.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are all directly relevant and hence are reproduced in full. These recommendations will be adopted on site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas. Special care will be necessary when work has to be carried out at night.*
>
> *Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.*
>
> *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*
>
> *Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.*
>
> *Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.*

Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically, screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen should be bent around the source. The height of any screen should be such that there is no direct line of sight between the source and the receiver.

BS5228 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice screens constructed of materials with a mass per unit of surface area greater than 7 kg/m^2 will give adequate sound insulation performance.

In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances, materials such as topsoil or aggregate can provide a degree of noise screening if placed between the source and the receiver.

Vibration

The vibration from construction activities will be limited to the values set out in Table 2. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage, these limits may need to be reduced by up to 50%.

Liaison with the Public

The Contractor will provide proactive community relations and will notify the public and sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. The Contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

A designated noise liaison should be appointed to site during construction works. Any complaints should be logged and followed up in a prompt fashion. In addition, prior to particularly noisy construction activity, e.g. rock breaking, piling, etc., the site contact should inform the nearest noise sensitive locations of the time and expected duration of the works.

Noise Monitoring

During the construction phase consideration should be given to noise monitoring at the nearest sensitive locations.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise* and be located a distance of greater than 3.5m away from any reflective surfaces, e.g. walls, in order to ensure a free-field measurement without any influence from reflected noise sources.

Vibration Monitoring

During the construction phase consideration should be given to vibration monitoring at the nearest sensitive locations.

Vibration monitoring should be conducted in accordance with BS7385-1 (1990) *Evaluation and measurement for vibration in buildings — Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings* or BS6841 (1987) *Guide to measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock*.

The mounting of the transducer to the vibrating structure should comply with BS ISO 5348:1998 *Mechanical vibration and shock – Mechanical mounting of accelerometers*. In summary, the following ideal mounting conditions apply:

- the transducer and its mountings are as rigid as possible;
- the mounting surfaces should be as clean and flat as possible;
- simple symmetric mountings are best, and;
- the mass of the mounting should be small in comparison to that of the structure under test.

In general, the transducer will be fixed to the floor of a building or concrete base on the ground using expansion bolts. In instances where the vibration monitor will be placed outside of a building a flat and level concrete base with dimensions of approximately 1 m x 1 m x 0.1 m will be required.

APPENDIX 9.4

NOISE MODEL PARAMETERS

PREPARED BY AWN CONSULTING LIMITED

Prediction calculations for noise emissions have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*. The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Directivity Factor: The directivity factor (D) allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. In this case the sound power level is measures in a down wind direction, corresponding to the worst-case propagation conditions and needs no further adjustment.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions. The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation) Our predictions have been carried out using various source height specific to each plant item, a receiver heights of 1.6m for single storey properties and 4m for double. An assumed ground factor of G = 1.0 has been applied off site. Noise contours presented in the assessment have been predicted to a height of 4m in all instances. For construction noise predictions have been made at a level of 1.6m as these activities will not occur at night.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log(\text{distance from source in meters}) + 11$$

Atmospheric Absorption Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies. In these predictions a temperature of 10^{o}C and a relative humidity of 70% have been used, which give relativity low levels of atmosphere attenuation and corresponding worst case noise predictions.

Table 9.4.1 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (^{o}C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.92	3.66	9.70	33.06	118.4

Barrier Attenuation The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency spectrum of the noise.

10.0 LANDSCAPE AND VISUAL

10.1 INTRODUCTION

This chapter of the EIA Report assesses the potential landscape and visual impacts (and resulting effects) likely to occur as a result of the of the proposed development within the Avoca River Park Industrial Estate lands of an Energy Centre along with associated and ancillary works.

Full details of the proposed development can be found in Chapter 2 - Description of Proposed Development.

The section should be read in conjunction with the photomontages prepared for the scheme included in Appendix 10.1 of EIA Report.

The following aspects are particularly relevant to the landscape and visual assessment:

Design

- Form and massing of the proposed development;
- Façade on all above ground structures; and
- Cognisance of how design elements impact on views of the proposed development and any effects on the receiving environment, including landscape character.

Operation

- Views of the proposed development and any effects on the receiving environment, including landscape character.

Construction

- Views of the proposed development and any effects on the receiving environment, including landscape character; and
- Loss or change of existing features that contribute to the receiving environment.

10.2 METHODOLOGY

10.2.1 General

The landscape assessment has considered the likely significant effects of the proposed development on the landscape as an environmental resource and the visual assessment has considered the effect of visual change on relevant receptors. Landscape and visual effects have been considered for the construction and operation of the proposed development.

To support the assessment, a series of photomontages, illustrating the physical and visual appearance of the proposed development, has been prepared from a range of publicly accessible locations that are representative of views in the surrounding environment. The Photomontage views are included in Appendix 10.1.

The assessment has been carried out with reference to the following legalisation, policy and guidelines:

Legislation

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Act 2000, as amended;
- Planning and Development Regulations 2001, as amended; and
- European Landscape Convention 2000.

Policy

- Wicklow County Development Plan 2016-2022; and
- Arklow and Environs Local Area Plan 2018-2024.

Guidelines

- Environmental Protection Agency (EPA, 2017). Guidelines on the Information to be contained in Environmental Impact Assessment Reports. Draft;
- Environmental Protection Agency (EPA, 2015). Advice Notes for preparing Environmental Impact Statements. Draft;
- Landscape Institute and the Institute of Environmental Management and Assessment (LI/IEMA, 2013) Guidelines for Landscape and Visual Impact Assessment, 3rd edition, (GLVIA);
- Landscape Institute (LI, 2018) Technical Information Note 05/2017 (Revised 2018) on Townscape Character Assessment (TCA);
- Department of Housing, Planning and Local Government (DHPLG, 2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (GEIA); and
- Landscape Institute (LI, 2019) Technical Guidance Note 06/2019 on Visual Representation of Development Proposals, (VPDP).

The methodology used for the landscape assessment entailed:

- Desktop studies of the site in relation to its overall context locally, regionally and nationally; and
- Visiting the site and its environs in July 2021 to assess the following:
  - Quality and type of views in the area;
  - The extent of the visual envelope, i.e. the potential area of visibility of the site in the surrounding landscape; and,
  - The character and quality of the surrounding landscape in relation to the position of the proposed development.

10.2.2 Nature of Impacts

Impacts on landscape/townscape arise in two distinct but closely related aspects. The first is impact on the character of the landscape/townscape arising from the insertion of new development or the alteration of elements within an existing context. The second aspect is visual impact, which arises as a result of changes or insertions within a view. The impact on the view depends on the degree and nature of the change and such changes may rise from either 'visual intrusion' (i.e. alteration without appreciable blocking) or 'visual obstruction' (i.e. alteration with a notable extent or full blocking).

It is recognised that as with all landscape/townscape and visual considerations, impacts will be influenced and informed, to some degree, by subjective perceptions of how the overall change(s) matter to any given individual.

The assessment of landscape/townscape and visual impacts includes:

- Direct impacts upon specific landscape/townscape elements within and adjacent to the site;
- Effects on the overall pattern of the landscape/townscape elements which give rise to the character of the site and its surroundings;
- Impacts upon any special interests in and around the site;
- Direct impacts of the scheme upon views, and
- Overall impact on townscape character and visual amenity.

10.2.3 Categorisation of the Baseline Environment

The landscape and visual assessment involved visiting the site and its environs in July 2021 to review the nature and scale of existing development surrounding the site, to identify landscape features, local character and land uses, to identify key views to and from the proposed development, and to note receptor sensitivity.

This site based assessment was augmented by reviewing aerial photography, publications and reports and project information included within the planning application and in this EIA Report.

10.2.4 Impact Assessment Methodology

The landscape and visual impact assessment for the proposed development takes account of the character and nature of the existing site and its surrounds, the location of sensitive landscapes and visual receptors, the sensitivity and significance of the site, and its vulnerability to change.

Classification of significance of effects or impacts are based on *Figure 3.5 of the EPA Draft EIA Report Guidelines 2017*, as copied below in Figure 10.1, and on the professional experience of the author in carrying out landscape and visual assessments for over 25 years.

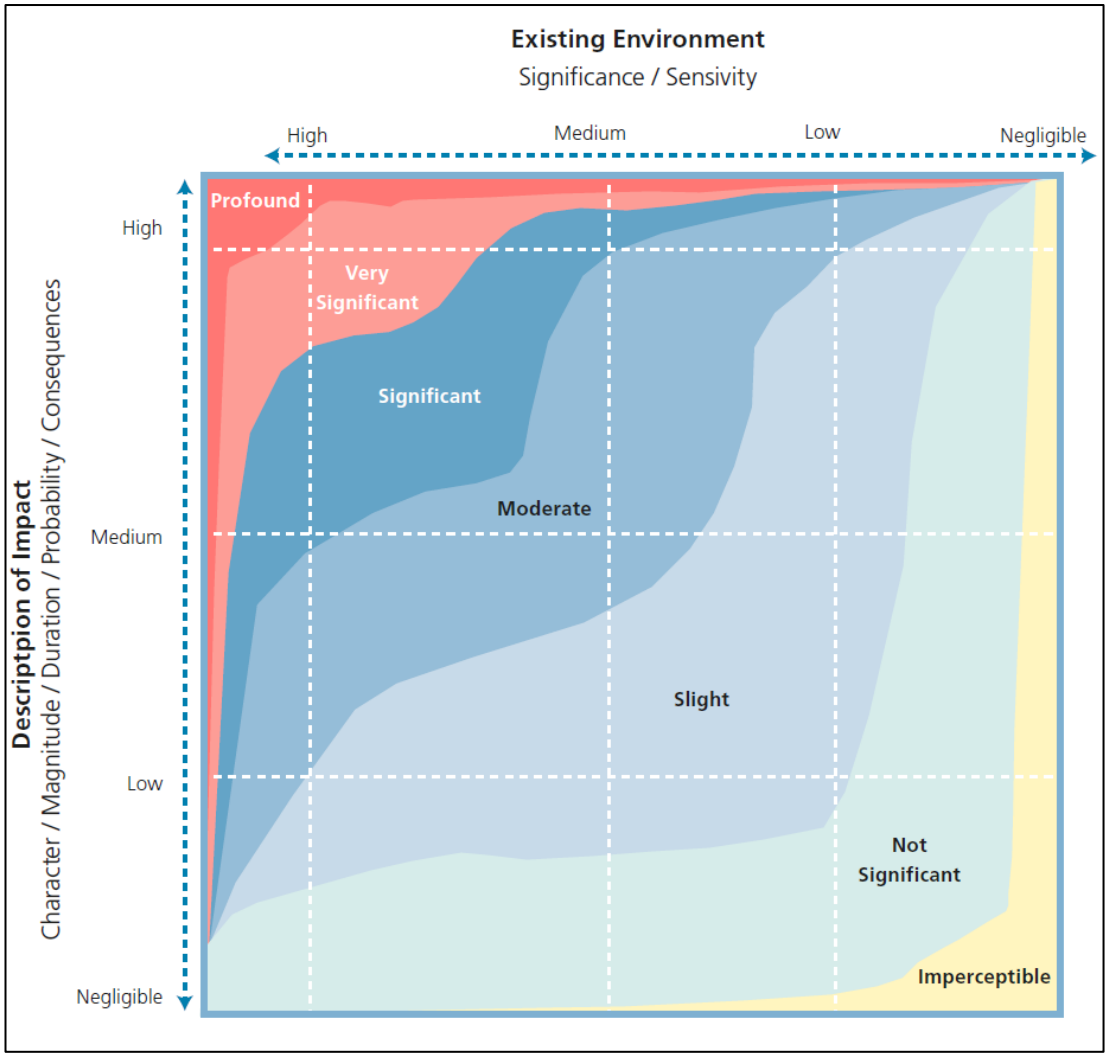


Figure 10.1 Significance of Effects [extract] Figure 3.5, EPA Draft EIA Report Guidelines 2017

The significance of effects, which in nature may be positive, neutral or negative/adverse, are described as follows:

- Imperceptible: An effect capable of measurement but without significant consequences.
- Not significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.
- Slight: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- Moderate: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- Significant: An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
- Very Significant: An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
- Profound: An effect which obliterates sensitive characteristics.

In terms of duration, effects are considered as follows:

- Momentary: lasting seconds to minutes.
- Brief: lasting up to one day.

- Temporary: lasting up to one year.
- Short-term: lasting one to seven years.
- Medium-term: lasting seven to fifteen years.
- Long-term: lasting fifteen to sixty years.
- Permanent: lasting over sixty years.

Further aspects of effects including their magnitude (i.e. extent, frequency, and context); probability (i.e. likely, indeterminable, 'worse-case'); and type (i.e. cumulative, interaction (synergistic), residual, indirect, etc.) are also considered in the assessment, where appropriate in accordance with those descriptions outlined in the EPA guidance[1].

There were no particular limitations or constraints in carrying out the assessment.

[1] See Section 10.2.1 above

10.3 RECEIVING ENVIRONMENT

10.3.1 Site Location and Context

The site of the proposed Energy Centre is located within the Avoca River Park Industrial Estate lands c. 2.0km northwest of Arklow town. The overall lands extend to c. 80 hectares along the Avoca River Valley and are mostly west of the M11 motorway and north of the Avoca River, the R747 and the Dublin-Rosslare railway line. Access is from the east via the L6179 leading around the Kilbride Industrial Estate and over the M11 motorway.

The proposed development site will occupy c. 5.01 hectares towards the east of the Avoca River Park Industrial Estate and adjacent to the L6179 as it enters the lands. See **Figure 10.2** below.

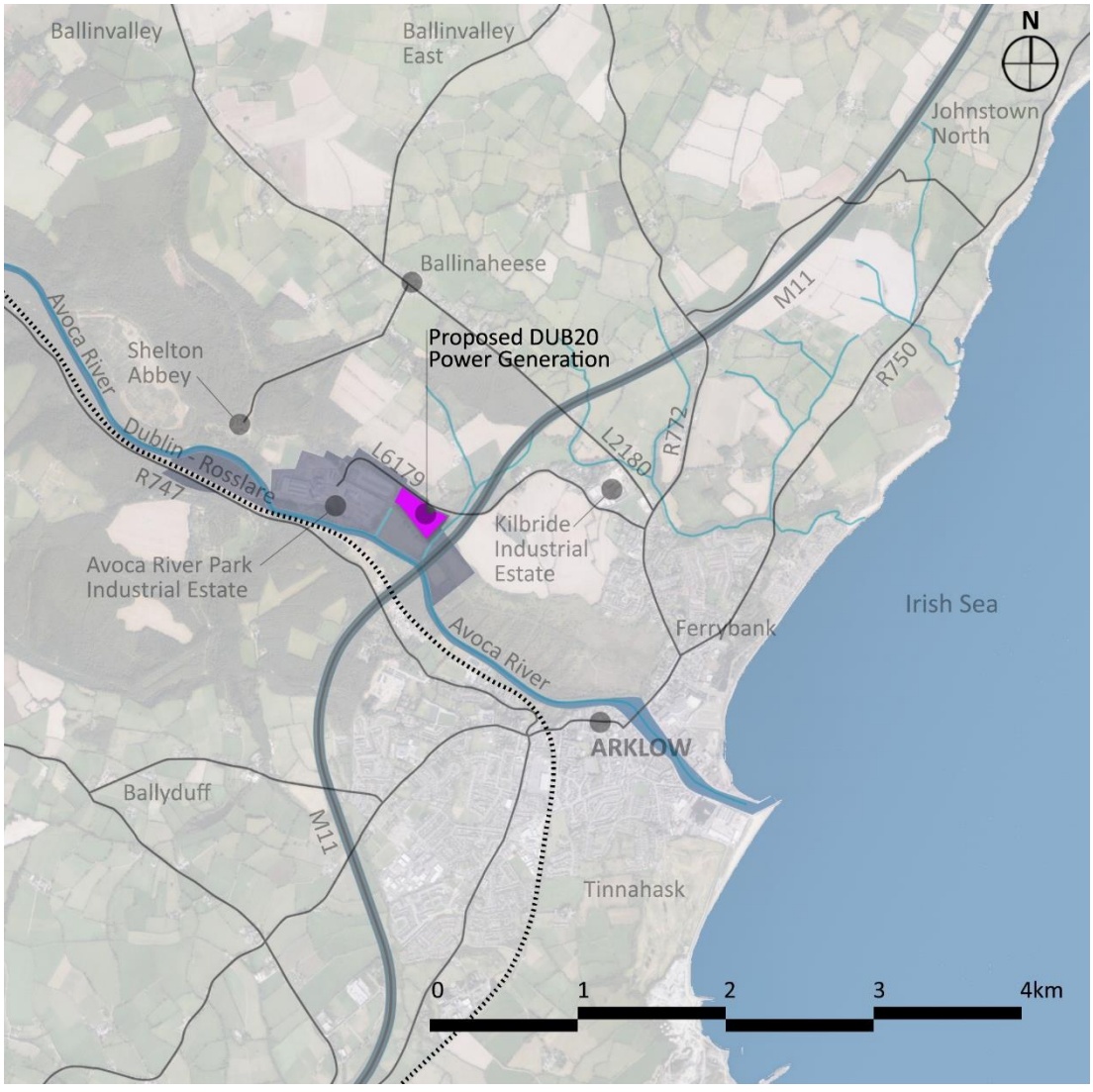


Figure 10.2 Site Location Context (Background Mapping Source: Bing Maps)

10.3.2 Landscape Context

The Avoca River valley floor is by its nature low lying with terrain rising steeply either side to form the northern and southern slops of the valley. The valley is typically only c.100m wide between Woodenbridge and Shelton Abbey with the road, the railway and the river running in parallel. The valley floor widens at Shelton Abbey to over 300m and continues to widen along the length of the industrial lands to c. 500m where the M11 crosses the valley.

Terrain to the immediate north of the industrial lands comprises the steep northern side of the valley, typically rising to between 30.0 and 40.0m OD and mostly in mature woodland. The landscape then begins to level out to become a more gently sloping agricultural landscape. The closest dwelling to the proposed development is c. 160m from the site and is elevated at c, 24m OD and set within agricultural grassland with mature broadleaved trees along the southern side of the property facing the valley.

The Avoca River, the R747 Vale Road, and the Dublin to Rosslare railway line run along the southern side of the valley floor. The southern side of the valley is also characterised by steeply sloping woodlands. A secondary wooded valley leads southwards from the Avoca River valley to Glenart Castle which is an early 19th century country house and gardens in private ownership and is a protected structure (RPS No. 16404001).

To the west, leading towards Woodenbridge, the valley narrows considerably and the richly wooded valley slopes rise to 100m OD and more creating a strong sense of enclosure to the valley.

To the east of the industrial lands, the elevated M11 motorway spans the Avoca River. High voltage electricity towers and overhead lines are also noticeable in the landscape, with the larger 220 kV line crossing the valley just west of the motorway via a series of tall overhead line support pylons. A halting site is located along the river side of the R747 just west of the motorway.

East of the M11 towards Arklow town and the coast, the landscape opens up and becomes much flatter, with the Arklow Town Marsh and Arklow on the northern and southern sides of the river.

10.3.3 Avoca River Park Industrial Estate

The Avoca River Park Industrial Estate lands including the proposed development site are part of the former Shelton Abbey Demesne that occupied the low lying (typically 3.0 to 6.0m OD) floor of the Avoca River Valley, and on the northern side of the river corridor.

Shelton Abbey is a late 18th century mansion and protected structure (RPS No. 16404005). It is located towards the western extent of the former demesne that originally extended eastwards along the Avoca River as far as the Arklow Town Marsh where a pathway continued through the marsh to Arklow.

Shelton Abbey Demesne was sold in the early 1950's and NET Irish Fertiliser Industries (IFI) developed a substantial fertiliser manufacturing facility on the flat and low lying eastern part of the demesne. Shelton Abbey became an open prison in the early 1970s. The IFI facility was closed in 2003 and was mostly dismantled, leaving the prilling and drying towers and a number of smaller structures together with extensive areas of flat tarmac marshalling and storage areas. Shelton Abbey continues to operate as an open prison.

The western part of the industrial estate, apart from the woodland areas due south of Shelton Abbey, comprises a range of high ridged industrial sheds associated with Holfeld Plastics. A wood processing facility operates in the central portion of the lands, and a moderate sized electricity substation is located centrally along the northern side of the lands.

The eastern part of the lands leading to the M11 motorway are undeveloped and mostly comprise low lying grassland and scrub leading to mixed broadleaved woodland where the lands slope upwards to the access roadway. The lands are traversed by the Shelton Abbey Canal that extends from Shelton Abbey towards Arklow. A watercourse runs along the eastern side of this area and drains into the Avoca River. An area of mature broadleaved woodland is located between the stream and the M11 motorway. This eastern part of the industrial lands is traversed by 220kV overhead powerlines with supporting pylons located just inside the northern boundary of the lands and on the southern bank of the Avoca River. The proposed development site is located within the northern half of this part of the industrial lands and is bound by the access roadway and the canal to the north and south respectively and the stream to the east.

It is noted from historic aerial photography that the area of the proposed development site appears to have been covered in grass and scrub in 1995 but had been cleared by 2000. The site was used as a landfill and following cessation of its use has been capped and the site has become heavily recolonised with ruderal species, scrub and grassland and has been left fallow and outgrown. The northern edge of the site comprises mixed broadleaved woodland and a similar woodland area stands just outside the site between the stream and the M11.



Figure 10.3 Aerial photography of Proposed Development site in (left to right) 1995, 2000, 2005 and currently. Mapping Source: Geohive)

Planning permissions have recently been granted for the development of a substantial Data Storage Facility and a 110kV substation. Another planning application is before An Bord Pleanála for the development of a larger 220kV substation on the northern side of the lands that will serve the proposed Arklow Bank Offshore Windfarm project.

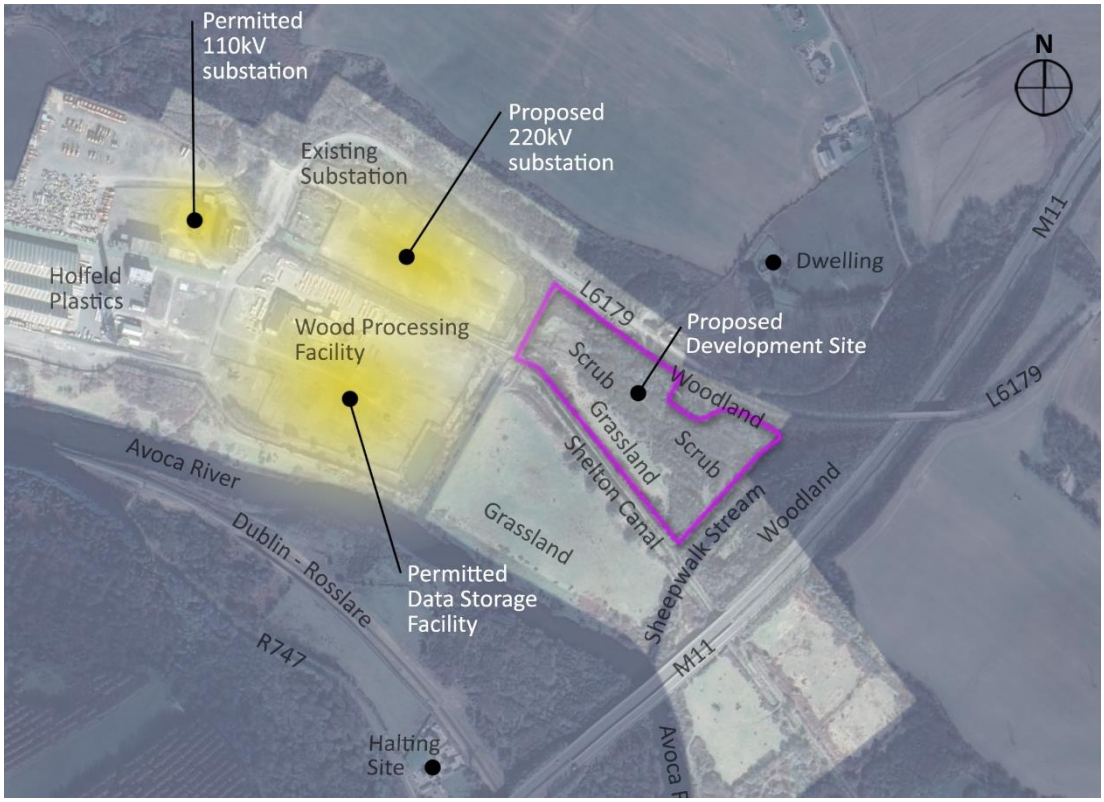


Figure 10.4 Site Location within Avoca River Park Industrial Estate (Background Mapping Source: Bing Maps)

10.3.4 Proposed Development Site

The proposed development will occupy the northern portion of the eastern part of the industrial lands and extend to c. 5.01 hectares. The site is bound on the north and south by the L6179 entrance road and the Shelton Canal respectively and to the west and east by the existing north-south access track and the Sheepswalk Stream respectively.

The ground mostly flat and is low lying ranging from 2.0 to 3.0m OD and is covered in a mix of grassland and scrub. The northern edge of the site rises sharply over a width of c. 40.0m to meet the c. 10.0m OD level of the access road. This sloping terrain is covered in mixed broadleaved woodland and a row of early mature birch line the edge of the road in conjunction with the palisade security fence.

A 220kV pylon is located on an outcrop along the northern edge of the site and a 220kV powerline traverses the site to the next pylon located on the southern bank of the Avoca River.

The undeveloped lands south of the Shelton Canal are mostly in fallow grassland with pockets of scrub. This portion of land is slightly higher than the proposed development site and ranges from 3.0 to 4.0m OD.

10.4 LANDSCAPE PLANNING CONTEXT

The proposed development is within the administrative area of Wicklow County Council, and development is guided by the Wicklow County Development Plan 2016-2022, (WCDP).

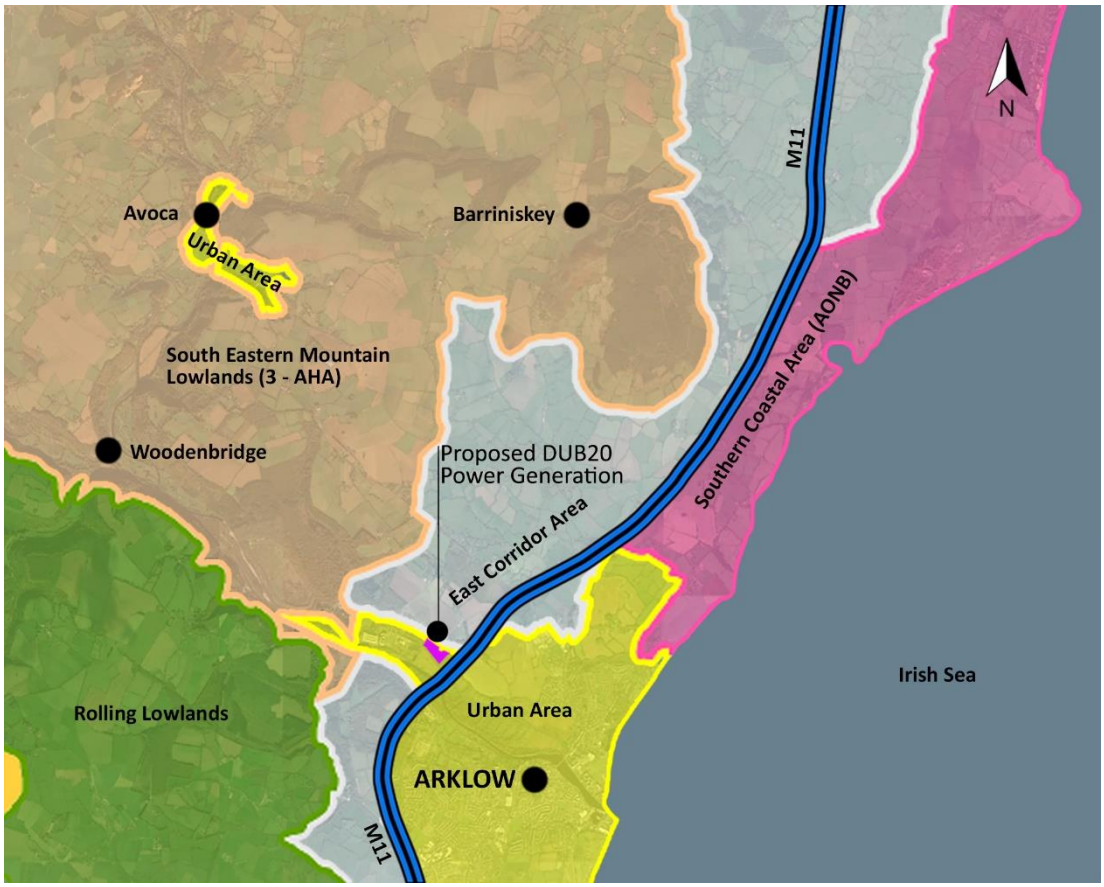


Figure 10.4 Landscape Category Areas (Source: WCDP 2016-2022, Map 10.13)

The WCDP, Appendix 5, Landscape Assessment, identifies a hierarchy of six distinct Landscape Categories throughout the County and within those, 15 Landscape Character Areas (LCAs).

The proposed development falls within the *Urban Area* category and bordering the *East Corridor Area* category.

The settlement hierarchy of the WCDP designates Arklow town as a Level 3 settlement, or large Growth Town II and as such is within Landscape Category No. 6, or *Urban Area,* that applies to all settlements of Level 1-6 defined in the Wicklow Settlement Hierarchy.

Section 4.5.6 of the WCDP Landscape Assessment states that 'In terms of landscape classification, these settlements have already been deemed suitable for development (of the type allowed by the settlement strategy and the development standards of this plan) and the impacts on the wider landscape of such development has already been deemed acceptable'. Table 1 describes the characteristics or Urban Areas 'As per the provision of the County Development Plan and the provisions of any Local Area, Town or Settlement plan for each area.'

The Arklow and Environs Local Area plan 2018-2024 identifies the former IFI factory site at Shelton Abbey as an '*Employment Opportunity Site*' given its strategic infrastructure assets.

The *East Corridor Area* category comprises the M11 corridor and for the most part runs through the more low lying and accessible tracts of land. It is the main connection between the major towns along the east coast of the County and is considered to be of *Medium Vulnerability*.

The Southern Coastal Area (AONB) category is described as comprising '…lands south of Wicklow Town extending as far as south of Arklow Rock. The coastal area is dominated by low boulder clay headlands interspersed with small shingly coves and extensive sandy beaches and dunes, the most well-known being at Brittas and Clogga. Along the way are rocky cliffs at Wicklow, Mizen and Arklow Heads. The area provides for a continuous prospect and numerous views from the coast road out to sea. Sand dunes are a dominant feature of the 'soft' coastline. The area has a rich coastal biodiversity of habitats and species protected through National and EU designations at Maherabeg Dunes and Buckroney Brittas Dunes and Fen (NHA and SAC) and Arklow Rock/Askintinny NHA. This landscape area is important not just from a landscape or habitat perspective, but also as an increasingly important area for recreational activities, the development and promotion of which must be managed appropriately'.

It is noted that the eastern boundary of the *South Eastern Mountain Lowlands* category Area of High Amenity is at Shelton Abbey and this area extends to the west and north to include the undulating mountain lowlands and valleys at Woodenbridge, and Avoca, and beyond to Aughrim and Rathdrum.

10.4.1 Views and Prospects

The WCDP 2016-2022, Figure 10.14, Views of Special Amenity of Special Interest, identifies 48 specific view locations that are of special amenity or interest. VP No. 23 is the only such view within the visual context of the proposed development and is from the N11 c. 1.5km north of Johnstown North and is a view towards the sea and coast.

Figure 10.15 of the same document also identifies routes with prospects of special amenity value or special interest.

There are a number of these within c.5km radius of the proposed development including parts of the N11 and Coast Road, roads around Barriniskey, Woodenbridge and Avoca, and also along part of the L2180 Beech Road to the north of the proposed substation site.

These are shown on **Figure 10.5** below.

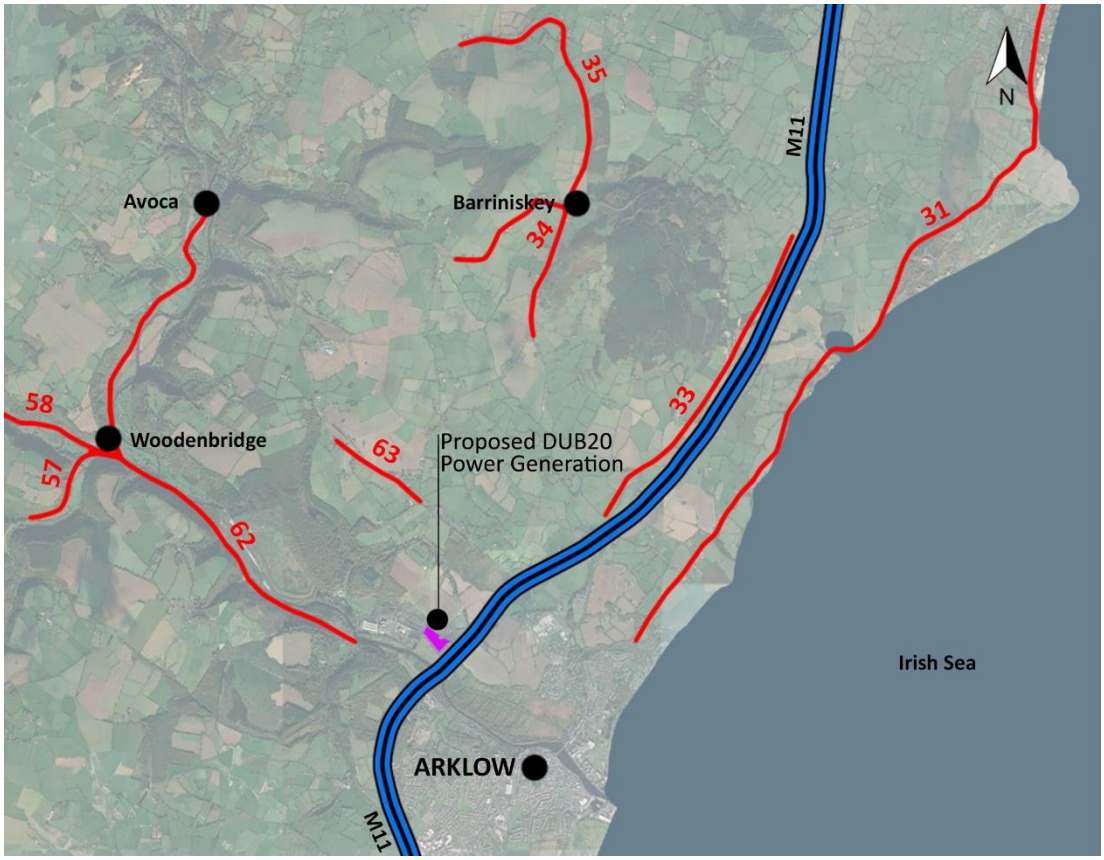


Figure 10.5 Prospects of Special Amenity Value or Special Interest (Source: WCDP Map 10.15)

No.	Description
31	R750 Wicklow to Arklow. Prospect towards sea from Coast Road
33	N11 south of Scratanagh Cross Roads. Prospect of Ballymoyle Hill
34	L6171 and L2172 at Barraniskey, Arklow. Prospects of Webbs River Valley and Arklow
35	L2172 and L6167 at Crone Upper, Redcross. Prospect to Northeast and east towards Wicklow head and coast
57	L2197 at Coollgarrow. Prospect of Goldmine River valley.
58	R747 from Woodenbridge to Coates Bridge, Aughrim. Prospect extending from Woodenbridge with tree lined valley and good river focus
62	R747 Vale of Avoca east of Woodenbridge. Prospect of both sets of Vale of Avoca including Avoca River Valley
63	L-2180-48 from Raheen to Sheepwalk. Prospect of Vale of Avoca

10.4.2 Other Designations

There are no Tree Protection Orders (TPOs), proposed Natural Heritage Areas (pNHAs), Special Areas of Conservation (SAC) or Special Protection Areas (SPAs) directly pertaining to the proposed development areas.

