Environmental Impact Assessment Report

PROVISION OF A PROPOSED 110KV GAS INSULATED SWITCHGEAR (GIS) SUBSTATION ON A SITE TO THE NORTH OF THE EXISTING KISH BUSINESS PARK, ARKLOW, COUNTY WICKLOW, AND AN UNDERGROUND 110KV TRANSMISSION LINE CONNECTION TO THE EXISTING ARKLOW – BANOGE OVERHEAD LINES

Volume 3 – EIA Appendix

Prepared by: AWN Consulting, October 2022

Prepared for: Crag Wicklow Limited

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Construction Environmental Management Plan

AWN, 2022

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CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN FOR A PROPOSED 110 KV SUBSTATION AND UNDERGROUND GRID CONNECTION, ARKLOW, CO. WICKLOW

Report Prepared For

Crag Wicklow Limited

Report Prepared By

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Our Reference

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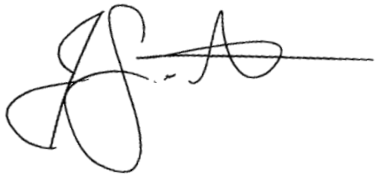
Signature		
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1.0 INTRODUCTION

This Outline Construction Environmental Management Plan (CEMP) has been prepared by AWN Consulting Ltd. (AWN) on behalf of Crag Wicklow Limited for submission to Wicklow County Council (WCC) for site clearance and preparation and the development of a 110 kV substation and underground grid connection.

The Proposed Development primarily comprises the provision of two no. 110 kV transmission lines (Circuit Route A & Circuit Route B) and a 110 kV Gas Insulated Switchgear (GIS) substation compound and Transformers / MV switch room compound along with associated and ancillary works.

This CEMP explains the construction techniques and methodologies which will be implemented during construction of the proposed development.

The CEMP will be implemented and adhered to by the construction Contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures. The construction Contractor will provide a further detailed CEMP to include any subsequent planning conditions relevant to the proposed development and set out further detail of the overarching vision of how the construction Contractor of the proposed development manage the site in a safe and organised manner.

This outline CEMP has been prepared to account for activities at the site during the demolition, excavation and construction phases of the project. The main issues that have been considered within this document are as follows;

- Description of works;
- Construction programme and phasing;
- Site logistics;
- Workforce;
- Public relations and community liaison;
- Construction traffic and access; and
- Safety, health and environmental management.

Preparation of the updated CEMP will comply with the mitigation measures presented by submitted expert reports, relevant legislation, guidelines, along with best practice. Additional mitigation measures may be added following consultation with relevant consultees in preparation of specific method statements prior to commencement of works.

2.0 DESCRIPTION OF THE PROJECT

The Proposed Development primarily comprises the provision of two no. 110kV transmission lines (Circuit Route A & Circuit Route B) and a 110kV Gas Insulated Switchgear (GIS) substation compound and Transformers / MV switch room compound along with associated and ancillary works. The Proposed Development is located on a Site with a total area of c. 8.69 hectares (ha) of predominantly agricultural land.

The ‘110 kV Substation Site’, is located within the Kish Business Park and comprises part of an irregularly shaped field bounded by hedgerows typical of its agricultural setting. The 110 kV Substation Site is currently in use as agricultural lands. To the

south of the 110 kV Substation Site is Armstrong Timber Engineering, there are agricultural lands to the north and east, and the Dublin-Rosslare rail line, R772, and M11 are located to the west. The 110 kV Substation Site is presently bounded by greenfield agricultural lands to the north and east, which are subject to permitted development for a 3 no. ICT Facility Buildings and associated development under Wicklow County Council (WCC) Reg. Ref.: 201088 (hereafter referred to as the 'Permitted ICT Facility').

The 'Circuit Route A', is a linear route; between the 110 kV Substation Site to the existing 110 kV Arklow – Banoge overhead line located to the west. This route crosses perpendicular to the Dublin-Rosslare rail line, then follows the R772 to cross the culverted Moneylane Stream and underneath the M11 motorway at Junction 21, then traverses along the L6187, enters agricultural lands at Knockeneahan Road (L2190), and terminates at the existing 110 kV Arklow – Banoge overhead line.

The 'Circuit Route B', is a linear route; between the 110 kV Substation Site to the existing 110 kV Arklow – Banoge overhead line located to the west. The route crosses perpendicular to the Dublin-Rosslare rail line, the Moneylane Stream, R772, M11, then traverses an IDA Business Park, and open agricultural lands adjacent to the M11 and Knockeneahan Road (L2190) and terminates at the existing 110 kV Arklow – Banoge overhead line.

The Moneylane Stream is situated to the west of the 110 kV Substation Site and flows in a northerly direction. The 110 kV Substation Site and Permitted ICT Facility is drained by a series of agricultural ditches which connect to the Moneylane Stream and ultimately discharges into the Avoca River.

Figure 2.1 *Proposed Development Lands (Red boundary)*

3.0 CONSTRUCTION PROGRAMME AND PHASING

The construction works associated with the proposed development site is anticipated to be constructed on a over 12 months. The site office and welfare facilities (site compound) will be shared with the ICT Facility permitted under WCC Reg. Ref.: 201088. The site compound and welfare facilities for the ICT Facility is established at the south west corner of the ICT site, which corresponds to the south east corner of the substation development. The location of the site compound can be viewed in Figure 5.1, below.

It is anticipated that the site compound will remain in this general location as the development progresses, however the appointed construction contractor may shift the location in future. All of the sub-contractors as well as the main contractor and project managers will occupy offices in the same area.

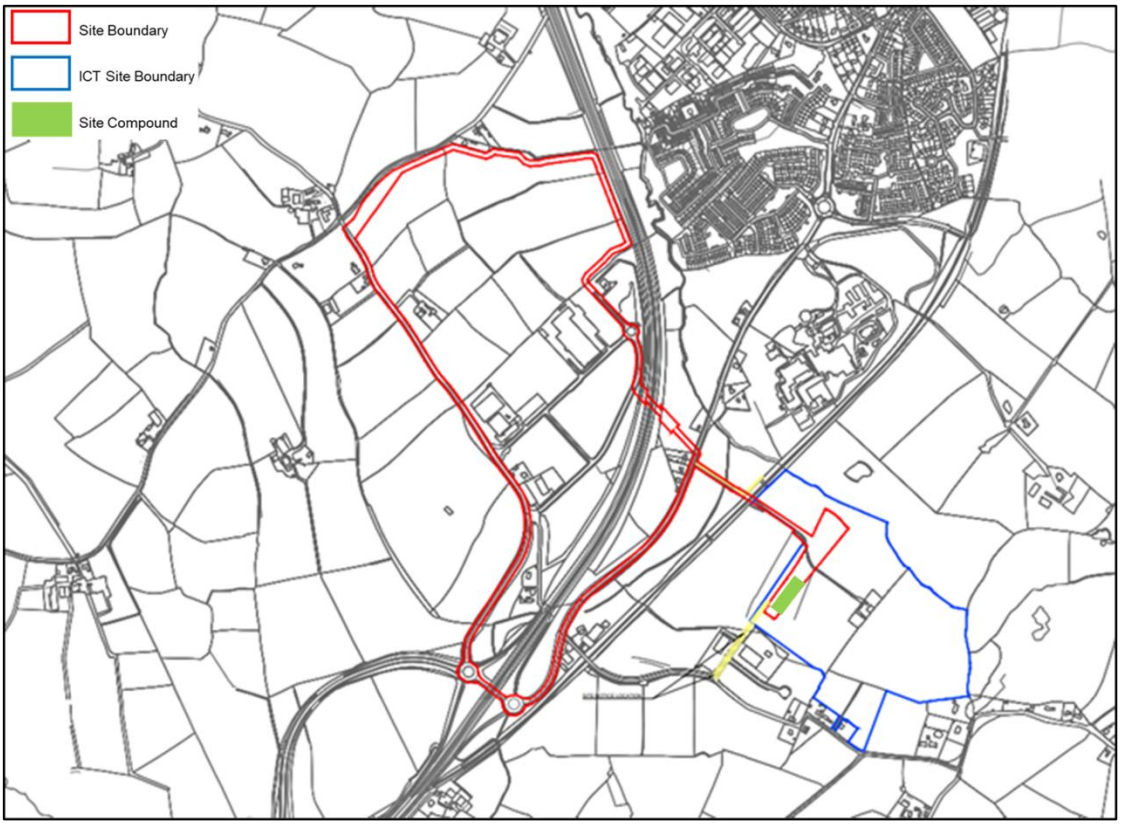


Figure 3.1 *Proposed site construction compound location (incl. site offices, staff facilities and refuse storage).*

The site parking for all staff will be located within the development site area. Parking for contractors and visitors will also be located in this area. The main contractor will designate this area. There will be no parking permitted on the surrounding road network or estate roads by the contractor or site operatives.

Estimates for the duration of the construction works are included in the table below. The overall start-to-finish duration is estimated to be 12 months with development aspects overlapping. Construction is anticipated to commence in Q3 2023 and be completed by Q3 2024.

No more than a 100 m section of trench will be opened at any one time. The second 100 m will only be excavated once the majority of reinstatement has been completed

on the first. The excavation, installation and reinstatement process will take place at a rate of c. 100 m per day.

Table 3.1 *Estimated Construction Duration*

Work Package	Estimated Construction Duration
Substation and associated works	12 months
Ducting, cabling and mast works	8 months

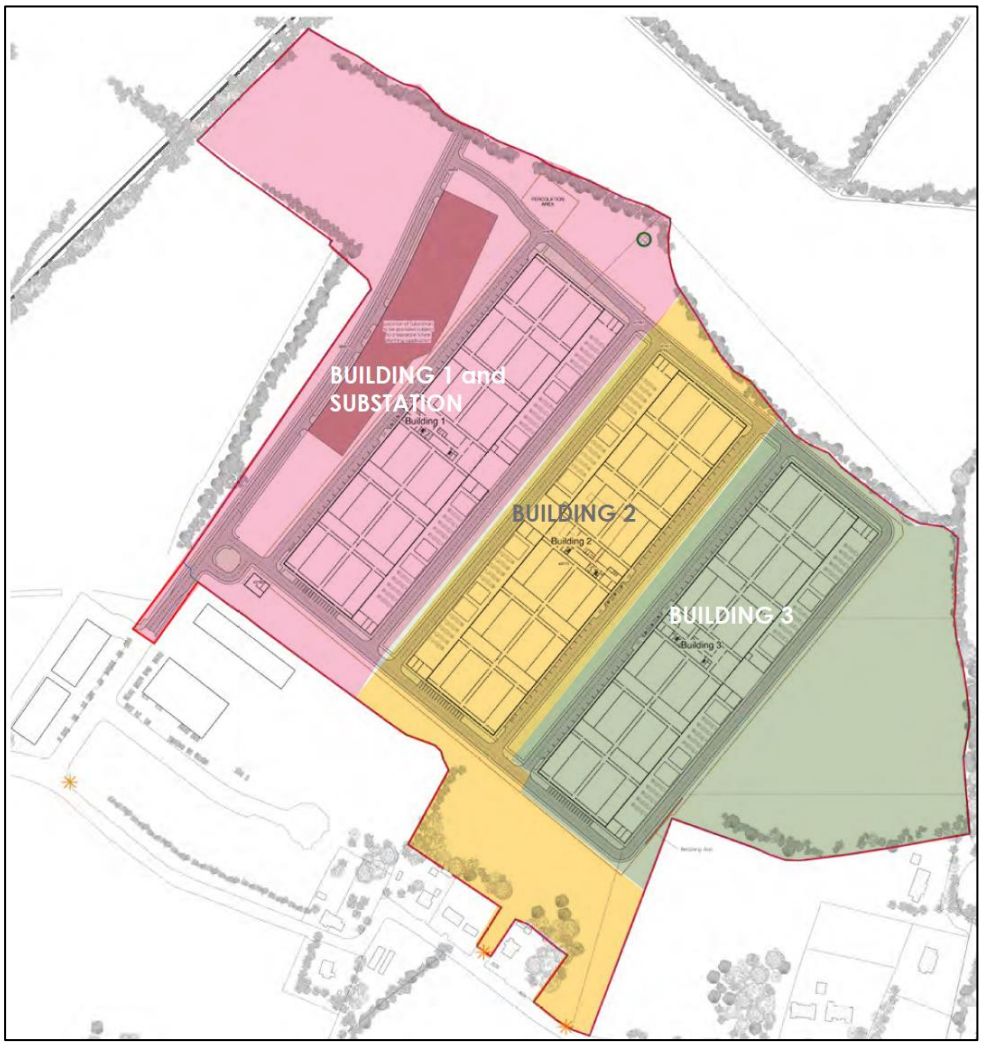


Figure 3.2 *Proposed outline phasing Plan including Permitted ICT Facility*

3.1 EXCAVATION & CONSTRUCTION PHASE

The project excavations will involve excavations for new foundations, site levelling and excavations for access roads and services. The Resource Waste Management Plan (RWMP) prepared by AWN Consulting Ltd (227501.0241WMR01) for the development will be updated by the main contractor and will be in compliance with the requirements of the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* published by the Environmental Protection Agency (November 2021) [1], which will identify and categorise any waste arising from the development.

The plan contains the proposals for the minimisation, re-use and re-cycling of site generated waste. As part of this plan separate storage areas will be designated on the site for various types of material in order to maximise the re-use and re-cycling potential. Procedure will also be put in place to ensure that all sub-contractors fulfil the requirements of the Waste Management Plan.

The project involves the construction of a 110 KV substation and underground grid connection and all associated site works. There will be no structural demolition associated with the proposed development. There will be the removal of a small section of redundant overhead line cable associated with the installation of the 2 no. new masts. This will generate waste metals (including their alloys), mixed metals, iron and steel, and cable.

The works will include:

- Site set up, welfare facilities and compound establishment, decommissioning and movement of site compound and facilities as needed.
- Set up of hoarding around compound and the site boundary.
- Erection of safety signage to all areas and implementation of traffic/pedestrian management plan.

4.0 EXCAVATIONS

4.1 ARCHAEOLOGICAL AND ARCHITECTURAL HERITAGE

An archaeological assessment of the proposed site area was carried out by Cultural Resource Development Services Ltd (CRDS Ltd) as part of the EIAR submission. The assessment was based on a desk study of published and unpublished documentary sources, as well as a field inspection, and partial geophysical survey of the proposed development area.

A suitably qualified archaeological consultant will be appointed to oversee the project from design through to planning and construction phase.

Geophysical survey was undertaken in in two phases in March and October 2020 by Target Archaeological Geophysics (Licence no. 20R0025) as part of the overall archaeological management plan for the site of the Permitted ICT Facility, that includes the site of the proposed 110 kV Substation. The survey objectives were to identify the location, form and extent of buried archaeological remains, where present within the site boundary, and to advise further works prior to proposed development at the site.

Prior to construction the geophysical survey of the proposed development, under license to the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht, will be completed across the site.

Pre-development archaeological testing, under license to the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht, will be undertaken in advance of construction on the 110 kV Substation site, as follows:

- Trenches will largely target anomalies identified by the archaeo-geophysical survey, but a number of trenches will also be excavated in areas where no features were highlighted (as per best practice guidelines; c. 10% of the site).

- Trenches will be dug by a tracked excavator equipped with a 1.8 m wide toothless ditching bucket. Each trench will be excavated to the surface of archaeological features, deposits or structures, or to the surface of the undisturbed natural soil or bedrock (typically less than 75cm). Topsoil will be removed from the test trenches in horizontal levels of not more than 0.20 m in thickness until sterile subsoil is reached.
- Should archaeological or architectural heritage features, deposits or structures be uncovered during these will be cleaned by hand, investigated and recorded.

Archaeological excavation of features, deposits or structured identified, will be undertaken in advance of construction, under license to the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht.

The archaeological sites discovered within the development area will be preserved by record (archaeological excavation), prior to construction taking place. All topsoil stripping associated with the proposed development will be monitored by a suitably qualified archaeologist.

If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht. Archaeological monitoring during the works will ensure the identification and recording of any additional archaeological remains that may be uncovered as a result of the construction.

4.2 GROUND CONDITIONS

Site investigations were undertaken in January/February 2020 by Ground Investigations Ireland (GII) within adjacent lands to the immediate East of the development area for the Permitted ICT Facility. These investigations consisted of 12 No trial pits (Table 5.1) and 4 no. boreholes.

Soil samples were compared with Waste Acceptance Criteria (WAC) and UK soil criteria based on land use. The WAC data provides assessment for suitability for disposal to landfill based on design of the landfill i.e. inert, Stable Non-reactive Hazardous Waste and Hazardous Waste Landfill. All samples were found to be below inert waste landfill criteria limits and no indications of contamination were recorded during the site investigation works.

In the event that contaminated material is found on site, this material will need to be segregated from clean/inert material, 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'* [2] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [3], which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify WCC and provide a Hazardous/Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s).

5.0 SITE LOGISTICS

5.1 SITE SAFETY COMPLIANCE

The Contractor shall be responsible for overall management of the site for the duration of the proposed works and will progress their works with reasonable skill, care, diligence and to proactively manage the works in a manner most likely to ensure the safety and welfare of those carrying out construction works.

The Contractor shall comply with all relevant Statutory requirements such as the 2005 Safety Health and Welfare at Work Act, The Construction Regulations (SI 291 of 2013), the General Application Regulations (SI 299 of 2007), etc. (and any amendments thereof).

In addition, the Contractor shall comply with all the reasonable safety requirements of the Client, the Project Supervisor for the Design Process and the Project Supervisor for the Construction Stage.

5.2 SITE ESTABLISHMENT AND SECURITY

The first activity to be carried out at the site will be the establishment of site facilities and security. It is anticipated that site establishment works will take approximately four weeks. The site office and welfare facilities will be confirmed in advance of the commencement of site works and agreed with WCC. Figure 3.1, above, shows the proposed locations of the site compound and staff parking.

All of the sub-contractors as well as the main contractor and project managers will occupy offices within the construction compounds. For the initial stages of construction site parking for all staff, contractors and visitors will be provided within the development site area. Carpooling and the use of public transport will be encouraged to reduce pressure on parking in the area

5.3 CONSENTS AND LICENSES

All statutory consents and licences required to commence on-site construction activities will be obtained ahead of works commencing, allowing for the appropriate notice period. These will include, but are not limited to:

- Site notices;
- Construction commencement notices; and
- Licence to connect to existing utilities where required.

5.4 SERVICES AND UTILITIES

Temporary site offices and welfare facilities for construction employees will need to be established. The offices and site amenities will initially need to have their own power

supply (generator), water deliveries and foul water collection until connections are made to the mains networks.

Electrical connections will be made by suitably qualified personnel following consultation with the relevant authorities and will be cognisant of subsequent construction works. High voltage connections will be established for heavy duty equipment and site facilities, as required.

During construction it is anticipated that a temporary supply will come from the local MV network with the location of the connection yet to be determined. All electrical works, including connection to the ESB network will be carried out by a suitably qualified contractor. In later phases of the construction, the utility feed will serve the development via the applicant-owned electrical compound, including transformer and associated switchgear.

Water supply required for welfare facilities, dust suppression and general construction activities will be sourced from the existing 150mm watermain under the Kish Business Park access road. Although before initial connections to the water supply are made it may need to be trucked onto site. As with electrical works, this will be carried out by a suitably qualified contractor. It will be necessary to service the site with a reliable and safe water supply.

Site welfare facilities will be established to provide sanitary facilities for construction workers on site. The main contractor will ensure that sufficient facilities are available at all times to accommodate the number of employees on site. It is anticipated that for the duration of construction, the cabins will need to have the foul water collected by a licensed waste sewerage contractor.

5.5 SURFACE WATER DRAINAGE

The adjacent watercourses and onsite ditches will be protected from sedimentation and erosion. Surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.

A number of erosion and sediment control features including geotextile lined settling basins and temporary moundings will be installed to ensure silts do not flow off site during the construction stage. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed. All inlets to the settling basins will be ‘riprapped’ to prevent scour and erosion in the vicinity of the inlet.

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. All run-off will be prevented from directly entering into any water courses as no construction will be undertaken directly adjacent to open water.

No significant dewatering will be required during the construction phase which would result in the localised lowering of the water table. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavation is kept relatively dry.

The following measures will be put in place during the construction phase to ensure protection of surface waterbodies. These measures are in compliance with the following relevant CIRIA guidance documents:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2015), Environmental Good Practice on Site (4th edition) (C741); Construction Industry Research and Information Association;
- BPGCS005, Oil Storage Guidelines;
- CIRIA 697 (2007), *The SuDS Manual*; and
- *UK Pollution Prevention Guidelines,* (PPG) UK Environment Agency, 2004.

5.6 MATERIAL HANDLING AND STORAGE

Key materials will be ordered by specific order for the project, a 'Just in Time' delivery system will operate to minimise storage of materials, the quantities of which are unknown at this stage. Where possible it is proposed to source general construction materials from the Wicklow area to minimise transportation distances.

Aggregate materials such as sands and gravels will be stored in clearly marked receptacles in the compound area within the site. 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 [4]) to prevent spillage.

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 receptacles will be stored adjacent to the construction areas as required and will move from west to east in each of the sub-phases as the construction works progress. The segregated receptacles will be maintained close to each other in a designated Waste Storage Area (WSA) insofar as possible and will be clearly signed to identify the types of waste to be placed in each in accordance with the requirements of the Resource and Waste Management Plan. Segregated skips will be located in the material storage area, as required, and wheelie bins (or other suitable waste receptacles) for the offices and welfare facilities will be provided in strategic locations around the compound.

5.7 VISITOR MANAGEMENT

Visitors will only be allowed to enter the site in vehicles via the main haul road or via designated pedestrian access gates. A dedicated, secured footpath to the main site offices will be established for registration and obtaining PPE prior to entering the site. A log will be maintained by security to control access to the site. Visitors will be required to attend a site-specific induction to allow access to the site unless being accompanied by an inducted member of the site team. Visitors will then be taken by an inducted member of the construction team to the required area of the site.

5.8 SITE WORKING HOURS

Site development and building works will only be carried out between the hours of 0700 to 1900 Mondays to Fridays inclusive and between 0800 and 1400 hours on Saturdays There will be no construction works carried out on Sundays or public holidays. Deviation from these times will only take place when written approval is granted by WCC in exceptional circumstances.

5.9 EMPLOYMENT AND MANAGEMENT WORKFORCE

It is estimated that there will initially be 15-20 staff on site on a typical day, however during peak construction periods this is expected to fluctuate up to a maximum of 35-60 staff and contractors on site per day. Site staff will include; management, engineers, construction crews, supervisors, environment health and safety personal, and maintenance contractors.

It is anticipated that the key project managers and main contractor representatives will maintain a presence on site for the whole duration of the project and the labour workforce will be determined by the specialist contractors required on site.

All employees working on the site will be required to have a SafePass Card (or similar approved Construction Health & Safety card), manual handling training, CIF COVID 19 training, and the necessary certificates to operate machinery, as required. The details of training required, records maintained, and induction procedures will be outlined in the Main Contractor's Health and Safety Plan(s).