Shelton Abbey Demesne is an historic designated landscape, NIAH Site ID No. 4251. The majority of the lands have been substantially modified, and the NIAH survey notes that *'a factory complex now dominates this site'*.

The Kilbride Church (in ruins) and *Howard Mausoleum* (RPS No. 16404006) are located along the L6179 on the eastern side of the M11 motorway.

10.4.3 Landscape and Visual Significance and Sensitivity

The proposed development of the Energy Centre will be located on lands within the eastern part of the established brownfield industrial facility. The Power Energy Centre will occupy the northern portion of this site bound by the L6179 aces road on the north and the Shelton Canal on the south and will be set against the steep wooded terrain of the valley behind it.

The formation level of the development site is 5.0m OD. The face of the valley directly north of the site rises to 30m OD with substantial woodland cover and the terrain then transitions to agricultural land and continues to rise more gently to over 50m OD. The southern side of the valley rises to similar levels. It is more heavily modelled and undulating than the northern side but has more expansive and dense woodland cover.

To the west, the valley quickly becomes more enclosed and remote from the industrial area, and to the east, the elevated motorway and overhead line infrastructure clearly signal the transition from the mountain and rolling lowlands to the urban area of Arklow.

By virtue of its low setting within the valley, the proposed development will be substantially secluded from the wider and more elevated landscape to the north and south and the Avoca River Valley leading westwards is quickly enclosed by a combination of wooded valley faces and the twisting nature of the river and road leading through it.

The Vale Road and the Dublin to Rosslare railway line run along the southern side of the valley past the industrial lands, and the presence of the lands does become apparent as the Vale Road approaches the lands from the west as taller structures, overhead line towers and the motorway overbridge start coming into view. The site is most visible from the elevated M11 motorway to the east and particularly from the northbound carriageway, however the open portion of the bridge span is less than 300m and observers are normally travelling at motorway speeds.

The sites of the proposed development is within the *Urban Area* landscape category, have established industrial uses and are considered to be of low landscape sensitivity and low to medium visual significance.

Within the actual site development area, there is extensive recolonisation of scrub and grassland and mixed broadleaved woodland along the northern edge.

10.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The Proposed Development will occupy approximately 5.01ha. site within the north eastern part of the existing industrial facility. In summary, the development comprises 2 no. energy centre buildings (with associated flues), a battery compound, MV switchoom, transformer compound, welfare building, and associated development. The project description is outlined in Chapter 2.

10.6 POTENTIAL IMPACTS OF THE DEVELOPMENT

New development has the potential to impact on the immediate site environs or the surrounding site context, or both. The quality of impacts can be positive, neutral or negative, and the significance of impacts is determined by the particular characteristics of the development and the existing context.

The proposed development will involve the construction of a substantial Power Energy Centre within an established industrial context.

Landscape and visual effects are discussed below, during construction, in operation and at decommissioning.

10.6.1 Do-Nothing Scenario

In the scenario where the proposed development does not proceed as planned, none of the effects as set out in this chapter would occur. Under the 'do nothing' scenario, the landscape receiving environment would remain as described in Section 10.3 and no significant effects would arise.

10.6.2 Construction Phase

Construction is anticipated to start in Q3 of 2022 and be completed in Q4 of 2023 and finish in 2024 subject to planning approval and obtaining the relevant permits and licences. It is noted that construction is expected for run concurrently with that of the permitted Data Centre development immediately to the west. Further information on anticipated timelines can be found in Chapter 2.

Construction activity at the proposed development that may give rise to landscape or visual impacts will include:

- Site establishment including contractors compound, security fencing together with associated welfare and administration facilities, storage compounds, lighting, vehicle parking and associated access tracks;
- Site clearance of grassland and scrub vegetation;
- Removal of mixed woodland from the embankment along the north of the site;
- Earthworks to include excavation of northern embankment, removal of topsoil and export of c. 6,000m^3 of soil to a licenced landfill;
- Earthworks for the proposed development;
- Import of c. 60,000m^3 of granular fill material to raise the general site level to 4.60m OD and compaction to establish formation levels;
- Construction of Power Energy Centre to include erection of structural frames and application of cladding materials to walls and roof surfaces;
- Construction of ancillary structures and installation of storage tanks and other facilities;
- Installation of equipment in buildings and compound areas;
- Operation of construction machinery including cranes;

- Construction vehicle movements associated with import and export of materials;
- General construction activity including personnel and vehicles;
- Completion of ancillary site area development including access roads, parking areas and landscaping.

Effects on Landscape Character

The proposed development is within the designated *Urban Area* Landscape Category and adjoining the *East Corridor Area*. The development site is substantially contained within the Avoca River Valley and secluded from the adjoining and wider landscape. Construction of the proposed development will give rise to short term and substantially localised effects on landscape character that will be perceived from with the immediate site area and from the southern side of the Avoca River Valley.

Site clearance will give rise to direct effects on the landscape of the site as vegetation is removed and ground modelling undertaken. The majority of such vegetation is recolonised grassland and scrub and is of low value however removal of broadleaved woodland trees along the northern site boundary that are of high local value will result in localised adverse effects on landscape and visual environment. Within the local context of an established industrial facility, the magnitude of development is considered medium. Construction activity including movement of construction vehicles and gradual emergence of building forms and ancillary structures will result in localised disturbance and effects on landscape character are considered locally moderate and negative.

In the wider landscape setting, and by virtue of the site area being substantially secluded within the Avoca River Valley, effects on landscape character are considered negligible or minor and neutral.

Effects on Views

Construction of the proposed development within the designated *Urban Area* Landscape Category and adjoining the *East Corridor Area* will give rise to localised, short term, moderate and negative effects on views along the Vale Road to the south of the site area and from the L6179 local access road serving the industrial estate. The site area is partly visible from Shelton Abbey but at a distance of over 1.0km and the existing industrial facilities at the Avoca River Park Industrial Estate are located between Shelton Abbey and the proposed site presenting substantial modification of the former historic landscape setting. In the wider landscape, the secluded nature of the site is such that visual effects will be negligible and neutral.

The proposed development site is partly visible from the elevated M11 motorway bridge however the motorway is considered of low sensitivity and the span less than 300m in length with potential observers travelling a motorway speeds such that and visual effects will be momentary. It is noted that the established woodland planting along the southern side of the access road to the industrial estate will be felled particularly along the western half of the development site. This will open up visibility from the access road across the lands towards the Avoca River and Vale Road. As an access road to an established industrial estate, those using the road will typically be employees within the estate.

The proposed development will not impact of views from the designated *Southern Coastal Area (AONB)* landscape category to the east.

10.6.3 Operation Phase

Effects on Landscape Character

The proposed development will occupy part of an established and evolving industrial estate. The development will represent an intensification of the industrial character of the site area as may be perceived from the local site context including the portion of the Avoca River Valley to the west and south of the site area.

The Energy Centre buildings will be largest structures and the larger of these, Energy Centre 2, will be comparable in length and height to the existing Holfeld Plastics sheds further west. The taller elements within the development include the 10 No. 33.0m high stacks associated with both Energy Centre buildings.

The development will be set along the northern side of the Avoca River Valley floor with the northern woodland slopes of the valley behind thereby by presenting the larger volumes of the buildings, where visible, against the backdrop of the valley side slopes and the more distant agricultural and upland landscape.

The building façades will be clad using horizontal cladding comprising a selected range of grey colours to express the horizontality of the building and the reduce the overall massing effect. Massing will be further reduced by using louvered façade elements around plant areas that also express the horizontality and use a colour tone that complements the general cladding.

The 10 No. stacks along the southern side of the Energy Centre buildings will present as a straight line of individual stacks at regular spacings along the site. The stacks will be the tallest elements and where visible from the immediate site environs of the Vale Road and M11 motorway will present as part of the skyline with the background and more distant landscape.

The established mature woodland character of the access road leading to the industrial estate will change considerable as existing trees are replaced with a new boundary hedgerow and the re-graded slopes are replanted with new mixed woodland species.

The development site is considered to be of low to medium sensitivity, and the development medium to large magnitude, and will give rise to slight to moderate adverse effects on landscape character.

Effects on Views

The proposed Power Energy Centre will give rise to localised, slight to moderate negative effects on views along the Vale Road to the south of the site area. The site area is partly visible from Shelton Abbey however the view has already been substantially modified.

In the wider landscape, including from the rolling upland areas to the north, the secluded nature of the site is such that visual effects will be negligible and neutral.

10.6.4 Decommissioning

The lifespan of the proposed development is not defined but it is anticipated that it will be maintained, and periodic upgrading undertaken over a long lifetime to meet future demand and upgrade in technology.

Should the Energy Centre cease to be required in the long term, full decommissioning in accordance with prevailing best practice will be undertaken and the site would revert to a vacant industrial site.

10.7 MITIGATION MEASURES AND MONITORING

The proposed development is designed to meet the specific technical specification requirements for infrastructure of this nature.

The site for the proposed development is a brownfield site within an established industrial facility and enjoys substantial screening from the wider landscape setting by virtue of being set low within the valley. The specific site area is also set back within the overall industrial estate and is more remote from the Vale Road and Dublin to Rosslare railway line.

Building elements within the power Energy centre are designed as simple forms with horizontal cladding panels that will be finished in a mosaic of selected grey colours that will mitigate the overall massing and assist in visually integrating the structure with the mixed woodland backdrop on the northern valley face. Perimeter security fencing will also be a dark grey/green finish. Site lighting will be provided using lamp standards up to 6.0m in height and fitted with high cut-off LED luminaires so as to minimise light spill. Lighting will typically be switched off during the hours of darkness and will be operated by motion sensors.

The site plan has been designed such that the buildings site towards the southern boundary so as to reduce encroachment into the sloping woodland area between the site and the access road. While established woodland will be removed from the slope, particularly along the western portion of the site, some of the larger trees will be retained along the eastern portion of the access roadway. The newly exposed site boundary will be replanted with a new roadside hedgerow. The lower slopes will incorporate the new access driveway to the facility and will be landscaped with mixed native woodland species that will establish full closed canopy cover over a period of five years from planting. Elsewhere within the development, roadway verges and remaining open spaces will be planted with mixed shrub planting to create a more attractive environment and to enhance biodiversity.

10.7.1 Mitigation During Construction

The development site including construction compounds and work areas will be managed in an orderly manner, with security fencing or hoarding as appropriate kept in good condition, and vehicular access managed to avoid congestion outside the development site. All vehicular traffic leaving work areas will be clean, and the local road network kept clean in accordance with the Construction Environmental Management Plan (CEMP) included with the planning application.

Where existing trees to be retained, tree protection fencing in accordance with BS 5837: 2012 will be installed to protect any adjacent trees from construction traffic or activity to ensure their integrity and vitality. Any suitable excavated topsoil or subsoil will be stockpiled appropriately for later backfilling and top-soiling.

Following completion of the civil works, all excavations will be backfilled using stockpiled or imported materials as appropriate, and ground surfaces prepared for seeding of landscaping.

10.7.2 Mitigation During Operation

The design of the various elements of the proposed development has been developed in order to meet the specific technical requirements of the infrastructure while minimising adverse landscape and visual effects as described above. Management and maintenance of mitigation features thereafter will ensure their

effectiveness in the medium and longer term. Maintenance of site lighting, incorporating horizontal cut-off light fittings, is also important to ensure light spill is minimised.

10.7.3 Monitoring During Construction

During construction, the contractor will ensure that all site areas including interfaces with and along public roads, are managed and maintained in an orderly manner and in accordance with the CEMP.

Proposed trees and other vegetation will be appropriately staked and protected from damage using stock proof fencing to ensure proper establishment.

10.7.4 Monitoring During Operation

The contractor will be subject to a five year management and maintenance clause that will ensure replacement landscaping and any planting that either dies or fails to establish properly.

Orderly operation and maintenance of the substation site area will ensure the facility remains as built, any defects repaired promptly, and lighting fixtures maintained to ensure minimal light spill.

10.8 CUMULATIVE EFFECTS

Cumulative landscape or visual effects of the proposed development are considered in combination the following developments at the Avoca River Park Industrial Estate and as illustrated on Figure 10.4 above:

- The permitted Data Centre development;
- The permitted 110kV substation development associated with the Data Centre; and,
- The proposed 220kV substation development associated with Arklow Bank Wind Park Onshore.

The permitted data centre development includes three large scale data storage buildings and will be located in the central portion of the industrial estate. It is understood that the northernmost of these buildings is on the same site area as the proposed 220 kV substation development and that the northern building will be omitted should both developments proceed.

The permitted data storage facility will present a large scale contemporary clean lined high tech industrial facility between the proposed substation and the Vale Road, Avoca River and the Dublin to Rosslare railway line.

The permitted data centre development will represent a greater intensification of industrial development at the Avoca River Park Industrial Estate as perceived and viewed primarily from along the Vale Road and from the M11 overbridge.

The separately permitted 110kV substation development associated with the data centre development will be located to the immediate northwest of the data centre and west of the existing 100kV substation. It is of modest scale and will be visually absorbed within the industrial setting. The cumulative landscape and visual effects of the permitted data centre development and 110kV substation have been included in the photomontage views in Appendix 14.1 and commentary on these is included in Section 10.8 Residual Effects below.

The permitted data centre development will be on the southern side of the Avoca River Park Industrial Estate lands and immediately north of the Dublin to Rosslare railway line. The proposed 220kV substation development is directly north of the permitted data centre and substantially screened behind it from the Vale Road. As such, and notwithstanding the data centre being beyond the elevated railway line, it will stand forward of the permitted 110kV substation, generally in front of the proposed 220kV substation and forward of the proposed Power Energy Centre when observed from the Vale Road. There are short sections of the Vale Road just east and west of the permitted data centre development from where the proposed Power Energy Centre and the proposed 220kV substation will also be partially visible.

It is considered that proposed development in combination with the other permitted and proposed developments will be a further intensification of industrial type development in the Avoca River Park Industrial Estate and potential cumulative landscape and visual effects along the Vale Road will be moderate and negative.

Along the M11 motorway overbridge, the proposed Power Energy Centre development will be closest to observers and will therefore be more prominent than the other developments. Noting that the motorway is of low sensitivity and effects will be momentary given the passing speed of observers along the c.300m length of motorway, cumulative landscape and visual effects are considered locally moderate and negative.

In the wider landscape, including from the western portion of the Avoca River Valley and the elevated agricultural lands to the north in particular, the secluded nature of the development sites set low within the valley is such that cumulative landscape and visual effects will be imperceptible and neutral.

10.9 RESIDUAL EFFECTS

Residual effects of the proposed Power Energy Centre development will range from negligible and neutral in the wider landscape context to slight to moderate and negative in the more immediate local site context.

Residual effects of the proposed Power Energy Centre development are described with reference to a series of Accurate Visual Representations (AVRs) that are included in **Appendix 10.1**. These are prepared from 11 view locations that are representative of the views towards the development in the local and wider landscape context. They include views from designated Prospects of Special Amenity Value or Special Interest to the north along the L2180 Beech Road and in the vicinity of Barriniskey, as well as a series of views along the Vale Road approaching from Woodenbridge and continuing past the site to the motorway overbridge. A view is also included from the motorway overbridge.

For each view location, the 'As Existing' (Figure 10.x.1), 'As Proposed' (Figure 10.x.2) and 'Cumulative' versions (Figure 10.x.3) are included. The cumulative views show the proposed development together with the permitted data centre and 110kV substation developments together with the proposed 220kV substation development. They do not include the offshore development as it is so remote from the onshore development however commentary is included in the sections below as appropriate.

In views where the proposed development will not be visible, its profile is shown in a red outline. On the cumulative views, if the permitted data centre and proposed 220kV substation are not visible, their profiles are shown in a yellow and light blue outline respectively.

Views 1 and 2

Views 1 and 2 are from the L2180 Beech Road c, 1.2 km north of the development, and from designated Prospect No. 63. Figures 14.1.1 and 14.2.1 show the 'As Existing' landscape and illustrate the substantially open agricultural landscape falling southwards towards the Avoca River Valley which is evident by density of woodland in the middle ground.

Figures 14.1.2 and 14.2.2 show the 'As Proposed' landscape, and include the profile of the proposed development in a red outline indicating that it will not be visible by virtue of being set at the low level of the valley and screened by the northern slopes of the valley.

It may be possible to see glimpse views of the tops of the two overhead line towers between intervening tree canopies in winter time, however these would be imperceptible in the wider landscape context which already includes other tower structures located on more elevated terrain.

Landscape and visual effects are considered to be negligible and neutral.

Figures 10.1.3 and 10.2.3 show the 'Cumulative' versions with the profile of the permitted data centre development in a yellow outline and the proposed 220kV substation development in a light blue outline indicating that both will also be screened.

As the seascape is partly visible from these locations, elements of the offshore development may be visible however they will not be seen in combination with the proposed development.

Views 3, 4 and 5

View locations 3, 4 and 5 are from the L6171 and L2172 at Barraniskey c. 5.0km north of the proposed development, and within the designated *South Eastern Mountain Lowland Area of High Amenity* landscape category, and from the designated Prospect No. 34.

Figures 10.3.1, 10.4.1 and 10.5.1 illustrate the 'As Existing' views from these locations as expansive views over the rolling agricultural lowlands sloping southwards towards Arklow town, the east coast and seascape, and to Tara Hill in County Wexford at over 18km distance. Like Views 1 and 2, the Avoca River Valley is discernible by virtue of the density of woodland along the valley.

The 'As Proposed' Figures 10.3.2, 10.4.2 and 10.5.2 illustrate that the proposed development will not be visible by virtue of being set at a low level within the valley.

Similarly, the 'Cumulative' versions in Figures 10.3.3, 10.4.3 and 10.5.3 illustrate that neither the permitted data centre or the proposed 220kV substation developments will be visible.

Landscape and visual effects are considered to be imperceptible.

The seascape is visible in the distance from these locations and elements of the currently proposed offshore wind farm development may be visible however they will not be visible in combination with the proposed development.

Views 6 to 10

This sequence of views is from Vale Road leading from west to east. View 6 is towards the eastern extent of the designated Prospect No. 64 and is where the more enclosed valley landscape begins to open up, and the sequence continues to View 10 which is just before the M11 motorway bridge. See Figures 10.6.1, 10.7.1, 10.8.1, 10.9.1 and 10.10.1 which illustrate the 'As Existing' views from these locations.

From view location 6 eastwards, various elements of infrastructure including the communications mast, the railway line, the prilling and drying towers and the various industrial buildings on the former Shelton Abbey demesne become increasingly visible along the Vale Road. Equally the northern face of the valley and the more elevated agricultural land further north become apparent behind the industrial land.

Figures 10.6.2/3, 10.7.2/3, 10.8.2/3, 10.9.2/3 and 10.10.2/3 show the 'As Proposed' and 'Cumulative' versions of Views 6 to 10.

At View 6, the proposed development is imperceptible beyond the intervening vegetation and structures. Similarly, the proposed 220kV substation is imperceptible and difficult to discern other than slight alterations to the overhead power line

infrastructure in the distance. The permitted data centre development is shown in a yellow outline as it will be fully screened.

At View 7, the widening valley corridor starts to reveal more distant views and the proposed development will be come visible beyond some of the low lying intervening vegetation and stands of trees. The main energy centre buildings will be set low in the view and seen against the backdrop of the sloping woodland valley face behind. The 10 No. stacks will be visible on the skyline presenting a clearer signal of the industrial nature of the proposed development. Effects on landscape character and on visual amenity will be slight and negative.

The cumulative View 7 illustrates a similar level of visibility of the permitted data centre and the proposed 220kV substation is imperceptible. Cumulative effects on landscape character and on visual amenity will be slight and negative.

At View 8, the valley floor continues to open up and the railway line in the foreground and the Avoca River and its banks are clearly visible in the foreground. The prilling and drying towers of the former IFI facility are prominent in the middle ground vegetation. Like View 7, the proposed development development will be partially visible with the body of the building set against the backdrop of the sloping woodland valley face and the stacks presenting as part of the skyline. Effects on landscape character and on visual amenity will be slight and negative.

The cumulative View 8 also illustrates a similar level of visibility of the permitted data centre and the proposed 220kV substation is imperceptible other than modifications to the overhead power line infrastructure associated with that development. Cumulative effects on landscape character and on visual amenity will be slight and negative.

At View 9, the railway line in the middle ground is elevated and provides substantial visual screening to much of the lands beyond with glimpse views of parts of the uppermost sloping valley face and the gently sloping agricultural fields beyond. The proposed development will be partially visible with the body of the energy centre buildings mostly screened by the railway and intervening vegetation and some of the stacks presenting on the skyline together with the high voltage overhead powerlines and supporting pylons. Effects on landscape character and on visual amenity will be slight and negative.

The cumulative View 9 illustrates the forward position of the permitted data centre which is more visible beyond the railway line and vegetation. Some taller elements of the proposed 22kV development are partially visible beyond. Cumulative effects on landscape character and on visual amenity will be slight/moderate and negative.

At View 10, just west of the existing halting site on Vale Road, the foreground fields and grassland and the intervening hedgerow vegetation affords substantial screening of the proposed site development area. The proposed development will be set low in the distance with parts of the façades and the roof elements becoming visible against the sloped woodland valley face behind. The stacks will present on the skyline clearly reinforcing the industrial nature of both the industrial estate and the proposed development. Effects on landscape character and on visual amenity will be moderate and negative.

The cumulative View 10 illustrates the intensification of change presented by the combination of permitted and proposed developments, with partial visibility of the proposed GIS buildings with the 22kV substation and partial visibility of the permitted

11.0 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

11.1 INTRODUCTION

The following chapter assesses the predicted impacts of the Proposed Development on archaeological, architectural and cultural heritage. The development is located in the townland of Shelton Abbey, in the Electoral Division of Kilbride, in Civil Parish of Kilbride, in the Barony of Arklow, in the County of Wicklow (ITM 722601 675086).

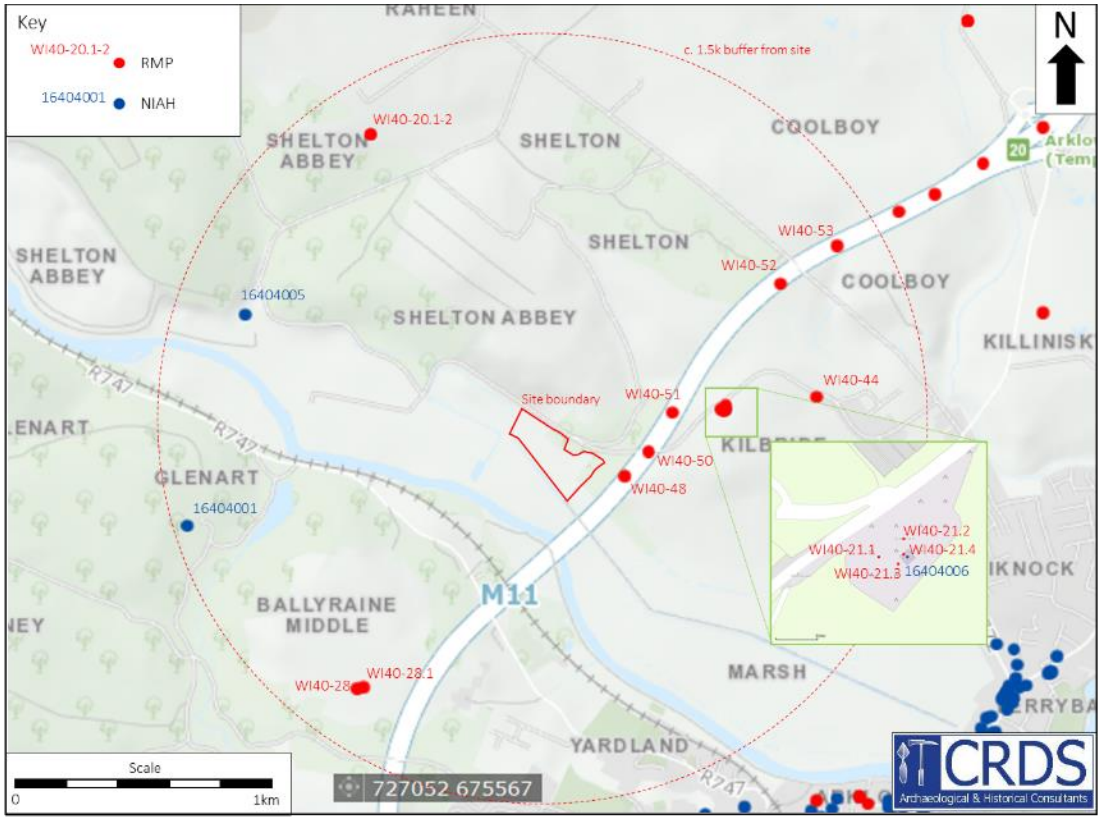


Figure 11.1 Site location map showing Recorded archaeological monuments within c. 1.5km of the Proposed Development. Field numbers are also shown (insert) (source: www.archaeology.ie)

11.2 METHODOLOGY

11.2.1 Introduction

A comprehensive desk-top study of available sources was undertaken. A study are area of approximately 1.5km radius from the Proposed Development was assessed, comprising the following townlands: Ballyarthur, Ballyraine Lower, Glenart, Kilbride, Kilcarra East, Kilcarra West, Killeagh, Marsh, Raheen, Sheepwalk, Shelton and Shelton Abbey.

11.2.2 Recorded archaeological sites and monuments

The Record of Monuments and Places (RMP), comprising the results of the Archaeological Survey of Ireland, is a statutory list of all recorded archaeological monuments known to the National Monuments Service. The relevant files for these sites contain details of documentary sources and aerial photographs, early maps, OS

memoirs, the field notes of the Archaeological Survey of Ireland and other relevant publications. Sites recorded on the Record of Monuments and Places all receive statutory protection under the National Monuments Act 1994. The information contained within the RMP is derived from the earlier non-statutory Sites and Monuments Record (SMR); some entries, however, were not transferred to the statutory record as they refer to features that on inspection by the Archaeological Survey were found not to merit inclusion in that record or could not be located with sufficient accuracy to be included. Such sites however remain part of the SMR. The record is a dynamic one and is updated so as to take account of on-going research. The Record of Monuments and Places was consulted in the Archives of the Department of Culture, Heritage and the Gaeltacht. There are no recorded archaeological monuments located within the site boundary. There are fourteen (of which seven have been excavated and are not to be included in the next revision of the SMR) recorded archaeological monuments within the study area which comprises a distance of c. 1.5km from the proposed development (see Figure 11.1 and Appendix 11.1).

11.2.3 Recorded archaeological finds

The National Museum of Ireland's topographical files are a national archive of all known archaeological finds from Ireland. They relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous excavations. The topographical files were not available for consultation at the time of the study due to Covid19 restrictions. Other published catalogues of prehistoric material were studied: Raftery (1983 - Iron Age antiquities), Eogan (1965; 1993; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers) and the Irish Stone Axe Project database, UCD, to determine if any archaeological artefacts had been recorded from the area. The townlands within the study area were assessed (see Appendix 11.2). It is important to note that numerous archaeological finds would have been recorded during the excavation of sites in the vicinity (see below).

11.2.4 Recorded archaeological excavations

The excavations bulletin website (www.excavations.ie) was consulted to identify previous excavations that have been carried out within the study area. This database contains summary accounts of excavations carried out in Ireland from 1970 to 2020. The townlands within the study area were assessed and the results given in Appendix 11.3.

11.2.5 Cartographic sources

Cartographic sources were used to identify additional potential archaeological and cultural heritage constraints. Primary cartographic sources consulted consisted of the John Speed's Map of Wicklow (1610; see Figure 11.2), the Down Survey 'Barony Map of Arklow' 1655-6 (see Figure 11.3) and the Ordnance Survey 6" and 25" maps, first and subsequent editions (T.C.D. Map Library, www.osi.ie; see Figures 11.4 and 11.5).

11.2.6 Architectural heritage

The National Inventory of Architectural Heritage (NIAH) is a systematic programme of identification, classification and evaluation of the architectural heritage of the State. The Minister for Arts, Heritage and the Gaeltacht is currently using the Inventory as the basis for making recommendations for the NIAH. There are three structures included in the NIAH within c. 1km of the proposed development (see Figure 11.1 and

Appendix 11.4). None of the structures will be directly impacted by the proposed development and none are visible from the site due to intervening vegetation and commercial, residential and industrial development.

11.2.7 Aerial photography

Available online sources for aerial photography were consulted, including the Ordnance Survey, Geological Survey and National Monuments Service collections (see Figures 11.7).

11.2.8 County development plan

The Wicklow County Development Plan 2016 – 2022 was also consulted. The plan includes policy objectives for the protection of the County's archaeological, architectural and cultural heritage (see Appendix 11.5). The Record of Protected Structures (RPS) contained within the plan includes every structure which is of special architectural, archaeological, artistic, cultural, scientific, social or technical interest within the county boundaries. There are no structures included in the RPS within c. 1.5km of the proposed development.

11.2.9 Historical research

A review of online sources for the townland of Shelton Abbey and the inhabitants of the townland in the 19th and early 20th century was undertaken, using the following sources:

- Griffiths Valuation was the first full-scale valuation of property in Ireland, overseen by Richard Griffith and published between 1847 and 1864. It is one of the most important surviving 19th century genealogical sources (http://www.askaboutireland.ie/griffith-valuation/; see Appendix 11.6)
- The National Archives comprises the files of the former State Paper Office (SPO) and the Public Record Office of Ireland (PROI). The SPO was established in 1702 as a repository for records relating to the administrations of the various Lords Lieutenant (the English monarch's representative in Ireland). The PROI was established under the Public Records (Ireland) Act, 1867 to acquire administrative, court and probate records over twenty years old (http://www.census.nationalarchives.ie/search/; see Appendix 11.7).

The baseline historical research utilised sources including Lewis' Topographical Dictionary of Ireland (Lewis 1837), the Proceedings of the Royal Irish Academy and the Journal of the Royal Society of Antiquaries. See Bibliography for full list of references used (Appendix 11.8).

11.2.11 Site assessment

A walkover field survey was undertaken on 18th August 2021 in sunny, warm weather. The site has been subjected to significant and extensive development in the past. No features of archaeological interest were noted (see Figures 11.7 – 11.13).

11.3 RECEIVING ENVIRONMENT

11.3.1 Archaeological, Architectural and Cultural Background

The following assessment is based on the data gathered through a baseline survey as described in Section 11.2 above, including a review of recorded archaeological

monuments (see Figure 11.1 and Appendix 11.1), finds (see Appendix 11.2), excavations (see Appendix 11.3), cartographic sources (see Figures 11.2 – 11.5), architectural heritage sites (see Figure 11.1 and Appendix 11.4), aerial photography (see Figure 11.6) and historical research (see Appendices 11.6 – 11.8).

11.3.1.1 Prehistory

There are no upstanding prehistoric monuments within the study area, however recent development led archaeological excavations and the recovery of stray archaeological finds indicate that prehistoric people may have occupied or moved through the landscape during this period. A stone axehead is recorded from the townland of Kilcarra West (see Appendix 11.2). Stone axeheads are the single most numerous artefact type surviving from prehistory in Ireland, where they have long been regarded as one of the characteristic objects of the Mesolithic and Neolithic periods (e.g. Woodman 1978; 1987; Cooney and Grogan 1994). More than 21,000 have been recorded by the Irish Stone Axehead Project (ISAP) since 1991 (Cooney and Mandal 1998).

Evidence of Bronze Age settlement was found during monitoring of topsoil-stripping during the construction of a motorway for Wicklow County Council at Kilbride (Excavations No. 1997:616; see Appendix 9.3; see also RMP No. WI40-48; Figure 11.1; and Appendix 11.1). The settlement site comprised an oval trench with a maximum diameter of 7.5m. Flints and pottery were found. The flints were mostly flakes struck from poor-quality flint. The pottery consisted of decorated sherds of late developed Beaker, Cordoned Urn and Vase. A small quantity of cremated human bone was found at the side of one of the post-holes.

Three adjacent spreads of burnt mound material were excavated in advance of the Arklow bypass road scheme (Excavations No. 1998:683; see Appendix 11.3**;** see also RMP WI40-51; Appendix 11.1; Figure 11.1). The burnt material was present in shallow pits/depressions and the only finds recovered were some pieces of unworked flint and fragments of burnt bone.

Fulacht Fiadh or burnt mounds are the most common surviving archaeological site from the Bronze Age. Fulacht Fiadh have been interpreted in a number of different ways, mainly as cooking troughs but secondary interpretations include places for washing, ritual initiations, bathing, tanning and even brewing (Burnt offerings 2001, Glasnevin; Buckley V.M, 1990; Ó Drisceoil, D.A. 1988; O'Kelly 1954; Quinn and Moore 2009). 'Burnt mounds', often termed 'fulachta fiadh' are assumed to be the most common prehistoric site type in Ireland. The most consistent elements of the site have been described as:

> *'a mound of heat-fractured stones, a trough and traces of fires – sometimes a formal hearth'* (Waddell 2000, 174, 177)

In its classic form, unexcavated and undisturbed, this site type can be identified as a low crescent or kidney shaped mound, generally exposed in low-lying areas adjacent to a water source. Under the sod the mound consists largely of burnt or heat-shattered stone mixed with a lesser proportion of charcoal rich soils and ash. The dimensions of the mounds vary, with an average height of 1-2m, and diameters of up to 30m from recorded Irish examples (Waddell 2000, 174).

Brindley and Lanting argued that the term 'fulacht fiadh' should be used only with reference to sites with mounds of burnt stone and troughs, and have argued that 'fulachta fiadh' have no connection with historical descriptions of practises involving cooking with fire-heated stone (Brindley and Lanting 1990, 56). The majority of excavated sites, exposed through development led archaeology, have been heavily

disturbed prior to their identification; ploughing and field clearance has frequently levelled the upper portions of the mound and dispersed sub-surface remains. Many survive simply as a 'trough' cut into subsoil with fragmented spreads of burnt stone and charcoal beneath the sod or scattered into the ploughzone.

Archaeological evidence of the Iron Age is comparatively limited in southeast Ireland. Ptolemy's map 'Menapia' dating to c. the 2nd century AD shows a tribe known as the 'Brigantes' as occupying an area between the Slaney River and the southern and eastern coastline (Culleton 1999). The Brigantes were a well-travelled sea-faring people known in coastal Britain, the Humber and Firth regions and even as far abroad as the Netherlands. This may explain why the few recorded Iron Age monuments are concentrated on the southern coast; promontory forts are located at Pollshone, Nook, Baginbun and Templetown and Saltee Island Great (Moore 1996). Two of these were excavated by Westropp in the early 20th century. A large hilltop enclosure at Ballyliegh and a ring barrow at Hook Head may also date to this period. However, the results of development-led excavations are gradually providing additional evidence for the Iron Age in Wexford. In 1999, during monitoring on the Ferns Sewerage Scheme a small Iron Age ring-ditch was uncovered. As yet there is no surviving evidence for the Iron Age around Pollahoney.

11.3.1.2 The Early Medieval Period

Early medieval Ireland was essentially a farming landscape characterised by the basic territorial unit known as a túath. it is estimated that at this time the country was divided into approximately 150 of these territories, each with its own king (Byrne 1973). During this period, defensive enclosures known as ringforts were constructed to protect farmsteads. These are one of the most frequently recorded archaeological site types and c. 50,000 examples are recorded in the Irish landscape. Ringforts are regarded as defended family homesteads and the dating evidence to date suggests they were primarily built between the 7th and 9th centuries AD (Stout 1997, 22–31).

There is little evidence of settlement dating to the Early Medieval Period in the study area. Ringforts are strongly associated with agricultural land and, as such, are rarely situated at higher altitudes. The closest examples are approximately 3km to the south of the site at Barnacleagh East and Ballygriffin.

The furnace recorded during archaeological excavations in advance of the Arklow bypass road scheme (RMP No. WI40-50; see Appendix 11.1). Although it did not contain definitive dating evidence, it is interpreted as dating to the Early Medieval Period.

11.3.1.3 The Late Medieval Period

The south east of the country is rich in Late Medieval sites associated with Anglo-Norman settlement: moated sites, motte-and-baileys, churches, earthwork castles, stone castles, and medieval towns. These date from the later 12th century after the arrival of the first Normans who landed at Bannow Bay Co. Wexford in 1169.

Mottes were among the first fortifications constructed by the Anglo-Normans on their arrival in Ireland. In their original form they consisted of steep-sided earthen mounds, topped with a wooden lookout tower or bretesche, the surviving remains generally consist of a flat-topped conical mound. The mottes are often associated with a rectangular enclosure, known as a bailey, which would have housed buildings. Mottes were usually located at easily defensible strategic sites. Moated sites, in comparison, represent the remains of defended farmsteads dating from a secondary phase of colonisation/settlement, during the thirteenth and fourteenth centuries. They are usually square or rectangular areas, defined by banks and external ditches. An

example in the vicinity is the moated site in Ballyraine Middle (RMP No. WI40-28), in the south of the study area.

11.3.1.3 The Post-Medieval Period

John Speed (1551–1629) was an English cartographer and historian. He drew historical maps in 1601 and 1627 depicting the invasion of England and Ireland. His map of the southeast of Ireland (see Figure 11.2) shows Arklow town as 'Arcklo' and includes what appears to be the River Avoca, and the and land in which the study area is located is listed as under the control of the Earl of Ormond.

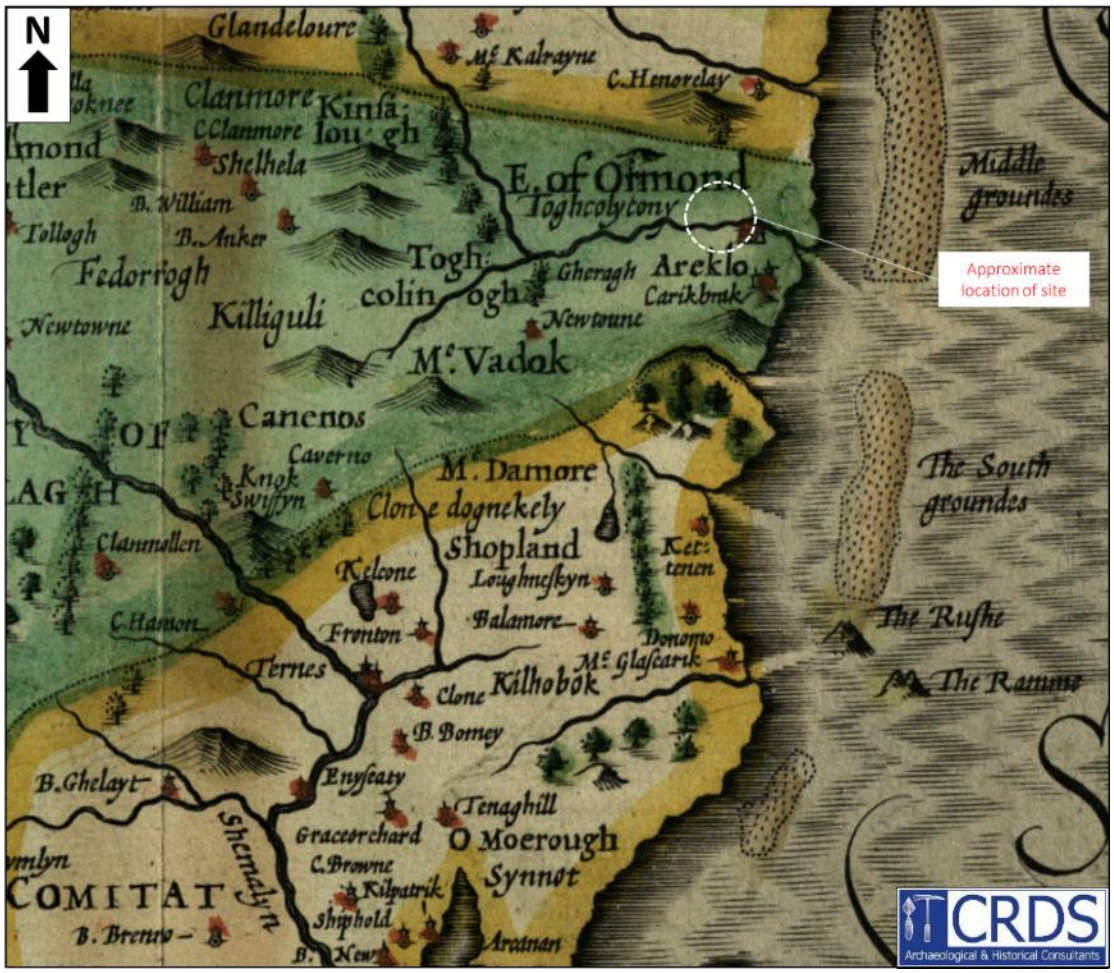


Figure 11.2 *Extract from John Speed's 1610 map of county Wicklow (source https://libguides.ucd.ie/findingmaps/mapshistIreland).*

The Down Survey of Ireland, undertaken in the years 1656-1658, was the first ever detailed land survey on a national scale anywhere in the world. The survey sought to measure all the land to be forfeited by the Catholic Irish in order to facilitate its redistribution to Merchant Adventurers and English soldiers. Profitable and unprofitable land were distinguished, and there were abbreviated captions for arable, meadow, bog, woodland, mountain and several kinds of pasture, with area figures for each of these categories. Coverage of other subjects was uneven. In the parish maps, dwelling houses with the owners' names are entered in each townland. As noted above, generally speaking, it was a survey of confiscated land. As a result of the re-distribution, approximately 7,500 New Model Army veterans settled in Ireland, in what became known as the Cromwellian Plantation. Interestingly, the Barony of Arklow, within which is Bogland is located, was not included in the survey (see Figure 11.3), with the exception of Arklow town, including Arklow Castle, Abby and Abbyland.

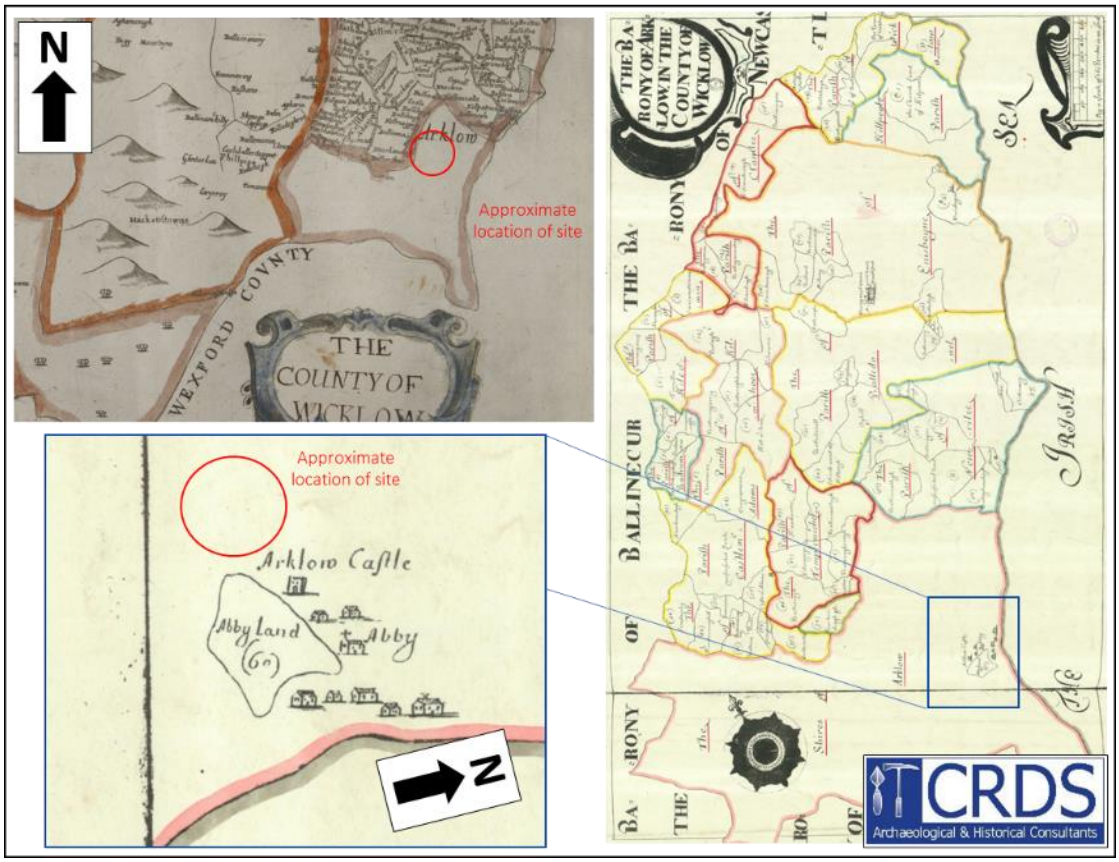


Figure 11.3 *Extracts from the Down Survey Map of the 'Barony of Arklow, in the County of Wicklow' showing Arklow (source TCD Historical Maps online).*

The above-mentioned moated site at Ballyraine Middle is shown as a T-shaped house on the first edition Ordnance Survey map and has been interpreted as a medieval manor house (RMP No. WI40:28.1; see Appendix 11.1).

The proposed development site is located within the demesne landscape of Shelton Abbey, a designated demesne landscape in the National Inventory of Architectural Heritage (NIAH Site ID 4251). The demesne was created in 1658 when the estate of Arklow was acquired by Robert Hassels from the Countess of Dromard. He built a small estate house on the lands along with a church and graveyard (RMP No. WI40:20.1 & 20.2; see Appendix 11.1).

By the time of the first edition Ordnance Survey (1830s; see Figure 9.4), the demesne landscape has matured and the current Shelton Abbey, built in 1770, is visible. Shelton Abbey House was in the ownership of the Howards, Earls of Wicklow, who erected the family Mausoleum (RMP No. WI40:21.4; see Appendix 11.1; NIAH No. 16404006; see Appendix 11.4) at Kilbride. This was built within the grounds of the aforementioned church and graveyard (RMP No. WI40:20.1 & 20.2).

There is relatively little change in the landscape between the first (1830s) and second (1910s; see Figure 11.5) edition Ordnance Survey Maps. Shelby Abbey and Demesne is virtually unchanged; though there is a notable change in the course of the Avoca River.

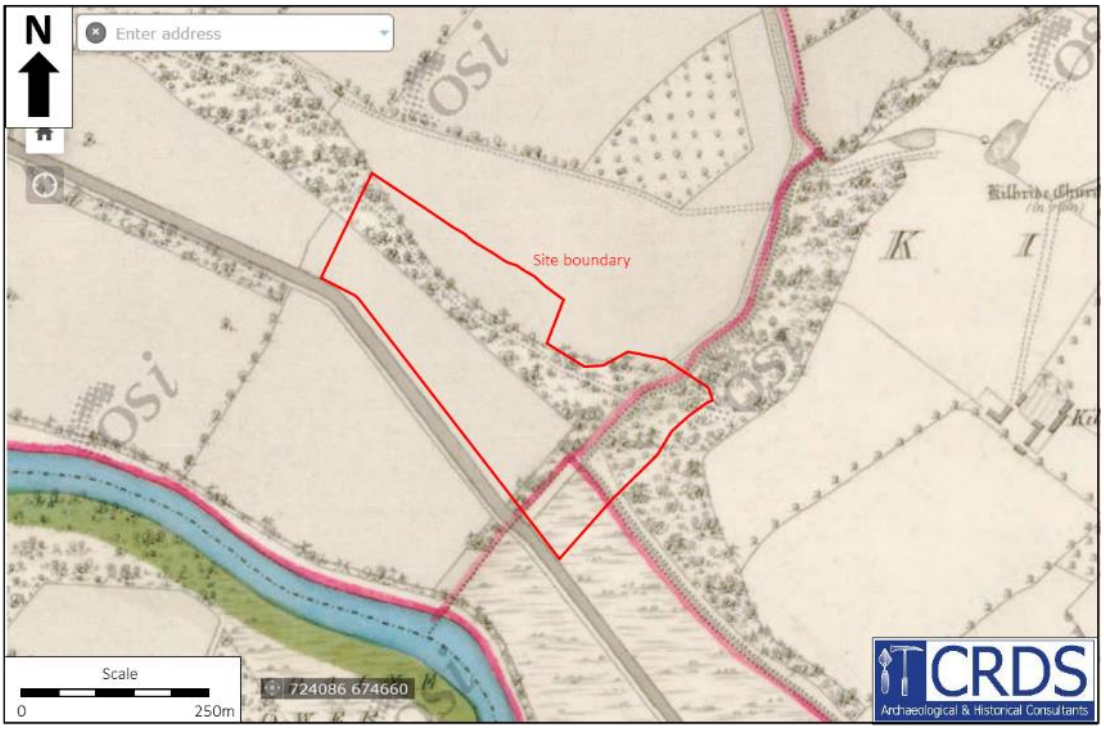


Figure 11.4 *Extract from the first edition Ordnance Survey Map of the site (source www.archaeology.ie).*

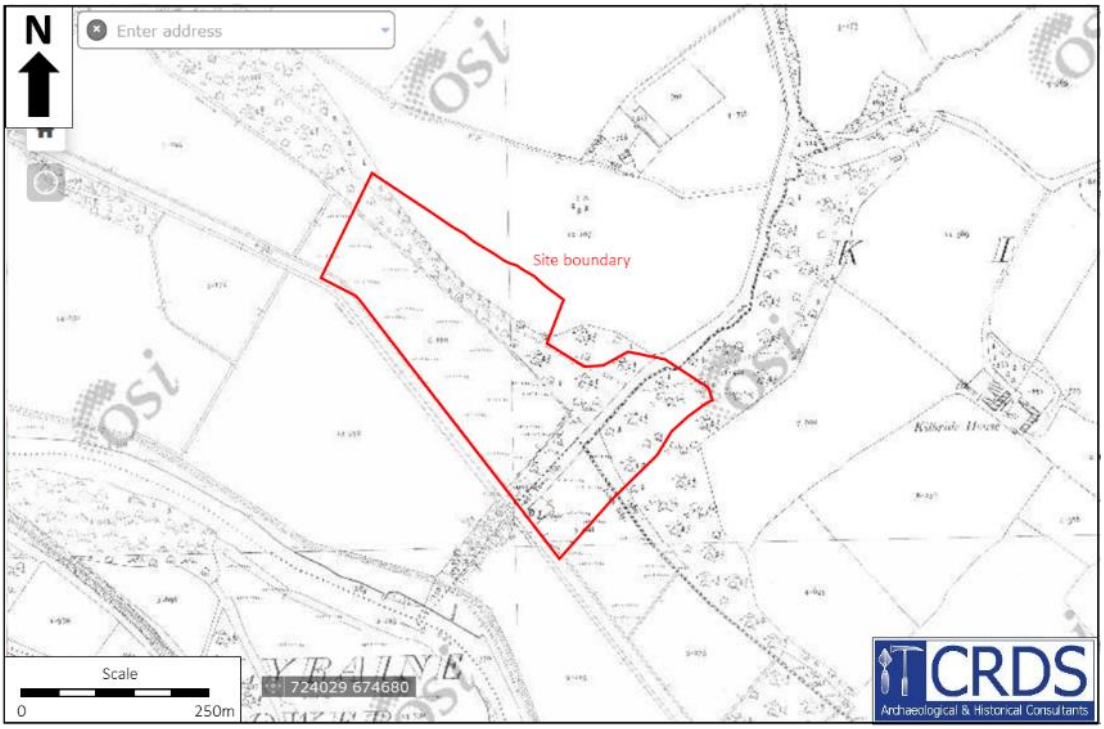


Figure 11.5 *Extract from the second edition Ordnance Survey Map of the site (source www.archaeology.ie).*

Shelton Abbey and Demesne is one of two manor houses / planned demesne landscapes in the study area; the other two are Glenart Castle (NIAH No. 16404001; RPS Ref. 40-02) and Demesne (NIAH Site ID: 4417). A third, Ballyraine House and Gardens are located immediately to the south of the study area. These landscapes indicate the influence of the wealthy landowners in the area from the 17th through 19th centuries.

A review of available aerial photography of the study area indicates that the site of the Proposed Development has been significantly developed in the recent past and is now part of the Avoca River Park industrial complex (see Figure 11.6; see also Figure 11.7).



Figure 11.6 *Extract from the Ordnance Survey Aerial Photograph of the site (source www.archaeology.ie).*

11.3.2 Field Survey

A walkover survey of the site was undertaken on 18th August 2021 in sunny, warm weather. The site was accessed along the northeastern boundary, and the survey comprised a walk along the hardcore roads that run through the interior of the site and along the southwestern boundary (see Figure 11.7). As can be seen in Figures 11.8 – 11.13, the site has been substantially developed in the recent past.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is for a gas powered energy centre facility providing grid support as a peaking plant and to provide power for development in the vicinity, including the adjacent permitted data storage facility development. Phase 1 will provide 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. Liquid fuel is provided for stand-by in event of interruption of the gas supply. A full description is provided in Chapter 2.

The proposed development will require ground disturbance for foundations and drainage and road infrastructure. It is noted that this is a brownfield site and as such significant disturbance has already occurred.

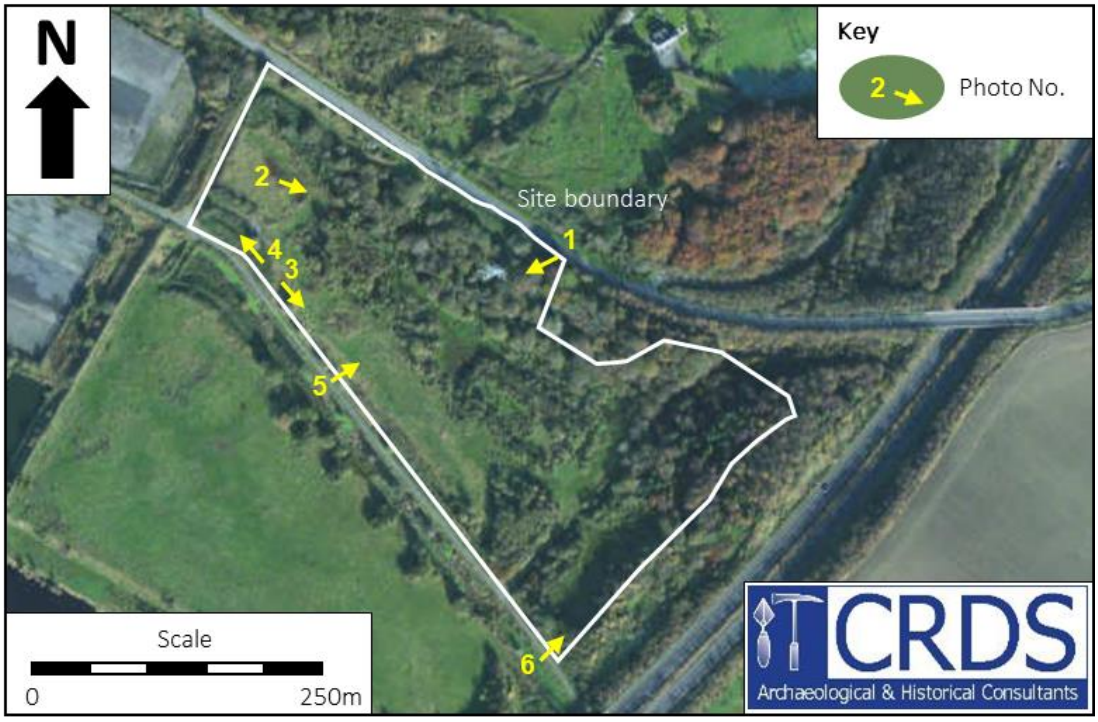


Figure 11.7 *Extract from the Ordnance Survey Aerial Photograph of the site, showing photograph numbers (source www.archaeology.ie).*



Figure 11.8 *Photograph 1. View to interior of site, facing west (see Figure 11.7).*



Figure 11.9 *Photograph 2. View to interior of site, facing southeast (see Figure 11.7).*



Figure 11.10 *Photograph 3. View along southwestern boundary of site, facing southeast (see Figure 11.7).*



Figure 11.11 *Photograph 4. View along southwestern boundary of site, facing northwest (see Figure 11.7).*



Figure 11.12 *Photograph 5. View to interior of site, facing east (see Figure 11.7).*



Figure 11.13 *Photograph 2. View to interior of site along southeastern boundary, facing east (see Figure 11.7).*

11.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

11.5.1 Construction Phase

The archaeological, architectural and cultural heritage impact at the site can be summarised as follows:

- There are no recorded archaeological sites or monuments within the Proposed Development lands, as listed in the Record of Monuments and Places for Co. Wicklow.
- There are fourteen recorded archaeological sites within c. 1.5km of the proposed development lands. Seven of these were discovered during the course of development works and have been excavated. None of these sites will be impacted, either directly or indirectly, by the Proposed Development works. However, they are indicative of the landscape having been densely populated since at least the Bronze Age.
- There are no recorded archaeological finds from the site, though a stone axe found in the area suggests settlement in the Neolithic Period.
- Archaeological excavations in the area in advance of development works over the past two decades has also revealed a number of previously unrecorded archaeological sites. The results of the excavation of these sites further indicate prehistoric and medieval settlement and activity in the area.
- There are no architectural heritage structures within the site boundary, recorded in either the National Inventory of Architectural Heritage or the Record of Protected Structures.
- There are three NIAH sites in the study area, but the Proposed Development will not have a direct or indirect impact on these.

- A desk-top survey of the lands proposed for development did not identify any evidence of archaeological features within the development land.
- Field survey confirmed that the site of the proposed development has been extensively and significantly impacted by previous development.

Therefore, will be no impacts on archaeological, architectural or cultural heritage associated with the Proposed Development.

11.5.2 Operational Phase

There are no potential impacts on archaeological, architectural and cultural heritage expected as a result of the operational phase of the Proposed Development.

11.6 REMEDIAL AND MITIGATION MEASURES

11.6.1 Construction Phase

As no features of archaeological or architectural heritage were identified in this study, and the site has been extensively and significantly developed in the past, no mitigation measures are required for archaeological, architectural and cultural heritage during the construction phase of the Proposed Development.

11.6.2 Operational Phase

No mitigation measures are required for archaeological, architectural and cultural heritage during the operational phase of the Proposed Development.

11.7 PREDICTED IMPACT OF THE DEVELOPMENT

11.7.1 Construction Phase

The construction of the Proposed Development will not impact directly on any known archaeological or architectural heritage sites. No previously unrecorded features of archaeological or architectural heritage were identified during the study. The site has been subjected to extensive and significant ground disturbance in the past.

Therefore, the overall impact of the proposed development on the archaeological, architectural and cultural heritage is deemed to be ***neutral*** and ***not significant***, and ***long term***.

11.7.2 Operational Phase

The operational phase of the Proposed Development is not predicted to have any impact on archaeological, architectural and cultural heritage.

11.8 CUMULATIVE IMPACTS

As there is no impact by the proposed development on the archaeological, architectural and cultural heritage, there is no cumulative impact.

11.9 RESIDUAL IMPACTS

No residual impacts on archaeological, architectural and cultural heritage are predicted.

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APPENDIX 11.1

RECORDED ARCHAEOLOGICAL MONUMENTS

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Recorded Archaeological Monuments located within c. 1.5km of the proposed development are listed below (source Record of Monuments and Places for Co. Wicklow, www.archaeology.ie).

RMP No.:	**WI040-020----**
Class:	Church
Townland:	SHELTON ABBEY
Description:	Situated on a gentle S-facing slope overlooking a steep drop immediately to the S. There is no visible indication of the 'Site of Grave Yard' marked on the 1838 OS 6-inch map as a rectangular enclosure (dims. c. 60m x 25m). Price (1967, 474-5) states that the area was leased to Robert Hassells in 1685. His house was called Shelton, which became the townland name. Price also mentions that the graveyard was on a hill named Whitson hill on a Shelton estate map, and suggests that this was also the site of a church. The above description is derived from the published 'Archaeological Inventory of County Wicklow' (Dublin: Stationery Office, 1997). In certain instances the entries have been revised and updated in the light of recent research.
Date of revision:	17 December 2008 Scheduled for inclusion in the next revision of the RMP

RMP No.:	**WI040-020001-**
Class:	Graveyard
Townland:	SHELTON ABBEY
Description:	Situated on a gentle S-facing slope overlooking a steep drop immediately to the S. There is no visible indication of the 'Site of Grave Yard' marked on the 1838 OS 6-inch map as a rectangular enclosure (dims. c. 60m x 25m). Price (1967, 474-5) states that the area was leased to Robert Hassells in 1685. His house was called Shelton, which became the townland name. Price also mentions that the graveyard was on a hill named Whitson hill on a Shelton estate map, and suggests that this was also the site of a church. The above description is derived from the published 'Archaeological Inventory of County Wicklow' (Dublin: Stationery Office, 1997). In certain instances the entries have been revised and updated in the light of recent research.
Date of revision:	19 September 2013
References:	Price, L. 1967 The place-names of Co. Wicklow. VII - The baronies of Newcastle and Arklow. The Dublin Institute of Advanced Studies (382-532). Scheduled for inclusion in the next revision of the RMP

RMP No.:	**WI040-021001-**
Class:	Church
Townland:	KILBRIDE (Arklow By., Kilbride ED)
Description:	Situated on a level area on a very gentle SW-facing slope overlooking the Avoca River. No trace of the church remains described in the OS Letters (O'Flanagan 1928, 133) nor of any other early features other than some eighteenth-century headstones in the heavily overgrown graveyard. The mausoleum named on the map is dedicated to Frances Parnell. The above description is derived from the published 'Archaeological Inventory of County Wicklow' (Dublin: Stationery Office, 1997). In certain instances the entries have been revised and updated in the light of recent research.
Date of revision:	19 September 2013
References:	O'Flanagan, Rev. M. (Compiler) 1928 Letters containing information relative to the antiquities of the county of Wicklow collected during the progress of the Ordnance Survey in 1838. Bray. Scheduled for inclusion in the next revision of the RMP

RMP No.:	**WI040-021002-**
Class:	Graveyard
Townland:	KILBRIDE (Arklow By., Kilbride ED)
Description:	Situated on a level area on a very gentle SW-facing slope overlooking the Avoca River. No trace of the church remains described in the OS Letters (O'Flanagan 1928, 133) nor of any other early features other than some eighteenth-century headstones in the heavily overgrown graveyard. The mausoleum named on the map is dedicated to Frances Parnell. The above description is derived from the published 'Archaeological Inventory of County Wicklow' (Dublin: Stationery Office, 1997). In certain instances the entries have been revised and updated in the light of recent research.
Date of revision:	19 September 2013
References:	O'Flanagan, Rev. M. (Compiler) 1928 Letters containing information relative to the antiquities of the county of Wicklow collected during the progress of the Ordnance Survey in 1838. Bray. Scheduled for inclusion in the next revision of the RMP

RMP No.:	**WI040-021003-**
Class:	Redundant record
Townland:	KILBRIDE (Arklow By., Kilbride ED)
Description:	This record was previously classed as a possible ecclesiastical enclosure, however there is currently no evidence for its existence.
Compiled by:	Claire Breen
Date of upload:	19 September 2013 Not scheduled for inclusion in the next revision of the RMP

RMP No.:	**WI040-021004-**
Class:	Mausoleum
Townland:	KILBRIDE (Arklow By., Kilbride ED)
Description:	At the centre of a graveyard (WI040-021002-). A rectangular structure with a colonnaded façade on its N face and built into a low hillside at S. A partially legible inscription records its dedication, 'To the memory of Frances Parnell'. A second mausoleum, erected in 1785 by Ralph, Viscount of Wicklow, (according to the inscription it bears) stands to the NE of the former and is in the form of a low, rectangular structure supporting a pyramid.
Compiled by:	Claire Breen
Date of upload:	19 September 2013 Not scheduled for inclusion in the next revision of the RMP

RMP No.:	**WI040-028----**
Class:	Moated site
Townland:	BALLYRAINE MIDDLE
Description:	Situated on fairly level ground c. 400m W of Ballyraine House. A large square enclosure shown on the 1909 OS 6-inch map (max. dims. c. 100m x 100m). It is described by Price (1936, 46) as having an earthen bank with stone facing, and a deep wide fosse, fed by a stream. It is shown on the first edition OS 6-inch map with a large house towards the E side, marked 'Site of a Building' (WI040-028001-). It was destroyed in 1971 (Information T. Barry; OPW and NMI Correspondence). The above description is derived from the published 'Archaeological Inventory of County Wicklow' (Dublin: Stationery Office, 1997). In certain instances the entries have been revised and updated in the light of recent research.
Date of revision:	17 December 2008

This monument is subject to a preservation order made under the National Monuments Acts 1930 to 2014 (PO no. 103/1940).
Scheduled for inclusion in the next revision of the RMP

RMP No.: **WI040-028001-**
Class: House - 16th/17th century
Townland: BALLYRAINE MIDDLE
Description: A large moated site (WI040-028----) is shown on the 1838 OS 6-inch map, with a large T-shaped house towards the E side, marked 'Site of a Building'. The moated site was destroyed in 1971. Barry suggested it may have been a medieval manor house (OPW and NMI Correspondence).
The above description is derived from the published 'Archaeological Inventory of County Wicklow' (Dublin: Stationery Office, 1997). In certain instances the entries have been revised and updated in the light of recent research.
Date of revision: 17 December 2008
This monument is subject to a preservation order made under the National Monuments Acts 1930 to 2014 (PO no. 103/1940).
Scheduled for inclusion in the next revision of the RMP

RMP No.: **WI040-044----**
Class: Font
Townland: KILBRIDE (Arklow By., Kilbride ED)
Description: A red sandstone block (33.5cm x 15.5cm; H 15.5cm-16.5cm) which an oval basin (13cm x 25cm; D 0.08m-0.09m) in the top centre and a small heavily weathered stone head carving on one corner. Located in the E transept of St. Patrick's church when inspected by ASI in 1999 (see WI035-058---- for present location record) but had previously been located here.
Compiled by: Claire Breen
Date of upload: 26 September 2013
Not scheduled for inclusion in the next revision of the RMP

RMP No.: **WI040-048----**
Class: Habitation site
Townland: KILBRIDE (Arklow By., Kilbride ED)
Description: This is the record for the Bronze Age settlement site excavated by Thaddeus Breen (97E0324) on the Arklow bypass road scheme. The site consisted postholes representing an oval structure (diam. 7.5m) and an assortment of other postholes forming no discernible pattern. No hearth was found but the site had been heavily truncated. Associated with these postholes were struck flakes of poor-quality flint and pottery sherds from Beaker, Cordoned Urn and Vast vessels, dating the site to the Bronze Age.
(http://www.excavations.ie/Pages/Details.php?Year=&County=Wicklow&id=4126)
Compiled by: Denis Power
Not scheduled for inclusion in the next revision of the RMP

RMP No.: **WI040-050----**
Class: Furnace
Townland: KILBRIDE (Arklow By., Kilbride ED)
Description: This is the record for the furnace excavated by Breandán Ó Ríordáin (97E0083) on the Arklow bypass road scheme. The remains occupied a space of 1.1m x 0.85m with a max. depth of 0.5m. The furnace had a lining of two stones, one on either side, and a crescent wall of solid iron slag. No finds other than fragments of slag and waste iron were recovered.
Compiled by: Denis Power

Date of upload:	25 January 2013 Not scheduled for inclusion in the next revision of the RMP
RMP No.:	**WI040-051----**
Class:	Burnt spread
Townland:	KILBRIDE (Arklow By., Kilbride ED)
Description:	This is the record for three adjacent spreads of burnt mound material excavated by Brendán Ó Riordáin (97E0083) on the Arklow bypass road scheme. The burnt material was present in shallow pits/depressions and the only finds recovered were some pieces of unworked flint and fragments of burnt bone.
Compiled by:	Denis Power
Date of upload:	25 January 2013 Not scheduled for inclusion in the next revision of the RMP
RMP No.:	**WI040-052----**
Class:	Burnt mound
Townland:	KILBRIDE (Arklow By., Kilbride ED)
Description:	This is the record for a burnt spread excavated by Brendán Ó Riordáin (97E0083) on the Arklow bypass road scheme. It consisted of an area c. 4m x c. 4m which contained burnt stone and charcoal and patches of grey and yellow marl. (Ó Riordáin 1999)
References:	Ó Ríordáin, B 1999 Archaeological Monitoring, Arklow Bypass, Co. Wicklow, 97E0083. Unpublished excavation report submitted to Heritage and Planning Division, National Monuments Service, Department Arts, Heritage and the Gaeltacht, Dublin.
Compiled by:	Denis Power
Date of upload:	25 January 2013 Not scheduled for inclusion in the next revision of the RMP
RMP No.:	**WI040-053----**
Class:	Burnt mound
Townland:	COOLBOY (Arklow By.)
Description:	This is the record for a spread of burnt material partially excavated by Brendán Ó Riordáin (97E0083) on the Arklow bypass road scheme. The spread had a depth of 0.25m. Excavation ceased when the area became flooded. The area was then backfilled and left undisturbed. (Ó Riordáin 1999) Scheduled for inclusion in the next revision of the RMP

APPENDIX 11.2

ARCHAEOLOGICAL FINDS

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Published catalogues of prehistoric material were also studied: Raftery (1983 - Iron Age antiquities), Eogan (1965; 1993; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers) were assessed. Of these, the only record is from the Irish Stone Axe Project Database, UCD.