6.0 CONSTRUCTION TRAFFIC AND SITE ACCESS

The proposed construction vehicle routes for the 110 kV Substation site are shown in Figure 6.1, below. To minimise construction impacts upon the surrounding road network, it is recommended that all construction traffic accesses and exits the site from the M11/N11 Junction 21 with no HGV construction traffic permitted to travel through Arklow town, as illustrated by Figure 6.1, below.

Construction traffic operation would only be limited 0700 to 2000 from Monday to Friday and 0800 to 1500 on Saturday. These times may vary to facilitate specific site requirements and/or construction activities associated with the site. Any variation will be discussed and agreed in advance with WCC.

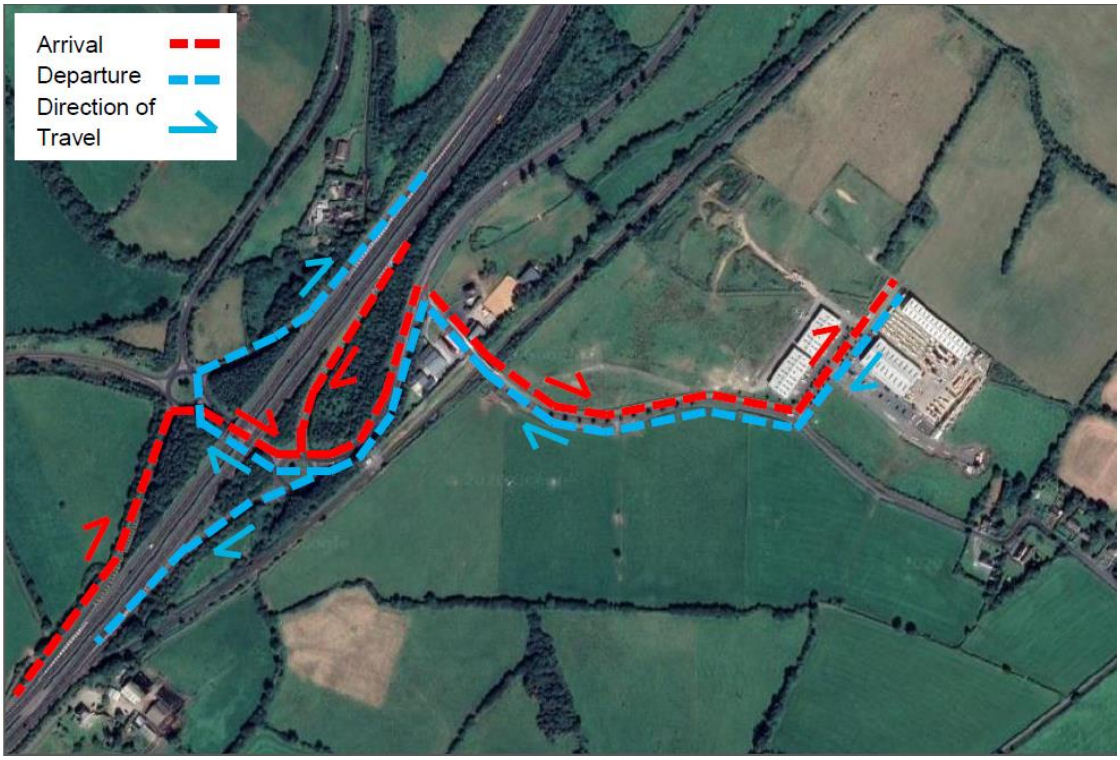


Figure 6.1 *Proposed Construction Traffic Route (source AECOM TTA 2020 – submitted with planning application Reg. Ref. 201088)*

Traffic management will be undertaken for the site works in accordance with the principles outlined below and shall comply at all times with the requirements of:

- Department of Transport Traffic Signs Manual 2010 – Chapter 8 Temporary Traffic Measures and Signs for Roadworks [5]
- Department of Transport Guidance for the Control and Management of Traffic at Road Works (2010) [6]
- Any additional requirements detailed in Design Manual for Urban Roads & Streets (DMURS) [7]

6.1 CONSTRUCTION TRAFFIC MANAGEMENT

Below is a list of the proposed traffic management measures to be adopted during the construction works. Please note that this is not an exhaustive list, and that it will be the appointed contractor's responsibility to prepare a detailed construction management plan.

- Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access locations;
- Construction and delivery vehicles will be instructed to use only the approved and agreed means of access; and movement of construction vehicles will be restricted to these designated routes;
- Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material;
- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the site;

- Parking of site vehicles will be managed and will not be permitted on public road, unless proposed within a designated area that is subject to traffic management measures and agreed with WCC;
- A road sweeper will be employed to clean the public roads adjacent to the site of any residual debris that may be deposited on the public roads leading away from the construction works;
- On site wheel washing will be undertaken for construction trucks and vehicles to remove any debris prior to leaving the site, to remove any potential debris on the local roads;
- All vehicles will be suitably serviced and maintained to avoid any leaks or spillage of oil, petrol or diesel. Spill kits will be available on site. All scheduled maintenance carried out off-site will not be carried out on the public highway; and
- Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footways. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage.
- Pedestrian facilities will cater for vulnerable users including mobility impaired persons.
- Material deliveries and collections from site will be planned, scheduled and staggered to avoid any unnecessary build-up of construction works related traffic.
- Deliveries to site shall be booked in advance using a delivery schedule, so as to prevent lorry congestion on the road networks surrounding the site. Alternative safe routeways shall be established for traffic and pedestrians where existing routeways have to be altered, removed or worked on during the project.

The mitigation measures will therefore ensure that the presence of construction traffic will not lead to any significant environmental degradation or safety concerns in the vicinity of the proposed works. Furthermore, it is in the interest of the construction programme that deliveries, particularly concrete deliveries, are not unduly hampered by traffic congestion, and as a result continuous reviews of haulage routes, delivery timings and access arrangements will be undertaken as construction progresses to ensure smooth operation.

6.2 SITE HOARDING AND SECURITY FENCING

Erection of security fencing and hoarding will take place at the start of the project alongside the site establishment and security works. It is estimated that erection of hoardings and fencing will require 2 weeks to complete.

All areas of construction will be fenced / hoarded off to prevent unauthorized access. This fencing shall remain closed at all times during construction works and closed and locked after construction work hours / break times.

This fencing shall be erected in accordance with good practice and the Construction Regulations 2013. Fencing arrangements shall be reviewed as the life of the project progresses.

Site access will be restricted by dedicated security personnel who will check all incoming and outgoing vehicles and workers.

7.0 SAFETY, HEALTH AND ENVIRONMENTAL CONSIDERATIONS DURING CONSTRUCTION WORKS

7.1 CONSTRUCTION HEALTH & SAFETY PLAN

The appointed main contractor will be required to prepare a Construction Health & Safety Plan which will be put in place prior to commencement of the works. At a minimum, this plan will include:

- Construction Health & Safety training requirements;
- Induction procedures;
- Emergency protocols; and
- Details of welfare facilities.

7.2 CONSTRUCTION LIGHTING

Construction work will generally be confined to daylight hours and lighting will generally not be required for the construction phase. There will however be occasions where the provision of portable lighting will be required (works on roadways and power floating floors as examples). Where possible and without jeopardising site safety lights will be pointed down at a 45-degree angle and away from sensitive receptors. The site compound will have external lights for safety and security. These lights will be pointed down at a 45-degree angle and away from sensitive receptors where possible.

7.3 AIR QUALITY

This section describes the site policy with regard to dust management and the specific mitigation measures which will be put in place during construction works. 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 measures have been formulated by drawing on best practice guidance from Ireland, the UK and the US, such as:

- Department of Environment, Heritage and Local Government (DOEHLG), *Quarries and Ancillary Activities, Guidelines for Planning Authorities* (2004) [8];
- US Environment Protection Agency (USEPA), *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition* (periodically updated) (1986) [9];
- The Scottish Office – Development Department, Planning Advice Note PAN50 Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings (1996) [10]; and
- Institute of Air Quality Management (IAQM), Guidance on the Assessment of Dust from Demolition and Construction (2014) [11].

7.3.1 Site Management

The site activities will be undertaken with due consideration of the surrounding environment and the close proximity of sensitive receptors such as watercourses, residents and pedestrians. Dust management during the construction phase will be the most important aspect in terms of minimising the impacts of the project on the surrounding air quality. The following measures will also be implemented to ensure impacts are minimised:

- 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;
- Community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- Complaint registers will be kept detailing all telephone calls and letters of complaint received in connection with construction activities, together with details of any remedial actions carried out;
- Equipment and vehicles used on site will be in good condition such that emissions from diesel engines etc. are not excessive; and
- Pre-start checks will be carried out on equipment to ensure they are operating efficiently and that emission controls installed as part of the equipment are functional.

Dust deposition levels will be monitored on a regular basis in order to assess the impact that site activities may have on the local ambient air quality. The following procedure will be implemented:

- The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 (+/- 2) days. Monitoring shall be conducted on a quarterly basis during periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities.
- The exact locations will be determined after consideration of the requirements of Method VDI 2119 with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures.
- After each 30 (+/- 2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m2/day in accordance with the relevant standards.
- Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager.

A limit value of 350 mg/m^2/day will be used in comparison with recorded values.

7.3.2 Dust Control Measures

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design, planning and effective control strategies. The siting of construction activities and stockpiling will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs.

- During working hours, technical staff will be available to monitor dust levels as appropriate; and
- At all times, the dust management 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.

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 management of dust by the construction contractor.

Site Roads

Site access routes (particularly unpaved routes) can be a significant source of fugitive dust from construction sites 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% [12].

- 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.

Land Clearing/Excavation

Land clearing / excavations 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.

Stockpiling

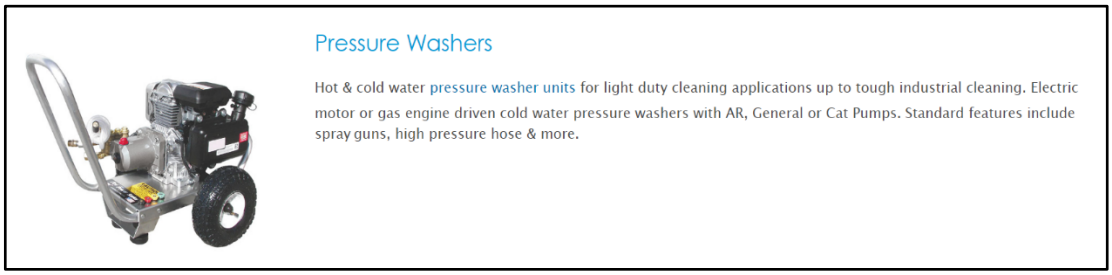
The location and moisture content of rubble stockpiles are important factors which determine their potential for dust emissions. The following measures will be put in place:

- 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.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:



Insert 7.1 Example of Proposed wheel cleaning equipment example

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
- Any hard surface site 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.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate, and an example of the washing equipment can be seen in insert 7.1 ; and
- Road sweepers will be employed to clean the site access route as required.

General

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 management of dust by the construction contractor.

7.4 ECOLOGY

The key strategies to be undertaken to minimise impact on the local flora and fauna during site clearing and construction are as follows.

- All site clearance and landscaping works will comply with current legislative requirements and best practice;
- Where possible, the removal of trees and tree lines suitable for use by nesting birds will be undertaken outside the bird nesting season (avoiding the period 1st March to 31st August);
- Should any trees or tree lines be removed that contain features suitable for roosting bats, such work will only be done during the autumn months;

- An outlier badger sett is located under the footprint of Phase 1 in the western part of the ICT site (Reg. Ref. 201088). It will be necessary to exclude badgers from this sett early in the development. The exclusion will be mitigated through the construction of a artificial sett within the site. These measures will be implemented under licence from the National Parks and Wildlife Service. No other active badger setts have been recorded on the lands however should it be necessary to close any other badger setts on development lands these will be closed and excluded under licence from the NPWS. Such works will be undertaken outside the breeding season (that is, outside the period 1st December to 31st June) and will involve appropriate mitigation of any impacts;
- Taking measures to limit the working area during the construction phase will reduce the impacts of the development on adjacent areas. The construction area will be clearly delimited by the site boundary hoarding and machinery should operate only within this allocated site area;
- All construction-related fuel will be contained within specially constructed bunds to ensure that fuel spillages whether accidental or otherwise are fully contained;
- All re-fuelling of plant, equipment and vehicles will be carried out at the construction site boundary. All fuels, chemicals, liquid and solid waste will be stored in areas bunded in accordance with established best practice guidelines at the construction compound also; and Provision of spill kits;
- The measures outlined in Section 5.5 will ensure that silt run-off and potential flooding risks are minimised which will protect any ecological receptors associated with the site; and
- Construction lighting will be designed so as to be sensitive to the potential presence of bats and should adhere to the following guidance:
    - Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers (Bat Conservation Trust, 2010) [13];
    - Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011) [14];
    - Bats and Artificial Lighting in the UK – Bats and the Built Environment Series. Guidance Note 08/18 (Bat Conservation Trust UK, 2018) [15].

7.5 NOISE AND VIBRATION

Noise impacts arising from earthworks and construction activities have the potential to cause annoyance or nuisance to local residents in the area.

The earthworks will generate typical construction activity related noise and vibration sources from use of a variety of plant and machinery such as, excavators, lifting equipment, dumper trucks, compressors and generators.

Construction Noise Limit Values

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 *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise* [16].

Table 7.1 *Construction Noise Limit Values*

Days and Times	Noise Levels (dB re. 2x10-5 Pa)
	$L_{Aeq(1hr)}$
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65
Evening* (19:00 to 23:00hrs)	55
Night time* (23:00 to 07:00hrs)	45

*Note** *Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.*

The total noise (LAeq) which should not be exceeded during daytime is therefore 65dB.

General Noise and Vibration Mitigation

The earthworks will generate typical construction activity related noise and vibration sources from use of a variety of plant and machinery such as rock breakers (if required), excavators, lifting equipment, dumper trucks, compressors and generators.

Following the same approach, BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites 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 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above.

The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. The recommended construction vibration criteria;

- Less than 15Hz - 15mm/s
- 15 to 40 Hz - 20mm/s
- 40 Hz and above - 50mm/s

Any noise complaints related to activities at the site will be logged and investigated and, where required, measures taken to ameliorate the source of the noise complaint.

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. excavation close to a property, etc., the site contact should inform the nearest noise sensitive locations of the time and expected duration of the works.

All works on site shall comply with BS 5228 2009+ A1 2014 (Parts 1 & 2) which gives detailed guidance on the control of noise and vibration from construction activities. In general, the contractor shall implement the following mitigation measures during the proposed infrastructure works:

- Avoid unnecessary revving of engines and switch off equipment when not required.
- Keep internal haul roads well maintained and avoid steep gradients.
- Minimise drop height of materials.
- Start-up plant sequentially rather than all together

More specifically the Contractor will ensure that:

- In accordance with “Best Practicable Means”, plant and activities to be employed on site are reviewed to ensure that they are the quietest available for the required purpose.
- Where required, improved sound reduction methods are used e.g. enclosures.
- Site equipment is located away from noise sensitive areas, as much as physically possible.
- Regular and effective maintenance by trained personnel is carried out to reduce noise and / or vibration from plant and machinery.
- Hours are limited during which site activities likely to create high levels of noise and vibration are carried out.
- A site representative responsible for matters relating to noise and vibration will be appointed prior to construction on site.

External noise and vibration monitoring will be undertaken at locations on the site boundary closest to sensitive locations. It is considered that it will be appropriate to amend the monitoring program as the works progress. Accordingly, monitors may be added, removed or relocated as necessary.

The noise monitoring terminals should provide the following at minimum:

- Logging at hourly intervals; and
- Daily CIC automated calibrations.

Vibration monitoring terminals should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: *Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures* [17].

The mounting of the transducer to the vibrating structure, by way of resin fixings only, will need to comply with BS EN ISO 5348: 1998: *Mechanical vibration and shock – Mechanical mounting of accelerometers* [18]. In summary, the following ideal mounting conditions apply:

- The transducer and its mountings should be 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.

7.6 RESOURCE AND WASTE MANAGEMENT

This section outlines the measures that will be undertaken to minimise the quantity of waste produced at the site and the measures to handle the waste in such a manner as to minimise the effects on the environment. A site-specific Resource and Waste Management Plan (RWMP) has been prepared by AWN Consulting and will be employed to ensure sustainable and effective waste management throughout the construction phase of the project.

Adherence to the RWMP prepared for the construction works will ensure that the management of waste arising is dealt with in compliance with the provisions of the *Waste Management Act 1996* as amended [19], associated Regulations, the *Litter Pollution Act of 1997* as amended [20] and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [21], and achieve optimum levels of waste reduction, re-use and recycling.

Typical waste materials that will be generated from the construction works will include:

- Soil and stones;
- Concrete, bricks, tiles and ceramics;
- Wood, glass and plastics;
- Metals;
- Gypsum-based construction material;
- Paper and cardboard;
- Mixed C&D waste; and
- Chemicals (solvents, paints, adhesives, detergents etc.).

The management of all hazardous waste arisings, if they occur, shall be coordinated in liaison with Health and Safety Management.

Waste Minimisation

Waste minimisation measures proposed are summarised as follows (and are described in more detail in the RWMP):

- Materials will be ordered on an 'as needed' basis to prevent over supply;
- Materials will be correctly stored and handled to minimise the generation of damaged materials;
- Materials will be ordered in appropriate sequence to minimise materials stored on site;
- A waste tracking log will be established;
- Sub-contractors will be responsible for similarly managing their wastes; and
- All wood waste generated by site works will be inspected and examined and will be segregated as re-useable wood and scrap wood waste

Waste Storage

The main waste storage area will be located in the site compound. A dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site. Additionally, skips and/or bins will be located in the materials storage area adjacent to the site compound.

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. There are numerous waste contractors in the Wicklow region that provide this service.

The site Resource Manager will ensure that all staff are informed of the requirements for segregation of waste materials by means of clear signage and verbal instruction. Appointed employees will be made responsible for ensuring good site housekeeping.

Pest Management

A pest control operator will be appointed as required to manage pest onsite during the construction phase of the project. Organic and food wastes generated by staff will not be stored in open skips, but in closed waste receptacles. Any waste receptacles will be carefully managed to prevent leaks, odours and pest problems.

Responsibility

It will be the responsibility of the construction manager to ensure that a written record of all quantities and natures of wastes removed from the site are maintained on-site in a waste file (in hardcopy or electronically).

It is the responsibility of the project manager or his/her delegate that all contracted waste haulage drivers hold an appropriate waste collection permit for the transport of waste loads and that all waste materials are delivered to an appropriately licenced or permitted waste facility in compliance with the relevant Regulations as outlined in the RWMP.

The contractor, as part of regular site inspection audits, will determine the effectiveness of the waste management strategy and will assist the project manager in implementing the measures set out in the RWMP and in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

Prior to commencement of the excavation and construction activity and removal of any waste off-site, details of the proposed destination of each waste stream will be provided to WCC, along with waste collection permit numbers.

7.7 SURFACE WATER MANAGEMENT

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. All run-off will be prevented from directly entering into any water courses as no construction will be undertaken directly adjacent to open water.

No significant dewatering will be required during the construction phase which would result in the localised lowering of the water table. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavation is kept relatively dry.

The following measures will be put in place during the construction phase to ensure protection of surface waterbodies. Construction works are informed by best practice guidance from Inland Fisheries Ireland on the prevention of pollution during development projects:

- Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532); and
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016).
- Environmental Good Practice on Site (3rd edition) (C692).

Surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.

It is envisaged that a number of geotextile lined settling basins and temporary mounding's and/or silt fences will be installed to ensure silts do not flow off site during the construction stage. This temporary surface water management facility will throttle

runoff and allow suspended solids to be settled out and removed. All inlets to the settling basins will be 'riprapped' to prevent scour and erosion in the vicinity of the inlet.

7.7.1 Pollution Control

Management of Suspended solids in run-off

Any temporary storage of spoil, hardcore, crushed concrete or similar material will be stored as far as possible from any surface water drains and also stored in receptacles where possible. In order to minimise the risk of contamination, the stockpiled material will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar.

There will be no direct pumping of silty water from the works to any watercourse. Sediment entrapment facilities will be installed to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area should pass through a sediment entrapment facility before it exits the site and flows downstream such as straw bales, silt fencing, silt barriers and diversion dams.

Soil Removal and Compaction

Excavated material will be reused on site where possible. All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, this soil will be segregated, and samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred.

Concrete Run-off

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within 10 meters of an existing surface water drainage point. Wash-outs should only occur in designated areas with an impervious surface.

Fuel and Chemical Handling

The following mitigation measures will be taken at the construction stage in order to prevent any spillages of fuels and prevent any resulting impacts to surface water systems;

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures will be taken:
    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump or valve will be fitted with a lock and will be secured when not in use;
    - All bowsers will carry a spill kit and operatives must have spill response training; and
    - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded areas;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they should be done so secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

Accidental Spills and Leaks

No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks will be kept in the material storage area in suitable containers and will be appropriately bunded as required. Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated areas of the site, where possible, which will be kept away from surface water drains.

Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels during machinery activities and prevent any resulting soil and/or groundwater quality impacts:

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:
    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump or valve will be fitted with a lock and will be secured when not in use;
    - All bowsers to carry a spill kit and operatives must have spill response training; and
    - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

Monitoring

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10m from surface water receptors. A regular log of inspections will be maintained and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

8.0 SUMMARY

This CEMP sets out the overall management strategy for construction works on the proposed Crag Wicklow Limited development. The CEMP aims to ensure the management of construction activity is carried out in a planned, structured and considerate manner which minimises the impacts of the works on the local environment, residents and commercial activities in the vicinity of the site. Due to the

nature of construction works, there may be unforeseen events which occur at the site and the project team will actively manage any changes and discuss with the relevant authorities, where required.

The CEMP will be reviewed regularly and will be updated by the construction contractor to account for any subsequent planning conditions issued, any updated guidance released and circumstantial changes at the site as the development progresses. The project team are committed to ensuring that the construction activities to be carried out are pro-actively managed so as to minimise potential impacts.

9.0 REFERENCES

1. Environmental Protection Agency (EPA) *'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021).*
2. Environmental Protection Agency (EPA), *Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
3. 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.
4. British Standards Institution (BSI), *BS EN 1992-3:2006 Eurocode 2: Design of concrete structures. Liquid retaining and containment structures*. (2006).
5. Department of Transport, *Traffic Signs Manual 2010 – Chapter 8 Temporary Traffic Measures and Signs for Roadworks* (2010).
6. Department of Transport, *Guidance for the Control and Management of Traffic at Road Works* (2010).
7. Department of Transport, Tourism and Sport and Department of Housing, Planning and Local Government, Design Manual for Urban Roads and Streets (2019).
8. Department of Environment, Heritage and Local Government (DOEHLG), *Quarries and Ancillary Activities, Guidelines for Planning Authorities* (2004).
9. US Environment Protection Agency (USEPA), *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)* (1986).
10. The Scottish Office – Development Department, *Planning Advice Note PAN50 Controlling the Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings* (1996).
11. Institute of Air Quality Management (IAQM), *Guidance on the Assessment of Dust from Demolition and Construction* (2014).
12. USEPA, *Fugitive Dust Technical Information Document for the Best Available Control Measures* (1997).
13. Bat Conservation Trust, *Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers* (2010).
14. Institute of Lighting Professionals, *Guidance Notes for the Reduction of Obtrusive Light GN01* (2011).
15. Bat Conservation Trust UK, *Bats and Lighting in the UK – Bats and the Built Environment* Series (2018).
16. British Standards Institution (BSI), *BS 5228-2:2009 Code of practice for noise and vibration control on construction and open sites. Vibration (+A1:2014)* (2009).
17. British Standards Institution (BSI), *BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures* (2010).
18. British Standards Institution (BSI), *BS EN ISO 5348: 1998: Mechanical vibration and shock – Mechanical mounting of accelerometers* (1998).
19. *Waste Management Act 1996* (No. 10 of 1996) as amended, including sub-ordinate and associated legislation.
20. *Litter Pollution Act 1997* (No. 12 of 1997) as amended
21. Eastern Midlands Waste Region, *Eastern-Midlands Region Waste Management Plan 2015 – 2021* (2015).

APPENDIX 5.1

NRA CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS AT EIA STAGE

NATIONAL ROADS AUTHORITY (NRA, 2009)

Impact Ratings and Assessment Criteria (Soils, Geology and Hydrogeology)
The 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 area presented in Tables 1 to 7 below.

Table 1 Criteria for rating site importance of Geological Features (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 impact magnitude 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
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
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
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

The NRA criteria for estimation of the importance of hydrogeological attributes at the site during the EIA stage are summarised below.

Table 2 Criteria for rating Site Attributes - Estimation of Importance of Hydrogeology Attributes (NRA)

Magnitude of Impact	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
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 4 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeology 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 6 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Neglible	**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

Table 5 Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on hydrology attributes (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/ or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Calculated risk of serious pollution incident >1% annually2
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm1
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level1
Minor Beneficial	Results in minor improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually2
Moderate Beneficial	Results in moderate improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually2
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm1

Additional examples are provided in the NRA Guidance Document

1 Refer to Annex 1, Methods E and F, Annex 1 of HA216/06

1 Refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

Table 7 Criteria for Rating Impact Significance of Hydrological Attributes (NRA, 2009)

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

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

APPENDIX 5.2

BOREHOLES WITHIN A 2KM RADIUS

AWN CONSULTING 2020 (SOURCE: GSI ONLINE)

Table 5.1 Groundwater wells within 2km radius from the development site

GSINAME	TYPE	Depth mBGL	Depth Bedrock is Met	Drill Date	EASTING	NORTHING	Townland	Use	Yeild Class	Productivity Class	Yield m3d
3217SWW077	Borehole	48.7		30/12/1899	323030	172730	KNOCKANRAHAN UPPER	Domestic use only	Moderate		80
3217SWW070	Borehole	6.1		8/01/1996	325100	171200	ROCK BIG				
3217SWW076	Borehole	76.2		30/12/1899	323540	171480	MONEY LITTLE	Industrial use	Poor		20
3215NWW001	Borehole	34.4	15.2	1/05/1970	324400	169270	BALLINABANOGE	Domestic use only	Moderate		54
3215NWW002	Borehole	41.5	3.7	16/05/1963	324390	169200	BALLINABANOGE	Domestic use only	Poor		33
3215NWW003	Borehole	26.5	26.2	1/01/1970	323610	168670	CRONELUSK	Domestic use only	Poor		38
3215NWW005	Borehole	26.2	25.6	1/07/1969	325350	168870	CLOGGA	Domestic use only	Poor		38
3215NWW006	Borehole	41.2	20.4	1/05/1966	325340	168940	CLOGGA	Domestic use only	Good		108
3215NWW011	Borehole	27.4		1/01/1995	323250	169990	ROCKBOG	Domestic use only	Poor		20
3217SWW007	Borehole	27.4	3.1	31/08/1963	325150	172640	TINAHASK LOWER	Domestic use only	Poor		22
3217SWW017	Borehole	21.3	6.7	1/07/1970	323040	170220	ROCKBOG	Domestic use only	Poor		27
3217SWW018	Borehole	13.7	1.2	1/05/1970	323090	170620	KISH	Domestic use only	Poor		38
3217SWW019	Dug well	4.2		30/12/1899	321380	171020	CURRANSTOWN				
3217SWW020	Borehole	21.3	6.7	1/07/1970	323010	170270	ROCKBOG	Domestic use only	Poor		27
3217SWW021	Borehole	21.6	2.4	31/07/1963	322200	170860	COOLADANGAN	Domestic use only	Poor		22
3217SWW022	Borehole	28.6	8.5	1/01/1968	324920	170460	ROCK BIG		Good		218
3217SWW026	Borehole	35.7	9.2	1/01/1971	322830	171280	BALLYNATTIN	Domestic use only	Poor		38
3217SWW028	Borehole	22.5	3	1/10/1969	324000	170450	ROCK BIG		Poor		38
3217SWW048	Borehole	48.7	21.3	14/03/1983	324600	173400	ARKLOW	Industrial use	Moderate		55
3217SWW052	Borehole	53.3	12	1/11/1996	324580	173320	ARKLOW	Domestic use only	Good		160
3217SWW053	Borehole	45.7	3.6	1/11/1996	324560	173250	ARKLOW	Domestic use only	Moderate		55
3217SWW054	Dug well	1.5		30/12/1899	322210	170930	COOLADANGAN				
3217SWW055	Borehole	34.4	15.2	1/05/1970	323100	170570	KISH		Moderate		55
3215NWW007	Borehole	20.4	20.4	30/12/1899	324680	169570	ASKINTINNY	Domestic use only			
3215NWW008	Borehole	33.5		19/08/1986	324800	169530	ASKINTINNY	Domestic use only	Moderate		65
3215NWW012	Dug well	2.6		23/11/1995	324940	168750	BALLINABANOGE				
3215NWW013	Dug well	2.7		23/11/1995	324860	168770	BALLINABANOGE				
3215NWW014	Dug well	2.4		23/11/1995	324820	168770	BALLINABANOGE				
3215NWW015	Dug well	2.8		23/11/1995	324730	168800	BALLINABANOGE				
3215NWW016	Dug well	2.6		23/11/1995	324670	168840	BALLINABANOGE				
3215NWW017	Dug well	2.9		23/11/1995	324580	168870	BALLINABANOGE				
3215NWW018	Dug well	2.7		23/11/1995	324610	168910	BALLINABANOGE				
3215NWW019	Dug well	2.7		23/11/1995	324670	168900	BALLINABANOGE				
3215NWW020	Dug well	2.6		23/11/1995	324600	169020	BALLINABANOGE				
3215NWW021	Dug well	2.6		23/11/1995	324740	168980	BALLINABANOGE				
3215NWW022	Dug well	2.6		23/11/1995	324810	168950	BALLINABANOGE				
3215NWW023	Dug well	2.6		23/11/1995	324830	168990	BALLINABANOGE				

GSINAME	TYPE	Depth mBGL	Depth Bedrock is Met	Drill Date	EASTING	NORTHING	Townland	Use	Yeild Class	Productivity Class	Yield m3d
3215NWW024	Dug well	2.5		23/11/1995	324760	169050	BALLINABANOGE				
3215NWW025	Dug well	2.6		23/11/1995	324620	169120	BALLINABANOGE				
3215NWW026	Dug well	2.7		23/11/1995	324580	168910	BALLINABANOGE				
3215NWW027	Dug well	2.1		23/11/1995	324640	168860	BALLINABANOGE				
3215NWW028	Dug well	2.4		23/11/1995	324710	168880	BALLINABANOGE				
3215NWW029	Dug well	2.5		23/11/1995	324840	168850	BALLINABANOGE				
3215NWW030	Dug well	2.4		23/11/1995	324600	168890	BALLINABANOGE				
3215NWW031	Dug well	2.5		23/03/1993	324460	169980	ASKINTINNY				
3215NWW032	Dug well	2.6		23/03/1993	324580	169990	ASKINTINNY				
3215NWW033	Dug well	2.8		23/03/1993	324760	169940	ASKINTINNY				
3215NWW034	Dug well	2.8		23/03/1993	324440	169860	ASKINTINNY				
3215NWW035	Dug well	3.2		23/03/1993	324560	169850	ASKINTINNY				
3215NWW036	Dug well	2.1	1.7	23/03/1993	324760	169850	ASKINTINNY				
3217SWW058	Borehole	91.4	7.5	9/08/1993	321600	173160	BALLYDUFF NORTH		Good	III	347.3
3217SWW059	Borehole	91.4	7.5	11/08/1993	322000	173020	BALLYDUFF		Good	IV	151
3217SWW060	Borehole	73.2	9	4/11/1993	321400	173080	BALLYDUFF NORTH		Excellent	II	440
3217SWW062	Borehole	9	7.5	6/04/1992	324500	172700	ABBEYLANDS	Industrial use	Moderate		60
3217SWW063	Borehole	7.4	7.4	7/04/1992	324450	172500	ABBEYLANDS	Other	Poor		10
3217SWW064	Borehole	5.9	3.5	8/04/1992	324450	172100	TINAHASK UPPER	Other	Poor		12
3217SWW065	Borehole	91.4	7.5	3/08/1993	322440	171660	BALLINTOMBAY		Good	III	287
3217SWW066	Borehole	91.4	12.5	6/08/1995	321260	172940	BALLYDUFF SOUTH		Excellent	III	400
3217SWW067	Borehole	91.4	15.5	12/08/1993	321420	172520	ECAWN		Good	III	314.2
3217SWW068	Borehole	91.4	3	9/10/1993	321060	172880	BALLYDUFF SOUTH		Excellent	III	628.4
3217SWW069	Borehole			30/12/1899	321110	171540	CURRANSTOWN UPPER	Domestic use only	Good	III	275
3217SWW071	Dug well	2.9		23/03/1993	324510	170100	ASKINTINNY				
3217SWW072	Dug well	2.8		23/03/1993	324660	170060	ASKINTINNY				
3217SWW073	Dug well	2	0.5	23/03/1993	324760	170080	ASKINTINNY				
3217SWW075	Borehole	118.8		30/12/1899	324740	170380	ROCK BIG	Domestic use only	Moderate		80
3217SWW102	Borehole	61	3	21/04/2000	321870	171570	COOLADANGAN	Agri & domestic use	Poor		21.8

APPENDIX 5.3

SOIL AND WATER LIMIT TABLES

AWN CONSULTING 2020

Soil Analysis

Table 1 WAC and LQM limits compared to the trial pit soil analysis

EMT Sample No.	**EMT Sample No.**	1-3	31-33	64-66							
Sample ID	**Sample ID**	TP01	TP06	TP12							
Depth		0.70	0.70	0.70							
COC No / misc											
Containers		V J T	V J T	V J T							
Sample Date		30/01/2020	30/01/2020	31/01/2020							
Sample Type		Soil	Soil	Soil							
Batch Number		1	1	1	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.	**LQM/CIEH Risk Commercial TV**
Date of Receipt		04/02/2020	04/02/2020	04/02/2020							
Solid Waste Analysis	**Solid Waste Analysis**										
Total Organic Carbon #	Total Organic Carbon	0.08	0.09	0.38	3	5	6	<0.02	%	TM21/PM24	
Sum of BTEX	Sum of BTEX	<0.025	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12	
Sum of 7 PCBs #	Sum of 7 PCBs	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8	
Mineral Oil	Mineral Oil	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16	
PAH Sum of 6 #	PAH Sum of 6	<0.22	<0.22	<0.22	-	-	-	<0.22	mg/kg	TM4/PM8	
PAH Sum of 17	PAH Sum of 17	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8	
CEN 10:1 Leachate	**CEN 10:1 Leachate**										
Arsenic #	Arsenic	<0.025	0.084	0.028	0.5	2	25	<0.025	mg/kg	TM30/PM17	640
Barium #	Barium	<0.03	<0.03	<0.03	20	100	300	<0.03	mg/kg	TM30/PM17	
Cadmium #	Cadmium	<0.005	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17	190
Chromium #	Chromium	<0.015	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17	8,600

Copper #	Copper	<0.07	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17	68,000
Mercury #	Mercury	<0.0001	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0	58
Molybdenum #	Molybdenum	<0.02	<0.02	<0.02	0.5	10	30	<0.02	mg/kg	TM30/PM17	
Nickel #	Nickel	<0.02	<0.02	<0.02	0.4	10	40	<0.02	mg/kg	TM30/PM17	980
Lead #	Lead	<0.05	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17	
Antimony #	Antimony	<0.02	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17	
Selenium #	Selenium	<0.03	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17	12,000
Zinc #	Zinc	0.04	<0.03	0.03	4	50	200	<0.03	mg/kg	TM30/PM17	730,000
Total Dissolved Solids #	Total Dissolved Solids	400	680	990	4000	60000	100000	<350	mg/kg	TM20/PM0	
Dissolved Organic Carbon	Dissolved Organic Carbon	70	30	30	500	800	1000	<20	mg/kg	TM60/PM0	
Mass of raw test portion	Mass of raw test portion	0.1064	0.1047	0.1066	-	-	-		kg	NONE/PM17	
Dry Matter Content Ratio	Dry Matter Content Ratio	84.5	86.2	84.0	-	-	-	<0.1	%	NONE/PM4	
Leachant Volume	Leachant Volume	0.883	0.886	0.883	-	-	-		l	NONE/PM17	
Eluate Volume	Eluate Volume	0.85	0.85	0.85	-	-	-		l	NONE/PM17	
pH	pH	7.27	7.53	6.55	-	-	-	<0.01	pH units	TM73/PM11	
Phenol	Phenol	<0.1	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0	
Fluoride	Fluoride	<3	<3	<3	-	-	-	<3	mg/kg	TM173/PM0	
Sulphate as SO4	Sulphate as SO4	<5	15	23	1000	20000	50000	<5	mg/kg	TM38/PM0	
Chloride	Chloride	<3	<3	<3	800	15000	25000	<3	mg/kg	TM38/PM0	

Water Quality Analysis

Table 2 Groundwater quality limits compared to the borehole groundwater samples

EMT Sample No.	1-9	10-18	19-27	28-36				
Sample ID	RB01	RB02	RB03	RB04				
Depth								
COC No / misc								
Containers	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G				
Sample Date	26/02/2020	26/02/2020	26/02/2020	26/02/2020				
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water				
Batch Number	1	1	1	1	European communities environmental objectives (groundwater) regulations	LOD/LOR	Units	Method
Date of Receipt	28/02/2020	28/02/2020	28/02/2020	28/02/2020				
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	10	<2.5	ug/l	TM30/PM14
Dissolved Boron	14	190	28	<12	1000	88	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	5	<0.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	2000	<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	10	<5	ug/l	TM30/PM14
Dissolved Manganese #	89	101	8	<2	50	231	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	1	<1	ug/l	TM30/PM14
Dissolved Nickel #	3	<2	<2	<2	20	<2	ug/l	TM30/PM14
Benzo(a)pyrene #	<0.016	<0.016	<0.016	<0.016	0.01	<0.016	ug/l	TM4/PM30
Benzene #	<0.5	<0.5	<0.5	<0.5	1	<0.5	ug/l	TM15/PM10
Electrical Conductivity @25C #	169	532	215	<2	2,500	484	uS/cm	TM76/PM0
pH #	6.60	7.86	7.03	<0.01	6.5<pH<9.5	7.71	pH units	TM73/PM0
1,2-Dichloroethane #	<2	<2	<2	<2	3	<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	1	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	10	<3	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	10	<3	ug/l	TM15/PM10

APPENDIX 5.4

SOILS AND GROUNDWATER SITE INVESTIGATION

GROUND INVESTIGATIONS IRELAND 2020

Ground Investigations Ireland Ltd
www.gii.ie

Site Dub 30 Arklow			**Borehole Number** RB01
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 14.40m	**Ground Level (mOD)** 33.93	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723368 E 671188.1 N	**Dates** 20/02/2020	**Project Contractor** GII	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(10.30)	OPEN HOLE TECHNIQUES CARRIED OUT. Driller notes: Stiff CLAY. Recovery consists of 0.15m of sub-angular to subrounded fine to coarse Gravel of different lithologies.			

Remarks
Open hole techniques carried out to a depth of 10.30m BGL.
50mm slotted standpipe installed from 14.40m to 1.0m with pea gravel surround, plain pipe installed from 1.0m to ground level with bentonite seal and raised cover.

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB01

Ground Investigations Ireland Ltd
www.gii.ie

Site Dub 30 Arklow			**Borehole Number** RB01
Machine : Beretta T44 **Flush :** HQ **Core Dia :** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 14.40m	**Ground Level (mOD)** 33.93	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723368 E 671188.1 N	**Dates** 20/02/2020	**Project Contractor** GII	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.30	86	0	0	NI		23.63	10.30 (0.50)	Extremely weak to weak dark grey black fine grained foliated SLATE. Partially weathered. 10.30m - 11.30m BGL - Non Intact.			
10.80						23.13	10.80	Very weak pale grey black fine grained foliated SLATE. Partially weathered.			
11.30	88	16	0	5				11.30m -12.20m BGL - Two fracture sets: F1:75-85 degrees, closely spaced, undulating/stepped smooth, tight to open, clay smearing on surface fractures. F2: 0-20 degrees, closely spaced, undulating stepped smooth, clean surface fractures.			
11.80											
12.20	100	20	20	NI			(3.20)	12.20m - 12.80m BGL - Non Intact.			
12.80	94	21	6	6				12.80m - 14.40m BGL - Two fracture sets: F1:70-80 degrees, closely spaced, undulating/stepped smooth, tight to open, clay smearing on surface fractures. F2: 0-20 degrees, closely spaced, undulating stepped smooth, clean surface fractures.			
						19.93	14.00 (0.40)	Weak pale grey black fine grained foliated SLATE. Partially weathered.			
14.40						19.53	14.40	Complete at 14.40m			

Remarks

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB01

Ground Investigations Ireland Ltd
www.gii.ie

Site Dub 30 Arklow			**Borehole Number** RB02
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 12.60m	**Ground Level (mOD)** 45.64	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723737.2 E 671016.3 N	**Dates** 19/02/2020	**Project Contractor** GII	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(12.60)	OPEN HOLE TECHNIQUES CARRIED OUT. Driller notes: Stiff CLAY.			

Remarks
Open hole techniques carried out to a depth of 12.60m BGL.
50mm slotted standpipe installed from 12.60m to 1.0m with pea gravel surround, plain pipe installed from 1.0m to ground level with bentonite seal and raised cover.

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB02

Ground Investigations Ireland Ltd
www.gii.ie

Site Dub 30 Arklow			**Borehole Number** RB02
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 12.60m	**Ground Level (mOD)** 45.64	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723737.2 E 671016.3 N	**Dates** 19/02/2020	**Project Contractor** GII	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						33.04	12.60	Complete at 12.60m			

Remarks

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB02

Ground Investigations Ireland Ltd
www.gii.ie

Site Dub 30 Arklow			**Borehole Number** RB03
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 13.80m	**Ground Level (mOD)** 40.73	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723340.8 E 670867.3 N	**Dates** 19/02/2020	**Project Contractor** GII	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(13.80)	OPEN HOLE TECHNIQUES CARRIED OUT. Driller notes: Stiff CLAY.			

Remarks
Open hole techniques carried out to a depth of 13.80m BGL.
50mm slotted standpipe installed from 13.80m to 1.0m with pea gravel surround, plain pipe installed from 1.0m to ground level with bentonite seal and raised cover.

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB03

Ground Investigations Ireland Ltd
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Site Dub 30 Arklow			**Borehole Number** RB03
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 13.80m	**Ground Level (mOD)** 40.73	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723340.8 E 670867.3 N	**Dates** 19/02/2020	**Project Contractor** GII	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						26.93	13.80	Complete at 13.80m			

Remarks

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB03

Ground Investigations Ireland Ltd
www.gii.ie

Site Dub 30 Arklow			**Borehole Number** RB04
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 12.30m	**Ground Level (mOD)** 53.66	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723851.6 E 670679.9 N	**Dates** 24/02/2020	**Project Contractor** GII	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(12.30)	OPEN HOLE TECHNIQUES CARRIED OUT. Driller notes: Stiff CLAY.			

Remarks
Open hole techniques carried out to a depth of 12.30m BGL.
50mm slotted standpipe installed from 12.30m to 1.0m with pea gravel surround, plain pipe installed from 1.0m to ground level with bentonite seal and raised cover.