ISAP No	NMI No	NMI Location	Townland	Object type
5063	Private possession 006	OC7:2	KILCARRA WEST	Stone axehead

APPENDIX 11.3

EXCAVATIONS

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The excavation bulletin website (www.excavations.ie) was consulted to identify previous excavations that have been carried out within the study area. This database contains summary accounts of excavations carried out in Ireland from 1970 to 2020.

1997:616 - KILBRIDE, Wicklow

County:	Wicklow
Site name:	KILBRIDE
SMR No.:	N/A
Licence No.:	97E0324
Author:	Thaddeus C. Breen, 13 Wainsfort Crescent, Dublin 6W, for Valerie J. Keeley Ltd.
Site type:	Bronze Age settlement site
ITM:	E 726923m, N 687384m
Lat, Long:	52.922272, -6.112449
Description:	This site was found during monitoring of topsoil-stripping during the construction of a motorway for Wicklow County Council. An oval foundation trench with a maximum diameter of 7.5m was found. A number of post-holes were found at what appeared to be the entrance, and a few more along the circumference. At one side was a further group of post-holes with no obvious pattern, and nearby were two straight shallow ditches, the longest 3.5m in length, arranged radially. Flints and pottery were found in all of these features. The flints were mostly flakes struck from poor-quality flint. The pottery consisted of decorated sherds of late developed Beaker, Cordoned Urn and Vase. All of it was weathered and found in secondary contexts. A small quantity of cremated human bone was found at the side of one of the post-holes.

1998:683 - ARKLOW BYPASS, Wicklow

County:	Wicklow
Site name:	ARKLOW BYPASS
SMR No.:	N/A
Licence No.:	97E0083
Author:	Breandán Ó Riordáin, Burgage More, Blessington, Co. Wicklow, for Valerie J Keeley Ltd.
Site type:	Various
ITM:	E 724942m, N 676256m
Lat, Long:	52.822771, -6.146166
Description:	Archaeological monitoring of topsoil-stripping on the route of the Arklow Bypass in former tillage fields north of Arklow resulted in the discovery of three sites. *Site 1, N176223* A small area of dark, charcoal-like material that lay 0.23m below the original surface of the ground in sandy, red-brown soil. No other material was associated with this deposit. *Site 2, N176155* This consisted of a deposit of charcoal associated with a scatter of cremated bone. It was in a layer of sandy, brown and reddish brown soil and appeared to have been partially protected by three relatively small field stones. The main deposit measures 0.5m north-south by 0.44m and is a maximum of 0.2m deep. It was apparent that this material, which originally lay c. 0.3m below the original ground surface, has suffered interference as a result of soil-stripping machines moving over the site as some of the charcoal and cremated bone had been spread northwards over a distance of some 4.5m. *Site 3, N176075*

This was initially identified as an area of light grey soil within which were sherds of decorated pottery. Cleaning showed that there were three separate pits present, as well as a larger, linear spread.
Pit A (diameter 0.9m, maximum depth 0.3m) contained a circular deposit of black clay and numerous sherds of pottery, charcoal and a fragment of bone. Six large stones were set around the north-eastern edge of the pit.
Pit B (0.9m north–south, 1m east–west, 0.35m deep) contained numerous sherds of pottery and charcoal and some flints.
Pit C (diameter 0.7m, depth 0.4m) contained sherds of pottery, charcoal and flint as well as fragments of burnt bone in the upper levels. At a lower level were found sherds of pottery and charcoal, but no flint fragments. Five large stones were set around the edge of this feature.
Pit D (diameter 0.48m, depth 0.2m) had a matrix of mid-brown/yellow redeposited sand containing two fragments of flint and occasional fragments of charcoal. A suggestion has been made that this may have been dug to hold a form of marker by which to locate the other three pits.
In excess of fifty sherds of pottery and over thirty flakes of flint, half of which were worked, were found in Pits A, B and C. Examination of the deposits in the pits suggests that there were two separate deposits in each. It was clear from the position of the pottery fragments that the vessels had been broken in antiquity; the potsherds are identifiable as being of Beaker and Food Vessel type. As there was no evidence to suggest the former presence of an associated earthwork, the site may be regarded as a flat cemetery.

2010:837 - Glenart Demesne, Wicklow

County:	Wicklow
Site name:	Glenart Demesne
SMR No.:	N/A
Licence No.:	10E0083
Author:	Gill McLoughlin, Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow.
Site type:	No archaeological significance
ITM:	E 721911m, N 674434m
Lat, Long:	52.807099, -6.191788
Description:	Monitoring was carried out in Glenart Demesne, Arklow, Co. Wicklow, between April and September 2010. Monitoring was required during the construction works associated with the Arklow water supply scheme due to the vicinity of Glenart Castle, 100m north-west of the pipeline route. The scheme traversed the townlands of Glenart, Pollahoney and Ballyfuff North in County Wicklow. This section of the pipeline had a total length of c. 2.5km and travelled through the demesne lands and woodland originally associated with Glenart Castle. Evidence for the raising of the ground level was identified along the old Arklow to Woodenbridge road, where a pre-existing road surface was identified c. 1m below the current ground level. This artificial raising of the surrounding surface was probably undertaken to combat flooding by the nearby river and is probably contemporary with the construction of a stone bridge. Although numerous features were investigated, nothing of archaeological significance was uncovered during the course of works.

2020:109 - Arklow Town Marsh, Tiknock, Ferrybank, Arklow, Wicklow

County:	Wicklow
Site name:	Arklow Town Marsh, Tiknock, Ferrybank, Arklow
SMR No.:	WI040-029
Licence No.:	18E0263
Author:	Siobhan Deery
Site type:	No archaeology found
ITM:	E 724311m, N 673926m
Lat, Long:	52.801987, -6.156409

Description: Archaeological assessment took place in advance of proposed flood alleviation works at the Arklow Town Marsh, Ferrybank, Arklow, County Wicklow. The location of this embankment lies partly within the Zone of Archaeological Potential associated with the historic town of Arklow (WI040-029) and lies in the vicinity of the site of a graveyard (WI040-029008-). Also of historic interest in the vicinity of the proposed works is the site of the 'Ovoca Brewery' which is shown on the six-inch 1st edition Ordnance Survey map. However this area has experienced significant disturbance in recent years.

The assessment incorporated a desk study and the results of archaeological monitoring of site investigation works.

Site investigations were initially to take the form of test pits approximately 2m x 2m, however, due to the wet ground conditions experienced in the marsh area, window sampling in 12 locations took place. No archaeological features, finds or soils were encountered as a result of the on-site archaeological monitoring programme.

Test excavation along the location of a proposed flood embankment was initially proposed, however due to waterlogged ground conditions, the presence of electricity wires and pylons as well as some areas being inaccessible due to overgrown vegetation, it was not possible to carry out this exercise as planned. An alternative archaeological strategy as part of the site enabling works for the project was devised.

Courtney Deery Heritage Consultancy, Lynwood House, Ballinteer Road, Dublin 16

APPENDIX 11.4

NATIONAL INVENTORY OF ARCHITECTURAL HERITAGE

PREPARED BY CRDS LTD.

The recorded archaeological sites within c. 1km of the development are listed below, all noted in the National Inventory of Architectural Heritage (NIAH) for Co. Wicklow (www.archaeology.ie).

Glenart Castle Hotel, GLENART, Arklow, County Wicklow
Reg No: 16404001



Rating:	Regional
Interest:	Architectural
Original Use:	Country house
In Use As:	Hotel
Date:	1810 - 1830
Coordinates:	321830, 174543
Date Recorded:	13/08/2003
Date Updated:	--/--/--
Description:	Detached multiple-bay part two part three and part four-storey toy castle style former mansion, built c.1820 with mid 19th century additions. It is now in use as a hotel. The house is built around the fabric of a hunting lodge. The building is a large sprawling complex comprising of mainly long two-storey wings, projecting canted bays, a porte-cochere and a tall tower. Parapets are all castellated and details include hooded mouldings and bartizans. It is constructed in ashlar granite with later wings finished in render. The window openings are largely flat-headed and filled with timber sash frames, mostly six over six. There are also many windows with double sash and tripartite frames. The building is set within a large wooded demesne with the remains of garden terraces close to the house. At the roadside there are two small matching picturesque gate lodges.
Appraisal:	A large and imposing early 19th-century country house which has been converted to commercial use with minimal loss of character.

Shelton Abbey, SHELTON ABBEY, Arklow, County Wicklow
Reg No: 16404005



Rating:	National
Interest:	Architectural Artistic Historical
Original Use:	Country house
In Use As:	Prison/jail
Date:	1770 - 1775
Coordinates:	322051, 175358
Date Recorded:	12/08/2003
Date Updated:	--/--/--
Description:	Detached eleven-bay two storey former mansion, built in 1770 but remodelled in gothic style to designs by Sir Richard Morrison in 1819. The building is finished with lined render and granite dressings. The decorative panelled front door has a blind fanlight and is set within a pointed-arched opening. This is recessed within a projecting triple arched flat-roofed porch. Window openings are generally set within flat-headed openings; there are some mullioned and transomed arrangements. The front is lavishly embellished with reducing buttresses with tall pinnacles. To the north and rear large two storeys wings were later added. The mainly pitched roof is finished with natural slate and has cast-iron rainwater goods. The building is set within a large wooded demesne. Internally the elaborate plasterwork is still intact.
Appraisal:	An important early 19th century country house which has been very well preserved. At that time the 'Abbey style' was considered appropriate to secluded settings such as this. It has been converted to institutional use with no loss of character.

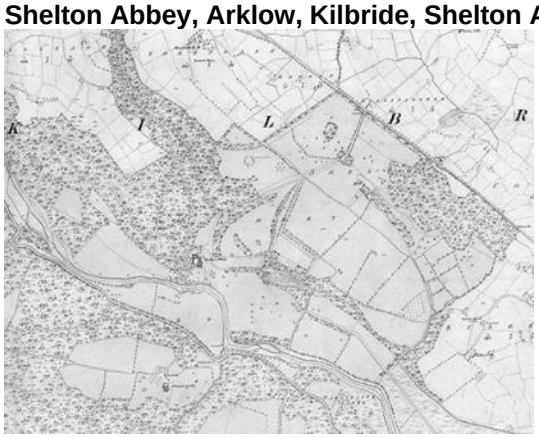
KILBRIDE (AR. BY.) KILBRIDE ED, Arklow, County Wicklow
Reg No: 16404006





Rating:	Regional
Interest:	Architectural
Original Use:	Mausoleum
In Use As:	Mausoleum
Date:	1780 - 1790
Coordinates:	323911, 174988
Date Recorded:	12/08/2003
Date Updated:	--/--/--
Description:	Freestanding single-bay single-stage mausoleum, dated 1785, on a square plan. Granite ashlar pyramidal roof centred on inscribed sarcophagus ("1785"). Rusticated granite ashlar walls on overgrown plinth with cut-granite stringcourse. Set in landscaped grounds of a slightly elevated site.
Appraisal:	A mausoleum erected by Ralph Howard (1726-86), first Viscount Wicklow of Shelton Abbey (see 16404005), representing an important component of the later eighteenth-century built heritage of County Wicklow with the architectural value of the composition, one attributed to Simon Vierpyl (c.1725-1810) of Dublin and London, confirmed by such attributes as the compact square plan form; the construction in a silver-grey granite demonstrating good quality workmanship; and the eye-catching pyramidal silhouette recalling the later Aldborough Mausoleum (1832) in Baltinglass (see 16316022). NOTE: A sarcophagus is inscribed: "Within the walls of the adjoining Church lie interr'd the Remains of M. Dorothea Howard otherwise Hassels Relict of John Howard Esq. Who Departed this Life at Shelton in December 1684 to Whose Memory and that of their Descendants and as a place of Burial for his Family Ralph Viscount Wicklow has caused this Monument to be Erected in the year of our Lord 1785".

Shelton Abbey, Arklow, Kilbride, Shelton Abbey



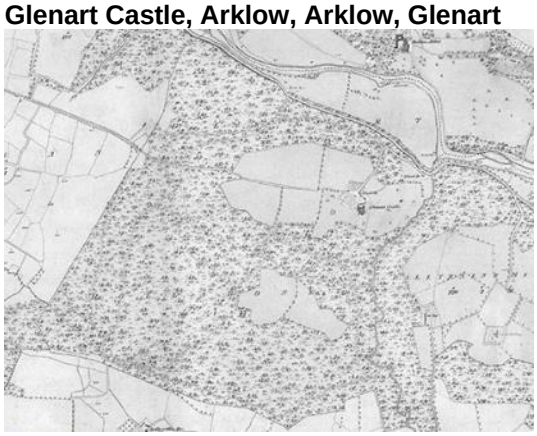


Site ID:	**4251**
Barony / Municipal Borough:	Arklow
Parish:	Kilbride
County:	26
Former County:	Wicklow
Townland:	Shelton Abbey
Present on Ordnance Survey	
First Edition:	yes, sheet 139
Second Edition:	yes
Revised Edition:	yes
Present on Ordnance Survey First Edition 6" Series	
[1836 to 1846]:	Yes
Location on Ordnance Survey 1:50,000	
Sheet No:	62
Grid Letter:	T
Grid Reference:	221754

Initial Overview

Site Footprint Visible	Yes
Boundary Defined	Yes
Significant Development	Yes
General Comments	A factory complex now dominates this site.
Architectural Features	
Principal Building	Yes
Garden Structures	No
Gateways and Gatehouses	No
Buildings of Indeterminate Purpose	No
Movement Within Site	
Entrances have changed	No
Drive position has changed	Yes
Avenues	No
Woodland Drives or Walks	Yes
Landscape Features	
Woodlands	Yes
Woodland Footprint Changed	Yes
Orchards	No
Parkland	No
Formal Garden	Yes
Kitchen / Walled and Productive Gardens	No
Vistas	No
Allees	No
Natural and Naturalistic Water Features	No
Artifical Water Features	No
Other Features	No
Section Comments	No

Glenart Castle, Arklow, Arklow, Glenart





Site ID:	**4417**
Barony / Municipal Borough:	Arklow
Parish:	Arklow
County:	26
Former County:	Wicklow
Townland:	Glenart
Present on Ordnance Survey	
First Edition:	yes, sheet 139
Second Edition:	yes
Revised Edition:	yes
Present on Ordnance Survey First Edition 6" Series [1836 to 1846]:	Yes
Location on Ordnance Survey 1:50,000	
Sheet No::	62
Grid Letter::	T
Grid Reference:	218745

Initial Overview

Site Footprint Visible	Yes
Boundary Defined	Yes
Significant Development	No
Architectural Features	
Principal Building	Yes
Garden Structures	No
Gateways and Gatehouses	No
Buildings of Indeterminate Purpose	No
Movement Within Site	
Entrances have changed	Yes
Drive position has changed	Yes
Avenues	No
Woodland Drives or Walks	Yes
Landscape Features	
Woodlands	Yes
Woodland Footprint Changed	No
Orchards	No
Parkland	Yes
Formal Garden	No
Kitchen / Walled and Productive Gardens	Yes
Vistas	No
Allees	No
Natural and Naturalistic Water Features	No
Artifical Water Features	No
Other Features	No

APPENDIX 11.5

WICKLOW COUNTY COUNCIL DEVELOPMENT PLAN
RECORD OF PROTECTED STRUCTURES

PREPARED BY CRDS LTD.

Extracts from the Wicklow County Development Plan 2016-2022 are given below.

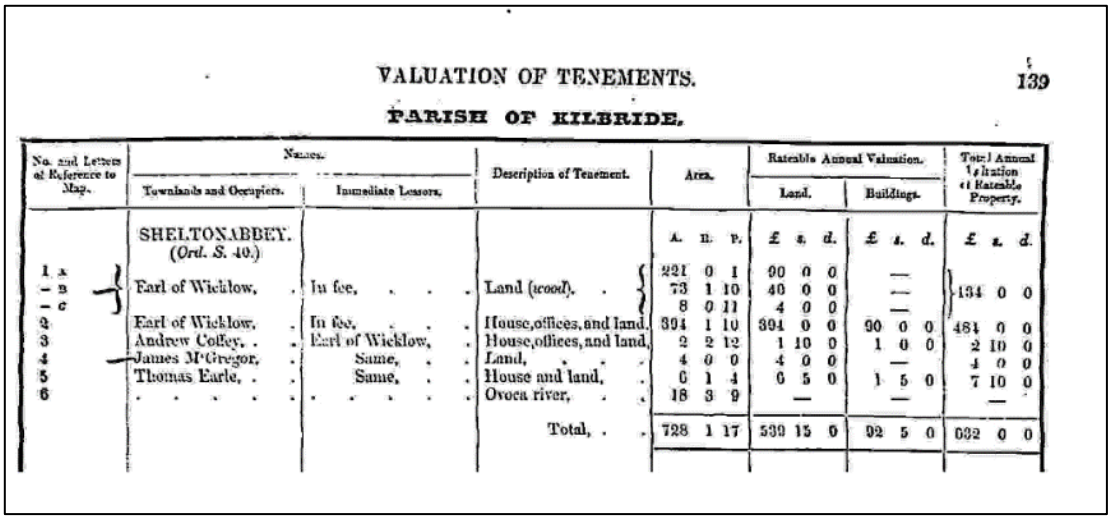
REF. NO.	OTHER REF	BUILDING ADDRESS	STRUCTURE	TOWNLAND	DESCRIPTION	PHOTO
40-02	40	Glenart Castle	Country House	Glenart Td	Large, late-19th Century gothic-revival house of various dates. At the rear is a rectangular-plan tower of opus incertum while in front is a cement-rendered, two-storey range with English crenellations and a full-height-half-octagon bow. There is a long range at right-angles which is a later addition.	
40-05	40	Shelton Abbey	Country House	Shelton Abbey Td	An extensive house designed by William Vitruvius Morrison to resemble a romantic abbey. The façade is of eight bays and two storeys with a two-bay breakfront, porte cochaire, buttresses and pinnacles. The building is highly decorative externally and internally.	
40-07		Howard Mausoleum, Kilbride , Arklow	Mausoleum		Freestanding mausoleum erected 1785 by Ralph Howard Viscount of Wicklow. The structure is constructed in ashlar granite. It comprises a tall square-based pyramid set on a high square base. At the base of the rise is a small Egyptian style structure with a temple front and tetrastyle in-antis portico. The mausoleum is set within a small graveyard and is of historic and architectural interest. NIAH 16404006	

APPENDIX 11.6

GRIFFITH'S VALUATION

PREPARED BY CRDS LTD.

Griffiths Valuation was the first full-scale valuation of property in Ireland, overseen by Richard Griffith and published between 1847 and 1864. It is one of the most important surviving 19th century genealogical sources (http://www.askaboutireland.ie/griffith-valuation/).



VALUATION OF TENEMENTS. 139

PARISH OF KILBRIDE.

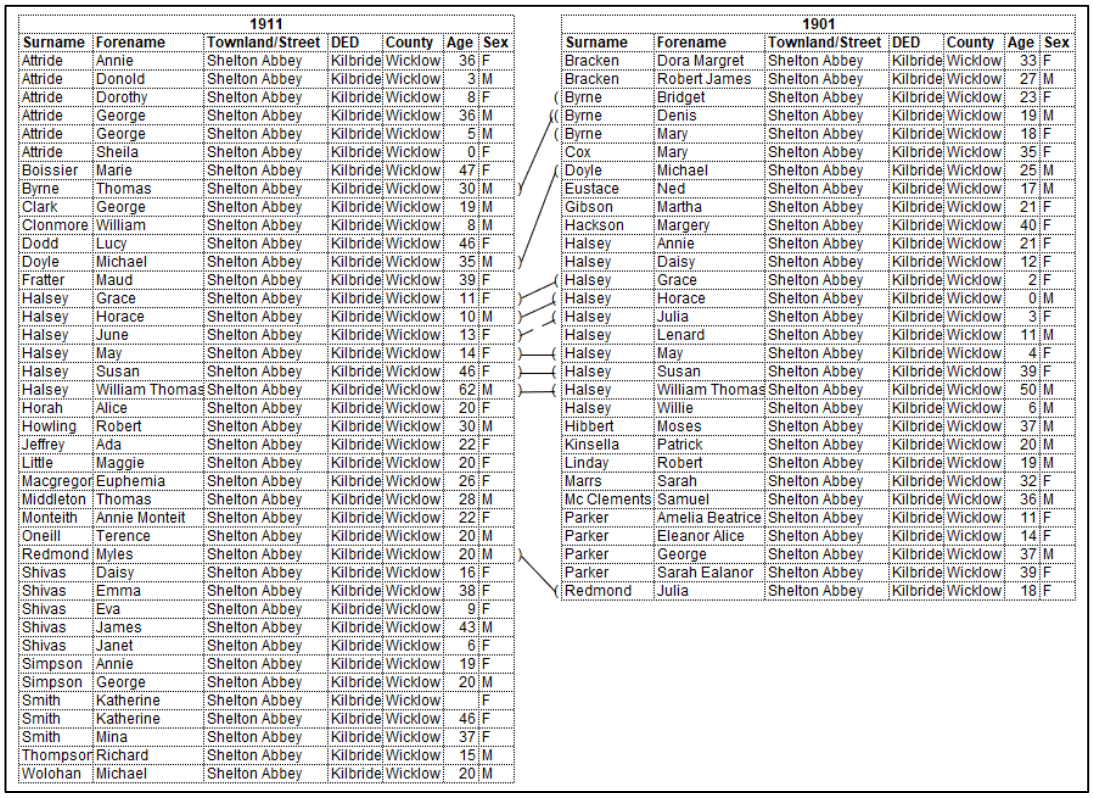
No. and Letters of Reference to Map.	Names. Townlands and Occupiers.	Names. Immediate Lessors.	Description of Tenement.	Area. A.	R.	P.	Rateable Annual Valuation. Land. £	s.	d.	Buildings. £	s.	d.	Total Annual Valuation of Rateable Property. £	s.	d.
	SHELTONABBEY. (*Ord. S.* 40.)														
1 a	Earl of Wicklow,	In fee,	Land (*wood*),	221	0	1	90	0	0	—			134	0	0
– b				73	1	10	40	0	0	—					
– c				8	0	11	4	0	0	—					
2	Earl of Wicklow,	In fee,	House, offices, and land,	394	1	10	394	0	0	90	0	0	484	0	0
3	Andrew Coffey,	Earl of Wicklow,	House, offices, and land,	2	2	12	1	10	0	1	0	0	2	10	0
4	James M'Gregor,	Same,	Land,	4	0	0	4	0	0	—			4	0	0
5	Thomas Earle,	Same,	House and land,	0	1	4	0	5	0	1	5	0	7	10	0
6	. . . . .	. . . . .	Ovoca river,	18	3	9		—			—			—	
			Total,	728	1	17	539	15	0	92	5	0	632	0	0

APPENDIX 11.7

NATIONAL CENSUS

PREPARED BY CRDS LTD.

The National Archives comprises the files of the former State Paper Office (SPO) and the Public Record Office of Ireland (PROI). The SPO was established in 1702 as a repository for records relating to the administrations of the various Lords Lieutenant (the English monarch's representative in Ireland). The PROI was established under the Public Records (Ireland) Act, 1867 to acquire administrative, court and probate records over twenty years old (http://www.census.nationalarchives.ie/search/).



1911

Surname	Forename	Townland/Street	DED	County	Age	Sex
Attride	Annie	Shelton Abbey	Kilbride	Wicklow	36	F
Attride	Donold	Shelton Abbey	Kilbride	Wicklow	3	M
Attride	Dorothy	Shelton Abbey	Kilbride	Wicklow	8	F
Attride	George	Shelton Abbey	Kilbride	Wicklow	36	M
Attride	George	Shelton Abbey	Kilbride	Wicklow	5	M
Attride	Sheila	Shelton Abbey	Kilbride	Wicklow	0	F
Boissier	Marie	Shelton Abbey	Kilbride	Wicklow	47	F
Byrne	Thomas	Shelton Abbey	Kilbride	Wicklow	30	M
Clark	George	Shelton Abbey	Kilbride	Wicklow	19	M
Clonmore	William	Shelton Abbey	Kilbride	Wicklow	8	M
Dodd	Lucy	Shelton Abbey	Kilbride	Wicklow	46	F
Doyle	Michael	Shelton Abbey	Kilbride	Wicklow	35	M
Fratter	Maud	Shelton Abbey	Kilbride	Wicklow	39	F
Halsey	Grace	Shelton Abbey	Kilbride	Wicklow	11	F
Halsey	Horace	Shelton Abbey	Kilbride	Wicklow	10	M
Halsey	June	Shelton Abbey	Kilbride	Wicklow	13	F
Halsey	May	Shelton Abbey	Kilbride	Wicklow	14	F
Halsey	Susan	Shelton Abbey	Kilbride	Wicklow	46	F
Halsey	William Thomas	Shelton Abbey	Kilbride	Wicklow	62	M
Horah	Alice	Shelton Abbey	Kilbride	Wicklow	20	F
Howling	Robert	Shelton Abbey	Kilbride	Wicklow	30	M
Jeffrey	Ada	Shelton Abbey	Kilbride	Wicklow	22	F
Little	Maggie	Shelton Abbey	Kilbride	Wicklow	20	F
Macgregor	Euphemia	Shelton Abbey	Kilbride	Wicklow	26	F
Middleton	Thomas	Shelton Abbey	Kilbride	Wicklow	28	M
Monteith	Annie Monteit	Shelton Abbey	Kilbride	Wicklow	22	F
Oneill	Terence	Shelton Abbey	Kilbride	Wicklow	20	M
Redmond	Myles	Shelton Abbey	Kilbride	Wicklow	20	M
Shivas	Daisy	Shelton Abbey	Kilbride	Wicklow	16	F
Shivas	Emma	Shelton Abbey	Kilbride	Wicklow	38	F
Shivas	Eva	Shelton Abbey	Kilbride	Wicklow	9	F
Shivas	James	Shelton Abbey	Kilbride	Wicklow	43	M
Shivas	Janet	Shelton Abbey	Kilbride	Wicklow	6	F
Simpson	Annie	Shelton Abbey	Kilbride	Wicklow	19	F
Simpson	George	Shelton Abbey	Kilbride	Wicklow	20	M
Smith	Katherine	Shelton Abbey	Kilbride	Wicklow		F
Smith	Katherine	Shelton Abbey	Kilbride	Wicklow	46	F
Smith	Mina	Shelton Abbey	Kilbride	Wicklow	37	F
Thompson	Richard	Shelton Abbey	Kilbride	Wicklow	15	M
Wolohan	Michael	Shelton Abbey	Kilbride	Wicklow	20	M

1901

Surname	Forename	Townland/Street	DED	County	Age	Sex
Bracken	Dora Margret	Shelton Abbey	Kilbride	Wicklow	33	F
Bracken	Robert James	Shelton Abbey	Kilbride	Wicklow	27	M
Byrne	Bridget	Shelton Abbey	Kilbride	Wicklow	23	F
Byrne	Denis	Shelton Abbey	Kilbride	Wicklow	19	M
Byrne	Mary	Shelton Abbey	Kilbride	Wicklow	18	F
Cox	Mary	Shelton Abbey	Kilbride	Wicklow	35	F
Doyle	Michael	Shelton Abbey	Kilbride	Wicklow	25	M
Eustace	Ned	Shelton Abbey	Kilbride	Wicklow	17	M
Gibson	Martha	Shelton Abbey	Kilbride	Wicklow	21	F
Hackson	Margery	Shelton Abbey	Kilbride	Wicklow	40	F
Halsey	Annie	Shelton Abbey	Kilbride	Wicklow	21	F
Halsey	Daisy	Shelton Abbey	Kilbride	Wicklow	12	F
Halsey	Grace	Shelton Abbey	Kilbride	Wicklow	2	F
Halsey	Horace	Shelton Abbey	Kilbride	Wicklow	0	M
Halsey	Julia	Shelton Abbey	Kilbride	Wicklow	3	F
Halsey	Lenard	Shelton Abbey	Kilbride	Wicklow	11	M
Halsey	May	Shelton Abbey	Kilbride	Wicklow	4	F
Halsey	Susan	Shelton Abbey	Kilbride	Wicklow	39	F
Halsey	William Thomas	Shelton Abbey	Kilbride	Wicklow	50	M
Halsey	Willie	Shelton Abbey	Kilbride	Wicklow	6	M
Hibbert	Moses	Shelton Abbey	Kilbride	Wicklow	37	M
Kinsella	Patrick	Shelton Abbey	Kilbride	Wicklow	20	M
Linday	Robert	Shelton Abbey	Kilbride	Wicklow	19	M
Marrs	Sarah	Shelton Abbey	Kilbride	Wicklow	32	F
Mc Clements	Samuel	Shelton Abbey	Kilbride	Wicklow	36	M
Parker	Amelia Beatrice	Shelton Abbey	Kilbride	Wicklow	11	F
Parker	Eleanor Alice	Shelton Abbey	Kilbride	Wicklow	14	F
Parker	George	Shelton Abbey	Kilbride	Wicklow	37	M
Parker	Sarah Ealanor	Shelton Abbey	Kilbride	Wicklow	39	F
Redmond	Julia	Shelton Abbey	Kilbride	Wicklow	18	F

12.0 TRAFFIC AND TRANSPORTATION

12.1 INTRODUCTION

The Applicant is applying to Wicklow County Council for planning permission for the provision of an energy centre with ancillary works within the Avoca River Park approximately 2.5 km northwest of Arklow town centre.

The subject site is located to the north of the Avoca River, in Avoca River Park. The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The site of the proposed development comprises approximately 5.01 hectares of land. The wider adjacent landholding is subject to an extant permission (Planning Application No. 18940) for a data storage facility and ancillary development. There is also a permission (Planning Application No. 201285) which updates the extant proposals together with SID applications for a 110kV GIS substation and associated works (ABP Ref 309252, which has been subject to an order to grant permission), and 220kV Substation and Grid Connection (ABP Ref 310090, which is currently under consideration)). The site is currently occupied by open scrub land with some trees and was formerly in use as a landfill.

Figure 12.4 below and red line boundary presents the lands subject to this planning application.

12.2 METHODOLOGY

This chapter has been prepared following Draft EPA Guidance on EIAR (2017) and taking the following documents into account:

- 'Wicklow County Development Plan 2016 – 2022' (Wicklow County Council, December 2016); and
- Arklow Environs and Local Area Plan (2018 – 2024);
- TII Traffic and Transport Assessment Guidelines (PE-PDV-02045) (May 2014);
- TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projects (PE-PAG-02017) – May 2019;
- Avoca River Park Proposed Data Centre Development Environmental Impact Assessment Report - Crag Digital Avoca Limited Aecom - PR-289532 August 2020;
- Infrastructure Report Echelon Data Centres Aecom – PR-60568620 July 2020;
- DUB 20 –Transport Statement DBFL August 2021;
- Environmental Impact Assessment Report Proposed 110kV GIS Substation Compound and Associated and Ancillary Works, Arklow (AWN) December 2020;
- Arklow Bank Wind Park Phase 2 Onshore Grid Infrastructure Environmental Impact Assessment Report Arup April 2021.

- The methodology used to conduct the assessment includes:

- Establishing baseline conditions – The existing conditions will be recorded including existing site location and use, surrounding road network, public transport services;
- Defining the development – This includes size, use, parking, staffing, trip distribution for the construction and operational stages of the development;

- Assess the potential impact of the development on the existing local transport network and its ability to carry the development traffic;

- Mitigation measures will then be proposed to offset any impacts that may result from the development.

12.3 RECEIVING ENVIRONMENT

12.3.1 Existing Road Access

12.3.1.1 Avoca River Park Access Road

The Avoca River Park Access Road is a 2-lane private single carriageway providing access to Avoca River Park. The carriageway width is approximately 7.0 m with no existing footways or cycle lanes. The speed limit on the road is predominantly 50km/h, with a short section limited to 80km/h reducing to a limit of 15km/h at the gates to the business park.

12.3.1.2 Kilbride Road

Kilbride is a single lane carriageway Regional Road running in a west to east direction, and vice versa. Kilbride connects to Beech Road from the east with a priority junction. The carriageway width is approximately 7.0 m with no existing footpaths or cycle lanes. Double yellow lines are situated on the both sides of the carriageway. The speed limit on Kilbride Road is 50km/h.

12.3.1.3 Beech Road

Beech Road is a single carriageway with width of approximately 7.0 m with a footway provided on the northern side of the carriageway. The speed limit on Beech Road is 50 km/h between the junction with R772 Dublin Road and Kilbride Road. Beyond Kilbride Road the road is subject to an 80 km/h speed limit.

Beech Road is well utilised during the morning and evening peak hours by commuters travelling towards Kilbride Industrial Estate in the morning peak, and vehicles departing Kilbride Industrial Estate in the evening peak.

12.3.1.4 R772

The R772 is a 2-lane single carriageway Regional Road running in a north south direction between M11 Junction 20 and Arklow.

The section north of Beech Road is subject to an 80 km/h speed limit. A pedestrian footway is provided on the eastern side of the carriageway with an on-road cycle lane provided on the western side of the carriageway which ends 400 m to the north of the junction of Beech Road. Frontage development on the north section of the R772

is limited to a few residential properties though these are well set back from the carriageway.

The section of the R772 south of Beech Road is subject to a 50 km/h speed limit. The road is suburban in nature with footways provided on either side of the carriageway and is street lit. Along the route, the road passes Templerainey Church, St Joseph's National School and a local convenience store in addition to residential properties on either side of the carriageway.

12.3.1.5 M11 Motorway

The M11 motorway connects Ashford with Enniscorthy, running in a southerly direction and vice versa. Access to the proposed site from the motorway is achieved via Junction 20. The on-slip – off-slip arrangements at Junction 20, M11 are summarised as follows:

- M11 Southbound Off-Slip R772 / Southbound On-Slip Roundabout Junction;
- M11 Northbound Off-Slip L2172/ Northbound On-slip Roundabout Junction.



Figure 12.1 *Location Plan* *© Openstreetmap Contributors*

12.3.2 Existing Public Transport

The closest bus stops to the site are located along the R772 at Ferrybank approximately 5km east of the site. These bus stops are operated by Bus Éireann and private companies. These services travel towards Dublin and Wexford Town. Services operate at up to one hour intervals during the day.

Wexford Bus also operates the 740 service with several services per day between Wexford and Dublin Airport. The nearest bus stop to Arklow is outside the Town by Junction 20 of the M11 motorway approximately 3.8 km from the site.

The closest railway station to the site is Arklow Train Station, located 7km to the south east of the development. It provides commuter rail services north to Dublin Connolly and south towards Rosslare Eurosport.

Given the distance to the nearest railway station, it is unlikely that travelling to work by train would be a feasible mode of transport for workers.

12.3.3 Road Safety

As part of the completion of this chapter, an assessment of collision statistics as published by the Road Safety Authority (RSA) was conducted. Collision statistics for 2005-2016 were reviewed. The collision statistics give information for fatal, serious or minor collisions.

Inspection shows there has been two minor collisions recorded within the vicinity of the subject site. The results of the analysis identify one incident at the Avoca River Park Access Road/Shelton Abbey junction and another further east on the River Park Access road. Both collisions were recorded as a minor vehicle collision but do not indicate any reoccurring collision hotspots or traffic concerns with the existing road network.

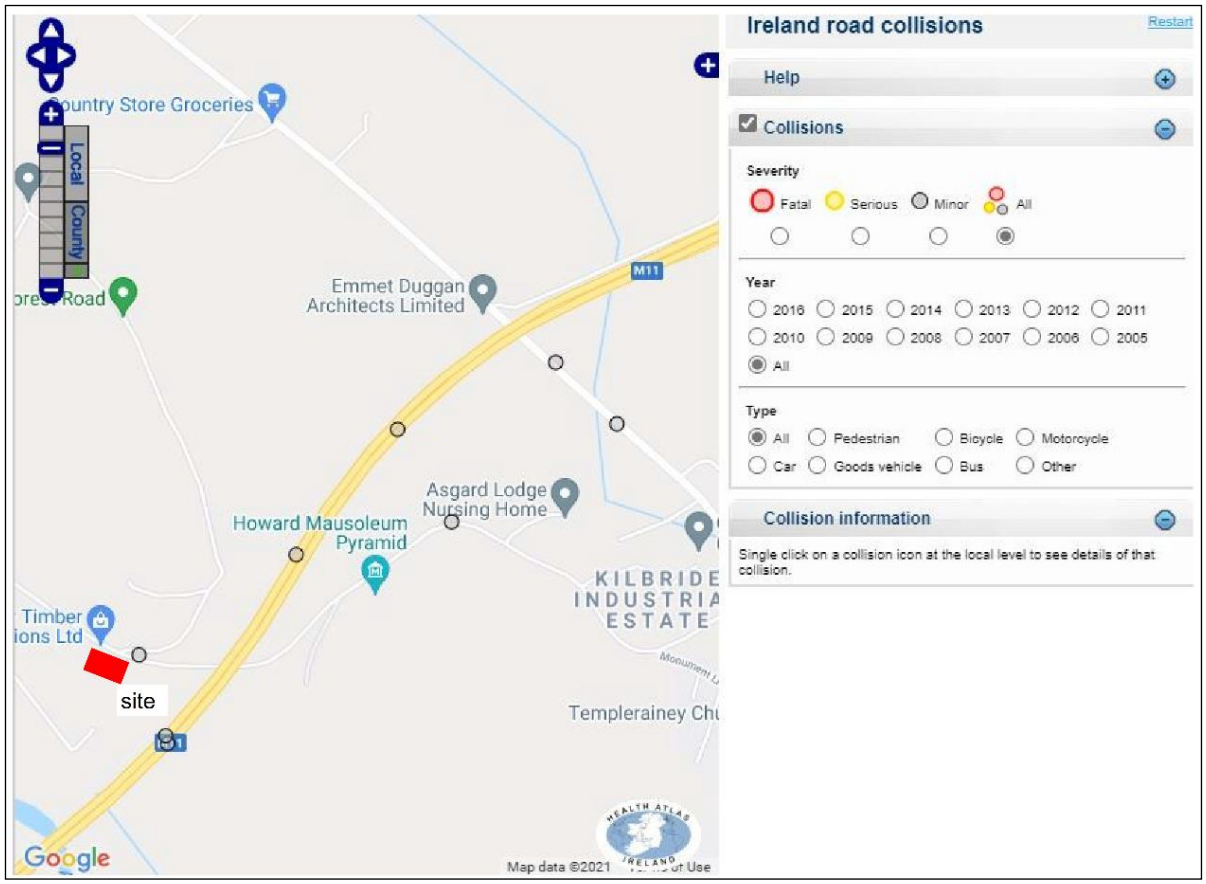


Figure 12. 2 *Collision Locations*

12.3.4 Existing Traffic Flow

In order to establish the existing local road network's traffic characteristics and subsequently enable the identification of the potential impact of the proposed development, traffic surveys (weekday classified junction turning counts) were conducted on Tuesday the 1st of May 2018 at the following locations:

- Junction 1: R772 / Beech Road Priority Junction; and
- Junction 2: Beech Road / Kilbride Road Priority Junction.

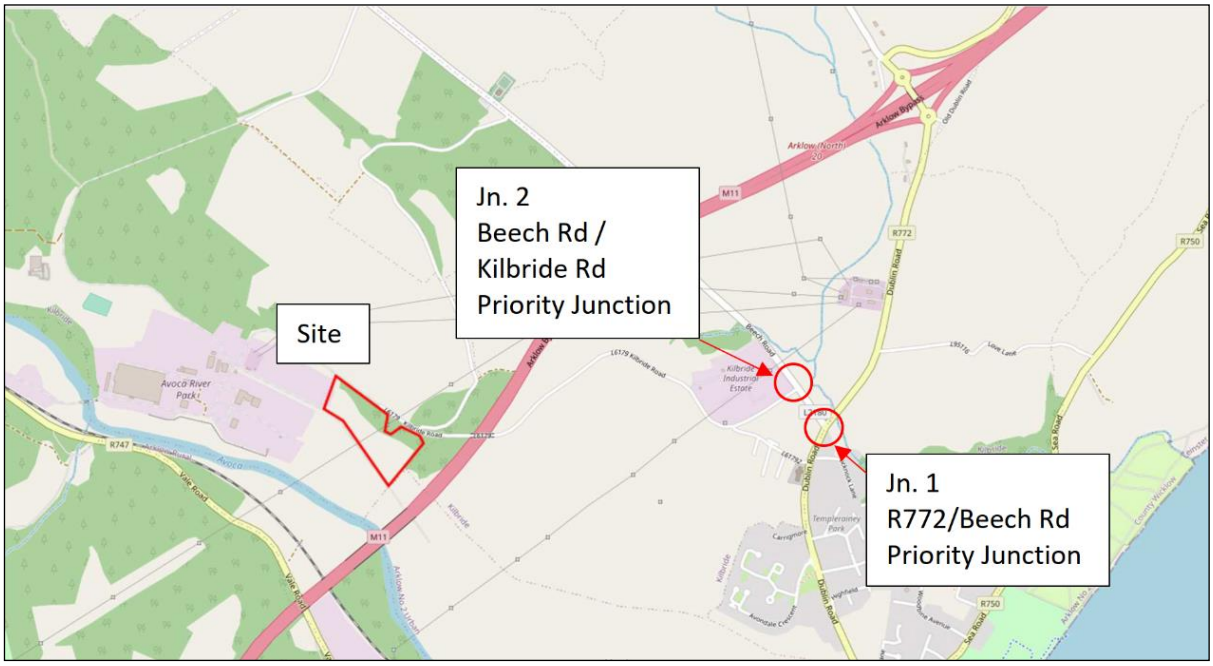


Figure 12.3 *Junction Locations*

The traffic survey data is set out in Appendix 12.1. Baseline flows (pcu's) for the junctions for 2018 are set out in Table 12.1 below:

Table 12.1 *2018 Baseline Flows*

Junction	AM Peak (PCU's)	PM Peak (PCU's)
J1: R772 / Beech Road	951	978
J2: Beech Road / Kilbride Road	382	440

Traffic growth rates from TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projects (PE-PAG-02017) – May 2019 are used to forecast future flows. Table 6.2 Central Growth Figures for Wicklow (LV) are used as the percentage of heavy vehicles (HV's) is insignificant. Construction is to commence in 2022 and is programmed to be completed within an eighteen-month time frame. Therefore, for construction and opening year the growth rate to be applied will be:

2018-2022 $1.0157^4 = 1.064$
2018-2023 $1.0157^5 = 1.081$

12.4 CHARACTERISTICS OF THE DEVELOPMENT

12.4.1 Construction Phase

The development site comprises existing primarily brownfield lands. Construction activities will be contained within the boundary of the site. There will be a requirement for haulage of unusable earthworks material together with importation of engineering fill to raise site levels. Construction materials will need to be brought to the site as will specialist plant. It is anticipated that these deliveries will occur throughout the day.

The number of construction operatives attending the site by vehicular means will result in a maximum of 103 vehicles per day accessing the site. It is anticipated that the majority of site operatives (80%) will arrive at the proposed construction site prior to the morning peak hour (08:00 – 09:00) on the surrounding road network. Furthermore in the evening peak hour, 25% of the site operatives are projected to depart outside of the evening peak hour (16:00 – 17:00) on the surrounding road network.

It is estimated that the peak number of construction deliveries to the site will be during the importation of stone, which will comprise 76 HGV's trips per day. These deliveries would be spread over a 10-hour working day, equating to 8 HGV trips per hour.

The combined impact of construction staff trips and HGV's will result in an additional 37 passenger car units (PCU) AM peak hour and 89 PCU PM peak hour trips on the surrounding road network.

Construction phase work will occur over a period of approximately eighteen months.

12.4.2 Operational Phase

The site is located within the Avoca River Park and includes provision of an energy centre with ancillary works. The proposed development also includes signage and boundary treatments; and all necessary site works above and below ground level.

A priority junction access to the site will be constructed off the Avoca River Park Access Road near the location of the existing field entrance to the site. The access will connect to internal site roads which will service the various sections of the energy centre. The access is a minimum of 6 metres wide to facilitate two-way flow. The access will also facilitate delivery of large equipment used for power generation together with liquid fuel deliveries in situations where alternative fuel supplies are necessary.

The internal layout of the site has been designed to give clear, legible routes for motorists to enter and exit the development. The site layout is set out in Figure 12.4 below.

The proposed development does not require any full time staff to operate it on a daily basis. It is forecast that there will be vehicle movements daily to the site for site maintenance purposes, together with some additional infrequent site visits for infrastructure maintenance. The number of visits equates to one van per day – or two trips. For the purposes of this assessment it is conservatively assumed that these will occur at the peak hour of the surrounding road network. Additionally, there will be liquid fuel supplies required to the back-up fuel system involving tanker supplies. These will be minimal, intermittent and are assumed to occur outside peak hours.

12.4.2.1 Car Parking

The site has access hard stand areas surrounding energy centre. six no. car spaces will be provided for visiting workers.

12.4.2.2 Cycle Parking

Four cycle parking spaces are proposed as part of the Proposed Development as all maintenance personnel servicing the site are expected to arrive via Light Vehicles (LV).

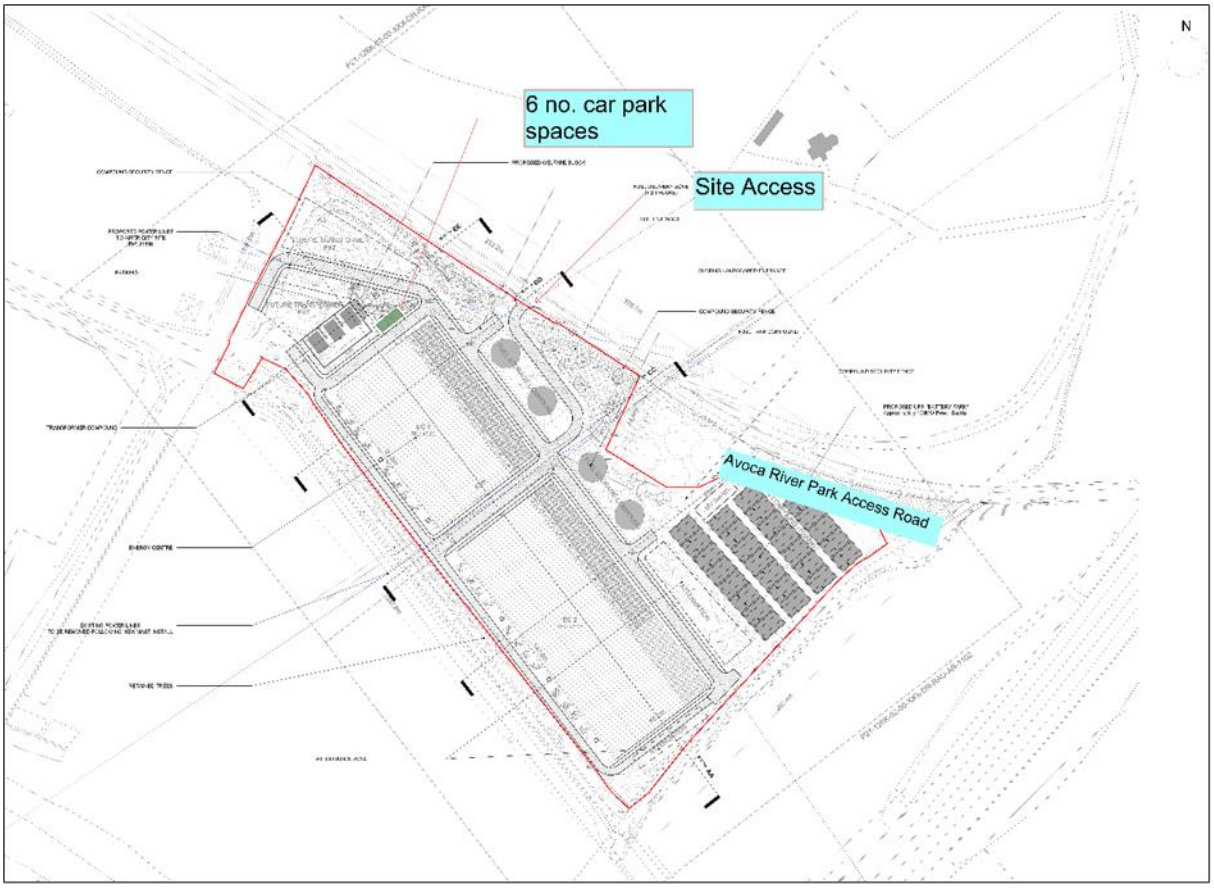


Figure 12.4 *Site Layout*

12.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

12.5.1 Construction Phase

The delivery to site of materials will be spread throughout the day and its impact on the existing road infrastructure is considered to relatively minor. All vehicles will have sufficient space within the site to manoeuvre and turn around.

Parking for construction operatives will be within the site.

The impacts of site operative and construction vehicles on the peak hours on the surrounding road network will be reduced by the offset nature of trips from that of the receiving road network in the case of the AM traffic. Overall, the construction stage traffic will not be of significant quantity.

Overall, there will negligible impact due to the construction phase works.

12.5.2 Operational Phase

The resultant number of peak hour trips due to the development will be negligible arising from the expected single inward and outward trips.

On the basis of the TII Traffic and Transport Guidelines (May 2014), as traffic generation is negligible the impact on surrounding junctions will be significantly below the 10% of the existing two-way traffic flow, and therefore modelling is not required.

12.6 REMEDIAL AND MITIGATION MEASURES

12.6.1 Construction Phase

A draft Construction Environmental Management Plan (CEMP) has been submitted as part of this application. The Contractor will develop this further for the construction phase. The plan will include measures to minimise the impacts associated with the construction phase upon the peak periods on the surrounding road network. The measures will include; use of site wheel wash, road sweeping of local roads and agreed routing of vehicles.

HGV trips are anticipated to arrive and depart the site at a uniform rate throughout the day, to avoid pressure on the morning and evening peak hour periods. However, monitoring of traffic will be carried as part of a Construction Traffic Management Plan which will be prepared prior to commencement of works on site, and measures will be put in place to minimise the impact of construction traffic on the surrounding road network.

All contractors' vehicles will park within the development site area, it is recommended that as part of the Construction Environmental Management Plan (CEMP) the contractor will be required to designate an area within the confines of the site dedicated to operative car parking. There will be no parking permitted on the surrounding road network by the contractor or site operatives.

12.6.2 Operational Phase

The traffic impact estimated for this are significantly below the thresholds stated in the TII Guidelines for *Traffic and Transport Assessments, 2014* for junction analysis. Therefore, no junction modifications are recommended on the public road to facilitate the Proposed Development.

12.7 PREDICTED IMPACTS OF THE DEVELOPMENT

12.7.1 Construction Phase

Construction works will include site levelling works at the site, and these will largely be contained within the site. There will be materials required for the building works, and deliveries will spread throughout the working day. Construction operatives will travel to and from the site, but the anticipated timings of trips will largely be offset from the peak times on the local road network. Based on the assessment of the network junctions there will be insignificant impacts on the receiving traffic and transportation environments. The impact of construction works will be ***short term, not significant and neutral***.

12.7.2 Operational Phase

The proposed development will have an imperceptible impact on the road network, in particular the junctions in the proximity of the development. Overall the impact of the development will be ***long term*** in duration of ***imperceptible neutral*** effect. The proportional traffic increase through the relevant junctions with the Proposed Development are significantly below the thresholds stated in the *TII Guidelines for Traffic and Transport Assessments, 2014* for junction analysis.

12.8 CUMULATIVE IMPACTS OF THE DEVELOPMENT

12.8.1 Construction Phase

The potential for impact on transportation during construction primarily arises from additional trips due to the works associated with the development as well as other developments in the vicinity of the site. The developments considered include those previously approved, and in the interests of conservativeness other associated developments that are proposed, but are currently still under consideration by An Bord Pleanála are also considered. The following developments are considered from a cumulative impact perspective:

- Avoca River Park Proposed Data Centre (WCC Planning Application No. 201285) (approved);
- Arklow Bank Wind Park Phase 2 Onshore Grid Infrastructure (including 220kV substation) (ABP Ref 310090) (application);
- 110kV GIS Substation Compound and Associated and Ancillary Works (ABP Ref 309252) (approved);
- Avoca River Park - Timber Factory Extension (Ref 19332) (approved).

The junctions using 2018 baseline traffic survey data as previously assessed for the Avoca River Park Proposed Data Centre were evaluated – refer to section 12.3.4. Consideration is made of the potential concurrent timings of the various developments in the context of the Energy Centre construction timeline.

From Table 12.2 overleaf, the worst case situation for the cumulative development during the construction of the Energy Centre will occur in 2023 where developments 1 and 3 could also be under construction.

The turning proportions for the Energy Centre are assumed to be the same as those used for the nearby data centre development.

The resultant traffic flows on the network for the peak hours is set out in Appendix 12.2.

Table 12.2 *Development Timelines and Traffic Generation*

Other Development	Construction Timeline	Construction or Operational	AM Peak Traffic (PCU's)		PM Peak Traffic (PCU's)	
			in	out	in	out
1. Data Centre Development	Q3 2021-Q4 2023	Construction	44	4	64	68

2. 110kV Substation Development	Q3 2021-Q4 2021	Operational	1	1	1	1
3. 220kV Sub Station and Grid Connection	2023-2025	Construction	72	54	54	112
Other Committed Development						
4. Avoca River Park - Timber Factory Extension (Ref 19332)	-	Operational	4	4	4	4
Total			**121**	**63**	**63**	**185**
Energy Centre	Q3 2022 – Q4 2023	Construction	**29**	**8**	**6**	**83**

12.8.1.1 Junction Assessments

Junction 1

The operational assessment of the local road network at Junction 1 – R772 / Beech Road priority junction was undertaken using the Transport Research Laboratory (TRL) Junctions 9 for non-signalised junctions. Full output from all junction assessments is set out in Appendix 12.3.

Table 12.3 *Junction 1 – Construction Phases Junction Assessment*

	AM				PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**Network Residual Capacity**	**Queue (PCU)**	**Delay (s)**	**RFC**	**Network Residual Capacity**
	2023 with Committed Development							
Stream B-C	0.3	9.4	0.26	32%	1.8	20.8	0.65	2%
Stream B-A	0.6	17.4	0.39		1.5	32.0	0.62	
Stream C-AB	0.9	8.5	0.42		0.8	6.4	0.33	
	2023 with Committed and Proposed Development							
Stream B-C	0.4	9.1	0.28	35%	3.6	38.4	0.80	-6%
Stream B-A	0.7	16.7	0.41		2.8	54.6	0.76	
Stream C-AB	1.2	9.1	0.48		0.8	6.4	0.34	

Where:

- Arm A – R772 South
- Arm B – Beech Road
- Arm C – R772 North.

The parameters shown in the tables are defined as follows:

- **Ratio of Flow to Capacity (RFC)** is a factor indicating the flow on a junction arm relative to its capacity. An RFC of 1.0 means the junction has reached its ultimate capacity and an RFC of 0.85 means that the junction has reached its reserve capacity;

- **Queue** is the average number of vehicles queued over the time period on the junction approach;

- **Queue delay** is the maximum value of average delay per arriving vehicle;

- **Network Residual Capacity** indicates the amount by which network flow could be increased before a threshold of 0.85 RFC is met.

From the above assessment it can be seen that Junction 1 with 'committed' development together with the proposed development construction traffic would be operating below capacity during the AM peak whilst the junction would be operating near capacity for the PM peak in the 2023 assessment year.

Junction 2

The operational assessment of the local road network at Junction 2 – Beech Road / Kilbride Road priority junction was also undertaken using the Transport Research Laboratory (TRL) Junctions 9 for non-signalised junctions.

Table 12.4 Junction 1 – Construction Phases Junction Assessment

	AM				PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**Network Residual Capacity**	**Queue (PCU)**	**Delay (s)**	**RFC**	**Network Residual Capacity**
	2023 with Committed Development							
Stream B-C	0	6.6	0.01	172%	0.1	8.4	0.06	31%
Stream B-A	0.3	8.7	0.21		1.4	16.6	0.58	
Stream C-AB	0.1	5.4	0.05		0	5.3	0.02	
	2023 with Committed and Proposed Development							
Stream B-C	0	6.7	0.01	133%	0.2	10.7	0.15	11%
Stream B-A	0.3	9.4	0.25		2.3	24.1	0.71	
Stream C-AB	0.1	5.5	0.07		0	5.3	0.02	

Where
- Arm A – Beech Road East
- Arm B – Kilbride Road
- Arm C –Beech Road West

From the above assessment it can be seen that Junction 2 with 'committed' development together with the proposed development construction traffic would be operating below capacity during both peaks in the 2023 assessment year.

Given the short term nature of the peak construction phase, the overall impact of the construction phase accounting for all of the potential developments is considered to have a **slight** impact on the performance of the junctions under study.

Contractors for the proposed development will be contractually required to operate in compliance with a Construction Environmental Management Plan CEMP which will include the mitigation measures outlined in this EIA report. As a result, there will be a minimal impact on the receiving environment. The cumulative impact is considered to be ***short term, neutral and slight.***

12.8.2 Operational Phase

The proposed development will necessitate a negligible number of additional movements of vehicles on the local road network. The construction of the adjacent data centre and other developments will result in additional traffic within the local

environment. The development will have a cumulative impact on the broader transportation environment. Even accounting for background traffic growth the development will not have a significant impact capacity of the local network. The cumulative effects of the operation of the proposed development is concluded to be of ***long*** term, ***imperceptible*** with a ***neutral*** impact on traffic and transportation quality in the local environment.

12.9 RESIDUAL IMPACTS

The volumes of traffic generated from the proposed development will have an insignificant effect on the road network traffic volumes and can be considered within the norms for development in such zoned lands. The residual traffic impacts of the development will be ***imperceptible.***

Appendix 12.1
Traffic Survey

Irish Traffic Surveys Ltd

Survey Name : ITS J199 Kilbride / Avoca
Site: 1
Date: 01.15.18
Location:



Irish Traffic Surveys

	A => A							A => B							A => C							B => A						
TIME	MCL	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MCL	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MCL	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MCL	CAR	LGV	OGV1	OGV2	BUS
07:00	0	0	0	0	0	0	0	0	0	10	6	3	0	1	20	22.5	0	7	3	0	0	0	10	10	0	64	9	3	0	2
07:15	0	0	0	0	0	0	0	0	0	9	1	4	0	1	15	18	0	4	0	1	1	0	6	7.8	0	45	8	2	0	2
07:30	0	0	0	0	0	0	0	0	0	4	2	1	0	0	7	7.5	0	14	2	0	1	0	17	18.3	0	74	13	3	0	0
07:45	0	0	0	0	0	0	0	0	0	27	5	0	0	2	34	36	0	16	3	1	0	0	20	20.5	0	52	9	3	0	2
H/TOT	0	0	0	0	0	0	0	0	0	50	14	8	0	4	76	84	0	41	8	2	2	0	53	56.6	0	235	39	11	0	6
08:00	0	0	0	0	0	0	0	0	0	21	6	1	0	0	28	28.5	0	19	3	1	0	0	23	23.5	0	67	11	4	1	1
08:15	0	0	0	0	0	0	0	0	0	33	7	2	0	2	44	47	0	13	3	1	0	0	17	17.5	0	69	9	1	0	1
08:30	0	0	0	0	0	0	0	0	0	64	3	2	1	0	70	72.3	0	14	3	0	1	0	18	19.3	0	67	7	1	1	2
08:45	0	0	0	0	0	0	0	0	0	92	8	0	0	1	101	102	0	29	3	0	1	1	34	36.3	0	58	7	1	0	0
H/TOT	0	0	0	0	0	0	0	0	0	210	24	5	1	3	243	249.8	0	75	12	2	2	1	92	96.6	0	261	34	7	2	4
09:00	0	0	0	0	0	0	0	0	0	76	6	0	0	0	82	82	0	19	3	0	1	0	23	24.3	0	59	8	1	0	0
09:15	0	0	0	0	0	0	0	0	0	49	11	1	0	0	61	61.5	0	13	3	0	1	2	19	22.3	0	83	14	7	0	1
09:30	0	0	0	0	0	0	0	0	0	41	2	2	1	0	46	48.3	0	21	3	0	1	0	25	26.3	0	34	8	3	0	0
09:45	0	0	0	0	0	0	0	0	0	68	5	3	0	1	77	79.5	0	9	1	2	1	0	13	15.3	0	48	6	3	1	0
H/TOT	0	0	0	0	0	0	0	0	0	234	24	6	1	1	266	271.3	0	62	10	2	4	2	80	88.2	0	224	36	14	1	1
16:00	0	0	0	0	0	0	0	0	0	29	1	0	0	0	30	30	0	5	3	1	0	0	9	9.5	0	46	4	0	0	2
16:15	0	0	0	0	0	0	0	0	0	74	7	2	0	0	83	84	0	11	3	1	0	0	15	15.5	0	52	3	0	0	0
16:30	0	0	0	0	0	0	0	0	0	60	12	0	0	1	73	74	0	14	0	1	1	0	16	17.8	0	44	12	0	0	2
16:45	0	0	0	0	0	0	0	0	0	82	7	1	0	2	92	94.5	0	13	4	1	0	3	21	24.5	0	58	4	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	245	27	3	0	3	278	282.5	0	43	10	4	1	3	61	67.3	0	200	23	0	0	4
17:00	0	0	0	0	0	0	0	0	0	55	8	1	0	0	64	64.5	0	10	3	0	0	0	13	13	0	51	2	0	1	0
17:15	0	0	0	0	0	0	0	0	0	79	19	1	0	0	99	99.5	0	14	4	0	0	1	19	20	0	51	4	0	0	0
17:30	0	0	0	0	0	0	0	0	0	68	14	0	0	0	82	82	0	8	5	0	0	1	14	15	0	38	4	0	0	0
17:45	0	0	0	0	0	0	0	0	0	83	14	2	1	1	101	104.3	0	10	1	0	0	0	11	11	0	41	3	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	285	55	4	1	1	346	350.3	0	42	13	0	0	2	57	59	0	181	13	0	1	0
18:00	0	0	0	0	0	0	0	0	0	78	7	1	0	0	86	86.5	1	6	0	0	0	0	7	6.4	0	49	3	0	0	0
18:15	0	0	0	0	0	0	0	0	0	68	6	0	0	0	74	74	0	13	1	0	1	0	15	16.3	0	35	8	0	0	1
18:30	0	0	0	0	0	0	0	0	0	79	9	0	0	0	88	88	0	8	3	0	1	0	12	13.3	0	41	4	1	0	0
18:45	0	0	0	0	0	0	0	0	0	76	4	0	0	0	80	80	0	12	2	0	1	0	15	16.3	0	31	2	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	301	26	1	0	0	328	328.5	1	39	6	0	3	0	49	52.3	0	156	17	1	0	1

	B => B							B => C							C => A							C => B						
TIME	MCL	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MCL	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MCL	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MCL	CAR	LGV	OGV1	OGV2	BUS
07:00	0	0	0	0	0	0	0	0	0	1	1	3	0	1	6	8.5	0	12	2	0	0	1	15	16	0	7	1	1	0	0
07:15	0	0	0	0	0	0	0	0	0	8	3	0	0	0	11	11	0	13	3	1	1	4	22	27.8	0	1	6	1	0	0
07:30	0	0	0	0	0	0	0	0	0	16	4	0	0	0	20	20	0	10	0	0	0	1	11	12	0	3	5	0	0	0
07:45	0	0	0	0	0	0	0	0	0	27	5	1	0	0	33	33.5	0	9	2	0	0	0	11	11	0	18	2	0	1	0
H/TOT	0	0	0	0	0	0	0	0	0	52	13	4	0	1	70	73	0	44	7	1	1	6	59	66.8	0	29	14	2	1	0
08:00	0	0	0	0	0	0	0	0	0	9	3	0	0	0	12	12	0	22	1	1	0	0	24	24.5	0	21	5	1	0	1
08:15	0	0	0	0	0	0	0	0	0	16	2	0	0	0	18	18	0	18	3	0	0	0	21	21	0	21	1	0	0	0
08:30	0	0	0	0	0	0	0	0	0	15	5	0	0	0	20	20	0	10	3	0	0	0	13	13	0	33	4	0	1	0
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	C => C							
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07:15	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0
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16:45	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0
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17:45	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0
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18:15	0	0	0	0	0	0	0	0
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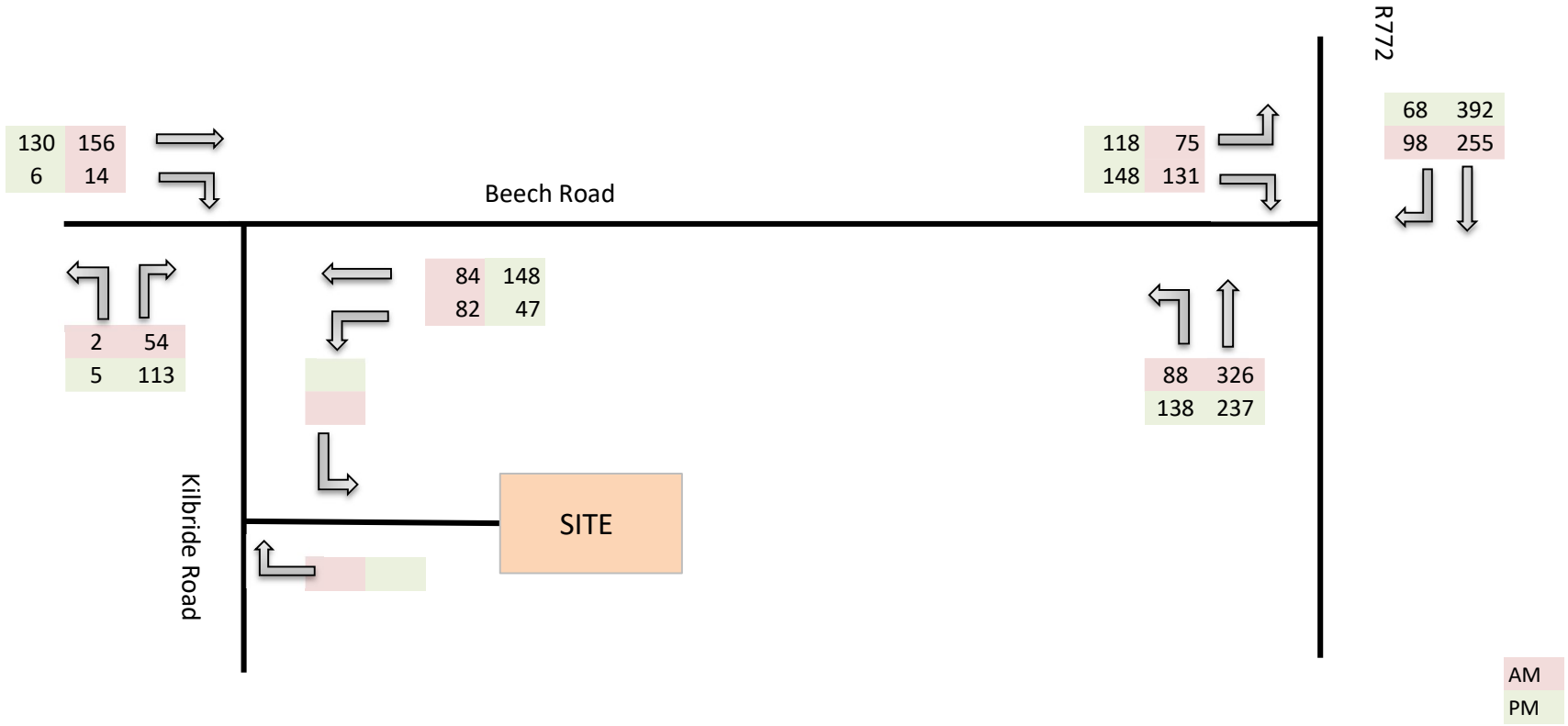
Irish Traffic Surveys Ltd

Survey Name : ITS J199 Kilbride / Avoca
Site: 2
Date: 01.15.18
Location:



Irish Traffic Surveys

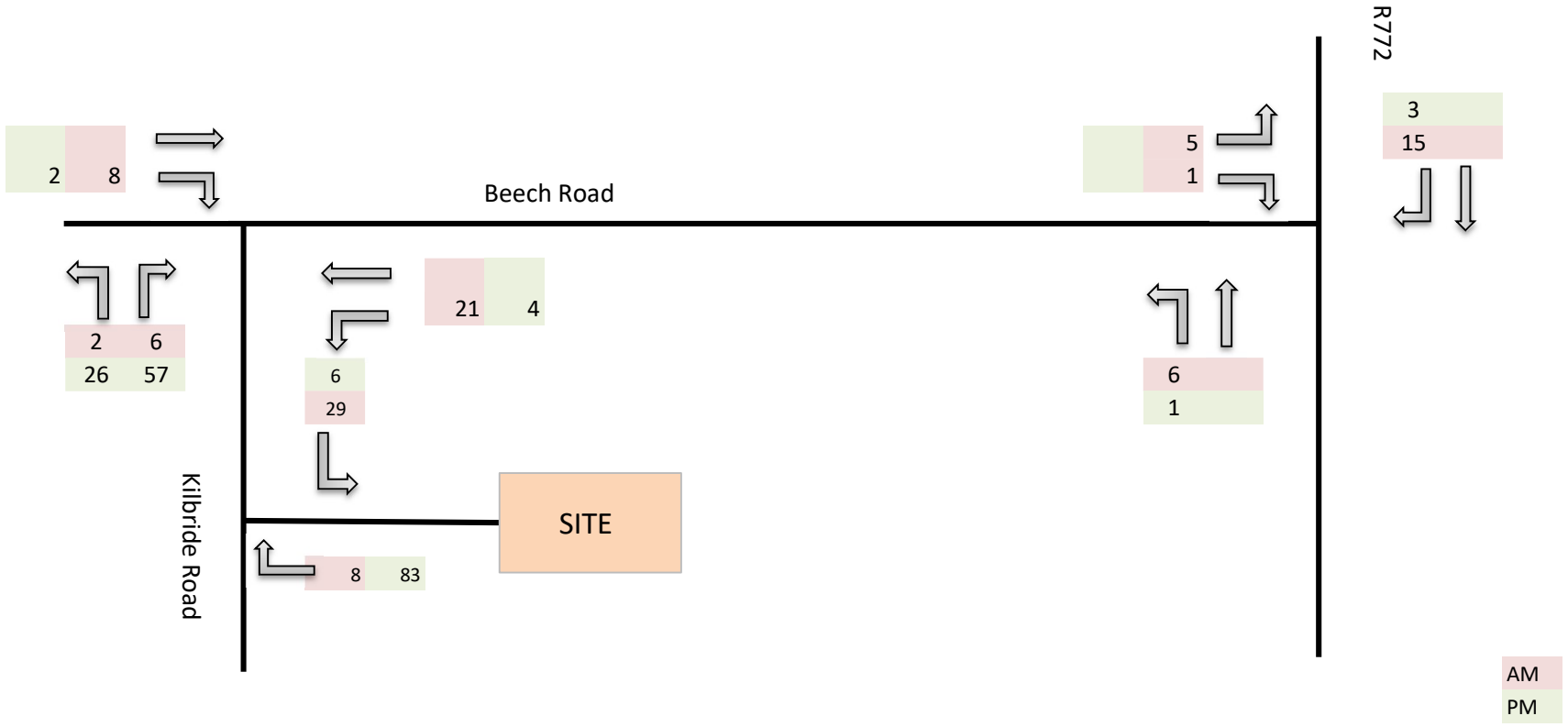
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CST Group
Chartered Consulting Engineers