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB04

Ground Investigations Ireland Ltd
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Site Dub 30 Arklow			**Borehole Number** RB04
Machine : Beretta T44 **Flush :** HQ **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 12.30m	**Ground Level (mOD)** 53.66	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723851.6 E 670679.9 N	**Dates** 24/02/2020	**Project Contractor** GII	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						41.36	12.30	Complete at 12.30m			

Remarks

Scale (approx)	Logged By
1:50	NM

Figure No. 9364-01-20.RB04

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

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W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Barry Sexton
Date :	10th March, 2020
Your reference :	9364-01-20
Our reference :	Test Report 20/3173 Batch 1
Location :	DUB30 Arklow
Date samples received :	28th February, 2020
Status :	Final report
Issue :	1

Four samples were received for analysis on 28th February, 2020 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: DUB30 Arklow
Contact: Barry Sexton
EMT Job No: 20/3173

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	RB01	RB02	RB03	RB04									
Depth													
COC No / misc													
Containers	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G									
Sample Date	26/02/2020	26/02/2020	26/02/2020	26/02/2020									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	28/02/2020	28/02/2020	28/02/2020	28/02/2020									
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5							<2.5	ug/l	TM30/PM14
Dissolved Boron	88	14	190	28							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Manganese #	231	89	101	8							<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	3	<2	<2							<2	ug/l	TM30/PM14
Dissolved Zinc #	<3	5	<3	<3							<3	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Acenaphthene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluorene #	<0.014	<0.014	<0.014	<0.014							<0.014	ug/l	TM4/PM30
Phenanthrene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Anthracene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluoranthene #	<0.012	<0.012	<0.012	<0.012							<0.012	ug/l	TM4/PM30
Pyrene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015	<0.015	<0.015	<0.015							<0.015	ug/l	TM4/PM30
Chrysene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018	<0.018	<0.018	<0.018							<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016	<0.016	<0.016	<0.016							<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
PAH 16 Total #	<0.195	<0.195	<0.195	<0.195							<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	83	83	79	83							<0	%	TM4/PM30
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	96	97	97	98							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	106	99	95	99							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: DUB30 Arklow
Contact: Barry Sexton
EMT Job No: 20/3173

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	RB01	RB02	RB03	RB04									
Depth													
COC No / misc													
Containers	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G									
Sample Date	26/02/2020	26/02/2020	26/02/2020	26/02/2020									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	28/02/2020	28/02/2020	28/02/2020	28/02/2020									
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM12/PM16/PM30
PCB 28	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
PCB 52	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
PCB 101	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
PCB 118	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
PCB 138	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
PCB 153	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
PCB 180	<0.1	<0.1	<0.1	<0.1 SV							<0.1	ug/l	TM17/PM30
Total 7 PCBs	<0.7	<0.7	<0.7	<0.7 SV							<0.7	ug/l	TM17/PM30
Chloride #	27.1	13.0	23.2	24.1							<0.3	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	<0.06	<0.06	<0.06	<0.06							<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.11	<0.03	0.26	0.05							<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6							<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6							<6	ug/l	TM0/PM0
Electrical Conductivity @25C #	484	169	532	215							<2	uS/cm	TM76/PM0
pH #	7.71	6.60	7.86	7.03							<0.01	pH units	TM73/PM0
Total Nitrogen	2.6	3.8	8.9	17.4							<0.5	mg/l	TM38/TM125/PM0

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: DUB30 Arklow
Contact: Barry Sexton
EMT Job No: 20/3173

SVOC Report : **Liquid**

EMT Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	RB01	RB02	RB03	RB04									
Depth													
COC No / misc													
Containers	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G									
Sample Date	26/02/2020	26/02/2020	26/02/2020	26/02/2020									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	28/02/2020	28/02/2020	28/02/2020	28/02/2020									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	147 SV	71	88	112							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	151 SV	76	88	119							<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: DUB30 Arklow
Contact: Barry Sexton
EMT Job No: 20/3173

VOC Report : **Liquid**

EMT Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	RB01	RB02	RB03	RB04									
Depth													
COC No / misc													
Containers	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G	V H HN HCL Z P G									
Sample Date	26/02/2020	26/02/2020	26/02/2020	26/02/2020									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	28/02/2020	28/02/2020	28/02/2020	28/02/2020									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	96	97	97	98							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	106	99	95	99							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: DUB30 Arklow
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/3173						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/3173

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/3173

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

EMT Job No: 20/3173

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			
TM38/TM125	Total Nitogen/Organic Nitrogen by calculation	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			

Ground Investigations Ireland
Groundwater Monitoring Field Sheet

(V1 August 2018)

Project Number	9364-01-2020	Sample Date	26/02/2020
Client	FT Squared	Well I.D.	RB01
Site Name	DUB30 Arklow	Weather	Dry
Sampler I.D.	NM	Weather Previous 24hrs	Wet

Well Data

Casing Diameter (mm)	150	Total Well Depth (m)	14.40
Standpipe Diam. (mm)	50	Water Level (mBTOC)	0.34
Stick Up (mm)	300	VOC Screen in casing (y/n)	N/A
Standpipe Type pvc, HDPE etc.	Blue PVC	VOC Data (ppm)	N/A

Purge Data

Time Purging Start	9:20	**Sampling Method/Equipment (Tick)**	
Timer Purging End	10:20	Submersible Pump	
Purge Volume (litres)	80	Bailer	✓
Colour	Brown	Tube with foot valve	
Recovery	100%	Low Flow Pumping	

Time	Litres Purged	Ph	EC (mS)	Temp	ORP	DO (mg/l)	Odour
10:20	80	7.65	0.65	10.7	96	NA	None

Additional Comments/Observations:

Ground Investigations Ireland
Groundwater Monitoring Field Sheet

(V1 August 2018)

Project Number	9364-01-2020	Sample Date	26/02/2020
Client	FT Squared	Well I.D.	RB02
Site Name	DUB30 Arklow	Weather	Dry
Sampler I.D.	NM	Weather Previous 24hrs	Wet

Well Data

Casing Diameter (mm)	150	Total Well Depth (m)	12.24
Standpipe Diam. (mm)	50	Water Level (mBTOC)	1.73
Stick Up (mm)	300	VOC Screen in casing (y/n)	N/A
Standpipe Type pvc, HDPE etc.	Blue PVC	VOC Data (ppm)	N/A

Purge Data

Time Purging Start	10:40	**Sampling Method/Equipment (Tick)**	
Timer Purging End	11:30	Submersible Pump	
Purge Volume (litres)	60	Bailer	✓
Colour	Yellowish/Light Brown	Tube with foot valve	
Recovery	100%	Low Flow Pumping	

Time	Litres Purged	Ph	EC (mS)	Temp	ORP	DO (mg/l)	Odour
11:30	60	7.72	0.24	8.2	146	NA	None

Additional Comments/Observations:

Ground Investigations Ireland
Groundwater Monitoring Field Sheet

(V1 August 2018)

Project Number	9364-01-2020	Sample Date	26/02/2020
Client	FT Squared	Well I.D.	RB03
Site Name	DUB30 Arklow	Weather	Dry
Sampler I.D.	NM	Weather Previous 24hrs	Wet

Well Data

Casing Diameter (mm)	150	Total Well Depth (m)	13.80
Standpipe Diam. (mm)	50	Water Level (mBTOC)	3.82
Stick Up (mm)	350	VOC Screen in casing (y/n)	N/A
Standpipe Type pvc, HDPE etc.	Blue PVC	VOC Data (ppm)	N/A

Purge Data

Time Purging Start	12:45	**Sampling Method/Equipment (Tick)**	
Timer Purging End	13:20	Submersible Pump	
Purge Volume (litres)	60	Bailer	✓
Colour	Dark Brown	Tube with foot valve	
Recovery	100%	Low Flow Pumping	

Time	Litres Purged	Ph	EC (mS)	Temp	ORP	DO (mg/l)	Odour
13:20	60	7.61	0.74	7.9	191	NA	None

Additional Comments/Observations:

Ground Investigations Ireland
Groundwater Monitoring Field Sheet

(V1 August 2018)

Project Number	9364-01-2020	Sample Date	26/02/2020
Client	FT Squared	Well I.D.	RB04
Site Name	DUB30 Arklow	Weather	Dry
Sampler I.D.	NM	Weather Previous 24hrs	Wet
Well Data			
Casing Diameter (mm)	150	Total Well Depth (m)	10.10
Standpipe Diam. (mm)	50	Water Level (mBTOC)	2.66
Stick Up (mm)	350	VOC Screen in casing (y/n)	N/A
Standpipe Type pvc, HDPE etc.	Blue PVC	VOC Data (ppm)	N/A
Purge Data			
Time Purging Start	11:55	**Sampling Method/Equipment (Tick)**	
Timer Purging End	12:30	Submersible Pump	
Purge Volume (litres)	42	Bailer	✓
Colour	Light Brown	Tube with foot valve	
Recovery	100%	Low Flow Pumping	

Time	Litres Purged	Ph	EC (mS)	Temp	ORP	DO (mg/l)	Odour
12:30	42	7.45	0.27	8.2	156	NA	None

Additional Comments/Observations:

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
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W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Barry Sexton
Date :	14th February, 2020
Your reference :	9364-01-20
Our reference :	Test Report 20/1659 Batch 1
Location :	Dub 30 Arklow
Date samples received :	4th February, 2020
Status :	Final report
Issue :	1

Twenty three samples were received for analysis on 4th February, 2020 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	7-9	19-21	31-33	40-42	46-48	58-60	64-66			LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP04	TP06	TP08	TP09	TP11	TP12					
Depth	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/01/2020	30/01/2020	30/01/2020	30/01/2020	31/01/2020	31/01/2020	31/01/2020	31/01/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020					
Antimony	<1	1	1	<1	1	1	1	<1			<1	mg/kg	TM30/PM15
Arsenic #	12.9	1.9	14.4	22.4	14.2	11.6	11.5	11.6			<0.5	mg/kg	TM30/PM15
Barium #	82	58	131	39	57	57	75	33			<1	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Chromium #	72.8	102.0	84.4	58.5	76.8	93.8	86.8	69.2			<0.5	mg/kg	TM30/PM15
Copper #	14	14	18	13	25	9	17	4			<1	mg/kg	TM30/PM15
Lead #	15	10	17	15	14	14	15	13			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Molybdenum #	2.2	3.2	0.7	2.1	1.9	2.8	1.7	3.0			<0.1	mg/kg	TM30/PM15
Nickel #	51.6	21.7	46.7	25.1	34.0	24.0	28.8	21.0			<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	1	1	<1	<1	<1			<1	mg/kg	TM30/PM15
Zinc #	55	41	71	65	78	48	60	44			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	<0.04	-	-	<0.04	-	-	-	<0.04			<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	-	-	<0.22	-	-	-	<0.22			<0.22	mg/kg	TM4/PM8
PAH 16 Total	-	<0.6	<0.6	-	<0.6	<0.6	<0.6	-			<0.6	mg/kg	TM4/PM8
PAH 17 Total	<0.64	-	-	<0.64	-	-	-	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	-	-	<1	-	-	-	<1			<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	106	103	105	103	98	108	100	95			<0	%	TM4/PM8
Methyl Tertiary Butyl Ether #	-	<2	<2	-	<2	<2	<2	-			<2	ug/kg	TM15/PM10
Benzene #	-	<3	<3	-	<3	<3	<3	-			<3	ug/kg	TM15/PM10
Toluene #	-	<3	<3	-	<3	<3	<3	-			<3	ug/kg	TM15/PM10
Ethylbenzene #	-	<3	<3	-	<3	<3	<3	-			<3	ug/kg	TM15/PM10
m/p-Xylene #	-	<5	<5	-	<5	<5	<5	-			<5	ug/kg	TM15/PM10
o-Xylene #	-	<3	<3	-	<3	<3	<3	-			<3	ug/kg	TM15/PM10

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	7-9	19-21	31-33	40-42	46-48	58-60	64-66			LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP04	TP06	TP08	TP09	TP11	TP12					
Depth	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/01/2020	30/01/2020	30/01/2020	30/01/2020	31/01/2020	31/01/2020	31/01/2020	31/01/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020					
Surrogate Recovery Toluene D8	-	94	99	-	96	101	103	-			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	88	91	-	91	97	99	-			<0	%	TM15/PM10
Mineral Oil (C10-C40)	<30	-	-	<30	-	-	-	<30			<30	mg/kg	TM5/PM8/PM16
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	-	-	<7	-	-	-	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	-	-	<26	-	-	-	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics C5-35	-	<19	<19	-	<19	<19	<19	-			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	-	-	<0.1	-	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C25	<10	-	-	<10	-	-	-	<10			<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	-	-	<10	-	-	-	<10			<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	-	-	<7	-	-	-	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	-	<19	<19	-	<19	<19	<19	-			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aromatics C5-40	<26	-	-	<26	-	-	-	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	<38	<38	-	<38	<38	<38	-			<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	<52	-	-	<52	-	-	-	<52			<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	-	-	<0.1	-	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	-	-	<10	-	-	-	<10			<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	-	-	<10	-	-	-	<10			<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	-	-	<5	-	-	-	<5			<5	ug/kg	TM31/PM12
Benzene #	<5	-	-	<5	-	-	-	<5			<5	ug/kg	TM31/PM12
Toluene #	<5	-	-	<5	-	-	-	<5			<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	-	-	<5	-	-	-	<5			<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	-	-	<5	-	-	-	<5			<5	ug/kg	TM31/PM12
o-Xylene #	<5	-	-	<5	-	-	-	<5			<5	ug/kg	TM31/PM12

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	7-9	19-21	31-33	40-42	46-48	58-60	64-66			LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP04	TP06	TP08	TP09	TP11	TP12					
Depth	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/01/2020	30/01/2020	30/01/2020	30/01/2020	31/01/2020	31/01/2020	31/01/2020	31/01/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020					
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35			<35	ug/kg	TM17/PM8
Natural Moisture Content	19.5	18.9	21.1	15.3	13.2	16.4	19.7	20.1			<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	16.3	-	-	13.3	-	-	-	16.8			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	-	-	<0.3	-	-	-	<0.3			<0.3	mg/kg	TM38/PM20
Chromium III	72.8	-	-	58.5	-	-	-	69.2			<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.08	-	-	0.09	-	-	-	0.38			<0.02	%	TM21/PM24
pH #	7.27	-	-	7.53	-	-	-	6.55			<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1064	-	-	0.1047	-	-	-	0.1066				kg	NONE/PM17
Mass of dried test portion	0.09	-	-	0.09	-	-	-	0.09				kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	31-33	64-66								LOD/LOR	Units	Method No.
Sample ID	TP01	TP06	TP12										
Depth	0.70	0.70	0.70										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	30/01/2020	30/01/2020	31/01/2020										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	04/02/2020	04/02/2020	04/02/2020										
Dissolved Antimony #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	0.0084	0.0028								<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	0.084	0.028								<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005								<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005								<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015								<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015								<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007								<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07								<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005								<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.004	<0.003	0.003								<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.04	<0.03	0.03								<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001								<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001								<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1								<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3								<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	1.5	2.3								<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	15	23								<5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3	<0.3								<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	<3								<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	7	3	3								<2	mg/l	TM60/PM0
Dissolved Organic Carbon	70	30	30								<20	mg/kg	TM60/PM0
pH	7.63	7.04	6.56								<0.01	pH units	TM73/PM0
Total Dissolved Solids #	40	68	99								<35	mg/l	TM20/PM0
Total Dissolved Solids #	400	680	990								<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	31-33	64-66													
Sample ID	TP01	TP06	TP12													
Depth	0.70	0.70	0.70													
COC No / misc																
Containers	V J T	V J T	V J T													
Sample Date	30/01/2020	30/01/2020	31/01/2020													
Sample Type	Soil	Soil	Soil													
Batch Number	1	1	1													
Date of Receipt	04/02/2020	04/02/2020	04/02/2020													
Solid Waste Analysis																
Total Organic Carbon #	0.08	0.09	0.38								3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025								6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035								1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30								500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22								-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64								100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	0.084	0.028								0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03								20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005								0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015								0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07								2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001								0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	<0.02								0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02								0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05								0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02								0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03								0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.04	<0.03	0.03								4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	400	680	990								4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	70	30	30								500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1064	0.1047	0.1066								-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	84.5	86.2	84.0								-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.883	0.886	0.883								-	-	-		l	NONE/PM17
Eluate Volume	0.85	0.85	0.85								-	-	-		l	NONE/PM17
pH #	7.27	7.53	6.55								-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1								1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3								-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	15	23								1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	<3								800	15000	25000	<3	mg/kg	TM38/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

SVOC Report : **Solid**

EMT Sample No.	7-9	19-21	40-42	46-48	58-60						LOD/LOR	Units	Method No.
Sample ID	TP02	TP04	TP08	TP09	TP11								
Depth	0.70	0.70	0.70	0.70	0.70								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	30/01/2020	30/01/2020	31/01/2020	31/01/2020	31/01/2020								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020								
SVOC MS													
Phenols													
2-Chlorophenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Phenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Other SVOCs													
1,2-Dichlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Azobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Carbazole	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Dibenzofuran #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Hexachlorobutadiene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Isophorone #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Nitrobenzene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	115	117	117	116	129						<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	115	111	108	111	132 SV						<0	%	TM16/PM8

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton
EMT Job No: 20/1659

VOC Report : **Solid**

EMT Sample No.	7-9	19-21	40-42	46-48	58-60						LOD/LOR	Units	Method No.
Sample ID	TP02	TP04	TP08	TP09	TP11								
Depth	0.70	0.70	0.70	0.70	0.70								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	30/01/2020	30/01/2020	31/01/2020	31/01/2020	31/01/2020								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020								
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2						<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1						<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6						<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30	<30	<30	<30						<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6						<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	<5	<5						<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3						<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5						<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6						<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7	<7	<7	<7						<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27						<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7	<7	<7	<7						<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	94	99	96	101	103						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	88	91	91	97	99						<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland

Reference: 9364-01-20

Location: Dub 30 Arklow

Contact: Barry Sexton

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
20/1659	1	TP01	0.70	1-3	No interpretation possible
20/1659	1	TP06	0.70	31-33	No interpretation possible
20/1659	1	TP12	0.70	64-66	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 20/01/9364
Location: Dub 30 Arklow
Contact: Barry Sexton

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/1659	1	TP01	0.70	2	06/02/2020	**General Description (Bulk Analysis)**	soil.stones
					06/02/2020	**Asbestos Fibres**	NAD
					06/02/2020	**Asbestos ACM**	NAD
					06/02/2020	**Asbestos Type**	NAD
					06/02/2020	**Asbestos Level Screen**	NAD
20/1659	1	TP06	0.70	32	06/02/2020	**General Description (Bulk Analysis)**	soil/stones
					06/02/2020	**Asbestos Fibres**	NAD
					06/02/2020	**Asbestos ACM**	NAD
					06/02/2020	**Asbestos Type**	NAD
					06/02/2020	**Asbestos Level Screen**	NAD
20/1659	1	TP12	0.70	65	06/02/2020	**General Description (Bulk Analysis)**	soil-stones
					06/02/2020	**Asbestos Fibres**	NAD
					06/02/2020	**Asbestos ACM**	NAD
					06/02/2020	**Asbestos Type**	NAD
					06/02/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9364-01-20
Location: Dub 30 Arklow
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/1659						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/1659

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/1659

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

EMT Job No: 20/1659

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

EMT Job No: 20/1659

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

EMT Job No: 20/1659

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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Site Dub 30 Arklow			**Trial Pit Number** TP01
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.20m L	**Ground Level (mOD)** 34.24	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723405.2 E 671205.4 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				34.04	0.20	Firm to stiff light brown grey mottled slightly sandy slightly gravelly CLAY.		
					(0.70)			
0.70	EN			33.34	0.90	Stiff brown grey slightly gravelly sandy silty CLAY.		
					(2.60)			
3.50	EN			30.74	3.50	Complete at 3.50m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.50m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP01

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Site Dub 30 Arklow			**Trial Pit Number** TP02
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.10m L	**Ground Level (mOD)** 36.20	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723567 E 671142.6 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				36.00	(0.20) 0.20	TOPSOIL. Stiff light grey brown slightly gravelly sandy CLAY.		
0.70	EN				(1.00)			
				35.00	1.20	Orangey brown slightly clayey gravelly fine to coarse SAND with occasional sub-angular to sub-rounded cobbles.		
					(0.30)			
			Water strike(1) at 1.50m.	34.70	1.50	Stiff brown grey slightly sandy slightly gravelly CLAY.		▽1
					(1.90)			
3.40	EN			32.80	3.40	Complete at 3.40m		

Plan

Remarks

Slow ingress of groundwater encountered at 1.5m BGL.
Trial pit stable.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP02

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Site Dub 30 Arklow			**Trial Pit Number** TP03
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.0m L	**Ground Level (mOD)** 36.20	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723472.4 E 671016.5 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				36.00	0.20	Firm dark brown slightly sandy slightly gravelly silty CLAY.		
					(0.30)			
				35.70	0.50	Firm to stiff light grey slightly sandy slightly gravelly CLAY.		
0.70	EN				(0.80)			
				34.90	1.30	Stiff to very stiff brown grey slightly sandy slightly gravelly CLAY.		
					(1.40)			
				33.50	2.70	Very stiff brown grey slightly sandy slightly gravelly CLAY.		
					(0.80)			
3.50	EN			32.70	3.50	Complete at 3.50m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.50m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP03

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Site Dub 30 Arklow			**Trial Pit Number** TP04
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.0m L	**Ground Level (mOD)** 39.84	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723366.7 E 670899.4 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				39.64	0.20	Firm to stiff light brown slightly sandy slightly gravelly CLAY.		
					(0.70)			
0.70	EN			38.94	0.90	Stiff brown grey mottled slightly sandy slightly gravelly CLAY with organic material.		
					(1.90)			
				37.04	2.80	Very stiff dark brown grey slightly sandy slightly gravelly CLAY.		
					(0.50)			
3.30	EN			36.54	3.30	Complete at 3.30m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.30m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP04

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Site Dub 30 Arklow			**Trial Pit Number** TP05
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.10m L	**Ground Level (mOD)** 43.51	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723473.9 E 670811.4 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				43.31	0.20	Firm light orangey brown grey mottled slightly sandy slightly gravelly CLAY.		
0.70	EN				(1.10)			
				42.21	1.30	Firm to stiff orangey brown black mottled slightly sandy gravelly CLAY with occasional sub-rounded cobbles.		
					(2.10)			
3.40	EN			40.11	3.40	Complete at 3.40m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP05

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Site Dub 30 Arklow			**Trial Pit Number** TP06
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.10m L	**Ground Level (mOD)** 42.00	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723596.3 E 670916.8 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				41.80	0.20	Firm light orangey brown grey mottled slightly sandy slightly gravelly CLAY.		
					(0.60)			
0.70	EN		Water strike(1) at 0.80m.	41.20	0.80	Firm brown slightly sandy gravelly CLAY. Significant water seepage at 0.80m BGL		▽1
					(0.50)			
				40.70	1.30	Brown reddish grey slightly clayey fine to coarse angular to sub-angular GRAVEL with occasional sub-angular cobbles. Gravel is comprised of slate.		
					(1.40)			
				39.30	2.70	Complete at 2.70m		

Plan

Remarks

Fast ingress of groundwater at 0.8m BGL
Trial pit unstable. Spalling at 0.90m BGL
Trial pit terminated at 2.70m BGL due to side wall spalling and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP06

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Site Dub 30 Arklow			**Trial Pit Number** TP07
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.0m L	**Ground Level (mOD)** 45.14	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723698.3 E 671010.3 N	**Dates** 30/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				44.94	0.20	Firm to stiff light orangey brown grey black mottled slightly sandy slightly gravelly CLAY.		
0.70	EN				(1.10)			
				43.84	1.30	Firm to stiff brown grey mottled slightly sandy gravelly CLAY with occasional sub-rounded cobbles.		
					(1.50)			
				42.34	2.80	Stiff light yellowish brown black mottled slightly sandy slightly gravelly SILT.		
					(0.60)			
3.40	EN			41.74	3.40	Complete at 3.40m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP07

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Site Dub 30 Arklow			**Trial Pit Number** TP08
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.00m L	**Ground Level (mOD)** 46.79	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723709.6 E 670928.4 N	**Dates** 31/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL.		
				46.49	0.30	Firm to stiff light orangey brown grey mottled slightly sandy gravelly clayey SILT.		
0.70	EN				(0.80)			
				45.69	1.10	Stiff brown grey black mottled slightly sandy slightly gravelly silty CLAY with rare sub-angular to sub-rounded cobbles and boulders.		
					(0.90)			
				44.79	2.00	Stiff light brown orange slightly gravelly sandy SILT.		
					(1.40)			
3.40	EN			43.39	3.40	Complete at 3.40m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP08

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Site Dub 30 Arklow			**Trial Pit Number** TP09
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.00m L	**Ground Level (mOD)** 50.81	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723851.3 E 670857.6 N	**Dates** 31/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL.		
				50.51	0.30	Firm to stiff light orangey brown grey mottled slightly gravelly sandy silty CLAY with occasional angular to sub-angular cobbles.		
0.70	EN				(0.90)			
				49.61	1.20	Firm to stiff brown grey black mottled slightly sandy silty CLAY.		
					(0.70)			
				48.91	1.90	Stiff brown black mottled slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles.		
					(1.10)			
				47.81	3.00	Stiff orangey yellow black mottled slightly sandy slightly gravelly SILT.		
					(0.40)			
3.40	EN			47.41	3.40	Complete at 3.40m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP09