Job No: 120314
Job Title: Avoca Energy Centre

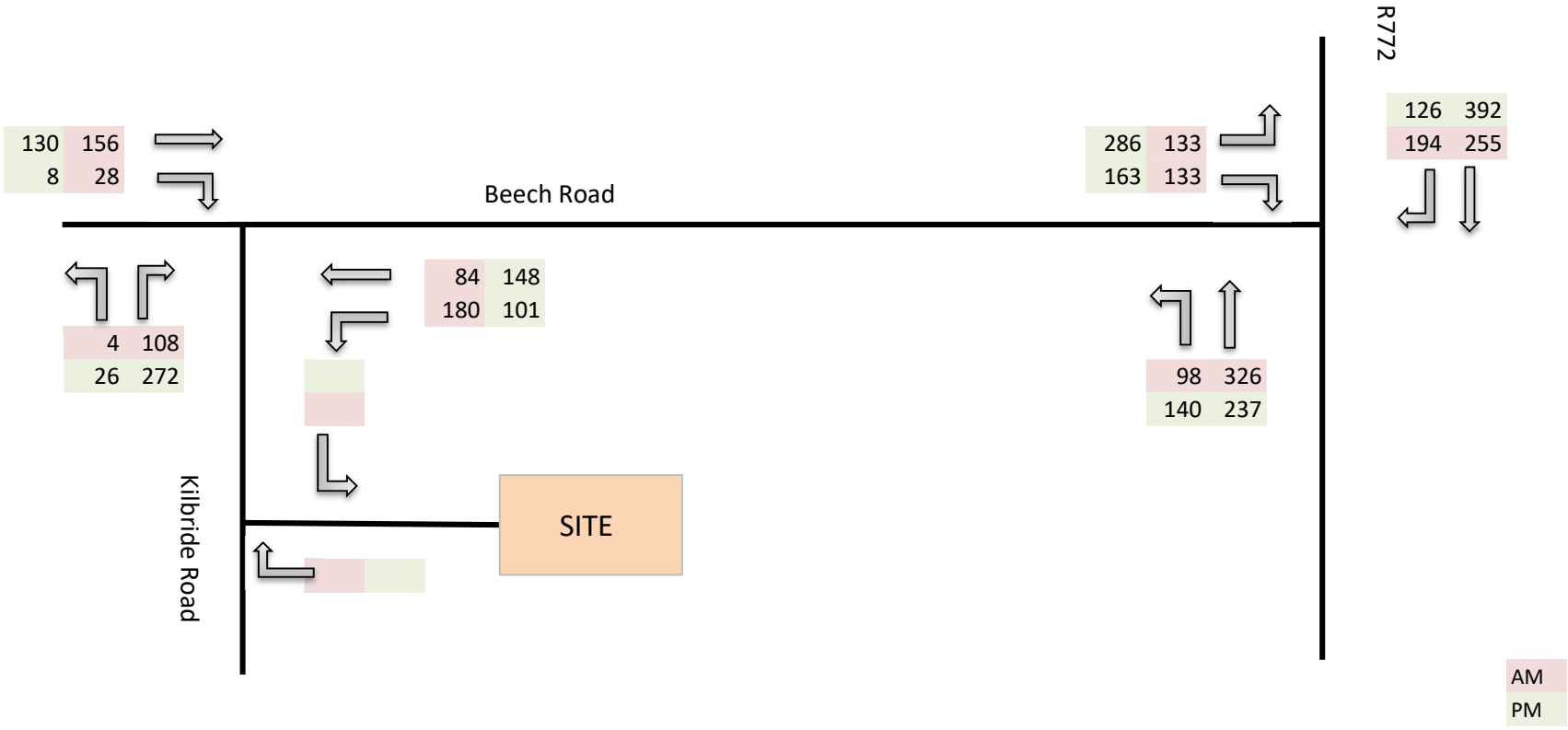
2023 Baseline Traffic - Figure 1



CST Group
Chartered Consulting Engineers

Job No: 120314
Job Title: Avoca Energy Centre

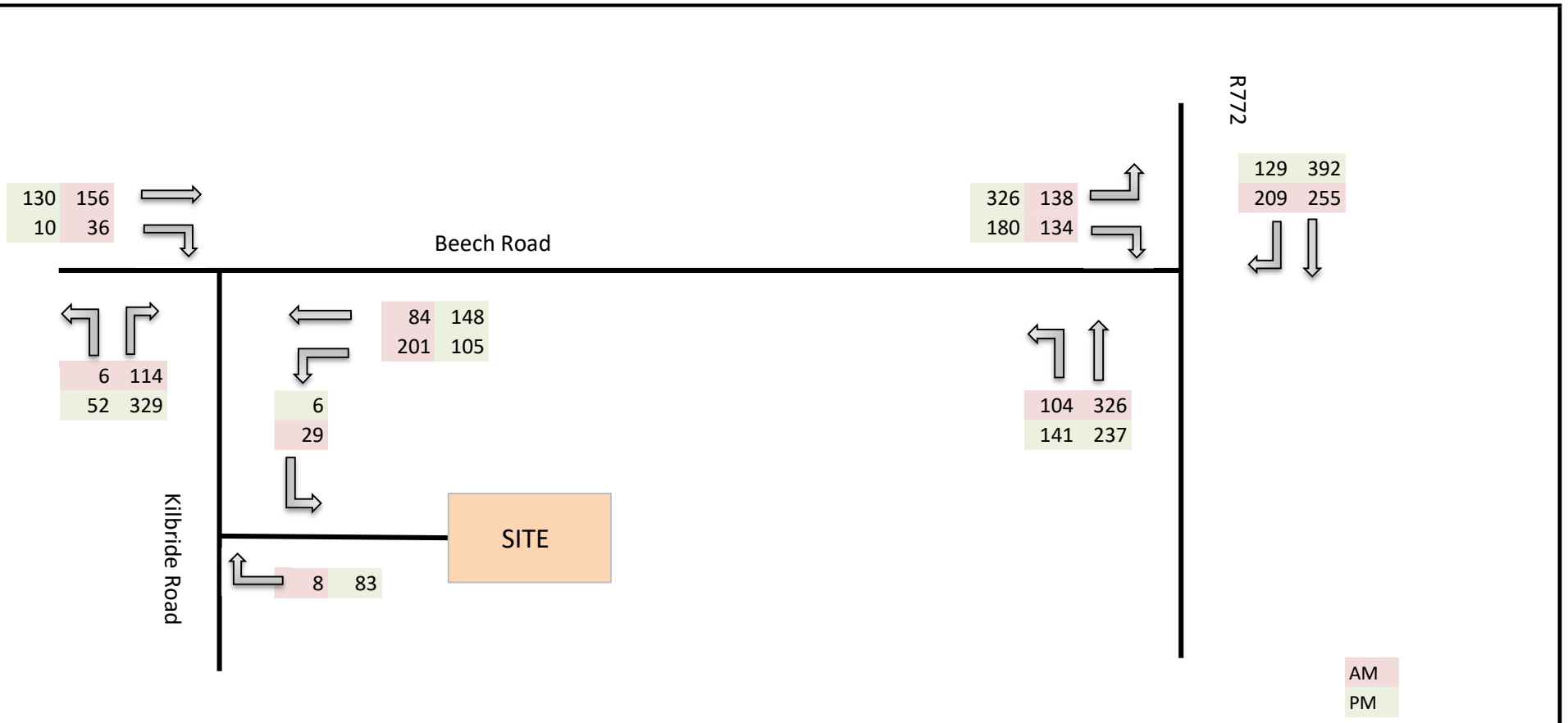
Power Centre - Construction Traffic - Figure 2



CST Group
Chartered Consulting Engineers

Job No: 120314
Job Title: Avoca Energy Centre

2023 Background with Other Developments Figure 3



CST Group
Chartered Consulting Engineers

Job No: 120314
Job Title: Avoca Energy Centre

2023 Combined Traffic - Figure 4

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.0.1.4646 []
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The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: 120314 T-Junction R772 Dublin Road-Beech Road.j9
Path: I:\CST\120\301-350\120314\calcs
Report generation date: 13/08/2021 14:05:06

»2023 Without Dev, AM
»2023 Without Dev, PM
»2023 With Dev, AM
»2023 With Dev, PM

Summary of junction performance

	AM						PM					
	Queue (PCU)	95% Queue (PCU)	Delay (s)	RFC	LOS	Network Residual Capacity	Queue (PCU)	95% Queue (PCU)	Delay (s)	RFC	LOS	Network Residual Capacity
	2023 Without Dev											
Stream B-C	0.3	~1	9.49	0.26	A	32 % [Stream B-A]	1.8	7.2	20.83	0.65	C	2 % [Stream B-A]
Stream B-A	0.6	~1	17.49	0.39	C		1.5	7.5	31.99	0.62	D	
Stream C-AB	0.9	~1	8.53	0.42	A		0.8	3.1	6.40	0.33	A	
	2023 With Dev											
Stream B-C	0.4	1.4	9.06	0.28	A	35 % [Stream B-A]	3.6	19.4	38.47	0.80	E	-6 % [Stream B-A]
Stream B-A	0.7	3.1	16.72	0.41	C		2.8	14.9	54.61	0.76	F	
Stream C-AB	1.2	5.7	9.09	0.48	A		0.8	3.4	6.48	0.34	A	

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	12/08/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CSTGROUP\Donal
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75	✓		✓	Delay	0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically
D1	2023 Without Dev	AM	DIRECT	07:45	09:15	90	15	✓
D2	2023 Without Dev	PM	ONE HOUR	15:45	17:15		15	✓
D3	2023 With Dev	AM	ONE HOUR	07:45	09:15		15	✓
D4	2023 With Dev	PM	ONE HOUR	15:45	17:15		15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2023 Without Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Flow Arm A	Analysis Options	Queue Variations cannot be calculated for the selected traffic profile type.
Warning	Flow Arm B	Analysis Options	Queue Variations cannot be calculated for the selected traffic profile type.
Warning	Flow Arm C	Analysis Options	Queue Variations cannot be calculated for the selected traffic profile type.
Warning	Profile Type	D1 - 2023 Without Dev, AM	The DIRECT profile type is being used with the 'O-D data varies over time' option, but O-D data does not vary over time. Are you sure this is correct?
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	5.40	A

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	32	Stream B-A

Arms

Arms

Arm	Name	Description	Arm type
A	untitled		Major
B	untitled		Minor
C	untitled		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	7.80			120.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B	One lane plus flare	10.00	7.00	5.10	4.60	3.90	✓	2.00	20	33

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	517	0.087	0.219	0.138	0.314
1	B-C	666	0.094	0.238	-	-
1	C-B	643	0.230	0.230	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.
Streams may be combined, in which case capacity will be adjusted.
Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically
D1	2023 Without Dev	AM	DIRECT	07:45	09:15	90	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A		DIRECT	✓	100.000
B		DIRECT	✓	100.000
C		DIRECT	✓	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	98	326
	B	133	0	133
	C	255	194	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.26	9.49	0.3	~1	A	133	200
B-A	0.39	17.49	0.6	~1	C	133	200
C-AB	0.42	8.53	0.9	~1	A	301	451
C-A						148	222
A-B						98	147
A-C						326	489

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	133	33	515	0.258	132	0.0	0.3	9.364	A
B-A	133	33	340	0.392	131	0.0	0.6	17.028	C
C-AB	300	75	724	0.414	296	0.0	0.9	8.380	A
C-A	149	37			149				
A-B	98	25			98				
A-C	326	82			326				

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	133	33	512	0.260	133	0.3	0.3	9.488	A
B-A	133	33	339	0.393	133	0.6	0.6	17.475	C
C-AB	301	75	725	0.415	301	0.9	0.9	8.532	A
C-A	148	37			148				
A-B	98	25			98				
A-C	326	82			326				

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	133	33	512	0.260	133	0.3	0.3	9.489	A
B-A	133	33	339	0.393	133	0.6	0.6	17.487	C
C-AB	301	75	725	0.415	301	0.9	0.9	8.534	A
C-A	148	37			148				
A-B	98	25			98				
A-C	326	82			326				

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	133	33	512	0.260	133	0.3	0.3	9.489	A
B-A	133	33	339	0.393	133	0.6	0.6	17.486	C
C-AB	301	75	725	0.415	301	0.9	0.9	8.535	A
C-A	148	37			148				
A-B	98	25			98				
A-C	326	82			326				

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	133	33	512	0.260	133	0.3	0.3	9.489	A
B-A	133	33	339	0.393	133	0.6	0.6	17.489	C
C-AB	301	75	725	0.415	301	0.9	0.9	8.534	A
C-A	148	37			148				
A-B	98	25			98				
A-C	326	82			326				

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	133	33	512	0.260	133	0.3	0.3	9.490	A
B-A	133	33	339	0.393	133	0.6	0.6	17.488	C
C-AB	301	75	725	0.415	301	0.9	0.9	8.534	A
C-A	148	37			148				
A-B	98	25			98				
A-C	326	82			326				

Queue Variation Results for each time segment

07:45 - 08:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.34	~1	~1	~1	~1			N/A	N/A
B-A	0.62	~1	~1	~1	~1			N/A	N/A
C-AB	0.92	~1	~1	~1	~1			N/A	N/A

08:00 - 08:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.35	~1	~1	~1	~1			N/A	N/A
B-A	0.64	~1	~1	~1	~1			N/A	N/A
C-AB	0.94	~1	~1	~1	~1			N/A	N/A

08:15 - 08:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.35	~1	~1	~1	~1			N/A	N/A
B-A	0.64	~1	~1	~1	~1			N/A	N/A
C-AB	0.94	~1	~1	~1	~1			N/A	N/A

08:30 - 08:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.35	~1	~1	~1	~1			N/A	N/A
B-A	0.64	~1	~1	~1	~1			N/A	N/A
C-AB	0.94	~1	~1	~1	~1			N/A	N/A

08:45 - 09:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.35	~1	~1	~1	~1			N/A	N/A
B-A	0.64	~1	~1	~1	~1			N/A	N/A
C-AB	0.95	~1	~1	~1	~1			N/A	N/A

09:00 - 09:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.35	~1	~1	~1	~1			N/A	N/A
B-A	0.64	~1	~1	~1	~1			N/A	N/A
C-AB	0.95	~1	~1	~1	~1			N/A	N/A

2023 Without Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	9.42	A

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	2	Stream B-A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2023 Without Dev	PM	ONE HOUR	15:45	17:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	377	100.000
B		ONE HOUR	✓	449	100.000
C		ONE HOUR	✓	518	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	140	237
	B	163	0	286
	C	392	126	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.65	20.83	1.8	7.2	C	262	394
B-A	0.62	31.99	1.5	7.5	D	150	224
C-AB	0.33	6.40	0.8	3.1	A	213	320
C-A						262	393
A-B						128	193
A-C						217	326

Main Results for each time segment

15:45 - 16:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	215	54	590	0.365	213	0.0	0.6	9.504	A
B-A	123	31	371	0.330	121	0.0	0.5	14.256	B
C-AB	153	38	779	0.196	151	0.0	0.4	5.736	A
C-A	237	59			237				
A-B	105	26			105				
A-C	178	45			178				

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	257	64	556	0.463	256	0.6	0.8	11.958	B
B-A	147	37	343	0.427	146	0.5	0.7	18.156	C
C-AB	202	50	808	0.250	201	0.4	0.5	5.943	A
C-A	264	66			264				
A-B	126	31			126				
A-C	213	53			213				

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	315	79	491	0.641	312	0.8	1.7	19.674	C
B-A	179	45	293	0.613	177	0.7	1.5	30.188	D
C-AB	284	71	849	0.334	283	0.5	0.8	6.372	A
C-A	287	72			287				
A-B	154	39			154				
A-C	261	65			261				

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	315	79	487	0.647	315	1.7	1.8	20.827	C
B-A	179	45	291	0.617	179	1.5	1.5	31.993	D
C-AB	284	71	849	0.335	284	0.8	0.8	6.396	A
C-A	286	72			286				
A-B	154	39			154				
A-C	261	65			261				

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	257	64	552	0.466	261	1.8	0.9	12.499	B
B-A	147	37	342	0.429	150	1.5	0.8	19.014	C
C-AB	202	51	808	0.250	204	0.8	0.5	5.979	A
C-A	263	66			263				
A-B	126	31			126				
A-C	213	53			213				

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	215	54	587	0.367	217	0.9	0.6	9.741	A
B-A	123	31	371	0.331	124	0.8	0.5	14.630	B
C-AB	154	38	779	0.197	154	0.5	0.4	5.774	A
C-A	236	59			236				
A-B	105	26			105				
A-C	178	45			178				

Queue Variation Results for each time segment

15:45 - 16:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.57	0.55	1.00	1.40	1.45			N/A	N/A
B-A	0.48	0.00	0.00	0.48	0.48			N/A	N/A
C-AB	0.36	0.00	0.00	0.36	0.36			N/A	N/A

16:00 - 16:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.84	0.11	0.89	1.39	1.39			N/A	N/A
B-A	0.72	0.15	0.90	1.38	1.44			N/A	N/A
C-AB	0.51	0.51	1.00	1.40	1.45			N/A	N/A

16:15 - 16:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	1.69	0.03	0.29	1.69	7.22			N/A	N/A
B-A	1.46	0.03	0.30	1.93	7.08			N/A	N/A
C-AB	0.81	0.03	0.26	0.81	0.81			N/A	N/A

16:30 - 16:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	1.77	0.03	0.29	1.77	7.11			N/A	N/A
B-A	1.53	0.03	0.30	2.01	7.45			N/A	N/A
C-AB	0.82	0.04	0.39	1.90	3.13			N/A	N/A

16:45 - 17:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.89	0.06	0.64	1.74	2.42			N/A	N/A
B-A	0.78	0.05	0.49	1.54	2.09			N/A	N/A
C-AB	0.53	0.53	1.00	1.40	1.45			N/A	N/A

17:00 - 17:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.59	0.04	0.39	1.11	1.82			N/A	N/A
B-A	0.51	0.04	0.36	1.44	1.61			N/A	N/A
C-AB	0.37	0.00	0.00	0.37	0.37			N/A	N/A

2023 With Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	6.18	A

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	35	Stream B-A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023 With Dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	285	100.000
B		ONE HOUR	✓	272	100.000
C		ONE HOUR	✓	464	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	201	84
	B	134	0	138
	C	255	209	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.28	9.06	0.4	1.4	A	127	190
B-A	0.41	16.72	0.7	3.1	C	123	184
C-AB	0.48	9.09	1.2	5.7	A	285	427
C-A						141	212
A-B						184	277
A-C						77	116

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	104	26	599	0.174	103	0.0	0.2	7.253	A
B-A	101	25	413	0.244	100	0.0	0.3	11.453	B
C-AB	214	54	723	0.296	212	0.0	0.5	7.034	A
C-A	135	34			135				
A-B	151	38			151				
A-C	63	16			63				

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	124	31	580	0.214	124	0.2	0.3	7.882	A
B-A	120	30	392	0.307	120	0.3	0.4	13.212	B
C-AB	273	68	740	0.369	272	0.5	0.7	7.705	A
C-A	144	36			144				
A-B	181	45			181				
A-C	76	19			76				

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	152	38	550	0.276	152	0.3	0.4	9.017	A
B-A	148	37	363	0.406	147	0.4	0.7	16.567	C
C-AB	365	91	764	0.478	364	0.7	1.2	9.008	A
C-A	146	36			146				
A-B	221	55			221				
A-C	92	23			92				

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	152	38	549	0.277	152	0.4	0.4	9.058	A
B-A	148	37	363	0.407	147	0.7	0.7	16.725	C
C-AB	366	91	764	0.479	366	1.2	1.2	9.088	A
C-A	145	36			145				
A-B	221	55			221				
A-C	92	23			92				

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	124	31	579	0.214	124	0.4	0.3	7.925	A
B-A	120	30	392	0.308	121	0.7	0.5	13.367	B
C-AB	274	68	741	0.370	276	1.2	0.8	7.794	A
C-A	143	36			143				
A-B	181	45			181				
A-C	76	19			76				

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	104	26	597	0.174	104	0.3	0.2	7.303	A
B-A	101	25	412	0.245	101	0.5	0.3	11.602	B
C-AB	215	54	723	0.297	216	0.8	0.5	7.121	A
C-A	134	34			134				
A-B	151	38			151				
A-C	63	16			63				

Queue Variation Results for each time segment

07:45 - 08:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.21	0.00	0.00	0.21	0.21			N/A	N/A
B-A	0.32	0.00	0.00	0.32	0.32			N/A	N/A
C-AB	0.52	0.52	1.00	1.40	1.45			N/A	N/A

08:00 - 08:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.27	0.00	0.00	0.27	0.27			N/A	N/A
B-A	0.43	0.00	0.00	0.43	0.43			N/A	N/A
C-AB	0.74	0.55	1.00	1.40	1.45			N/A	N/A

08:15 - 08:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.38	0.03	0.26	0.46	0.49			N/A	N/A
B-A	0.67	0.03	0.26	0.67	0.67			N/A	N/A
C-AB	1.19	0.03	0.27	1.19	1.30			N/A	N/A

08:30 - 08:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.38	0.03	0.31	1.26	1.45			N/A	N/A
B-A	0.68	0.03	0.29	1.36	3.14			N/A	N/A
C-AB	1.21	0.03	0.30	1.51	5.73			N/A	N/A

08:45 - 09:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.28	0.00	0.00	0.28	0.28			N/A	N/A
B-A	0.45	0.04	0.37	1.20	1.35			N/A	N/A
C-AB	0.77	0.51	0.98	1.40	1.45			N/A	N/A

09:00 - 09:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.21	0.00	0.00	0.21	0.21			N/A	N/A
B-A	0.33	0.03	0.27	0.49	0.89			N/A	N/A
C-AB	0.54	0.06	0.63	1.33	1.41			N/A	N/A

2023 With Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	17.02	C

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	-6	Stream B-A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2023 With Dev	PM	ONE HOUR	15:45	17:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	378	100.000
B		ONE HOUR	✓	506	100.000
C		ONE HOUR	✓	521	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	141	237
	B	180	0	326
	C	392	129	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.80	38.47	3.6	19.4	E	299	449
B-A	0.76	54.61	2.8	14.9	F	165	248
C-AB	0.34	6.48	0.8	3.4	A	218	327
C-A						260	390
A-B						129	194
A-C						217	326

Main Results for each time segment

15:45 - 16:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	245	61	582	0.421	243	0.0	0.7	10.510	B
B-A	136	34	366	0.370	133	0.0	0.6	15.314	C
C-AB	156	39	778	0.201	155	0.0	0.4	5.769	A
C-A	236	59			236				
A-B	106	27			106				
A-C	178	45			178				

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	293	73	542	0.541	291	0.7	1.1	14.261	B
B-A	162	40	332	0.487	160	0.6	0.9	20.767	C
C-AB	207	52	807	0.256	206	0.4	0.5	5.995	A
C-A	262	65			262				
A-B	127	32			127				
A-C	213	53			213				

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	359	90	458	0.783	351	1.1	3.1	31.451	D
B-A	198	50	267	0.743	192	0.9	2.4	45.104	E
C-AB	291	73	849	0.342	289	0.5	0.8	6.452	A
C-A	283	71			283				
A-B	155	39			155				
A-C	261	65			261				

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	359	90	447	0.803	357	3.1	3.6	38.466	E
B-A	198	50	260	0.762	197	2.4	2.8	54.613	F
C-AB	291	73	849	0.343	291	0.8	0.8	6.477	A
C-A	283	71			283				
A-B	155	39			155				
A-C	261	65			261				

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	293	73	532	0.550	302	3.6	1.3	16.235	C
B-A	162	40	328	0.493	169	2.8	1.0	23.485	C
C-AB	207	52	808	0.256	208	0.8	0.5	6.028	A
C-A	261	65			261				
A-B	127	32			127				
A-C	213	53			213				

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	245	61	579	0.424	248	1.3	0.8	10.922	B
B-A	136	34	365	0.371	137	1.0	0.6	15.904	C
C-AB	157	39	779	0.202	158	0.5	0.4	5.810	A
C-A	235	59			235				
A-B	106	27			106				
A-C	178	45			178				

Queue Variation Results for each time segment

15:45 - 16:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.71	0.55	1.00	1.40	1.45			N/A	N/A
B-A	0.57	0.55	1.00	1.40	1.45			N/A	N/A
C-AB	0.37	0.00	0.00	0.37	0.37			N/A	N/A

16:00 - 16:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	1.14	0.07	0.91	2.10	2.87			N/A	N/A
B-A	0.91	0.10	0.90	1.34	1.74			N/A	N/A
C-AB	0.53	0.53	1.00	1.40	1.45			N/A	N/A

16:15 - 16:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	3.11	0.04	0.38	8.04	16.50			N/A	N/A
B-A	2.43	0.04	0.39	6.47	12.40			N/A	N/A
C-AB	0.83	0.03	0.26	0.83	0.83			N/A	N/A

16:30 - 16:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	3.60	0.03	0.34	7.47	19.40			N/A	N/A
B-A	2.80	0.04	0.36	6.68	14.89			N/A	N/A
C-AB	0.84	0.04	0.38	1.97	3.40			N/A	N/A

16:45 - 17:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	1.27	0.04	0.43	3.23	5.28			N/A	N/A
B-A	1.02	0.04	0.41	2.51	4.03			N/A	N/A
C-AB	0.55	0.55	1.00	1.40	1.45			N/A	N/A

17:00 - 17:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.75	0.03	0.33	1.68	3.53			N/A	N/A
B-A	0.61	0.03	0.32	1.30	2.70			N/A	N/A
C-AB	0.38	0.00	0.00	0.38	0.38			N/A	N/A

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.0.1.4646 []
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Filename: 120314 T-Junction Beech Road-Kilbride Road.j9
Path: I:\CST\120\301-350\120314\calcs
Report generation date: 12/08/2021 15:35:56

»2023 Without Dev, AM
»2023 Without Dev, PM
»2023 With Dev, AM
»2023 With Dev, PM

Summary of junction performance

	AM						PM					
	Queue (PCU)	95% Queue (PCU)	Delay (s)	RFC	LOS	Network Residual Capacity	Queue (PCU)	95% Queue (PCU)	Delay (s)	RFC	LOS	Network Residual Capacity
	2023 Without Dev											
Stream B-C	0.0	~1	6.55	0.01	A	172 % [Stream B-A]	0.1	0.5	8.36	0.06	A	31 % [Stream B-A]
Stream B-A	0.3	~1	8.70	0.21	A		1.4	4.1	16.62	0.58	C	
Stream C-AB	0.1	~1	5.36	0.05	A		0.0	0.5	5.30	0.02	A	
	2023 With Dev											
Stream B-C	0.0	0.5	6.71	0.01	A	133 % [Stream B-A]	0.2	0.5	10.67	0.15	B	11 % [Stream B-A]
Stream B-A	0.3	1.5	9.40	0.25	A		2.3	11.7	24.12	0.71	C	
Stream C-AB	0.1	0.7	5.50	0.07	A		0.0	0.5	5.32	0.02	A	

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	12/08/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CSTGROUP\Donal
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75	✓		✓	Delay	0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically
D1	2023 Without Dev	AM	DIRECT	07:45	09:15	90	15	✓
D2	2023 Without Dev	PM	ONE HOUR	15:45	17:15		15	✓
D3	2023 With Dev	AM	ONE HOUR	07:45	09:15		15	✓
D4	2023 With Dev	PM	ONE HOUR	15:45	17:15		15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2023 Without Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Flow Arm A	Analysis Options	Queue Variations cannot be calculated for the selected traffic profile type.
Warning	Flow Arm B	Analysis Options	Queue Variations cannot be calculated for the selected traffic profile type.
Warning	Flow Arm C	Analysis Options	Queue Variations cannot be calculated for the selected traffic profile type.
Warning	Profile Type	D1 - 2023 Without Dev, AM	The DIRECT profile type is being used with the 'O-D data varies over time' option, but O-D data does not vary over time. Are you sure this is correct?
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	2.07	A

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	172	Stream B-A

Arms

Arms

Arm	Name	Description	Arm type
A	untitled		Major
B	untitled		Minor
C	untitled		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	7.80			160.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B	One lane plus flare	10.00	10.00	7.80	5.50	5.00	✓	3.00	29	23

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	596	0.100	0.253	0.159	0.361
1	B-C	619	0.087	0.221	-	-
1	C-B	667	0.238	0.238	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.
Streams may be combined, in which case capacity will be adjusted.
Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically
D1	2023 Without Dev	AM	DIRECT	07:45	09:15	90	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A		DIRECT	✓	100.000
B		DIRECT	✓	100.000
C		DIRECT	✓	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	180	84
	B	108	0	4
	C	156	28	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.01	6.55	0.0	~1	A	4	6
B-A	0.21	8.70	0.3	~1	A	108	162
C-AB	0.05	5.36	0.1	~1	A	36	54
C-A						148	222
A-B						180	270
A-C						84	126

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	4	1	554	0.007	4	0.0	0.0	6.542	A
B-A	108	27	522	0.207	107	0.0	0.3	8.651	A
C-AB	36	9	707	0.051	36	0.0	0.1	5.358	A
C-A	148	37			148				
A-B	180	45			180				
A-C	84	21			84				

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	4	1	554	0.007	4	0.0	0.0	6.545	A
B-A	108	27	522	0.207	108	0.3	0.3	8.695	A
C-AB	36	9	707	0.051	36	0.1	0.1	5.364	A
C-A	148	37			148				
A-B	180	45			180				
A-C	84	21			84				

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	4	1	554	0.007	4	0.0	0.0	6.545	A
B-A	108	27	522	0.207	108	0.3	0.3	8.695	A
C-AB	36	9	707	0.051	36	0.1	0.1	5.361	A
C-A	148	37			148				
A-B	180	45			180				
A-C	84	21			84				

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	4	1	554	0.007	4	0.0	0.0	6.545	A
B-A	108	27	522	0.207	108	0.3	0.3	8.695	A
C-AB	36	9	707	0.051	36	0.1	0.1	5.364	A
C-A	148	37			148				
A-B	180	45			180				
A-C	84	21			84				

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	4	1	554	0.007	4	0.0	0.0	6.545	A
B-A	108	27	522	0.207	108	0.3	0.3	8.695	A
C-AB	36	9	707	0.051	36	0.1	0.1	5.364	A
C-A	148	37			148				
A-B	180	45			180				
A-C	84	21			84				

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	4	1	554	0.007	4	0.0	0.0	6.545	A
B-A	108	27	522	0.207	108	0.3	0.3	8.695	A
C-AB	36	9	707	0.051	36	0.1	0.1	5.364	A
C-A	148	37			148				
A-B	180	45			180				
A-C	84	21			84				

Queue Variation Results for each time segment

07:45 - 08:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	~1	~1	~1	~1			N/A	N/A
B-A	0.26	~1	~1	~1	~1			N/A	N/A
C-AB	0.08	~1	~1	~1	~1			N/A	N/A

08:00 - 08:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	~1	~1	~1	~1			N/A	N/A
B-A	0.26	~1	~1	~1	~1			N/A	N/A
C-AB	0.08	~1	~1	~1	~1			N/A	N/A

08:15 - 08:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	~1	~1	~1	~1			N/A	N/A
B-A	0.26	~1	~1	~1	~1			N/A	N/A
C-AB	0.08	~1	~1	~1	~1			N/A	N/A

08:30 - 08:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	~1	~1	~1	~1			N/A	N/A
B-A	0.26	~1	~1	~1	~1			N/A	N/A
C-AB	0.08	~1	~1	~1	~1			N/A	N/A

08:45 - 09:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	~1	~1	~1	~1			N/A	N/A
B-A	0.26	~1	~1	~1	~1			N/A	N/A
C-AB	0.08	~1	~1	~1	~1			N/A	N/A

09:00 - 09:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	~1	~1	~1	~1			N/A	N/A
B-A	0.26	~1	~1	~1	~1			N/A	N/A
C-AB	0.08	~1	~1	~1	~1			N/A	N/A

2023 Without Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	6.99	A

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	31	Stream B-A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2023 Without Dev	PM	ONE HOUR	15:45	17:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	249	100.000
B		ONE HOUR	✓	298	100.000
C		ONE HOUR	✓	138	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	101	148
	B	272	0	26
	C	130	8	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.06	8.36	0.1	0.5	A	24	36
B-A	0.58	16.62	1.4	4.1	C	250	374
C-AB	0.02	5.30	0.0	0.5	A	9	13
C-A						118	177
A-B						93	139
A-C						136	204

Main Results for each time segment

15:45 - 16:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	20	5	531	0.037	19	0.0	0.0	7.034	A
B-A	205	51	540	0.379	202	0.0	0.6	10.579	B
C-AB	7	2	686	0.010	7	0.0	0.0	5.301	A
C-A	97	24			97				
A-B	76	19			76				
A-C	111	28			111				

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	23	6	506	0.046	23	0.0	0.0	7.452	A
B-A	245	61	530	0.461	244	0.6	0.8	12.524	B
C-AB	9	2	690	0.013	9	0.0	0.0	5.280	A
C-A	115	29			115				
A-B	91	23			91				
A-C	133	33			133				

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	29	7	461	0.062	29	0.0	0.1	8.328	A
B-A	299	75	516	0.581	297	0.8	1.3	16.343	C
C-AB	11	3	697	0.016	11	0.0	0.0	5.250	A
C-A	141	35			141				
A-B	111	28			111				
A-C	163	41			163				

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	29	7	459	0.062	29	0.1	0.1	8.360	A
B-A	299	75	516	0.581	299	1.3	1.4	16.617	C
C-AB	11	3	697	0.016	11	0.0	0.0	5.250	A
C-A	141	35			141				
A-B	111	28			111				
A-C	163	41			163				

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	23	6	505	0.046	23	0.1	0.0	7.480	A
B-A	245	61	530	0.461	246	1.4	0.9	12.780	B
C-AB	9	2	690	0.013	9	0.0	0.0	5.280	A
C-A	115	29			115				
A-B	91	23			91				
A-C	133	33			133				

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	20	5	530	0.037	20	0.0	0.0	7.056	A
B-A	205	51	540	0.379	206	0.9	0.6	10.794	B
C-AB	7	2	686	0.010	7	0.0	0.0	5.301	A
C-A	97	24			97				
A-B	76	19			76				
A-C	111	28			111				

Queue Variation Results for each time segment

15:45 - 16:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.04	0.00	0.00	0.04	0.04			N/A	N/A
B-A	0.60	0.55	1.00	1.40	1.45			N/A	N/A
C-AB	0.01	0.00	0.00	0.01	0.01			N/A	N/A

16:00 - 16:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.05	0.03	0.25	0.45	0.48			N/A	N/A
B-A	0.84	0.20	0.94	1.42	1.48			N/A	N/A
C-AB	0.01	0.01	0.25	0.45	0.48			N/A	N/A

16:15 - 16:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.07	0.03	0.26	0.47	0.49			N/A	N/A
B-A	1.33	0.03	0.28	1.33	3.78			N/A	N/A
C-AB	0.02	0.00	0.00	0.02	0.02			N/A	N/A

16:30 - 16:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.07	0.00	0.00	0.07	0.07			N/A	N/A
B-A	1.36	0.03	0.28	1.36	4.14			N/A	N/A
C-AB	0.02	0.00	0.00	0.02	0.02			N/A	N/A

16:45 - 17:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.05	0.00	0.00	0.05	0.05			N/A	N/A
B-A	0.88	0.07	0.77	1.53	1.92			N/A	N/A
C-AB	0.01	0.00	0.00	0.01	0.01			N/A	N/A

17:00 - 17:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.04	0.00	0.00	0.04	0.04			N/A	N/A
B-A	0.62	0.05	0.45	1.47	1.55			N/A	N/A
C-AB	0.01	0.00	0.00	0.01	0.01			N/A	N/A

2023 With Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	2.28	A

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	133	Stream B-A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023 With Dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	285	100.000
B		ONE HOUR	✓	120	100.000
C		ONE HOUR	✓	192	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	201	84
	B	114	0	6
	C	156	36	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.01	6.71	0.0	0.5	A	6	8
B-A	0.25	9.40	0.3	1.5	A	105	157
C-AB	0.07	5.50	0.1	0.7	A	42	63
C-A						134	201
A-B						184	277
A-C						77	116

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	5	1	569	0.008	4	0.0	0.0	6.378	A
B-A	86	21	536	0.160	85	0.0	0.2	7.971	A
C-AB	33	8	693	0.047	32	0.0	0.1	5.450	A
C-A	112	28			112				
A-B	151	38			151				
A-C	63	16			63				

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	5	1	558	0.010	5	0.0	0.0	6.510	A
B-A	102	26	524	0.195	102	0.2	0.2	8.524	A
C-AB	41	10	699	0.058	40	0.1	0.1	5.469	A
C-A	132	33			132				
A-B	181	45			181				
A-C	76	19			76				

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	7	2	543	0.012	7	0.0	0.0	6.705	A
B-A	126	31	508	0.247	125	0.2	0.3	9.386	A
C-AB	52	13	707	0.074	52	0.1	0.1	5.499	A
C-A	159	40			159				
A-B	221	55			221				
A-C	92	23			92				

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	7	2	543	0.012	7	0.0	0.0	6.706	A
B-A	126	31	508	0.247	126	0.3	0.3	9.403	A
C-AB	52	13	707	0.074	52	0.1	0.1	5.499	A
C-A	159	40			159				
A-B	221	55			221				
A-C	92	23			92				

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	5	1	558	0.010	5	0.0	0.0	6.515	A
B-A	102	26	524	0.195	103	0.3	0.2	8.548	A
C-AB	41	10	699	0.058	41	0.1	0.1	5.474	A
C-A	132	33			132				
A-B	181	45			181				
A-C	76	19			76				

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	5	1	569	0.008	5	0.0	0.0	6.384	A
B-A	86	21	536	0.160	86	0.2	0.2	8.007	A
C-AB	33	8	693	0.047	33	0.1	0.1	5.454	A
C-A	112	28			112				
A-B	151	38			151				
A-C	63	16			63				

Queue Variation Results for each time segment

07:45 - 08:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	0.00	0.00	0.01	0.01			N/A	N/A
B-A	0.19	0.00	0.00	0.19	0.19			N/A	N/A
C-AB	0.06	0.00	0.00	0.06	0.06			N/A	N/A

08:00 - 08:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	0.01	0.25	0.45	0.48			N/A	N/A
B-A	0.24	0.00	0.00	0.24	0.24			N/A	N/A
C-AB	0.08	0.03	0.25	0.45	0.48			N/A	N/A

08:15 - 08:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	0.00	0.00	0.01	0.01			N/A	N/A
B-A	0.32	0.03	0.26	0.46	0.49			N/A	N/A
C-AB	0.11	0.03	0.27	0.48	0.67			N/A	N/A

08:30 - 08:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	0.00	0.00	0.01	0.01			N/A	N/A
B-A	0.33	0.03	0.31	1.14	1.47			N/A	N/A
C-AB	0.11	0.00	0.00	0.11	0.11			N/A	N/A

08:45 - 09:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	0.00	0.00	0.01	0.01			N/A	N/A
B-A	0.25	0.00	0.00	0.25	0.25			N/A	N/A
C-AB	0.08	0.00	0.00	0.08	0.08			N/A	N/A

09:00 - 09:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.01	0.00	0.00	0.01	0.01			N/A	N/A
B-A	0.19	0.00	0.00	0.19	0.19			N/A	N/A
C-AB	0.07	0.00	0.00	0.07	0.07			N/A	N/A

2023 With Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	11.05	B

Junction Network Options

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold
Left	Normal/unknown	11	Stream B-A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2023 With Dev	PM	ONE HOUR	15:45	17:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	253	100.000
B		ONE HOUR	✓	381	100.000
C		ONE HOUR	✓	140	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	105	148
	B	329	0	52
	C	130	10	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.15	10.67	0.2	0.5	B	48	72
B-A	0.71	24.12	2.3	11.7	C	302	453
C-AB	0.02	5.32	0.0	0.5	A	11	17
C-A						117	176
A-B						96	145
A-C						136	204

Main Results for each time segment

15:45 - 16:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	39	10	518	0.076	39	0.0	0.1	7.506	A
B-A	248	62	535	0.463	244	0.0	0.8	12.248	B
C-AB	9	2	685	0.013	9	0.0	0.0	5.320	A
C-A	97	24			97				
A-B	79	20			79				
A-C	111	28			111				

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	47	12	481	0.097	47	0.1	0.1	8.295	A
B-A	296	74	525	0.564	294	0.8	1.2	15.504	C
C-AB	11	3	690	0.016	11	0.0	0.0	5.303	A
C-A	115	29			115				
A-B	94	24			94				
A-C	133	33			133				

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	57	14	400	0.143	57	0.1	0.2	10.484	B
B-A	362	91	510	0.710	358	1.2	2.3	23.060	C
C-AB	14	3	696	0.020	14	0.0	0.0	5.279	A
C-A	140	35			140				
A-B	116	29			116				
A-C	163	41			163				

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	57	14	395	0.145	57	0.2	0.2	10.666	B
B-A	362	91	510	0.710	362	2.3	2.3	24.118	C
C-AB	14	3	696	0.020	14	0.0	0.0	5.281	A
C-A	140	35			140				
A-B	116	29			116				
A-C	163	41			163				

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	47	12	476	0.098	47	0.2	0.1	8.392	A
B-A	296	74	525	0.564	300	2.3	1.3	16.274	C
C-AB	11	3	690	0.016	11	0.0	0.0	5.303	A
C-A	115	29			115				
A-B	94	24			94				
A-C	133	33			133				

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
B-C	39	10	515	0.076	39	0.1	0.1	7.563	A
B-A	248	62	535	0.463	250	1.3	0.9	12.684	B
C-AB	9	2	685	0.013	9	0.0	0.0	5.320	A
C-A	97	24			97				
A-B	79	20			79				
A-C	111	28			111				

Queue Variation Results for each time segment

15:45 - 16:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.08	0.00	0.00	0.08	0.08			N/A	N/A
B-A	0.84	0.55	1.00	1.40	1.45			N/A	N/A
C-AB	0.01	0.00	0.00	0.01	0.01			N/A	N/A

16:00 - 16:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.11	0.00	0.00	0.11	0.11			N/A	N/A
B-A	1.25	0.12	1.10	1.99	2.69			N/A	N/A
C-AB	0.02	0.02	0.25	0.45	0.48			N/A	N/A

16:15 - 16:30

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.16	0.03	0.26	0.47	0.49			N/A	N/A
B-A	2.26	0.03	0.32	3.90	11.72			N/A	N/A
C-AB	0.02	0.00	0.00	0.02	0.02			N/A	N/A

16:30 - 16:45

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.17	0.03	0.25	0.45	0.48			N/A	N/A
B-A	2.35	0.03	0.29	2.35	9.34			N/A	N/A
C-AB	0.02	0.00	0.00	0.02	0.02			N/A	N/A

16:45 - 17:00

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.11	0.00	0.00	0.11	0.11			N/A	N/A
B-A	1.34	0.05	0.49	3.29	4.98			N/A	N/A
C-AB	0.02	0.00	0.00	0.02	0.02			N/A	N/A

17:00 - 17:15

Stream	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
B-C	0.08	0.00	0.00	0.08	0.08			N/A	N/A
B-A	0.88	0.04	0.38	2.10	3.62			N/A	N/A
C-AB	0.01	0.00	0.00	0.01	0.01			N/A	N/A

13.0 MATERIAL ASSETS

13.1 INTRODUCTION

This chapter evaluates the impacts, if any, which the proposed development may have on Material Assets as defined in Directive 2014/52/EU, the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015.

This chapter has also been prepared to address the issues associated with material assets during the construction and operational phases of the proposed development as described in Chapter 2.

13.2 METHODOLOGY

In 2011 EIA Directive (2011/92/EU) material assets included architectural and archaeological heritage. In accordance with the 2014 EIA Directive, those heritage aspects are dealt with as components of cultural heritage (which are addressed in Chapter 12 Archaeological, Architectural and Cultural Heritage of this EIA Report).

The EPA Draft EIA Report Guidelines 2017 state that material assets are now taken to mean built services and infrastructure, roads and traffic and waste management. The EPA Draft Advice Notes for EIS 2015 also give the following examples of material assets; assimilative capacity of air, ownership and access and tourism.

In this EIA Report, the impacts on some of the material assets described above have been considered in the following chapters of this EIA Report as follows:

- Chapter 4 Population and Human Health;
- Chapter 8 Air Quality & Climate, and;
- Chapter 13 Traffic & Transportation

The European Commission Guidance on the preparation of the Environmental Impact Assessment Report has been considered in the preparation of the EIA report refers to a number of examples of material assets including buildings, other structures, mineral resources and water resources. The proposed development will not impact on any other structures or buildings. The impacts on mineral resources and water resources have been considered in the following chapters of this EIA Report as follows:

- Chapter 5 Land, Soils, Geology & Hydrogeology; and
- Chapter 6 Hydrology.

This chapter assesses ownership and access, built services and infrastructure, which have not already been addressed elsewhere in this EIA Report. Section 12.3 addresses ownership and access. The subsequent sections address built services and infrastructure.

The potential impacts on built services and infrastructure, if any, are assessed in terms of the following:

- Power Supply;
- Telecommunications;
- Water supply, Surface water infrastructure and Foul drainage infrastructure;

.

Assessment of impact on utilities has been undertaken by consultation regarding supply with the various utility suppliers including Gas Networks Ireland, Eirgrid, ESB Networks and Irish Water (IW). Mitigation measures are proposed where required.

13.3 OWNERSHIP AND ACCESS

The EPA Draft Advice Notes 2015 refer to the need to consider the ownership and accessibility of the site. This section addresses ownership and accessibility of the site for the proposed development.

The site of the proposed development as described in Chapter 2 Description of the proposed development is owned by the Applicant.

The main site access is along the northern boundary of the Avoca River Park. Construction traffic will enter from existing gate entrances off Avoca River Park private access road. As outlined in the CEMP, Warning signage will be provided for all other road users on all approaches in accordance with Chapter 12 of the Traffic Signs Manual and the Contractor's Traffic Management Plan. As part of the Construction Stage Safety Plan for the works a Construction Traffic Management Plan (CTMP) will be prepared in accordance with the principles outlined below and held on site.

13.4 RECEIVING ENVIRONMENT

The existing drainage and wastewater infrastructure has been described in Chapter 2 (Description of the proposed development) and the Infrastructure Design Report prepared by DBFL which accompanies the planning application. The associated built services and infrastructure in the vicinity of the site are summarised in the following sections.

13.4.1 Power and Electrical Supply

The proposed development is for the provision of an on site Power Generation Facility to provide power to the permitted datacentre and surrounding development.

An Bord Pleanála (ABP) has approved the provision of a 110 kV GIS substation compound on adjoining lands within the Avoca River Park. There is also a current SID application under section 182A of the Act for a 220kV substation and transmission lines adjacent, relating to a proposed offshore windfarm development.

A 49 kVA domestic supply is available within the existing ESB Networks medium voltage substation within the industrial estate.

There is an existing gas line and gas skid on site capable of provideing 23MW thermal.

In a separate future development, ESB networks will undertake works to run a 110kV cable to the proposed development.

13.4.2 Telecommunications

A telecommunications distribution network is in place in the area. The requirement for telecoms is minor for this proposed development and there is sufficient capacity in the network.

13.4.2 Water Infrastructure

An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate and runs along the southern boundary of the proposed development site.

The existing surface water features in the vicinity of the site includes drainage ditches, along the south-western and south-eastern boundaries, that ultimately drain to the Avoca River by way of marchlands further downstream (see Chapter 6, hydrology).

13.4.3 Foul Drainage Infrastructure

There are no public foul drainage systems on or near the site. Foul discharge from the existing Avoca River Park industrial estate is to several septic tanks. Discharge from the permitted datacentre development welfare system is to a package treatment plant.

13.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

13.5.1 Construction Phase

Power and Electrical Supply
During construction, contractors will require power for heating and lighting of the site and their onsite construction compound. The power requirements will be relatively minor. It is proposed that a temporary power supply be established for the construction phase.

Surface Water and Foul Drainage Infrastructure and Water Supply
Welfare facilities (canteens, toilets etc.) will be required for the construction staff. It is proposed to import water by tanker to the site for the duration of the construction phase.

A temporary enclosed wastewater management system, including a wastewater holding tank, will be established at the temporary site construction compounds capable of handling the demand during the construction phase.

13.5.2 Operational Phase

Power Supply
The proposed development will supply the permanent power supply to the adjacent permitted data centre development and wider environment. The engines will be dual fuel so therefore capable of operating from liquid fuel (emergency operation only) and gas. There is an existing gas line and gas skid on site capable of provideing 23MW thermal. The Applicant has made an application to Gas Network Ireland for transmission gas fuel.

The energy centre comprises two buildings namly, Phase 1 which is capable of providing 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel. During operation, gas will be provided from a combination of the existing gas line (23 MW) and from the gas transmission network (250 MW), once this is available,

Surface Water Infrastructure

The management of surface water for the proposed development has been designed to comply with the policies and guideline outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of WCC objectives as far as reasonably practicable and taking due cognisance of the phosphogysum pond on the subject site. To manage peak flow rates, the discharge from the development lands will be limited to greenfield run-off rates (c. 2l/sec/ha). The flows leaving the site will be directed to existing drainage ditches at the southeast of the subject site provided outside of the landfill cell in the form of an above ground detention basin. The detention basin will have a capacity of 550m^3 storage volume for the 100 year event plus 10% climate change (DBFL drawings 210103-DBFL-CS-SP-DR-C-3310). A settling pond will be incorporated within the attenuation basin to prevent migration of possible contaminants beyond the site. The use of infiltration to the underlying hydrogeology will only be undertaken outside of the underlying cell within the site boundary. A description of the Sustainable Urban Drainage Systems (SUDS) is described within the Infrastructure report and Chapter 6 surface water.

Foul Drainage Infrastructure
Welfare facilities will be required for maintenance staff only. The design foul loading is calculated as 0.059 l/s. Since there is no existing public sewer in the vicinity of the site, a new 150mm diameter foul drainage sewer is proposed to collect and convey wastewater from the welfare facility to a proposed new packaged treatment system located at the southern end of the site (drawing no 210103-DBFL-RD-SP-DR-1301 for layout). The treated effluent will discharge into a shallow soil polishing filter, which will provide a tertiary level of treatment and improve quality before being discharge into the drainage ditch at the south-eastern corner of the site.

Water Supply
An existing 50mm diameter uPVC water main serves the existing Avoca River Park Industrial Estate runs along the southern boundary of the proposed development site. The water supply requirements for the proposed development are limited to the local welfare facilities that will be required for maintenance staff only. The average daily demand is 0.012l/s and peak hour water demand is 0.075l/s. A new 50 mm diameter connection to the existing watermain is proposed, along the southwestern boundary of the proposed development. Refer to DBFL drawing no. 201103-DBFL-RD-SP-DR-C-1301 for layout. IW has confirmed the feasibility of this connection.

13.6 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

13.6.1 Construction Phase

Power and Electrical Supply
During construction, contractors will require power for heating and lighting of the site and their onsite accommodation. In addition, some on site equipment/plant will require power. A construction compound and temporary power supply will be installed for the construction the proposed development. The power requirements for the construction phase will be relatively minor and therefore the power demand for the construction phase will have a potential short-term imperceptible impact.

Excavations within the vicinity of existing electrical services will be carried out in consultation with EBS Networks to ensure there is no impact on existing users.

Surface Water Infrastructure
During the construction phase, a site drainage system will be constructed on the site so as to attenuate run-off, guard against soil erosion and safeguard downstream water

quality. The drainage system will be excavated and constructed in conjunction with the construction works. The surface water run-off drainage system will be implemented along all areas to be developed in order to separate and collect 'dirty water' run-off from the roads and compound, and to intercept clean over land surface water flows from upslope areas.

The site drainage system is designed as a measure to ensure that the design will not change the existing flow regime across the site, will not deteriorate water quality and will safeguard existing water quality status of the catchment from sediment runoff. To achieve separation, clean water drains will be positioned around the upslope areas of the energy centre compound, internal access road and site construction temporary compound while dirty water drains will be positioned on the downslope sides, with road surfaces and compounds sloped towards dirty drains.

Foul Drainage Infrastructure
Welfare facilities (canteens, toilets etc.) will be required for the construction crew. A temporary wastewater management system, including a wastewater holding tank, will be installed at the construction compound for the duration of the construction phase.

Water Supply
Welfare facilities (canteens, toilets etc.) will be required for the construction staff. It is proposed to import potable water by tanker to the site for the duration of the construction phase.

13.6.2 Operational Phase

Power Supply
There is an existing gas line and gas skid on site capable of provideing 23MW thermal. The Applicant has made an application to Gas Network Ireland for transmission gas to operate the fuel energy centre i.e. Phase 1 which is capable of providing 100MW and Phase 2 an additional 150MW. The engines are designed for dual gas/diesel/diesel replacement liquid fuel for emergency scenarios.

Based on availability of gas within the network for developments of this nature (Gas Networks Ireland) the operation phase is ***long-term, neutral*** and ***not significant.***

Surface water, foul water and water supply Infrastructure
The proposed development will not impact on the capacity within public sewer as welfare facilities from the proposed development will to be treated on site within a proposed new packaged treatment system. The treated effluent will discharge into a shallow soil polishing filter, which will provide a tertiary level of treatment and improve quality before being discharge into the drainage ditch at the south-eastern corner of the site (See Infrastructure report and Chapter 5).

The proposed development will have minimal impact on water supply as the requirement is for 6-10 maintenance staff only.

The surface water management will be managed in compliance with SuDs and incorporate adequate attenuation for the proposed development.

The potential impact associated with foul and surface water drainage and water supply for the operational phase is ***long-term, neutral*** and ***imperceptible***.

13.7 REMEDIAL AND MITIGATION MEASURES

13.7.1 Construction Phase

Construction of the proposed development will require power, drainage infrastructure and water supply connections but will not require any connections outside the red line boundary of the proposed development site.

Ongoing consultation with relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community.

Surface Water Infrastructure
Run-off water containing silt will be contained on site and treated as outlined in Chapter 6 and the CEMP.

The construction works will not require any interruptions to service in existing surface water sewers.

Foul Drainage Infrastructure
A temporary wastewater management system, including a wastewater holding tank, will be installed at the construction compound.

Water Supply
Welfare facilities (canteens, toilets etc.) will be required for the construction staff. It is proposed to import water by tanker to the site for the duration of the construction phase. There will be no offsite impact.

13.7.2 Operational Phase

Power, Electricity Supply
The proposed development has been designed in accordance with GNI requirements. No remedial or mitigation measures are required in relation to power supply.

Telecommunications
There is sufficient capacity available in the area network for the proposed development. Therefore, no remedial or mitigation measures are required in relation to telecommunications.

Foul Drainage Infrastructure
The design for the treatment plant and polishing filter will be in accordance with EPA guidelines. No further mitigation measures are required.

Water Supply
No remedial or mitigation measures are required in relation to water supply infrastructure.

13.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

13.8.1 Construction Phase

The implementation of mitigation measures detailed above will ensure that the predicted impacts on the material assets assessed in this chapter will be ***short-term, neutral*** and ***imperceptible*** for the construction phase.

13.8.2 Operational Phase

The predicted impacts on power and electrical supply, telecommunications, surface water infrastructure, foul drainage infrastructure and water supply will be ***long-term, neutral*** and ***not significant.***

13.9 RESIDUAL IMPACTS

The proposed development entails minimal use of material assets examined in this chapter (i.e. power and electrical supply, telecommunications, surface water infrastructure, foul drainage infrastructure and water supply) during construction. Once operational, the proposed development has minimal requirements on material assets apart from gas supply. A process of application is ongoing including consultation by the applicant with GNI. The overall predicted residual impact of the proposed development can be classed as ***long-term*** and ***not significant*** with respect to material assets.

13.10 CUMULATIVE IMPACTS

The proposed development entails minimal use of material assets during construction. Once operational, the proposed development will result in minimal impact on surface water, foul drainage and water infrastructure. GNI has capacity for supply for Gas generation plants.

Based on this, it is predicted that the cumulative impact of the proposed development with other permitted and planned developments is considered to be ***imperceptible*** during the construction and **not significant** during operational phases.

14.0 WASTE MANAGEMENT

14.1 INTRODUCTION

This chapter has been prepared to address the issues associated with waste management during the construction and operational phases of the proposed development.

A site-specific Construction & Demolition Waste Management Plan (C&D WMP) has been prepared to deal with waste generation during the construction phase of the proposed development and is included as Appendix 14.1. The C&D WMP has been prepared in accordance with the '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* [1] document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

14.2 METHODOLOGY

The assessment of the impacts of the proposed development arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents (as set out in Section 14.2.1), along with an extensive document review to assist in identifying current and future requirements for waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. A summary of the documents reviewed, and the relevant legislation is provided in Appendix 14.1 C&D WMP.

This Chapter is based on the proposed development, as described in Chapter 2 (Description of the Development) and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation, excavation and levelling); and
- Operational phase.

A desk study was carried out which includes the following tasks:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction phase of the proposed development have been calculated. The waste types and estimated quantities are based on published data by the EPA in *National Waste Reports* [2], data recorded from similar previous developments, Irish and US EPA waste generation research, other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.6.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 5 Land, Soils, Geology and Hydrogeology. Chapter 7 of the EIA Report also discusses the environmental quality of soils which will have to be excavated to facilitate construction of the proposed development.

14.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) (Figure 13.1).

Figure 13.1 Waste Hierarchy (Source: European Commission)



The Irish government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, *Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland*, was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national waste targets is due to the Irish and international waste context changing in the years since the launch of the previous waste management plan, *A Resource Opportunity,* in 2012. The need to embed climate action in all strands of public policy aligns with the goals of the European Green Deal.

The strategy for the management of waste from the construction phase is in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects*, published by the Department of Environment, Heritage and Local Government (DoEHLG) in 2006. The guidance document, *Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers* (FÁS & Construction Industry Federation, 2002), was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021*, *BS 5906:2005 Waste Management in Buildings – Code of Practice*, the Wicklow County Council (WCC) *Draft County of Wicklow (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-Laws, 2018*, the EPA National Waste Database Reports 1998 – 2018 and the EPA National Waste Statistics Web Resource.

Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste - Any substance or object which the holder discards or intends or is required to discard.

Prevention - Measures taken before a substance, material or product has become waste, that reduce:

a) the quantity of waste, including through the re-use of products or the extension of the life span of products;

b) the adverse impacts of the generated waste on the environment and human health; or

c) the content of harmful substances in materials and products.

Reuse - Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse - Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment - Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery - Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling - Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal - Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I of the Waste Framework Directive sets out a non-exhaustive list of disposal operations.

14.3 RECEIVING ENVIRONMENT

In terms of waste management, the receiving environment is largely defined by Wicklow County Council (WCC) as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021.

The waste management plan sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020. The National Waste Statistics update published by the EPA in August 2020 identifies that Ireland's current progress against this C&D waste target is at 77% and our progress against 'Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)' is at 51%. Both of these targets are required to be met by 12 December 2020 in accordance with the requirements of the Waste Framework Directive.

The *Wicklow County Development Plan 2016 – 2022* [14] sets out a number of policies for the Wicklow area in line with the objectives of the waste management plan.
Waste policies with a particular relevance to the development are as follows:

Policy Objective WE1*: to require all developments likely to give rise to significant quantities of waste, either by virtue of the scale of the development or the nature of the development (e.g. one that involves demolition) to submit a construction management plan, which will outline, amongst other things, the plan for the safe and efficient disposal of waste from the site.*

Policy Objective WE2*: to require all new developments, whether residential, community, agricultural or commercial to make provision for storage and recycling facilities (in accordance with the standards set out in Development & Design Standards of this plan).*

Policy Objective WE3*: to facilitate the development of existing and new waste recovery facilities and in particular, to facilitate the development of 'green waste' recovery sites.*

Policy Objective WE4*: to facilitate the development of waste-to-energy facilities, particularly the use of landfill gas and biological waste.*

Policy Objective WE5*: to have regard to the Council's duty under the 1996 Waste Management Act (as amended), to provide and operate, or arrange for the provision and operation of, such facilities as may be necessary for the recovery and disposal of household waste arising within its functional area.*

Policy Objective WE6*: to facilitate the development of sites, services and facilitates necessary to achieve implementation of the objectives of the Regional Waste Management Plan.*

In terms of physical waste infrastructure, three municipal solid waste landfills remain operational in the Eastern Midlands Region (EMR) and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the EMR including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

14.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in detail in Chapter 2 (Description of the Proposed Development) of this EIA Report. The aspects relevant to this chapter are described in the following sections.

14.4.1 Construction Phase

As outlined in the Infrastructure Report and SSFRA, the land will be built up such that all proposed roads will be set above the 1% AEP fluvial flood level (3.20m AOD) including an appropriate freeboard:3.20m AOD +0.50m freeboard = 3.70m AOD.
All proposed highly vulnerable development will be set above the 0.1% AEP fluvial flood level (4.10m AOD) including and appropriate freeboard: 4.10m AOD +0.50m freeboard = 4.60m AOD.

Assuming a thin layer of topsoil across the site, the following volumes are anticipated:

- Topsoil (removal off site with partial storage for replacement) ~6,000 m^3
- Engineered stone fill material (import) ~42,000 m^3
- Engineering Materials (Bound and Unbound Sub-Base/Concrete/Asphalt) ~ 30,000 m^3. A further 9,000 m^3 of concrete for piling.
- Pile arisings (if required) distributed around the site (limited engineering requirement) ~9,000 m^3 (this volume will be replaced by concrete).

If any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27.

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phosphogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring. In October 2005 the Licence was transferred to Holfeld Plastics Ltd (Holfeld).

In 2011 Holfeld applied to the Agency to amend the IPPC Licence area to exclude the Production Area. As part of this information, an Environmental Risk Assessment was undertaken by OCM in June 2011. This report compiled the information from the 1994 and 1997 site investigations, creating an updated hydrogeological conceptual model. All these reports are publicly available in the IPCC licence documents on the EPA website.

In addition, a recent initial intrusive site investigation has been directed from a geotechnical perspective by Atkins Limited and from an environmental perspective by OCM.

During the operation of the former production area and landfill, the primary contaminant sources included the handling and storage of the compounds used in the fertiliser manufacture (anhydrite, ammonia, dolomite and gypsum); oil storage, and PCB containing electrical equipment. The oil and PCB contaminated subsoils were removed from the site in 2006, which eliminated this source. All fertiliser manufacturing compounds and finished product were removed from the site during the decommissioning process, thereby eliminating this primary source.

If any excavated material requires removal from site and is deemed to be a waste, removal and reuse/recycling/recovery/disposal of the material will be carried out in accordance with the *Waste Management Act 1996* (as amended), the *Waste Management (Collection Permit) Regulations 2007* (as amended) and the *Waste Management (Facility Permit & Registration) Regulations 2007* (as amended). The volume of waste requiring recovery/disposal will dictate whether a Certificate of Registration (COR), permit or licence is required by the receiving facility.

Any surplus material that requires removal from site for offsite reuse, recovery and/or disposal and any potentially contaminated material (in the unlikely event that it is encountered), should be segregated, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [12] using the *HazWasteOnline* application (or similar approved classification method). If the material is to be disposed of to landfill, it will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* and landfill specific criteria. This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability.

Soils/stones that are not required and/or suitable for reuse on-site, may be suitable for acceptance at either inert or non-hazardous soil recovery facilities/landfills in Ireland or, in the event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities.

During the construction phase, waste produced will include surplus steel and metal materials and broken/off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials are also likely to be generated.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste electrical and electronic equipment (WEEE), printer/toner cartridges and waste batteries may also be generated infrequently from site offices.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&D WMP included as Appendix 14.1. The C&D WMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed development and these are summarised in Table 14.1.

Table 14.1 Estimated off-site reuse, recycling and disposal estimates for construction waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	439	10	44	80	351	10	44
Timber	372	40	149	55	205	5	19
Plasterboard	133	30	40	60	80	10	13
Metals	106	5	5	90	96	5	5
Concrete	80	30	24	65	52	5	4
Other (includes cabling, ducting, conduits, packaging and plastics)	199	20	40	60	120	20	40
Total	**1329**		**302**		**902**		**125**

It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the construction waste that will be generated from the construction of the proposed development as the exact materials and quantities may be subject to some degree of change and variation during the construction process. However, the above estimates are considered to be the worst-case scenario.

It should be noted that the waste volumes outlined above, as well as any excavated material described throughout this chapter, will be generated across the c. 12-15 month construction period. As detailed in Chapter 2 (Description of the Proposed Development), a ten-year permission is sought for the proposed development. The rationale for the ten-year permission duration primarily relates to the scale of the proposed development, the need to provide adequate time for the delivery of a gas connection to the subject site (subject to a separate planning application and connection process with Gas Networks Ireland), the necessary timeline for construction, commissioning, testing, and completion of the proposed energy centre development.

The appointed contractor(s) will be required to prepare a detailed Construction Environmental Management Plan (CEMP) prior to commencement of construction which may refine the above waste estimates.

14.4.2 Operational Phase

An Operational Waste Management Plan (OWMP) will be developed prior to commencement of operations. The plan will seek to ensure the facility contributes to the targets outlined in the EMR Waste Management Plan 2015 – 2021. Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the proposed development are summarised below.

Segregation of Waste Materials Onsite

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

Table 14.2 below summarises the anticipated management strategy to be used for typical wastes to be generated at the proposed development.

Table 14.2 Anticipated Onsite Waste Management

Waste Type	Hazard Y/N	On-site Storage/Treatment Method (anticipated)	Method of Treatment or Disposal (offsite)
Packaging Waste	N	Segregated bins/skips	Recycle
Office Waste	N	Segregated bins/skips	Recycle
General Non-Hazardous Waste	N	Segregated bins/skips	Recovery
Empty Containers	N	Segregated bins/skips	Disposal to landfill
Canteen/Kitchen Waste	N	Segregated bins for compost, mixed recyclable and general waste	Compost food waste. Recycle mixed dry recyclable waste. Recovery of other general waste
Non-hazardous WEEE	N	Segregated bins for waste electric and electronic equipment	Recovery
Landscaping waste	N	Composting bins	Composting
Waste Oil	Y	Oil drum in external waste storage area	Recovery
Waste sludge from oil separator	Y	Storage tank connected to oil separator	Recovery or disposal
(Wet) Batteries	Y	Specialised container in waste storage area	Return to supplier
(Dry) Batteries	Y	Specialised container in waste storage area	Recovery

Management of Wastes Moving Offsite

All waste leaving site will be recycled or recovered, with the exception of those waste streams where appropriate recycling facilities are currently not available.

All waste leaving the site will be transported by suitably permitted contractors and taken to suitably licensed or permitted facilities. All waste leaving the site will be recorded and copies of relevant documentation maintained.

Hazardous Waste

Hazardous waste may be generated from batteries, contaminated chemical drums and other packaging. If the packaging contains residues of or if it is contaminated by dangerous substances, it may be classed as a hazardous waste (depending on the volume and concentration of contaminants). If the drums are found to be unsuitable for re-use, they will be classed as a waste. Any waste classed as hazardous will be stored in a designated area (suitably bunded, where required) and will be removed off site by a licensed hazardous waste contractor(s).

Waste sludge from the petrol interceptors will be pumped out/removed as required by a suitably permitted/licenced contractor.

14.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

This section details the potential waste impacts associated with the proposed development.

14.5.1 Construction Phase

The proposed development will generate a range of non-hazardous and hazardous waste materials during construction. Construction activities will inevitably generate quantities of waste from surplus soils/stones, where materials are oversupplied, incorrect materials delivered, or materials are cut to size on-site. General

housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste.

Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. Dedicated areas for waste skips and bins will be identified in the construction compound and across the site, as required. The dedicated waste storage areas will be easily accessible to waste collection vehicles.

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas.

All waste contractors collecting waste from the site must hold a valid collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

Construction wastes will be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, recycling, recover and/or disposal. There are numerous licensed waste facilities in the Leinster region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the proposed development would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of construction waste materials at facilities in the region. Where possible, waste will be segregated into recyclable and recoverable materials. The majority of construction materials are either recyclable or recoverable.

Recovery and recycling of construction waste has a positive impact on sustainable resource consumption, for example where waste timber is mulched into a landscaping product or waste asphalt is recycled for use in new pavements. The use of recycled materials, where suitable, reduces the consumption of natural resources.