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Site Dub 30 Arklow			**Trial Pit Number** TP10
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.00m L	**Ground Level (mOD)** 48.85	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723745.7 E 670825.7 N	**Dates** 31/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL.		
				48.55	0.30	Firm to stiff light orangey brown grey mottled slightly sandy slightly gravelly clayey SILT.		
0.70	EN				(0.90)			
				47.65	1.20	Firm to stiff brown grey black mottled slightly sandy gravelly CLAY.		
					(0.40)			
				47.25	1.60	Light yellowish brown slightly clayey slightly sandy fine to coarse angular GRAVEL.		
			Water strike(1) at 2.00m.		(0.80)			▽1
				46.45	2.40	Firm to stiff light orangey brown slightly gravelly sandy SILT.		
					(1.00)			
3.40	EN			45.45	3.40	Complete at 3.40m		

Plan

Remarks

Slow ingress of groundwater encountered at 2.0m BGL
Trial pit stable.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP10

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Site Dub 30 Arklow			**Trial Pit Number** TP11
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.00m L	**Ground Level (mOD)** 52.29	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723560.4 E 670672.3 N	**Dates** 31/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				52.09	0.20	Firm to stiff light orangey brown grey mottled slightly sandy slightly gravelly CLAY.		
0.70	EN				(1.00)			
				51.09	1.20	Stiff brown slightly sandy slightly gravelly CLAY with occasional angular to sub-angular cobbles.		
					(0.70)			
				50.39	1.90	Stiff reddish brown slightly sandy gravelly CLAY.		
					(0.30)			
2.20	EN			50.09	2.20	WEATHERED ROCK recovered as angular sine to coarse GRAVEL. Gravel is comprised of ordovician slate.		
					(0.30)			
				49.79	2.50	Complete at 2.50m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 2.50m BGL due to possible rock or boulder and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP11

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Site Dub 30 Arklow			**Trial Pit Number** TP12
Machine : 7 Tonne Excavator **Method :** Trial Pit	**Dimensions** 0.90m W x 3.20m L	**Ground Level (mOD)** 51.79	**Client** FT Squared	**Job Number** 9364-01-20
	Location 723809.9 E 670709.4 N	**Dates** 31/01/2020	**Project Contractor** GII	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL.		
				51.49	0.30	Firm light orangey brown slightly gravelly very sandy SILT.		
0.70	EN				(1.30)			
			Water strike(1) at 1.60m.	50.19	1.60	Brown silty fine to coarse SAND.		▽1
					(0.30)	Sand lens between 1.60m - 1.90m BGL		
				49.89	1.90	Stiff brown grey black mottled slightly gravelly sandy silty CLAY with occasional sub-angular to sub-rounded cobbles.		
					(1.50)			
3.40	EN			48.39	3.40	Complete at 3.40m		

Plan

Remarks

Slow ingress of groundwater encountered between 1.60m and 1.90m BGL.
Trial pit spalling at 2.0m BGL.
Trial pit terminated at 3.40m BGL and backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	NM	9364-01-20.TP12

DUB30 Arklow Trial Pit Photographs

TP01

TP02

TP03

TP04

TP05

TP06

TP07

TP08

TP09

TP10

TP11

TP12

APPENDIX 6.1

CRITERIA FOR RATING SITE ATTRIBUTES – ESTIMATION OF IMPORTANCE OF HYDROLOGY ATTRIBUTES

NATIONAL ROADS AUTHORITY (NRA, 2009)

Table 1 Criteria for rating Site Attributes - Estimation of Importance of Hydrology 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

APPENDIX 6.2

STAGE 1 – FLOOD RISK ASSESSMENT (FRA) COMPLETED BY AWN, 2022

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STAGE 1 FLOOD RISK ASSESSMENT

110KV SUBSTATION & ASSOCIATED UNDERGROUND TRANSMISSION LINE

ARKLOW, CO. WICKLOW

Report Prepared For

Crag Wicklow Ltd

Report Prepared By
Alan Wilson BSc
Environmental Consultant

Our Reference
AW/227501.0241WR01

Date of Issue
17 October 2022

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Record of Approval

Details	Written by	Approved by
Signature		
Name	Alan Wilson BSc	Marcelo Allende
Title	Environmental Consultant	Senior Environmental Consultant
Date	17 October 2022	17 October 2022

TABLE OF CONTENTS

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1.0 INTRODUCTION

AWN Consulting Ltd (AWN) has been appointed by Crag Wicklow Ltd. to undertake a Stage 1 Flood Risk Assessment ("FRA") for a proposed development located within the townlands of Kish, Bogland, Ballynattin, and Ballintombay, to the South of Arklow, County Wicklow. This assessment has been completed in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities' 2009 (FRM Guidelines).

The Site area consists of three main areas: 110 kV Substation Site, Circuit Route A, Circuit Route B; these areas are described below.

The first, the '110 kV Substation Site', is located within the Kish Business Park and comprises part of an irregularly shaped field bounded by hedgerows typical of its agricultural setting. The 110 kV Substation Site is currently in use as agricultural lands.

The 110 kV Substation Site is presently bounded by greenfield agricultural lands to the north and east, which are subject to a Permitted Development for a 3 no. ICT Facility Buildings and associated development Wicklow County Council (WCC) Reg. Ref.: 201088. The 110 kV Substation Site is currently accessed via the existing permitted access from the Kish Business Park Road.

The second, the 'Circuit Route A', is a linear route of 2934 m; between the 110 kV Substation Site to the existing 110 kV overhead line located to the west.

The third, the 'Circuit Route B', is a linear route of 2216 m; between the 110 kV Substation Site to the existing 110 kV overhead line located to the west.

The county town of Wicklow is located approximately 25 km north, with Dublin city centre 65 km further to the north of the site. The M11 motorway provides an excellent transport link to the surrounding area.

Insert 1.1 *Site Location and Surrounding Land Use (source: Google Earth Pro, 2022)*

This report was prepared by Alan Wilson (BSc), and Marcello Allende (BSc, BEng). Alan is an Environmental Consultant (Hydrologist) with AWN Consulting. Alan holds a BSc Honours in Environmental Management in Agriculture/Environmental and Geographical Sciences, working on projects involving EIA Reports, Environmental Site Investigation and contaminated lands on a range of developments. Alan has over 2 years' experience as an Environmental Consultant including roles in Ecology and Forestry related work. Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is an Senior Environmental Consultant (Hydrologist) with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI).

1.1 PLANNING CONTEXT

The following planning policy documents are relevant to the assessment of the proposed development:

- The National Planning Guidelines published by the OPW and the Department of the Environment, Heritage and Local Government in November 2009 entitled 'The Planning System and Flood Risk Management Guidelines for Planning Authorities';
- National Development Plan 2018-2027;
- Wicklow County Development Plan 2016-2022;
- Adopted Wicklow County Development Plan 2022-2028.

1.2 PURPOSE OF A SITE SPECIFIC FLOOD RISK ASSESSMENT

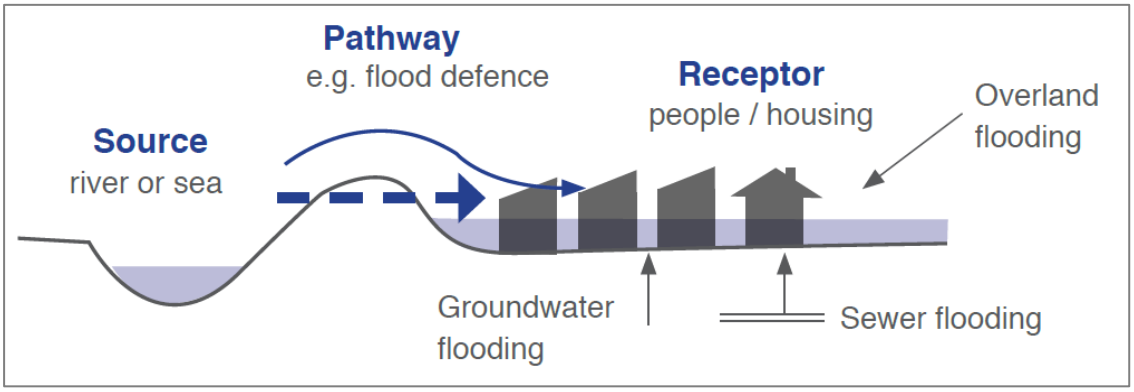
In line with the Guidelines, a Site Specific Flood Risk Assessment should be undertaken for a scale of individual site planning applications. The purpose of this FRA is to assess all types of flood risk for a new development. A FRA identifies the sources of flood risk, the effects of climate change on this, the impact of the development, the effectiveness of flood mitigation and management measures and the residual risks that remain after those measures are put in place.

Note: The SSFRA is a live document that is designed to be updated as further flood risk information becomes available and changes *to the development plan are proposed under any variations. Accordingly, all information in relation to flood risk is provided for general policy guidance only. It may be altered in light of future data and analysis. As a result, all landowners and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands in which they have an interest prior to making planning or development decisions.*

1.3 THE PLANNING SYSTEM AND FLOOD RISK MANAGEMENT GUIDELINES

This assessment was undertaken in accordance with the Department of the Environment, Heritage and Local Government (DoEHLG) Flood Risk Management Guidelines for Planning Authorities published by the OPW in 2009 (hereafter referred to as the FRM Guidelines) in order to introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process.

For carrying out a Site-specific Flood Risk Assessment (SSFRA), the OPW Guidelines recommend using Source-Path-Receptor (S-P-R) concept model to identify where the flood originates from, what the floodwaters path is and the areas in which assets and people might be affected by such flooding (Section 2.18 of the OPW Guidelines, 2009). Insert 1.2 shows a schematic representation of S-P-R model.



Insert 1.2 *Source-Pathway-Receptor Model (OPW, 2019)*

A Flood Risk Assessment (FRA) is undertaken over several stages with the need for progression to a more detailed stage dependent on the outcomes of the former stage.

As per the FRM Guidelines a tiered approach has been taken. This usually begins with a Stage 1 Assessment which aims to quantify the risk posed to the development and to the surrounding environment by this development. The main aim of this FRA is to determine the risk of flooding to the site and the impact development will have on the

floodplain, developments off site, upstream and downstream levels and any mitigation measures necessary.

This hierarchy of assessment ensures that flood risk is taken into account at all levels of the planning system but also that the right level of detail is considered. This avoids the need for detailed and costly assessments prior to making strategic decisions.

In terms of the Flood Risk Assessment and Management Study the scope of this work incorporates three stages:

- ***Stage 1: Flood Risk Identification -*** to identify whether there may be any flooding or plan issues related to a plan area or proposed development site that may warrant further investigation.

- ***Stage 2: Initial Flood Risk Assessment -*** to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. The extent of the risk of flooding should be assessed which may involve preparing indicative flood zone maps. Where existing river or coastal models exist, these should be used broadly to assess the extent of the risk of flooding and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures; and,

- ***Stage 3: Detailed Flood Risk Assessment -*** to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model of the river or coastal cell across a wide enough area to appreciate the catchment wide impacts and hydrological processes involved.

However, as explained in the following sections, based ~~of~~ on the nature of the development and the results of the flood risks identified during Stage 1, it was not necessary to proceed to Stages 2 and 3.

As described in the FRM guidelines flood risk is a combination of the likelihood of flooding and the potential consequences arising. This is normally expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

The likelihood of flooding is normally expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in 100 years, i.e. it has a 1% chance of occurring in any one year. Therefore:

- 100-year flood = 1% Annual Exceedance Probability (AEP).
- 1000-year flood = 0.1% AEP.

In the FRM Guidelines, the likelihood of a flood occurring is established through the identification of Flood Zones which indicate a high, moderate, or low risk of flooding from fluvial or tidal sources, as defined as follows:

- *Flood Zone A* - Where the probability of flooding is highest (greater than 1% AEP or 1 in 100 for river flooding and 0.5% AEP or 1 in 200 for coastal flooding) and where a wide range of receptors would be vulnerable.
- *Flood Zone B* - Where the probability of flooding is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 for coastal flooding); and
- *Flood Zone C* - Where the probability of flooding is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding).

Insert 1.3 *Indicative Flood Zone Map (OPW, 2009)*

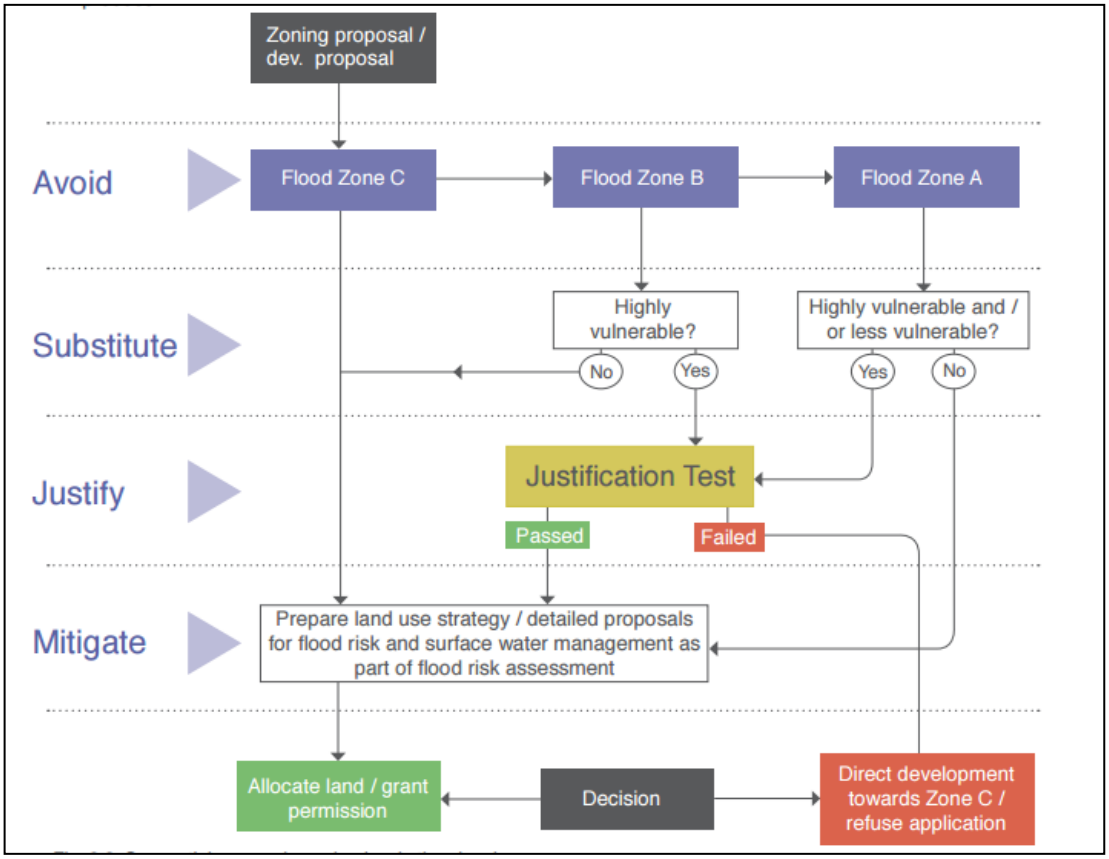
According to the OPW Guidelines, the planning implication of each of the zones mentioned above are:

- *Zone A* - High probability of flooding. Most types of development would be considered inappropriate in this zone.
- *Zone B* - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone
- *Zone C* - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

Potential impacts of the proposed development were considered within the study area. This is defined as the area within the proposed development site boundary (i.e. the proposed development site), and the wider hydrological setting of the area (refer to Insert 1.1 above and 2.1 below). A sequential plan approach was undertaken for this risk assessment under guidance from the local planning authorities (2009). Specifically, a sequential approach is first and foremost directed towards land that is at low risk of flooding. The underpinning philosophy of the sequential approach is highlighted in the illustration below. It should be noted that the above guidance is

applicable in the layout and design of the specific subject site at the development management stage.

Based on the CFRAM PRFA (Preliminary Flood Risk Assessment) and Wicklow County Development Plan 2016-2022, the subject site resides in Flood Zone C (refer to Section 4 below). This report contains the first stage of the flood risk assessment.



Insert 1.4 *Sequential approach mechanism in the planning process*

1.4 METHODOLOGY

This assessment follows the FRM Guidelines; the methodology involves researching the following data sources:

- Base maps – Ordnance Survey of Ireland;
- Flood Hazard Maps and flooding information for Ireland, www.floodinfo.ie Office of Public Works (OPW);
- Geological Survey of Ireland (GSI) maps on superficial deposits;
- EPA hydrology maps;
- National River Basin Management Plan 2018-2021;
- Geological Survey of Ireland (GSI) maps on superficial deposits (current and historical);
- Circular PL2/2014 Flooding Guidelines;
- The National Development Plan 2018 – 2027;
- Wicklow County Development Plan 2016-2022;
- Adopted Wicklow County Development Plan 2022-2028.

The proposed development and its component parts have been assessed against the FRM Guidelines Classification of Vulnerability. It is considered that the proposed development would reside within the essential infrastructure category ('*utilities distribution, including power stations and substations*'); as such it is classified as '*Highly Vulnerable Development*' (see Table 1.1).

According to the FRM Guidance, a Highly Vulnerable Development requires a Justification test for Flood Zone A and B, and is appropriate for Flood Zone C (see Table 1.2).

Table 1.1 *Classification of vulnerability of different types of developments.*

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Table 1.2 *Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.*

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

1.5 CLIMATE CHANGE

Flood risk is anticipated to increase as a result of climate change. Projected impacts for Ireland include:

- Sea level rise of between 18cm and 59cm this century;
- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding; and
- Increased storm surges.

With respect to this assessment and the development area only changes in the intensity of rainfall events and the magnitude of river flooding are of direct relevance.

In all developments, climate change should be considered when assessing flood risk and in particular residual flood risk. Consideration of climate change is particularly important where flood alleviation measures are proposed, as the design standard of the proposal may reduce significantly in future years due to increased rainfall, river flows and sea levels.

The Guidelines recommend that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. A significant amount of research into climate change has been undertaken on both a national and international front, and updates are ongoing.

Based on these two scenarios the OPW recommended allowances for climate change are given in Table 1.3. These climate change allowances are particularly important at the development management stage of planning and will ensure that proposed development is designed and constructed to take into account best current knowledge.

Table 1.3 *Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios for Fluvial and Tidal Sources*

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Peak Flood Flows	+20%	+30%

Mean Sea Level Rise	+500 mm	+1,000 mm
Land Movement	-0.5 mm/year [1]	-0.5 mm/year [1]
Urbanisation	No General Allowance – Review on a Case by Case Basis	No General Allowance – Review on a Case by Case Basis
Forestation	-1/6 Tp [2]	-1/3 Tp [2] +10% SPR [3]

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

For most development, including residential, nursing homes, shops and offices, the medium-range future scenario (20% increase in flows) is an appropriate consideration. This should be applied in all areas that are at risk of flooding (i.e. within Flood Zone A and B) and will be considered for sites which are in Flood Zone C but are adjacent to Flood Zone A or B. This is because land which is currently not at risk may become vulnerable to flooding when climate change is taken into account.

Where the risk associated with inundation of a development is low and the design life of the development is short (typically less than 30 years) the allowance provided for climate change may be less than the 20% / 0.5m level.

In general, climate change will be accounted for by the setting of finished floor levels to a height which includes an allowance for climate change. However, climate change may also reveal additional flow paths which need to be protected or give rise to flows which exceed culvert capacity or overtop defences. These outcomes will need to be specifically investigated for each site, and an appropriate response provided.

2.0 EXISTING HYDROLOGICAL ENVIRONMENT

2.1 SITE LOCATION

The location of the proposed development site is located entirely within the Hydrometric Area No. 10 (WFD Catchment: Ovoca-Vartry) in Ovoca-Vartry WMU (Water Management Unit) within the former Eastern River Basin District (ERBD) (now the Irish River Basin District) and Avoca WFD Subcatchment (WFD name: Avoca_SC_020, ID 10_9; EPA, 2022) – Refer to Figure 1 in Appendix 1).

The current EPA watercourse mapping shows existing watercourses within and adjacent to the proposed development site. The site is drained by a local network which is composed of ditches and watercourses (Moneylane 10 & Springfield 10) which traverse the site. The Springfield 10 is located in the eastern area of the proposed development site; however, this feature is not shown in any of the historical mapping (1832 to 1913) records provided within the GeoHive website. A site walkover conducted in January 2020 included a visual inspection of this watercourse. This visit was after significant rain and stagnant water was visible in this watercourse, additionally the watercourse is heavily modified with a straight channel delineating a

field boundary. The inspection suggests that the watercourse is a manmade drainage feature with intermittent or ephemeral and likely fed from surface runoff from the clay soils shown in the majority of the trial pits across the site.

The Springfield 10 flows in a westerly direction and enters the Moneylane 10 along the sites eastern boundary. The Moneylane 10 flows North before merging with the Ballyduff Stream c. 1.4km downstream. The Ballyduff Stream enters the River Avoca a further 2.2km downstream before eventually flowing into the southwestern Irish Sea at Ballybrittas Bay c. 8km downstream of the proposed development site – Refer to Insert 2.1 below.

Insert 2.1 *Regional Hydrological Environment (source: EPA, 2022)*

There are no Europeans sites at the mouth of the Avoca River, the closest, Buckroney-Brittas Dunes and Fen SAC (Site code 000729), is located approximately 5 km to the north of the river mouth. The Kilpatrick Sandhills SAC is located over 6km to the south along the coast. Potential adverse effects on these European sites from the proposed development are highly unlikely given the distance of removal.

The nearest protected site is the Arklow Rock Askintinny (Site Code 001745). This is an area of outcrop with associated habitat. There is no hydrological connectivity to this proposed Natural Heritage Site – Refer to Figure 2 in Appendix 1.

2.2 EXISTING SITE GEOLOGY AND HYDROGEOLOGY

The subsoil map (refer to Figure 3 in Appendix 1) presents the area to be made up of Irish Sea Till derived from limestones derived from Lower Palaeozoic sandstones and shales (IrSTLPSsS) with matrix of Irish Sea Basin origin present within small areas in the southern portions of the site. There is no indication of alluvium subsoil underlying the proposed route.

The absence of Alluvium indicate that there are no historic rivers or flood plains on the site. Reference to the GSI Bedrock Geology indicates that the site is underlain by the Kilmacrea formation (Llandeilo-Caradoc Stage, Rock Unit code: OCKILM). This geological formation comprises primarily of buff-weathering grey and black slates and shales, with occasional sandstones. There are some tuffaceous horizons, and distinction between shale-rich parts of volcanic formations and tuff-rich parts - Refer to Figure 4 in Appendix 1.

The GSI online mapping shows the site crosses three groundwater vulnerability categories. The western boundary of the site experiences a High (H) Vulnerability, the south-western and south-eastern areas of the site experience Low (L) vulnerability and the majority of the site is classified with a "Moderate" vulnerability status – See Table 1.4 below denoting the general overburden depths of each vulnerability class - Refer to Figure 5 in Appendix 1.

Table 1.4 *Vulnerability Mapping Guidelines (source: GSI, 2022)*

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.