There is a quantity of soil and stone which will need to be excavated to facilitate the proposed development (c. 15,000m^3). It is currently anticipated that all of the excavated material will be retained on site. In the event that potentially contaminated material is encountered, correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on the health and safety of workers as well as on the receiving environment, both on and off-site. Contaminated material will need to be removed off-site for appropriate treatment and/or disposal.

Reuse of excavated material offsite will reduce consumption of natural quarry resources.

The opportunities for other waste materials to be reused off-site will provide positive impacts in the resourcing of materials for other developments and reduce the requirement for raw material extraction.

The potential effect of construction waste generated from the proposed development is considered to be ***short-term, negative*** and ***not significant.***

14.5.2 Operational Phase

The nature of the development means that the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion into recycled products (e.g. paper mills and glass recycling).

Dedicated waste storage areas are provided for storage of waste pending collection by nominated waste contractors.

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas.

Waste collection vehicles will be required to service the development on a regular basis to remove waste.

All waste contractors collecting waste from the site must hold a valid collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO) and waste will only be brought to suitably registered/permitted/licenced facilities. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

The potential impact of operational waste generation from the development is considered to be ***long-term, negative*** and ***not significant.***

14.5.3 Do Nothing Scenario

If the proposed development was not to go ahead there would be no additional construction or operational waste generation at the site until such time as an alternative development consistent with the land use zoning is granted permission and constructed.

14.6 REMEDIAL AND MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

14.6.1 Construction Phase

A project specific C&D WMP has been prepared in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* guidance document issued by the Department of Environment Heritage and Local Government (DoEHLG). Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the proposed development. Prior to commencement of construction, the contractor(s) will be required to refine/update this document to

detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

The project engineers have estimated that assuming a thin layer of topsoil across the site, the following cut volumes are anticipated:

- Topsoil (removal off site with partial storage for replacement) ~6,000 m^3
- Engineered stone fill material (import) ~42,000 m^3
- Engineering Materials (Bound and Unbound Sub-Base/Concrete/Asphalt) ~ 30,000 m^3. A further 9,000 m^3 of concrete for piling.
- Pile arisings (if required) distributed around the site (limited engineering requirement) ~9,000 m^3 (this volume will be replaced by concrete).

It is anticipated that surplus material will be retained on site. It is not anticipated that there will be surplus material that will require removal from site. In the unlikely event that there is surplus material that is not required for reuse onsite, it will be reused or recovered off-site insofar as is reasonably practicable. Where there is no suitable reuse or recovery option available, it will be disposed of at an authorised facility.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
    - Concrete rubble (including ceramics, tiles and bricks);
    - Plasterboard;
    - Metals;
    - Glass; and
    - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be temporarily stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A person responsible for waste management will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act*

1997 to 2009 and the *EMR Waste Management Plan (2015 - 2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

14.6.2 Operational Phase

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Dry Mixed Recyclables;
  - Organic food/green waste;
  - Mixed Non-Recyclable Waste;
  - Batteries (non-hazardous and hazardous);
  - Waste electrical and electronic equipment (WEEE) including computers, printers and other ICT equipment; and
  - Cleaning chemicals (solvents, pesticides, paints, adhesives, resins, detergents, etc.).
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly labelled with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997* and the *EMR Waste Management Plan (2015 - 2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

14.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section describes the predicted impact of the proposed development following the implementation of the remedial and mitigation measures.

14.7.1 Construction Phase

A carefully planned approach to waste management as set out in Section 14.6.1 and adherence to the C&D WMP during the construction and demolition phase will ensure that the impact on the environment will be ***short-term, neutral*** and ***imperceptible***.

14.7.2 Operational Phase

During the operational phase, a structured approach to waste management as set out in Section 14.6.2 will promote resource efficiency and waste minimisation. Provided

the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***long-term, neutral*** and ***imperceptible***.

14.8 RESIDUAL IMPACTS

Adherence to the mitigation measures outlined in Section 14.6.1 and 14.6.2 will ensure that there are no significant impacts on resource or waste management from the proposed development. The management of waste during the construction phase in accordance with the Construction & Demolition Waste Management Plan (C&D WMP) and during the operational phase in accordance with the mitigation measures in Section 14.6.2 will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy. The residual impact will be ***neutral*** and ***imperceptible***.

14.9 CUMULATIVE IMPACT ASSESSMENT

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments (including the substation and grid options as outlined in Chapter 2) are discussed in Sections 14.9.1 and 14.9.2 below for construction and operational phases.

14.9.1 Construction Impacts

The construction of the proposed development and other surrounding proposed and permitted developments (as outlined in Chapter 3) require site clearance, excavations and levelling which will generate a requirement for soil removal and/or import. The proposed development requires a net import of soil which is readily available. However, provided measures as set out in any planning permissions for management of soil movement are implemented, the cumulative impact will be ***short-term*** and ***imperceptible***.

14.9.2 Operational Impacts

The proposed development will includes measures to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management.

The cumulative impacts associated with material assets will be ***long-term*** and ***imperceptible***.

14.10 REFERENCES

1. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
2. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
3. Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation includes:

a. European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended.
b. Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended.
c. Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended.
d. Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended.
e. European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended.
f. Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended.
g. Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
h. European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
i. European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended.
j. Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended.
k. European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
l. Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended.
m. Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended.
n. European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
o. European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
p. European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended.

4. Department of Environment, Communities and Local Government (DoECLG), *A Resource Opportunity - Waste Management Policy in Ireland* (2012).
5. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers* (2002).
6. BS 5906:2005 Waste Management in Buildings – Code of Practice
7. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
8. Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
9. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended.
10. Environmental Protection Agency (EPA), *National Waste Statistics Web Resource – Progress to EU Targets* (October 2018)
11. Wicklow County Council (WCC)*, Wicklow County Development Plan 2016 – 2022*
12. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
13. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.

APPENDIX 14.1

CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN

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APPENDIX 14.1

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLAN

PROPOSED ENERGY CENTRE AT AVOCA RIVER PARK

Technical Report Prepared By

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Construction and Demolition (C&D) Waste Management Plan (WMP) for a proposed power generation facility at Avoca River Park. No demolition works are required.

The purpose of this C&D WMP is to provide information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with current legal and industry standards including the *Waste Management Acts 1996-2011* and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern-Midlands Region Waste Management Plan 2015-2021* [4]. In particular, this C&D WMP aims to ensure maximum recycling, re-use and recovery of waste with diversion from landfill, where possible. It also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources).

In the preparation of the C&D WMP consideration has been given to the requirements of National and Regional waste policy, legislation and other guidelines (referred to in Section 2.0). However, in determining the structure and content of the document, the following two publications have been referenced in particular:

- Department of the Environment, Heritage and Local Government (DoEHLG)*, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006) [5]*.*
- FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers,* (2002) [6]*.*

These Guidance Documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.0 OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* [7] which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland [7]. The target for C&D waste in this Strategy was to recycle at least 50% of C&D waste within a five-year period (by 2003), with a progressive increase to at least 82% over fifteen years (by 2013) [7].

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report titled *Recycling of Construction and Demolition Waste* [8] concerning the development and implementation of a voluntary construction industry programme to meet the governments objectives for the recovery of construction and demolition waste.

A number of additional National and Regional Waste Policies, Strategies and Reports have been issued in previous years including:

- Department of the Environment, Heritage and Local Government (DoEHLG), *Preventing and Recycling Waste - Delivering Change* (2002);
- DoEHLG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action, World Summit on Sustainable Development* (2002);
- DoEHLG, *Taking Stock and Moving Forward* (2004);
- DoEHLG, *National Strategy on Biodegradable* Waste (2006); and
- DoEHLG, *A Resource Opportunity* (2012).

The most recent national policy document was published in July 2012, entitled *A Resource Opportunity - Waste Management Policy in Ireland* [9]. This document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions in relation to C&D waste - it commits to undertake a review of specific producer responsibility requirements for C&D projects over a certain threshold.

The National Construction and Demolition Waste Council (NCDWC) was launched in June 2002, as one of the recommendations of the Forum for the Construction Industry, in the Task Force B4 final report. The NCDWC subsequently produced *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* in July 2006 in conjunction with the Department of the Environment, Heritage and Local Government (DoEHLG).

The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted construction and demolition wastes;
- Procedures to prevent and minimise wastes;
- Options for reuse/recycling/recovery/disposal of construction and demolition wastes;
- Provision of training for Waste Manager and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of proposed consultation with relevant bodies i.e. waste recycling companies, Wicklow County Council, etc.

2.2 Regional Level

The proposed development is located in the Local Authority area of Wicklow County Council (WCC).

The *Eastern-Midlands Region Waste Management Plan 2015 – 2021* is the regional waste management plan for the WCC area published in May 2015.
The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of *"70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes)* to be achieved by 2020.
The *Wicklow County Development Plan 2016 – 2022* [10] sets out a number of objectives for Wicklow County in line with the objectives of the regional waste management plan.

It is the policy of the Council, as set out in the Regional Waste Management Plan, to:

- prevent or minimise the production of waste in the first instance;
- reduce, re-use and recycle to the maximum extent possible;
- endeavour to recover energy from waste where possible; and
- ensure the efficient and safe disposal of any residual waste.

Other waste management objectives with a particular relevance to the proposed development are:

WE1 - To require all developments likely to give rise to significant quantities of waste, either by virtue of the scale of the development or the nature of the development (e.g. one that involves demolition) to submit a construction management plan, which will outline, amongst other things, the plan for the safe and efficient disposal of waste from the site.

WE2 - To require all new developments, whether residential, community, agricultural or commercial to make provision for storage and recycling facilities (in accordance with the standards set out in Development & Design Standards of this plan).

WE6 - To facilitate the development of sites, services and facilities necessary to achieve implementation of the objectives of the Regional Waste Management Plan.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended
    - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended
    - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
    - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended
    - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
    - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
    - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
    - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended
    - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 191 of 2015)
    - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended
    - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended

  - Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998)
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended.
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended.

These Acts and subordinate Regulations enable the transposition of relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the Waste Management Acts 1996 – 2011 and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal reuse, recycling, recovery and/or disposal (including its method of reuse, recycling, recovery and/or disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final waste reuse, recycling, recovery and/or disposal site. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the appointed construction contractor(s) are legally compliant with respect to waste transportation, reuse, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and reuse/recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended, or a waste or Industrial Emissions (IE) licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

The proposed development consists of the provision of a power generation facility along with associated and ancillary works as described in Avoca River Park, Arklow, Co. Wicklow.

A detailed description of the development is provided in Chapter 2 (Description of the Proposed Development) of this EIA Report. A description of the characteristics of the

development relevant to waste are described in Section 14.4 of Chapter 14 (Waste Management).

3.2 Overview of the Non-Hazardous Wastes to be produced

Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will generate c. 15,000m^3 of soil and stones, as advised by the project engineers. It is currently anticipated that all of the excavated material will be retained on site.

The main buildings at the site will be constructed from structural steel. It is expected that throughout the construction phase, waste will be produced from surplus steel and other metal materials and broken/off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials are also likely to be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

3.3 Potentially Hazardous Waste

3.3.1 Contaminated Soil

The wider landholding comprises a large primarily brownfield site which is served by existing roads infrastructure implemented as part of the setting out of the Industrial Park. The lands form part of a closed landfill previously used by an Irish Fertilizer's Industry factory (licenced facility which ceased operations in 2002), on the west side of an Integrated Pollution Control (IPC) licenced landfill boundary area identified as the Phosphogypsum and Carbon Black Cells. The portion of land on which the proposed development will be located was previously designated as phophogypsum ponds. The landfill is part of an Integrated Pollution Control (IPC) licenced landfill facility. Rehabilitation works are being undertaken in accordance with EPA requirements which include capping and ongoing monitoring. In October 2005 the Licence was transferred to Holfeld Plastics Ltd (Holfeld).

In 2011 Holfeld applied to the Agency to amend the IPPC Licence area to exclude the Production Area. As part of this information, an Environmental Risk Assessment was undertaken by OCM in June 2011. This report compiled the information from the 1994 and 1997 site investigations, creating an updated hydrogeological conceptual model. All these reports are publicly available in the IPCC licence documents on the EPA website.

In addition, a recent initial intrusive site investigation has been directed from a geotechnical perspective by Atkins Limited and from an environmental perspective by OCM.

During the operation of the former production area and landfill, the primary contaminant sources included the handling and storage of the compounds used in the fertiliser manufacture (anhydrite, ammonia, dolomite and gypsum); oil storage, and PCB

containing electrical equipment. The oil and PCB contaminated subsoils were removed from the site in 2006, which eliminated this source. All fertiliser manufacturing compounds and finished product were removed from the site during the decommissioning process, thereby eliminating this primary source. Refer to Chapter 5 (Land, Soils, Geology and Hydrogeology Chapter) of the EIA Report for further details.

Any surplus material that requires removal from site as a waste for offsite reuse, recovery and/or disposal and any potentially contaminated material, should it be encountered, should be segregated, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [12] using the *HazWasteOnline* application (or similar approved classification method). If the material is to be disposed of to landfill, it will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* and landfill specific criteria. This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability.

Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated in accordance with the above procedure.

Further details on the soil quality at the site is provided in Chapter 5 (Land, Soils, Geology and Hydrogeology).

3.3.2 Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil waste generated at the site.

3.3.3 Other Known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, waste electrical and electronic equipment (WEEE) containing hazardous components, printer/toner cartridges and batteries (Lead, Ni-Cd or Mercury) may be generated from the temporary site offices during construction works. These wastes will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

3.4 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that may typically be generated by the construction activities at the proposed site are presented in Table 1. The List of Waste code (also referred to as the European Waste code or EWC) for each waste stream is also shown.

Table 1. Typical waste types generated, and List of Waste Codes

Waste Material	List of Waste Code
Soil and stones	17 05
Concrete, bricks, tiles, ceramics	17 01
Wood, glass and plastic	17 02
Bituminous mixtures*	17 03 01/02
Metals (including their alloys)	17 04
Gypsum-based construction material	17 08
Paper and cardboard	20 01 01
Mixed construction and demolition waste	17 09 04
Electrical and electronic components	20 01 35
Biodegradable Kitchen Waste and Canteen Waste	20 01 08
Green waste	20 02 01
Sewage Sludge	20 03 04/06
Batteries and accumulators*	20 01 33-34
Wood preservatives*	03 02
Liquid fuels*	13 07
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.) *	20 01 13-19, 27-30
Soil and stones containing dangerous substances (if encountered) *	17 05 03
Other construction and demolition wastes containing dangerous substances*	17 09 03

Note: * individual waste type may contain hazardous materials

4.0 ESTIMATED WASTE ARISINGS

4.1 Construction Waste Generation

Table 2 shows the breakdown of construction waste types produced on a typical site based on data from EPA *National Waste Reports* [14].

Table 2. Breakdown of waste materials generated on a typical Irish construction site *(Source: EPA National Waste Reports)*

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

An assessment has been undertaken to estimate the quantity of construction waste likely to be generated from the proposed power generation facility.

Table 4.2 presents the estimated construction waste quantities based on the gross floor area of the buildings to be constructed and includes indicative targets for off-site reuse, recycling and recovery.

Table 3. Estimated on and off-site reuse, recycling and disposal rates for construction waste (based on floor size)

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	439	10	44	80	351	10	44
Timber	372	40	149	55	205	5	19
Plasterboard	133	30	40	60	80	10	13
Metals	106	5	5	90	96	5	5
Concrete	80	30	24	65	52	5	4
Other (includes cabling, ducting, conduits, packaging and plastics)	199	20	40	60	120	20	40
Total	**1329**		**302**		**902**		**125**

In addition, as noted in Section 3.2, the quantity of excavated material that will be generated has been estimated by the project engineers to be c. 15,000m^3. It is currently proposed that all excavated material will be retained on site.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

All waste arising during the construction phase will be transported off-site by an approved waste contractor holding a current waste collection permit. All waste arising requiring reuse, recycling, recovery or disposal off-site will be brought to facilities holding the appropriate COR, licence or permit, as required.

4.2 Proposed Waste Management Options

4.2.1 Waste Management Options for Excavated Materials

The Waste Management Hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling/recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. Any excavations carried out will be required to facilitate construction works so the preferred option of prevention will not be applicable. However, the volume of material removed from site will be minimised where possible. It is currently proposed that all excavated material will require offsite reuse, recovery and/or disposal

In the event that any excavated material is removed off-site for reuse as a by-product (and not as a waste), it will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that certain conditions are met and that by-product decisions are made to the EPA via their online notification form. However, it is not currently anticipated that any excavated material will be removed offsite for reuse as a by-product. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27. However, it is not currently anticipated that any excavated material will be removed offsite or imported onto the site for reuse as a by-product.

If any excavated material removed from site is deemed to be a waste, then removal and reuse/recycling/ recovery/disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. The volume of waste removed will dictate whether a COR, permit or licence is required by the receiving waste facility. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the unlikely event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

4.2.2 Waste Management Options for other Construction Wastes

Waste materials generated will be segregated on-site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring reuse, recycling, recovery or disposal off-site will be transferred to a facility holding the appropriate COR, permit or licence, as required.

Mixed C&D waste (classified under the List of Waste code 17 09 04) is permitted for acceptance at a number of waste facilities in the region including Integrated Material Solutions landfill in north Dublin and a number of waste transfer stations.

Written records will be maintained by the contractor detailing the waste arising throughout the construction phase, the classification of each waste type, the contact details and waste collection permit number of all waste contractors who collect waste from the site and the end destination details for all waste removed and disposed offsite.

Dedicated storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc., as required. The containers used for storing hazardous liquids will be appropriately bunded or will be stored on suitably sized spill pallets.

The management of the main construction waste streams are detailed as follows:

<u>Concrete Blocks, Bricks, Tiles & Ceramics</u>
The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible.

<u>Hard Plastic</u>
As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber
Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc., will be placed into a dedicated skip and recycled off-site. Clean timber is typically recycled as chipboard.

Metal
Metals will be segregated and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard
Plasterboard from the construction phase will be stored in a separate skip, pending collection for recycling. The site manager and project engineers will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass
Glass materials will be segregated for recycling, where possible.

Waste Electrical and Electronic Equipment
Waste electrical and electronic equipment (WEEE) will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling off site.

Other Recyclables
Where any other recyclable wastes such as cardboard and soft plastic are generated, these will be segregated at source into dedicated skips and removed offsite.

Non-Recyclable Waste
Construction waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team (see Section 6.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Hazardous Wastes
On-site storage of any hazardous wastes produced (i.e. contaminated soil in the unlikely event that it is encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

It should be noted that until the main contractor is appointed, it is not possible to provide information on the specific destinations of each waste stream. Prior to commencement construction of the proposed power generation facility and removal of any waste off-site, details of the proposed destination of each waste stream will be provided to WCC.

4.3 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the waste contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the contractor.

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 – 2011* as amended, *Waste*

Management (Collection Permit) Regulations 2007 as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project Waste Manager (see Section 6.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority COR, waste permit or EPA Waste/IE Licence for that site will be provided to the nominated project Waste Manager. If the waste is being shipped abroad, a copy of the TFS document will be obtained from Dublin City Council (as the relevant authority on behalf of all local authorities in Ireland) and kept on-site along with details of the final destination (permits, licences etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

If any surplus soil or stone is being removed from the site for reuse on another construction site as a by-product, this will need to be done in accordance with Article 27 of the *EC (Waste Directive) Regulations, 2011*. Similarly, if any soil or stone are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27.

All information will be entered in a waste management recording system to be maintained on site.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided below. The total cost of construction waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

5.1 Reuse

By reusing materials on site, there will be a reduction in the transport and offsite recycling/recovery/disposal costs associated with the requirement for a waste contractor to take the material away to landfill.

Clean and inert excavated material which cannot be reused on site may be used as capping material for landfill sites, or for the reinstatement of quarries, etc. as previously discussed. This material is often taken free of charge for such purposes, reducing final waste disposal costs. However, it is not currently anticipated that surplus excavated material will be removed off site.

5.2 Recycling

Salvageable metals will earn a rebate which can be offset against the costs of collection and transportation of the skips. Clean uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will typically charge less to take segregated wastes, such as recyclable waste, from a site than mixed waste streams.

5.3 Disposal

Landfill charges in the Eastern-Midlands region are currently at around €130-150 per tonne (which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a fee for provision and collection of skips.

Collection of segregated construction waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a registered, permitted or licensed facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill.

6.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the Waste Manager to ensure commitment, operational efficiency and accountability during the construction phase of the project.

6.1 Waste Manager Training and Responsibilities

The nominated Waste Manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid him/her in the organisation, operation and recording of the waste management system implemented on site. The Waste Manager will have overall responsibility to oversee, record and provide feedback to the Project Manager on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to subcontractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The Waste Manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The Waste Manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this C&D WMP.

6.2 Site Crew Training

Training of the site crew is the responsibility of the Waste Manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the C&D WMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

7.0 RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling, recovery or disposal. A recording system will be put in place to record the construction waste arisings on site. A copy of the Waste Collection Permits, COR, Waste Facility Permits and Waste/IED Licences will be maintained on site at all times.

The Waste Manager or delegate will record the following;

- Waste taken for reuse off-site;
- Waste taken for recycling;
- Waste taken for disposal; and
- Reclaimed waste materials brought on-site for reuse.

For each movement of waste on or off-site, a signed docket will be obtained by the Waste Manager from the waste contractor, detailing the weight and type of the material and the source and destination of the material. This will be carried out for each material type. This system will also be linked with the delivery records. In this way, the percentage of construction waste generated for each material can be determined.

The system will allow the comparison of these figures with the targets established for the recovery, reuse and recycling of construction waste presented earlier and to highlight the successes or failures against these targets.

8.0 OUTLINE WASTE AUDIT PROCEDURE

8.1 Responsibility for Waste Audit

The appointed Waste Manager will be responsible for auditing the site during the construction and demolition phases of the project.

8.2 Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported on or off-site should be undertaken mid-way through the project. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established reuse/recovery/recycling/disposal targets for the site.

Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed.

Upon completion of the construction phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total reuse, recycling, recovery and disposal figures for the development.

9.0 CONSULTATION WITH RELEVANT BODIES

9.1 Local Authority

Once the main contractor has been appointed and prior to removal of any waste materials offsite, details of the proposed destination of each waste stream will be provided to WCC for their approval.

WCC will also be consulted, as required, throughout the construction phase in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

9.2 Recycling/Salvage Companies

Companies that specialise in C&D waste management will be contacted to determine their suitability for engagement. Where a waste contractor is engaged, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and facility COR/permits/licences are held. In addition, information regarding individual construction materials will be obtained, including the feasibility of recycling each material, the costs of recycling/reclamation, the means by which the wastes will be collected and transported off-site and the recycling/reclamation process each material will undergo off site.

10.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No. 20 of 2011). Subordinate and associated legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended 2011 (S.I. No. 323 of 2011)
    - Waste Management (Collection Permit) Regulations 2007 (S.I No. 820 of 2007) as amended 2008 (S.I. No. 87 of 2008) and 2016 (S.I. No. 24 of 2016)
    - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 821 of 2007) as amended 2008 (S.I. No. 86 of 2008), 2014 (S.I. No. 310 and S.I. No. 546 of 2014) and 2015 (S.I. No. 198 of 2015)
    - Waste Management (Licensing) Regulations 2000 (S.I. No. 185 of 2000) as amended 2004 (S.I. No. 395 of 2004) and 2010 (S.I. No. 350 of 2010)
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended 1998 (S.I. No. 164 of 1998), 2001 (S.I. No. 356 of 2002) and 2011 (S.I. No. 126 and No. 192 of 2011)
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
    - European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
    - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended 2015 (S.I. No. 190 of 2015)
    - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
    - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended 2015 (S.I. No. 542 of 2015)
    - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
    - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended 2014 (S.I. No. 349 of 2014) and 2015 (S.I. No. 347 of 2015)
    - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended 2000 (S.I. No. 73 of 2000)
    - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended by European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
    - The European Communities (Trans frontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988) ○ European Union (Properties of Waste Which Render It Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
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5. Department of the Environment, Heritage and Local Government (DoEHLG), *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*, (2006).
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10. Wicklow County Council (WCC), *Wicklow County Development Plan 2016 – 2022*
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15.0 INTERACTIONS

15.1 INTRODUCTION

This chapter of the EIA Report addresses potential interactions and inter-relationships between the environmental factors discussed in the preceding chapters. This covers both the construction and operational phase of the proposed development.

This chapter has been produced following the guidance within, the EIA Directive, the *Planning and Development Act 2000* (as amended), the EPA *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* 2017 and EPA Draft *Advice Notes for Preparing Environmental Impact Statements* 2015.

In accordance with the guidance not only are the individual significant impacts required to be considered when assessing the impact of a development on the environment, but so must the interrelationships between these factors be identified and assessed.

The majority of the EIA Report chapters have already included and described assessments of potential interactions between aspects, considered by the various specialists contributing to this impact assessment. The quality, magnitude and duration of potential impacts are defined in accordance with the criteria provided in the EPA 2017 Guidance as outlined in Chapter 1. This section of the assessment presents a summary and assessment of the identified interactions.

These interactions have been identified and considered by the various specialists contributing to this impact assessment.

Section 171A of the Planning and Development Act requires that the interactions between the following be assessed:

- Population and human health;
- Land, soil, water, air and climate;
- Biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive; and
- Material assets, cultural heritage, and the landscape.

15.2 DISCUSSION – POSITIVE IMPACTS

The reasoning behind the interactions that are considered to have a positive effect (i.e., a change which improves the quality of the environment) is outlined in this section.

Planning and Alternatives on:

Population and Human Health
The proposed development will create up to 250 temporary jobs during the construction phase, which will have a **short term**, **positive**, **imperceptible** effect on employment and business in the Arklow area.

It is intended that the proposed development will act as a peaking plant (providing grid support) and provide power for the permitted data storage facility, wider area and national grid which will enable further employment within the Arklow area. Therefore,

the operation phase will have a **long term**, **positive**, **imperceptible** effect on employment and business in the region.

15.3 DISCUSSION – NEUTRAL IMPACTS

The reasoning behind the interactions that are considered to have a neutral effect (i.e., no effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error) is outlined in this section.

Land, Soils, Geology and Hydrogeology on:

Hydrology
The main potential impact of the construction works proposed is on surface water quality (due to sediment laden run-off and spillages during construction of the proposed development); however, the implementation of a Construction and Environmental Management Plan (CEMP) and mitigation as detailed in Section 6.7.1 of Chapter 6 (Hydrology) will ensure the effect will be ***short-term, imperceptible*** and ***neutral***.

Waste Management
As detailed in Chapter 14 (Waste Management), c. 6,000 m^3 of excavated material may be generated during construction. All excavated soil & stones will be reused on site. The management of waste during the construction phase in accordance with the Construction & Demolition Waste Management Plan (C&D WMP) will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy. Therefore, the effect of generation of soils/stones in terms of waste management will be ***neutral***.

Archaeology and Cultural heritage
As the site is brownfield and has been previously disturbed. There is no potential for disturbance of archaeology during construction or operation. The impact will be i**mperceptible** and **neutral**.

Biodiversity
There will be a loss of habitat including woodland (Local value) as a result of the site redevelopment. However, with mitigation for bats during consruction and operation and landscaping, the impact is considered to be neutral and imperceptible.

Hydrology on:

Land, Soils, Geology and Hydrogeology
There is a potential impact on soil through poorly managed surface water run-off during the construction phase of the proposed development; however, this will be managed through the implementation of a Construction and Environmental Management Plan (CEMP) to ensure management of any accidental discharges to ground during construction. The design has taken in to account the presence of the underlying landfill by minimising disturbance during construction and SuDs design and management during operation. The use of infiltration to the underlying hydrogeology will only be undertaken outside of the underlying cell within the site boundary.

Any interactions between hydrology and land and soils will be***, imperceptible*** and ***neutral.***

Biodiversity
The management of surface water for the proposed development has been designed to comply with the policies and guideline outlined in the Greater Dublin Strategic

Drainage Study (GDSDS) and with the requirements of WCC objectives. This will improve water quality discharging off site during operation.

There is no formal designation on the proposed development lands and the development area may be considered of Low Local Ecological Value. The design measures and mitigation measures incorporated in the CEMP will ensure that there is no change in the overall water regime. The predicted effect will be ***imperceptible*** and ***neutral***.

Waste Management
Hydrocarbon sludge waste and rubbish/debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the proposed development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 14 such that the effect of the waste generation will be ***long-term, imperceptible*** and ***neutral***.

Air Quality and Climate on:

Hydrology
Mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised and therefore the predicted effect from air (including dust) on the water environment during construction is ***short-term, imperceptible*** and ***neutral***.

Biodiversity
Mitigation measures during the construction phase of the proposed development will ensure that dust generation is minimised and the effect on biodiversity will be ***short term***, ***imperceptible*** and ***neutral***.

Noise and Vibration on:

Population and Human Health
The potential impact of noise and vibration on the local population is discussed in Chapter 4 (Population and Human Health) and Chapter 9 (Noise & Vibration). Noise emissions associated with the construction phase of the development are expected to be less than the prevailing ambient noise level at the nearest sensitive locations. In addition, due to the distance between the site and the nearest sensitive locations, vibration impacts generated during construction are expected to be ***negligible***. During operation (with design and mitigation measures in place) there will be **no significant impact on human health** as a result of noise emissions.

Material Assets on:

Population and Human Health
The proposed development will not have a significant impact on material assets such as surface water drainage, water supply, wastewater drainage and road infrastructure. The individual chapters of this EIA Report (Chapter 12 Traffic and Transportation and Chapter 13 Material Assets) have assessed the capacities of the available infrastructure to accommodate the proposed development and the implementation of the mitigation measures proposed will ensure there are no negative impacts on the local population. The predicted effect is therefore ***imperceptible*** and ***neutral***.

Hydrology
The proposed development will result in minor changes to surface water drainage, water supply and wastewater networks. However, a combination of mitigation

measures to be implemented as detailed in Section 6.7 of Chapter 6 (Hydrology), as well as the capacity already built into these networks, will ensure that these changes will result in a ***long-term, imperceptible*** and ***neutral*** impact.

15.4 DISCUSSION – NEGATIVE IMPACTS

The reasoning behind the interactions that are considered to have a negative effect (i.e., a change which reduces the quality of the environment) is outlined in this section.

Noise on:

Biodiversity
Noise generated during the construction phase of the proposed development will have a **short-term negative, temporary** impact on fauna which are likely to be displaced during construction works. As the majority of the area is already industrial in nature the overall operational noise levels will not change significantly.

Population and Human Health
The mitigation measures that will be put in place at the proposed development for the construction phase will ensure that the impact of construction noise and vibration emissions are ***slight, negative*** and ***temporary***.

The mitigation measures that will be put in place at the proposed development for the operational phase will ensure that the impact of construction noise and vibration emissions are ***negative, not significant*** and ***long-term***.

Land, Soils, Geology and Hydrogeology on:

Air Quality and Climate
There is a potential for the construction activity to impact on air quality in terms of dust generated but mitigation measures outlined in Chapter 8 (Air Quality & Climate) of this EIA Report, implemented through the CEMP will ensure a ***short term, imperceptible*** and ***negative*** effect. With design and mitigation measures in place the impacts during operation are **imperceptible and longterm.**

Landscape and Visual on:

Traffic and Transportation
The establishment of site enclosures, construction traffic access routes, construction vehicular activity, site lighting and temporary traffic management regimes will cause disruption during the construction of the proposed development. Effects on landscape character during construction will be ***temporary*** and will have a locally ***moderate*** and ***negative*** effect. Effects on views during construction will be ***temporary***, and will have ***moderate***, and ***negative*** effect. Residual impacts on landscape and visual effects from the wider locality will be not significant or imperceptible.

Population and Human Health
The predicted impact of the proposed development on the landscape is described in Chapter 10. The proposed development is well-sited on brownfield lands and has been designed to ensure that it will be integrated into its setting. Residual landscape and

visual effects from the wider locality will be ***slight*** to ***moderate***, will be ***long-term and negative*** effect.

15.5 SUMMARY

In summary, the interactions between the environmental factors and impacts discussed in this EIA Report have been assessed and the majority of interactions are ***neutral***.

15.1 TABLE OF INTERACTIONS

*Table **Error! No text of specified style in document.**.1 Summary of interrelationships Between the Aspects*

	Planning and Alternatives		**Population & Human Health**		Land, Soils and Hydrogeology		Hydrology		Biodiversity		Air Quality and Climate		Noise and Vibration		Landscape and Visual Impact		Cultural Heritage		Material Assets, including Transport and Waste	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Planning and Alternatives			+	+	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Population & Human Health					×	×	o	o	×	×	-	o	-	o	o	o	×	×	o	o
Land, Soils and Hydrogeology							o	o	o	o	-	o	-	×	×	×	o	×	o	o
Hydrology									o	o	o	o	-	×	×	×	×	×	o	o
Biodiversity											o	o	o	×	o	o	×	×	×	×
Air Quality and Climate													×	×	×	o	×	×	×	×
Noise and Vibration															×	×	×	×	×	×
Landscape and Visual Impact																	×	×	-	×
Cultural Heritage																			×	×
Material Assets, including Transport and Waste																				

Con.	Construction Phase
Op.	Operational Phase
×	No Interaction

+	Positive Interaction
o	Neutral Interaction
-	Negative Interaction

data centre development including its stacks. Cumulative effects on landscape character and on visual amenity will be moderate and negative.

View 11

View 11 is from the northbound carriageway of the M11 motorway as it begins to cross the Avoca River and is presented as two adjoining images. Figures 10.11.1a and 10.11.1b illustrate the expansive flat valley floor contained by the wooded slopes and clearly show the prilling and drying towers towards the western part of the industrial land. A number of industrial buildings are partially visible within the lands together with overhead lines and supporting towers.

Figures 10.11.2a and 10.11.2b included the proposed development and illustrate the body of the proposed development being set low and behind intervening roadside and riverbank vegetation. The taller stacks will become part of the skyline and will be readily visible from the motorway. Effects on landscape character and on visual amenity will be locally moderate and negative.

Figures 10.11.3a and 10.11.3b include the permitted data centre development and the proposed 220kV substation development and illustrates the low lying yet expansive nature of the developments generally presenting as strong horizontal elements within the valley and punctuated by the taller flue stacks of different developments. Cumulative effects on landscape character and on visual amenity are considered minor or locally moderate and negative.

It is noted that the wind turbines forming part of the offshore ABWP Phase 2 are also likely to be visible from the M11 motorway overbridge however these will be part of the expansive townscape and seascape setting.

10.10 REFERENCES

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment
- Planning and Development Act 2000, as amended
- Planning and Development Regulations 2001, as amended
- European Landscape Convention 2000
- Wicklow County Development Plan 2016-2022
- Arklow and Environs Local Area Plan 2018-2024
- Environmental Protection Agency (EPA, 2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft
- Environmental Protection Agency (EPA, 2015) Advice Notes for preparing Environmental Impact Statements. Draft
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- Landscape Institute (LI, 2019) Technical Guidance Note 06/2019 on Visual Representation of Development Proposals (VPDP)