Groundwater vulnerability is based on the thickness of the subsoil overlying the bedrock aquifer. Overall, the GSI groundwater vulnerability was mapped as being 'Moderate' for the majority of and vicinity of the proposed development site which indicates a general overburden depth potential of >10 m. Ground Investigations carried out by Ground Investigations Ireland 2022 (GII) in the East of the site did not encounter competent bedrock in any of the boreholes <10mbgl. Therefore, the local groundwater is not considered as a sensitive receptor due to the presence of the low permeability subsoil (Irish Sea Till) and the thickness of this overburden.

3.0 DEVELOPMENT CHARACTERISTICS

The Proposed Development consists of three main components the 110 kV Substation Site, Circuit Route A, Circuit Route B these areas are described below – See Figures 6 & 7 in Appendix 1 for Cable Circuit Route Layout and Typical Mast Detail.

110kV Gas Insulated Switchgear (GIS) Substation

Construction of a 2 storey 110kV Gas Insulated Switchgear (GIS) Substation to be located on lands at Kish and Boglands, to the south of Arklow, County Wicklow. The proposed comprises a 110kV Substation building that includes, cable room, battery room relay room, stair cores and circulation areas, welfare facilities, with an overall height of c. 14.5 m, a Client Control Building that of c. 6 m, and site infrastructure 4 no. transformer bays, fire walls (c. 10 m high), drainage works, all internal road/footpath

access routes, landscaping and boundary treatment works, vehicular access and provision of 8 no. car parking spaces in the overall compound. Disabled parking spaces and electric car charging ports are not proposed due to occupancy and usage of the substation. The proposed 110 kV Substation will serve the ICT Facility permitted under WCC Reg. Ref.: 201088.

The proposed 110 kV Substation layout is shown on Figure 2.2 below.

Cable Circuits and New Masts

The underground cable (Cable Circuit A) is a single circuit 110 kV cable and communications ducts and 5 joint bays that will follow a liner route of 2,934 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV overhead line. The 2,934 m route can be summarised as approximately:

- extending to the north-west c. 434 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- c. 800 m in the existing carriageway ducting along the R772 to the M11 Junction 21
- c. 300 m in carriageway through the M11 Junction 21
- Proceeding to the northwest c. 1,400 m in the existing carriageway along the L6187.
- At the terminus the cable connects to the existing 110 kV overhead line via a proposed c. 17 m above ground level mast adjacent to Knockeneahan Road (L2190).

The underground cable (Cable Circuit B) is a single circuit 110 kV cable and communications ducts and 4 joint bays that will follow a liner route of 2,216 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV overhead line. The 2,216 m route can be summarised as approximately:

- extending to the north-west c. 416 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- 158 m in farmland crossing, and carriageway ducting along the R772
- 142 m under the M11 via HDD
- 600 m in private road (IDA), and future development lands (IDA)
- 900 m in farmland
- At the terminus the cable connects to the existing 110 kV overhead line via a proposed c. 17 m above ground level mast adjacent to Knockeneahan Road (L2190).

There is no existing public foul network at the site, properties in the adjacent development to the 110 kV Substation site within Kish Business Park treat their wastewater on site. There is no public surface water infrastructure located within or adjacent to the site. The 110 kV Substation site is drained by a series of agricultural ditches which connect to the Moneylane Stream which ultimately discharges into the Avoca River.

There is a direct pathway from the site to the Moneylane Stream via over land flow that will require appropriate management. The permitted development WCC Reg. Ref. 201088 includes for the ~~the~~ removal, infilling and redirection of the existing agricultural ditches that currently drain the site. Surface water discharge from the site will be

managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.

All run-off will be prevented from directly entering into the existing water courses and drainage ditches. See Chapter 5 (Land, Soils, Geology and Hydrogeology) and Chapter 6 (Hydrology) for a full description of mitigation measures proposed.

During construction, contractors will require temporary power for onsite accommodation, and construction equipment and plant. The power requirements will be relatively minor. It is anticipated that generators will be provided on site to provide temporary power until a temporary connection to mains can be established.

Telecommunications including fibre required during the construction phase will be provided via a mobile connection.

The 110 kV Substation in itself do not require an operational electrical supply, there is limited water, and waste water demand associated with welfare facilities within the 110 kV Substation building, the new hardstanding and resultant surface water is to be managed via the permitted (WCC Reg. Ref. 201088) surface water drainage system.

The Cable Circuit B and Drop Down Mast in themselves do not require an operational electrical supply, there is no water, or waste water demand and no new hardstanding or surface water generation

Refer to Drainage and Water Services Design Report and Chapter 6 of the EIAR for further details.

4.0 STAGE 1 – FLOOD RISK IDENTIFICATION

In broad terms, the potential sources of flooding at the site can be categorised as:

- Fluvial (River) Flooding: The main risk of fluvial flooding is from the local hydrological environment. Fluvial or river flooding occurs when the capacity of a watercourse is exceeded or the channel is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying area.

- Tidal/Coastal Flooding: The risk from coastal flooding is from surge events in the Irish Sea, this would appear to be low as the site is a considerable distance inland from the coast (c. 2km). Refer to Section 4.2 below.

- Pluvial Flooding: Pluvial flooding occurs when the capacity of the local urban drainage network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography and cause flooding.

- Groundwater Flooding: Groundwater Flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding. Groundwater flood is usually associated with areas of high karstification i.e. the west of Ireland.

Each of these potential sources of flooding are considered in this FRA.

4.1 HISTORICAL FLOODING RECORDS

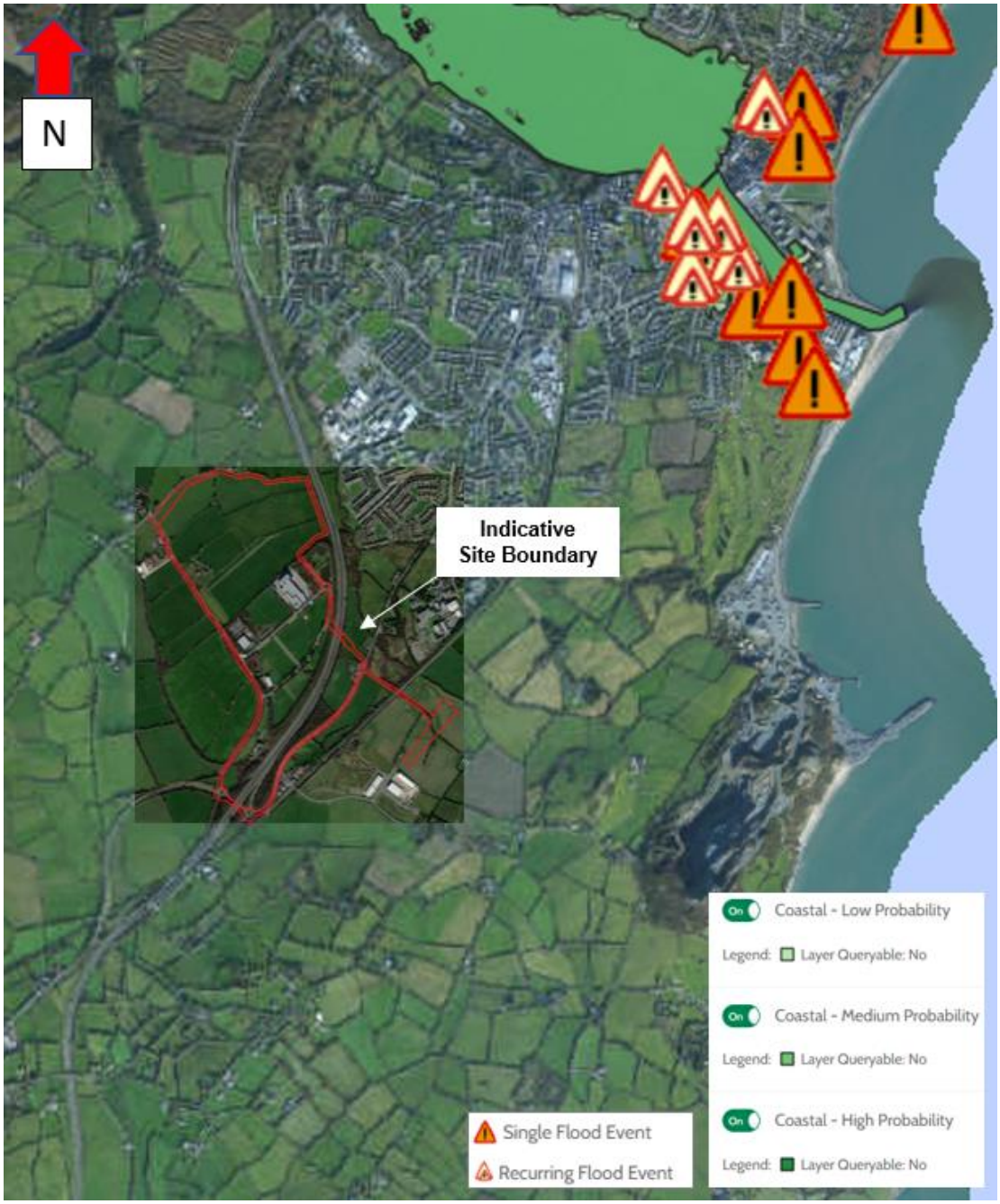
A review of the OPW Preliminary Flood Risk Assessment (PFRA) mapping data there are no previous flood events recorded within the proposed development site. Furthermore, the site in the proposed scenario will be developed and carefully managed for surface water runoff and attenuation will be in place to cater for the 1 in 100 year rainfall event as per the GDSDS document. There are no historic flood events recorded in the vicinity of the site.

4.2 FLUVIAL FLOODING

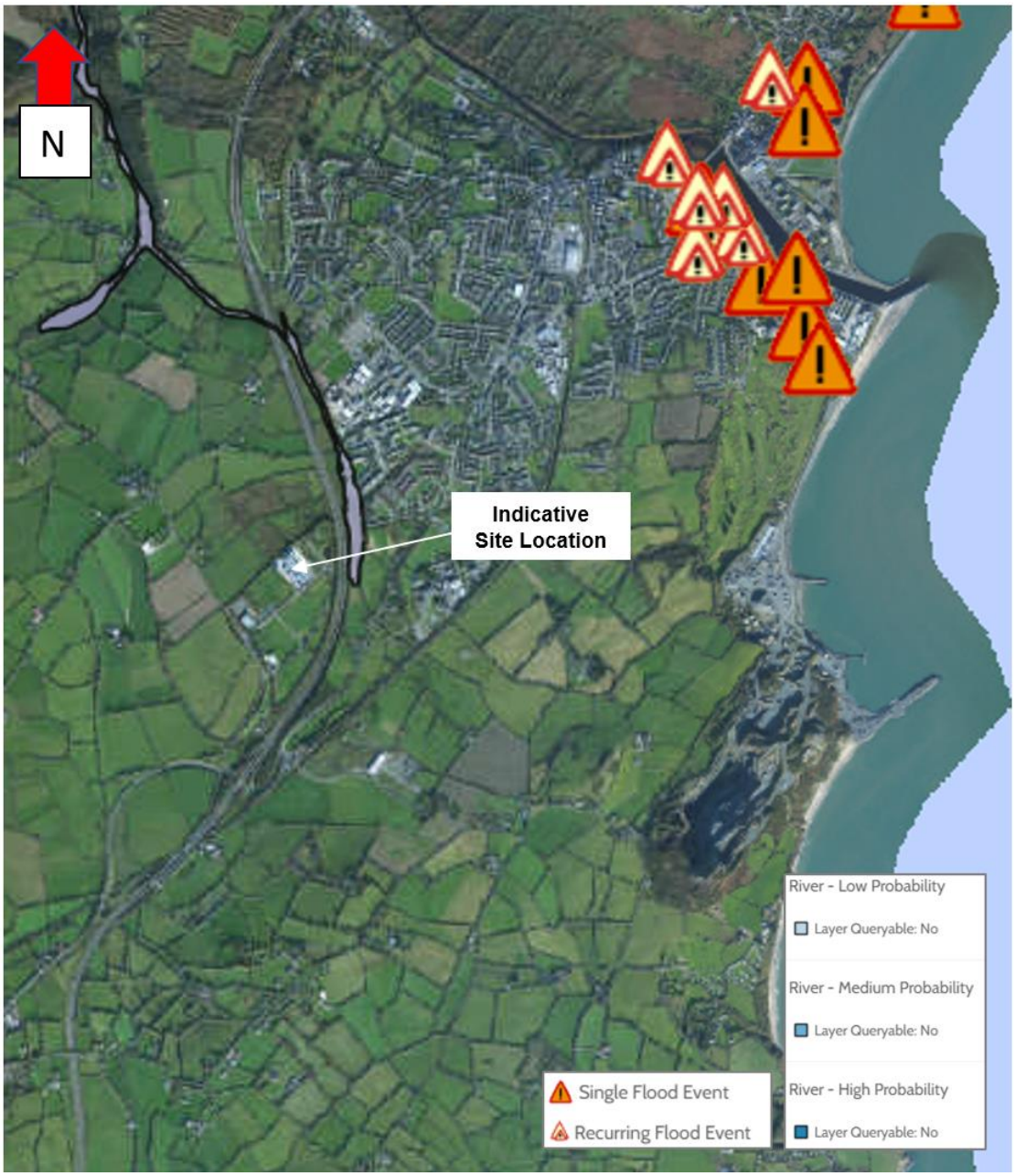
CFRAM Preliminary Flood Risk Assessment (PFRA)

The EU Floods Directive (2007/60/EC) required Member States to undertake a national preliminary flood risk assessment by 2011 to identify areas where significant flood risk exists or might be considered likely to occur. Members States were also required to prepare catchment-based Flood Risk Management Plans by 2018 that will set out flood risk management objectives, actions and measures. The OPW in co-operation with various Local Authorities produced a number of PFRAs which aimed to map out current and possible future flood risk areas and develop risk assessment plans. These have been used to form the Draft Flood Risk Management Plans aimed at identifying possible structural and non-structural measures to improve the flood risk.

As part of the CFRAM programme provisional flood maps had been produced by the OPW which have been used in this assessment. The PFRA flood maps do not indicate flooding risk throughout the proposed development site – Refer to Inserts 4.1 & 4.2 below.



Insert 4.1 *Extract from CFRAM Coastal Flooding Map for the Site Area (CFRAM, 2022).*



Insert 4.2 *Extract from CFRAM Fluvial Flooding Map for the Site Area (CFRAM, 2022).*

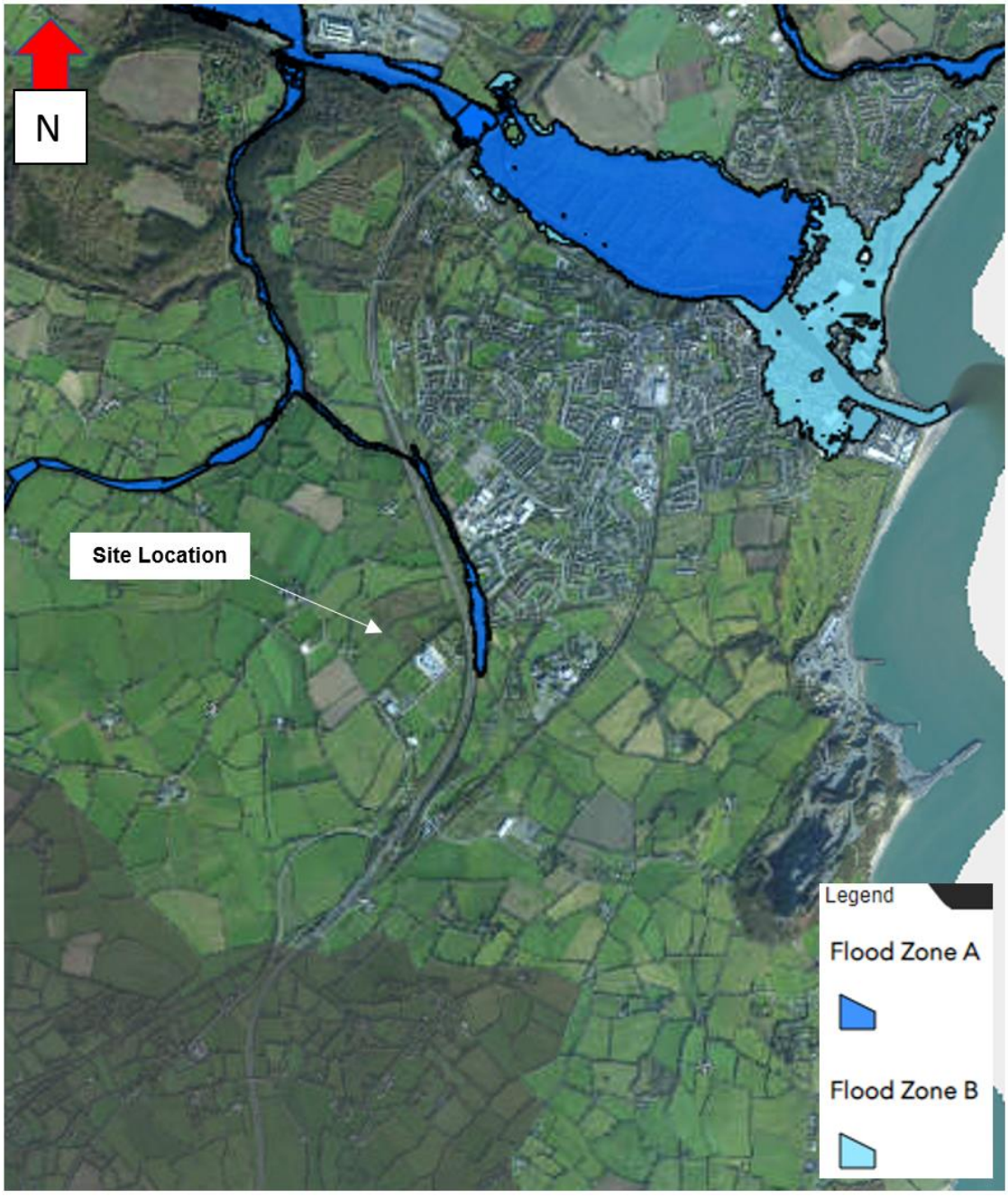
From reviewing Inserts 4.1 and 4.2 it is shown that the proposed development site is located entirely within Flood Zone C i.e. the probability of flooding is low (less than 0.1% AEP or in 1 in 1000 year) for Fluvial and Coastal flooding. The proposed development may be categorised as *"Appropriate"* as per the FRA Guidelines (OPW, 2009) as the development is "*Highly Vulnerable Development"*. Therefore a Justification Test for Development Management is not required in this case.

Strategic Flood Risk Assessment (SFRA) – Adopted Wicklow County Development Plan 2022-2028

Strategic Flood Risk Assessment (SFRA) for the Adopted Wicklow County Development Plan 2022-2028 was developed by Wicklow County Council (*Note: The SFRA will be finalised and published by 23rd October 2022*). Flood Risk Maps have been produced as part of this assessment based on desk and field studies including

predictive and historical indicators of flood risk, documented Council knowledge of lands, etc.

A Flood Risk Assessment mapping was developed by the Council and an extract is shown in Insert 4.3 below. The proposed development site is located nearby to flood zones A & B. However, the M11 forms the eastern boundary of the site acting as a natural flood defence from these zones if flooding were to occur. This shows the proposed development site is outside any defined flood risk zone and is located entirely within Flood Zone C (Source: https://www.wicklow.ie/Living/CDP2021).



Insert 4.3 *Extract from the Adopted Wicklow County Development Plan 2022-2028 (SFRA, 2022)*

4.3 PLUVIAL FLOODING

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. The resulting water follows along natural valley lines, creating flow paths along roads and through and around developments and ponding in low spots, which often coincide with fluvial floodplains. Any areas at risk from fluvial flooding will almost certainly be at risk from surface water flooding.

An overall strategy for the management of pluvial risk is presented for the proposed development in the Drainage and Water Services Design Report. The development will incorporate a network of Sustainable Urban Drainage System (SUDS) measures, reducing flood risk and safeguarding water quality.

SUDS implementation aims to provide an effective system to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater, contributing to amenity, aesthetics and biodiversity enhancement and allowing for the maximum collection of rainwater for re-use where possible.

SUDS features will aim to replicate the natural characteristics of rainfall runoff by providing control of run-off at source

4.4 GROUNDWATER FLOODING

Groundwater flooding can be due to high water tables and increased recharge following extended periods of wet weather and usually associated with the karst areas of the west of Ireland. According to the OPW records, there have been no reported instances of groundwater flooding in the area of study. An analysis of datasets available online through GSI Mapping was undertaken to determine the potential for groundwater flooding. Groundwater flooding is most common in Karst areas. The GSI Groundwater Data Viewer shows no indication of any Karst features in the area. This indicates that the proposed site has a very low risk from groundwater flooding.

4.5 TIDAL/ COASTAL FLOODING

The risk from coastal flooding is from surge events in the Southwestern Irish Sea – Brittas Bay or in transitional waterbodies. As there is a considerable distance inland from the coast (c. 2 km) the proposed site has a very low risk from tidal or coastal flooding – refer to Insert 4.4 below.

Insert 4.4 *Extract from CFRAM Coastal Flooding Map for the Site Area (CFRAM, 2022).*

4.6 OTHER SOURCES OF FLOODING

There are no reservoirs, canals or other significant artificial sources in the vicinity of the development site. As such flooding from this source is not considered a risk to the site and therefore is not discussed further within this FRA.

4.7 OVERVIEW OF FLOOD RISK IDENTIFICATION

The OPW Historical records show that there is no evidence of flooding at the site. The desktop review shows the proposed development site is not at risk from coastal, pluvial, fluvial or groundwater flooding. Therefore, the proposed development is

located within Flood Zone C. Based of the 2009 Guidelines, it is concluded that this type of development is *appropriate* for this flood zonation.

Therefore, based ~~of~~on the nature of the development and the results presented above, it is considered that it is not necessary to proceed to Stages 2 and 3.

4.8 FLOOD MITIGATION MEASURES

A number of SuDS measures (refer to Chapter 6 of the EIAR and the Drainage and Water Services Design Report) are included in the design of the proposed development. In order to provide adequate stormwater attenuation for a 100-year rainfall event and 20% climate change (based on the allowances suggested by the OPW, refer to Section 1.5 above) while incorporating SUDS into the site and also incorporating long term and treatment storage, it is proposed to form a detention basin on the site.

The management of surface water for the proposed development has been designed to comply with the policies of the Waterford County Council and guidelines of the Greater Dublin Strategic Drainage Study (GDSDS) as reference (refer to the Drainage and Water Services Design Report). The overall objective is to minimise stormwater runoff and to collect and treat this minimised amount of runoff as close to the source as possible.

4.9 RESIDUAL RISK

According to the 2009 Guidelines, the residual risk remains after all risk avoidance, substitution and mitigation measures have been implemented, on the basis that such measures only reduce risk, not eliminate it.

The residual risk associated to climate change is considered to be low, based on CFRAM Mid-Range and High-End future models (refer to Section 1.5 – Table 1.3). Insert 4.1, Insert 4.2 & Insert 4.4 extracted from OPW and Insert 4.3 extracted from the Adopted Wicklow County Development Plan 2022-2028 (SFRA, 2022) show that the site is located within Flood Zone C for both cases.

Insert 4.5 Mid-Range *Future* Scenario *Flood Extent (OPW, 2022).*

Insert 4.6 *High End Future Scenario Flood Extent (OPW, 2022).*

In addition, the development include SUDS that have been designed with an allowance 20% increase in flows as suggested per 2009 Guidelines.

5.0 CONCLUSIONS

This Stage 1 Flood Risk Assessment has been undertaken in accordance with the FRM guidelines. The main aim of this FRA is to determine the risk of flooding to the site and the impact the development will have on the floodplain, upstream and downstream levels and any mitigation measures necessary. The OPW CFRAM online mapping and associated Maps were used to consider the risk of flooding to the proposed site. Based of the nature of the development and the results presented above, it is considered that it is not necessary to proceed to Stages 2 and 3.

The review of the available data on fluvial, pluvial, tidal/coastal and groundwater flooding shows that the proposed development site has no historical flood hazard identified in the vicinity; the entire site falls within Flood Zone C and no further

justification test is required. In addition, according to the EIAR Chapter 6 (Hydrology), there will be no impact on the existing hydrological regime and as such there is no likely flood risk associated with the proposed development. No residual risk is foreseen as the development is located outside any flooding zones associated with future scenarios (Mid Rane Future Scenarios "MRFS" and High End Future Scenarios "HEFS"). The development includes the implementation of SUDS that have been designed with an allowance 20% increase in flows as suggested per 2009 Guidelines.

Based on this information the proposed development complies with the appropriate policy guidelines for the area which include the Wicklow County Development Plan 2016-2022, Adopted Wicklow County Development Plan 2022-2028 (*Note: The SFRA will be finalised and published by 23rd October 2022*) and the National Development Plan 2018-2027.

Overall, it is concluded that this proposed development and the surrounding area is not at risk from flooding since the proposed development is located in Flood Zone C. The type of development is classed as a *'Highly Vulnerable Development'*. This type of development is deemed appropriate for this flood zonation.

6.0 REFERENCES

- The Planning System and Flood Risk Management Guidelines for Planning Authorities, DoEHLG, 2009.
- Base maps, Ordnance Survey Ireland.
- Flood Hazard Maps and flooding information for Ireland, www.floodinfo.ie
- GSI Bedrock Geology, Subsoils, Aquifers, Groundwater vulnerability online mapping, (source: www.gsi.ie).
- Wicklow County Council Development Plan 2016-2022 (source: Wicklow County Development Plan 2016-2022 | Wicklow.ie).
- Adopted Wicklow County Development Plan (2022-2028) (source: https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Stage-3-Draft-County-Development-Plan).
- Arklow and Environs Local Area Plan 2018 – Strategic Flood Risk Assessment (SFRA) (source: Microsoft Word - Appendix C - Strategic Flood Risk Assessment - ARKLOW & ENVIRONS LAP 2018 (wicklow.ie)
- The National Development Plan 2018 – 2027.
- Drainage and Water Services Design Report. 110kV GIS Substation. Alan Traynor Consulting Engineers Ltd, October 2022.

APPENDIX I

Figures

(AWN, 2022)

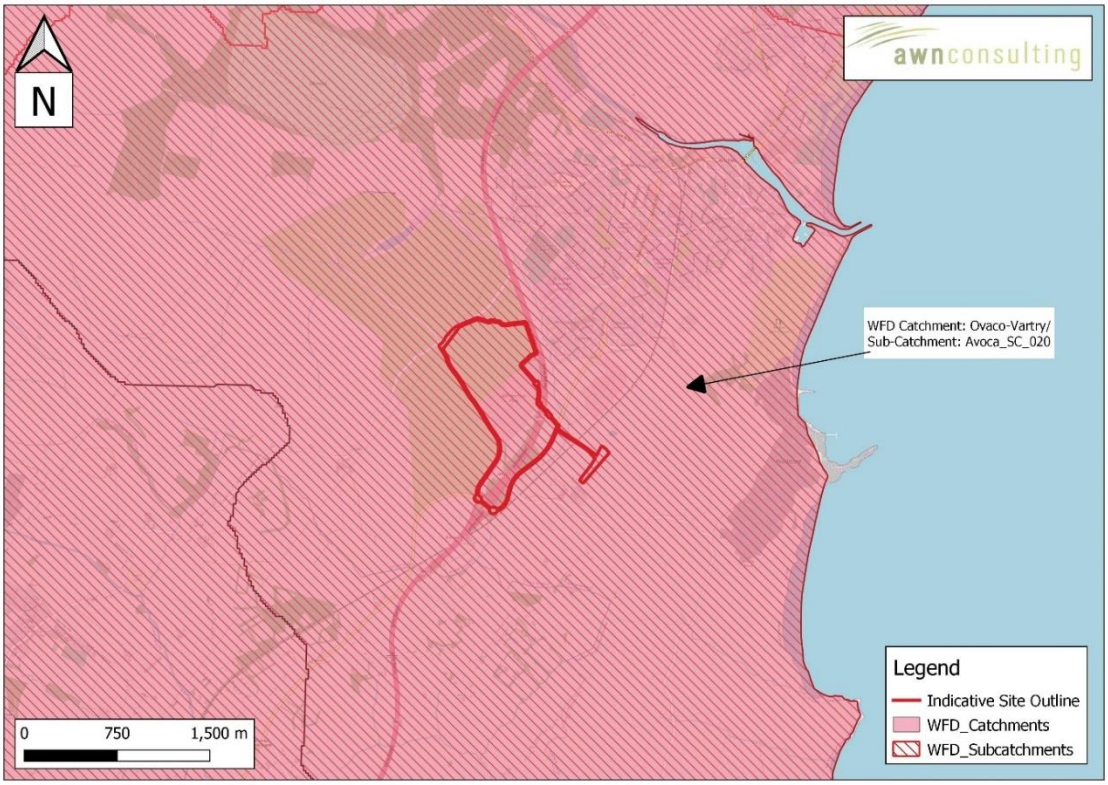


Figure 1 *WFD Catchments/Sub-Catchments (source: EPA, 2022)*

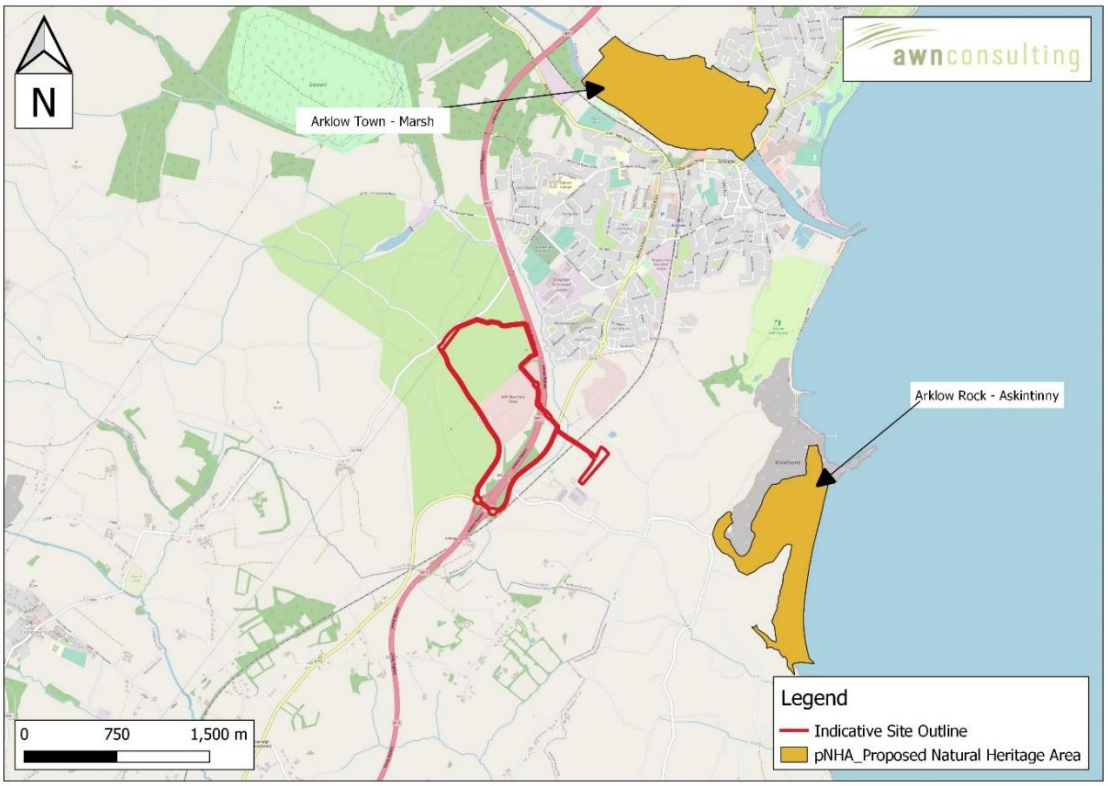


Figure 2 *Conservation Areas in context of the proposed development site (Source: EPA, 2022)*

Figure 3 *Subsoils Map (Source: Teagasc, 2022)*

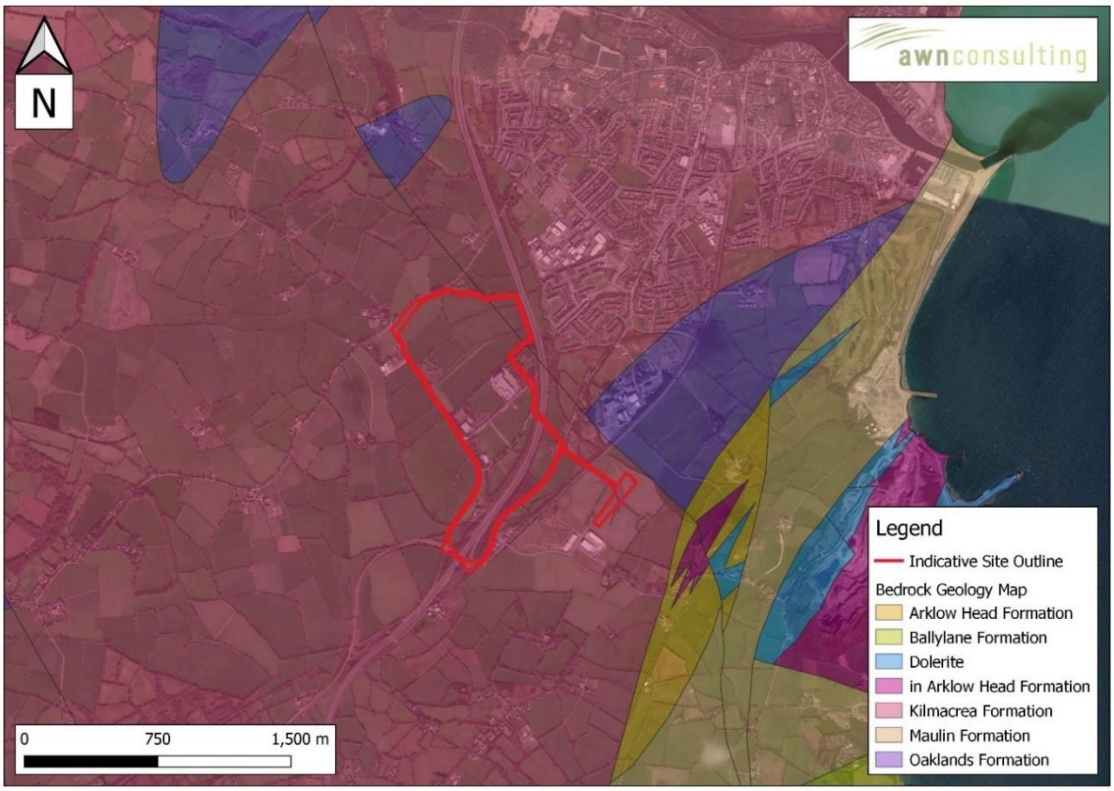


Figure 4 *Bedrock Geology Map (source: GS1, 2022)*

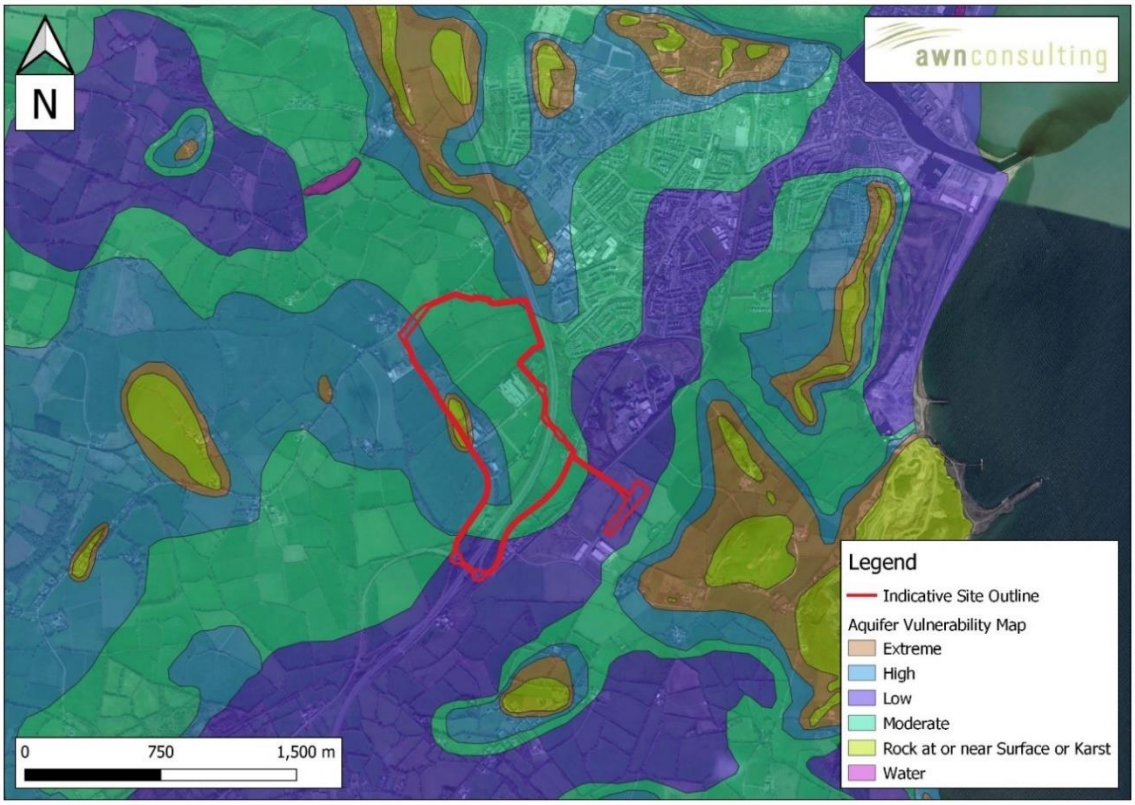


Figure 5 *Aquifer Vulnerability Map (Source: GSI, 2021)*

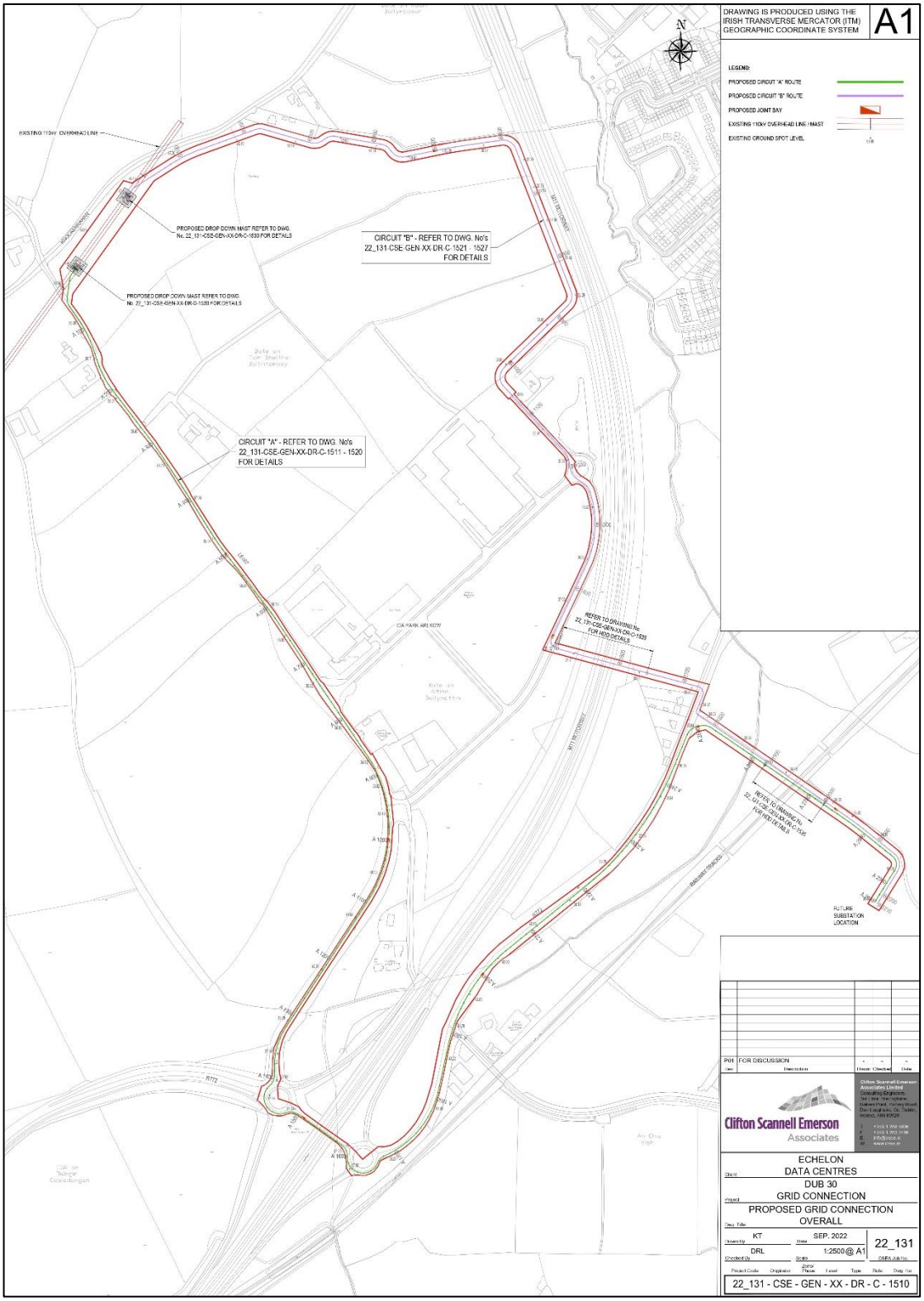


Figure 6 *Cable Circuit Site Layout (CSEA Sheet: 1510)*

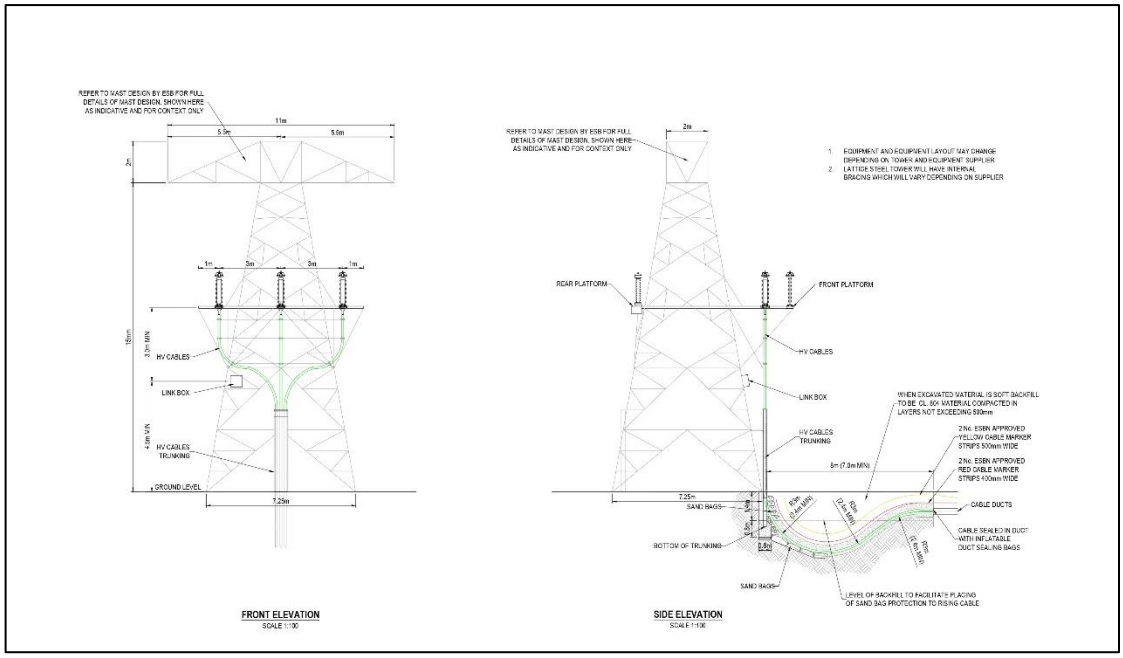


Figure 7 *Typical Mast Detail (CSEA Sheet:1530)*

APPENDIX 7.1

Report for the purposes of Appropriate Assessment Screening

Moore Group 2022

Report for the purposes of Appropriate Assessment Screening

Kish DSF Grid Connection

Prepared by: Moore Group – Environmental Services

17 October 2022

On behalf of Crag Wicklow Limited

Project Proponent	Crag Wicklow Limited
Project	Kish DSF Grid Connection
Title	Report for the purposes of Appropriate Assessment Screening Kish DSF Grid Connection

Project Number	22168	**Document Ref**	22168 Kish DSF Grid Connection AAS1 Rev0	
Revision	**Description**	**Author**		**Date**
Rev0	Issued to Client	G. O'Donohoe		17 October 2022
Moore Archaeological and Environmental Services Limited				

Table of Contents

Abbreviations

AA	Appropriate Assessment
EEC	European Economic Community
EPA	Environmental Protection Agency
EU	European Union
GIS	Geographical Information System
LAP	Local Area Plan
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
SuDS	Sustainable Drainage System
WFD	Water Framework Directive

1. Introduction

1.1. General Introduction

This report for the purposes of Appropriate Assessment (AA) Screening has been prepared to support a Planning Application for the Proposed Development (described in Section 3 below). This report contains information required for the competent authority to undertake screening for Appropriate Assessment (AA) in respect of the construction of a GIS Substation and Grid Connection to a Data Storage Facility at Kish, Arklow, Co. Wicklow (hereafter referred to as the Proposed Development) to determine whether it is likely individually or in combination with other plans and projects to have a significant effect on any European sites, in light of best scientific knowledge.

Having regard to the provisions of the Planning and Development Act 2000 – 2021 (the "Planning Acts") (section 177U), 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 under section 177V of the Planning Acts.

When screening the project, there are two possible outcomes:

- the project poses no potential for a likely significant effect and as such requires no further assessment; and
- the project has potential to have likely significant effect (or this is uncertain) unless mitigation measures are applied, and therefore an AA of the project is necessary.

This report has been prepared by Moore Group - Environmental Services to enable 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 27 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

Article 6(3) and 6(4) of the Habitats Directive is transposed into Irish Law inter alia by the Part XAB of the Planning Acts (in particular section 177U and 177V) which governs the requirement to carry out appropriate assessment screening and appropriate assessment, where required, per Section 1.1 above.

The Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) 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 Bird and Natural Habitats Regulations 2011 as amended, and the Wildlife Act 1976, as amended, 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 have a significant effect on Natura 2000 sites.

Article 6(3) establishes the requirement to screen all plans and projects and to carry out an appropriate 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."*

2. Methodology

The Commission's methodological guidance (EC, 2002, 2018, 2021 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 enable 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.)(soon to be superseded by EC Guidance in prep.).
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 & PSSP 2/10.
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC, 2018).
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC, 2021).
- Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2021).
- Office of the Planning Regulator (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 1995-2022;
- 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 2022-2028

3. Description of the Proposed Development

The Proposed Development consists of three main components; the 110kV GIS Substation Site, Circuit Route A and Circuit Route B, which are described below.

110kV Gas Insulated Switchgear (GIS) Substation

Construction of a 2 storey 110kV Gas Insulated Switchgear (GIS) Substation, to be located on lands at Kish and Boglands, to the south of Arklow, County Wicklow. This comprises a 110kV Substation building that includes cable room, battery room, relay room, stair cores and circulation areas and welfare facilities, with an overall height of c. 14.5m, a Client Control Building, and site infrastructure including 4 no. transformer bays, fire walls (c. 10 m high), drainage works, all internal road/footpath access routes, landscaping and boundary treatment works, vehicular access, and provision of 8 no. car parking spaces in the overall compound. The proposed 110 kV Substation will serve the ICT Facility permitted under WCC Reg. Ref.: 201088.

Cable Circuits and New Masts

The underground cable (Cable Circuit A) is a single circuit 110 kV cable and communications ducts and 5 joint bays that will follow a liner route of 2,888 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV Arklow – Banoge overhead line. The 2,888 m route can be summarised as approximately:

- extending to the north-west c. 434 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- c. 800 m in the existing carriageway ducting along the R772 to the M11 Junction 21
- c. 300 m in carriageway through the M11 Junction 21
- Proceeding to the northwest c. 1,400 m in the existing carriageway along the L6187.
- At the terminus the cable connects to the existing 110 kV Arklow – Banoge overhead line via a proposed c. 17 m above ground level lattice mast adjacent to Knockeneahan Road (L2190).

The underground cable (Cable Circuit B) is a single circuit 110 kV cable and communications ducts and 4 joint bays that will follow a liner route of 2,164 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV Arklow – Banoge overhead line. The 2,164 m route can be summarised as approximately:

- extending to the north-west c. 416 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- 158 m in farmland crossing, and carriageway ducting along the R772
- 142 m under the M11 via HDD
- 600 m in private road (IDA), and future development lands (IDA)
- 900 m in farmland

- At the terminus the cable connects to the existing 110 kV Arklow – Banoge overhead line via a proposed c. 17 m above ground level lattice mast adjacent to Knockeneahan Road (L2190).

During construction, a temporary access will be established for the 110kV Substation from the Kish Business Park Road terminus at the western site of the site. It is proposed that the accesses and haul roads for vehicles, the contractors' compound and fencing will be utilised for all development on the main site.

It is proposed that during operation, the 110kV Substation will be accessed via controlled entry on the permitted inner relief road under WCC Reg. Ref. 201088, from the Kish Business Park road terminus at the western site of the site. This road will be adjacent to Armstrong Engineering and accessed via Clogga Road.

Figure 1 shows the Proposed Development location and Figure 2 shows a detailed view of the Proposed Development boundary on recent aerial photography. Figure 3 shows the layout of the Proposed Development.

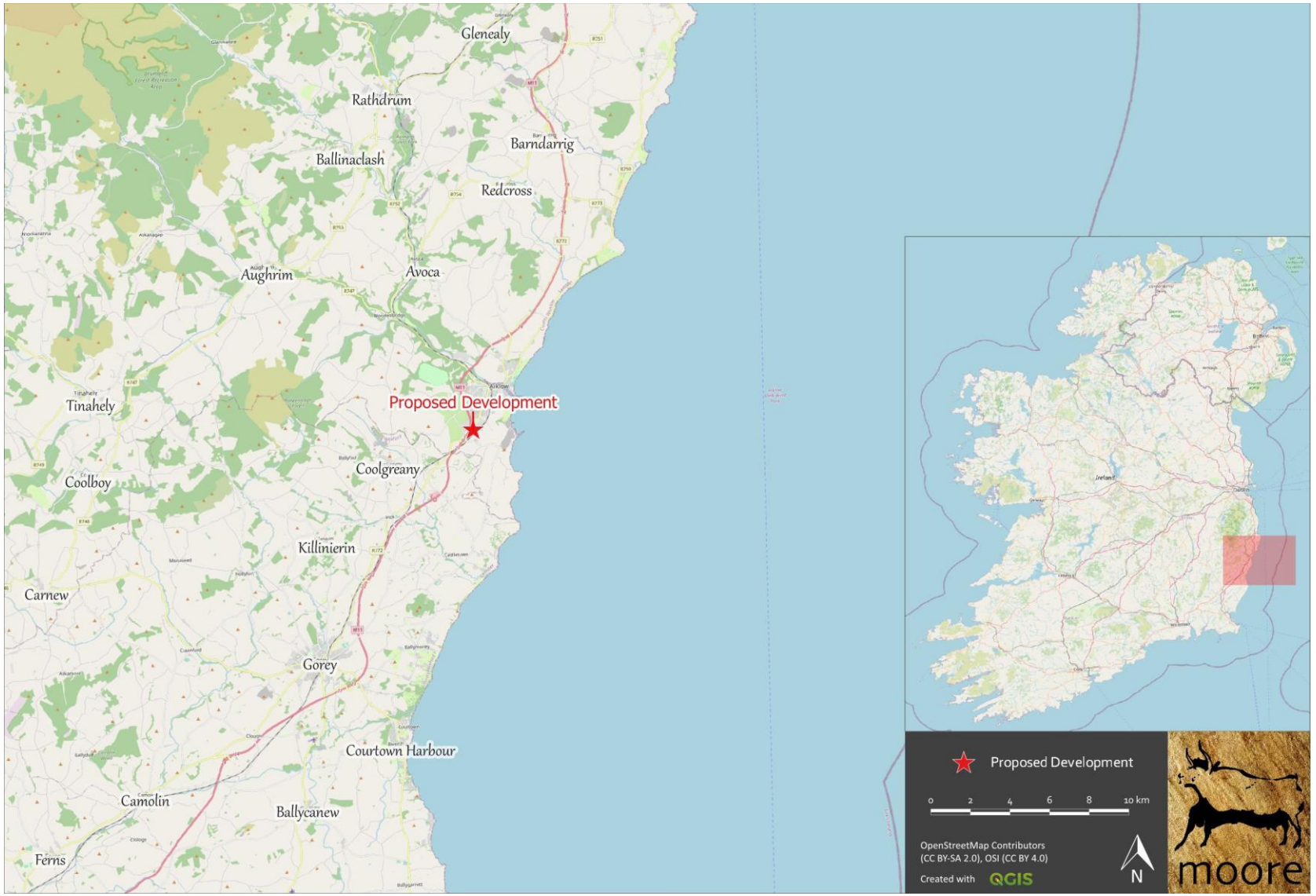


Figure 1. Showing the Proposed Development location at Arklow, Co. Wicklow.

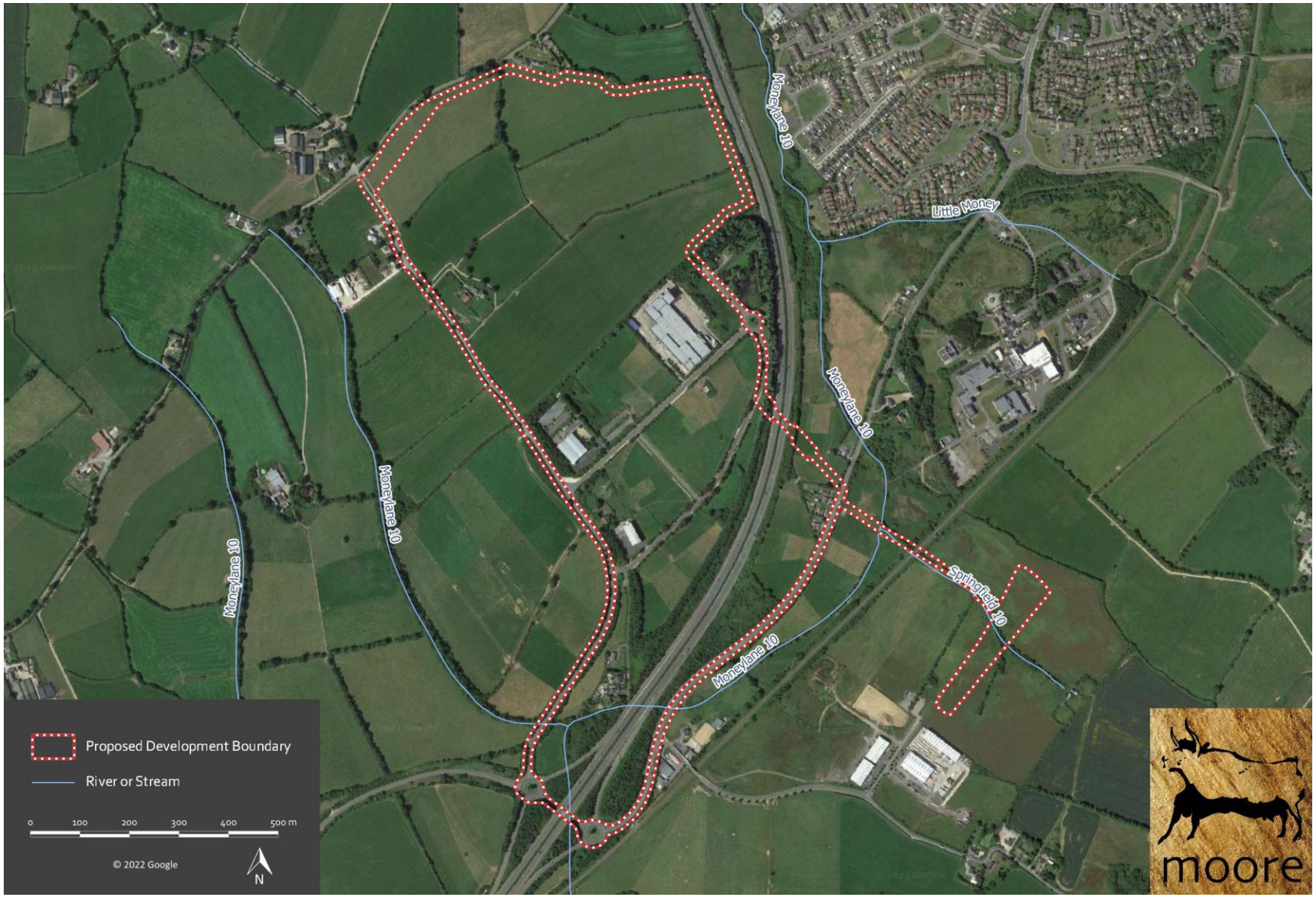


Figure 2. Showing the Proposed Development boundary on recent aerial photography.

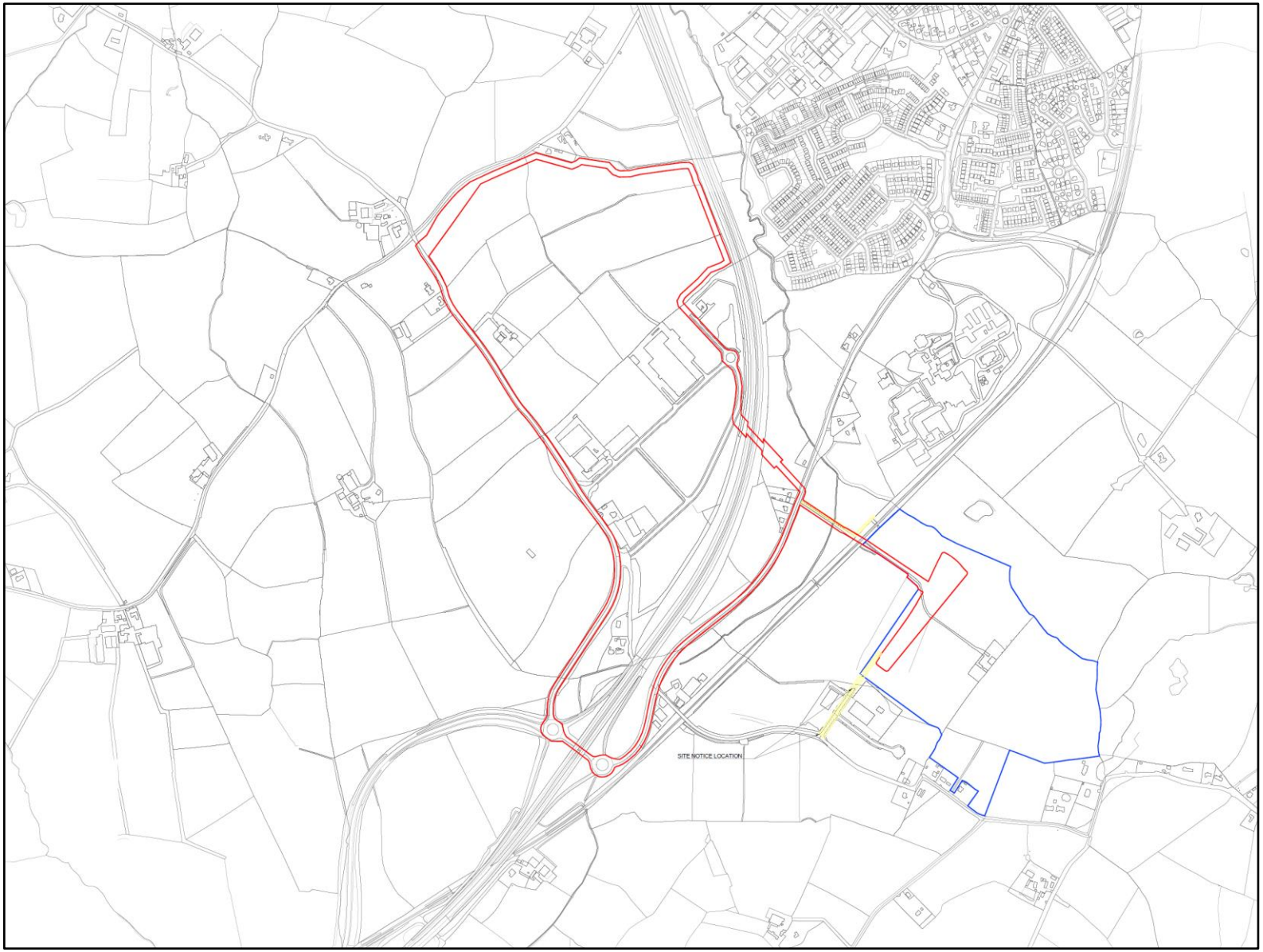


Figure 3. Plan of the Proposed Development.

4. Identification of Natura 2000 Sites

4.1. Description of Natura Sites Potentially Significantly Affected

A Zone of Influence (ZoI) 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. In accordance with the OPR Practice Note, PN01, the ZoI should be established on a case-by-case basis using the Source- Pathway-Receptor framework.

The European Commission's "*Assessment of plans and projects in relation to Natura 2000 sites guidance on Article 6(3) and (4) of the Methodological Habitats Directive 92/43/EEC*" published 28 September 2021 states at section 3.1.3:

Identifying the Natura 2000 sites that may be affected should be done by taking into consideration all aspects of the plan or project that could have potential effects on any Natura 2000 sites located within the zone of influence of the plan or project. This should take into account all of the designating features (species, habitat types) that are significantly present on the sites and their conservation objectives. In particular, it should identify:

- *any Natura 2000 sites geographically overlapping with any of the actions or aspects of the plan or project in any of its phases, or adjacent to them;*
- *any Natura 2000 sites within the likely zone of influence of the plan or project Natura 2000 sites located in the surroundings of the plan or project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g. water) and various types of waste, discharge or emissions of substances or energy;*
- *Natura 2000 sites in the surroundings of the plan or project (or at some distance) which host fauna that can move to the project area and then suffer mortality or other impacts (e.g. loss of feeding areas, reduction of home range);*
- *Natura 2000 sites whose connectivity or ecological continuity can be affected by the plan or project.*

The range of Natura 2000 sites to be assessed, i.e. the zone in which impacts from the plan or project may arise, will depend on the nature of the plan or project and the distance at which effects may occur. For Natura 2000 sites located downstream along rivers or wetlands fed by aquifers, it may be that a plan or project can affect water flows, fish migration and so forth, even at a great distance. Emissions of pollutants may also have effects over a long distance. Some projects or plans that do not directly affect Natura 2000 sites may still have a significant impact on them if they cause a barrier effect or prevent ecological linkages. This may happen, for example, when plans affect features of the landscape that connect Natura 2000 sites or that may obstruct the

movements of species or disrupt the continuity of a fluvial or woodland ecosystem. To determine the possible effects of the plan or project on Natura 2000 sites, it is necessary to identify not only the relevant sites but also the habitats and species that are significantly present within them, as well as the site objectives.

The Zone of Influence may be determined by considering the Proposed Development's potential connectivity with European sites, in terms of:

- Nature, scale, timing and duration of all aspects of the proposed works and possible impacts, including the nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of potential pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Location of ecological features and their sensitivity to the possible impacts.

The potential for source pathway receptor connectivity is firstly identified through GIS interrogation and detailed information is then provided on sites with connectivity. European sites that are located within a potential Zone of Influence of the Proposed Development are presented in Figure 4 below. Spatial boundary data on the Natura 2000 network was extracted from the NPWS website (www.npws.ie) on 17 October 2022. This data was interrogated using GIS analysis to provide mapping, distances, locations and pathways to all sites of conservation concern including pNHAs, NHA and European sites.

The nearest European sites to the Proposed Development is the Kilpatrick Sandhills SAC (Site Code 001742), approximately 4.5km to the southeast. The site is in a coastal location with no connectivity to the proposed development. Similarly, the Buckroney-Brittas Dunes and Fen SAC is a coastal site located further north of Arklow Town and has no connectivity to the proposed development.

The Proposed Development is located within an area of farmland, public roads, and an industrial park to the southwest of Arklow, Co. Wicklow. The site is drained by a series of agricultural ditches, including the Springfield Stream, which flow into the Moneylane Stream and ultimately into the Avoca River.

There is no connectivity to any European sites within or outside the potential Zone of Influence.

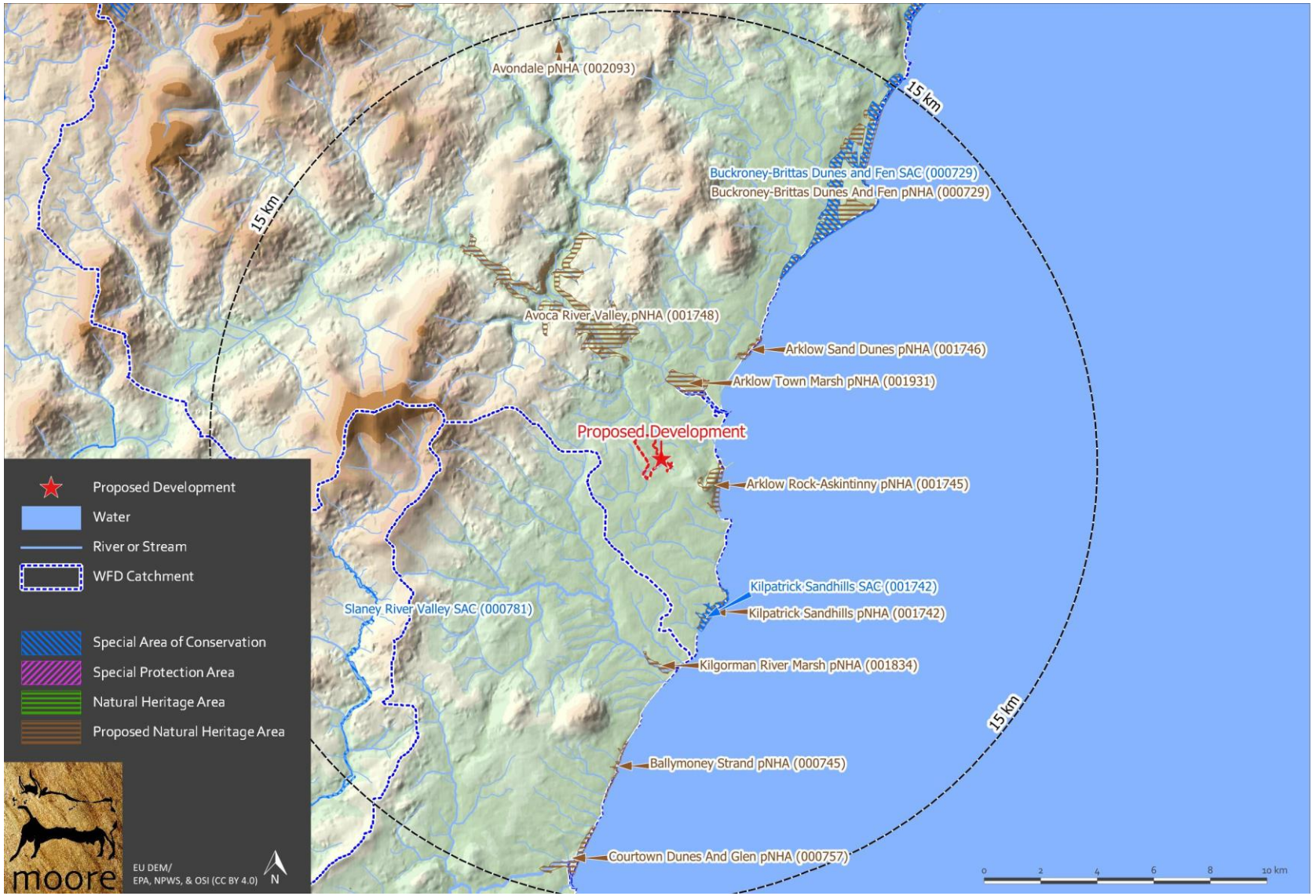


Figure 4. Showing European sites and NHAs/pNHAs within the wider Potential Zone of Influence of the Proposed Development.

4.2. Ecological Network Supporting Natura 2000 Sites

A concurrent GIS analysis of the proposed Natural Heritage Areas (pNHA) and designated Natural Heritage Areas (NHA) in terms of their role in supporting the species using Natura 2000 sites was undertaken along with GIS investigation of European sites. It was assumed that these supporting roles mainly related to mobile fauna such as mammals and birds which may use pNHAs and NHAs as ecological corridors or "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 in the decision process and during the preparation of this AA Screening report.

The NHAs and pNHAs identified in Figure 4 are located outside the Zone of Influence, and there are no areas of supporting habitat that will be impacted by 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. Assessment of Likely Significant Effects

The Proposed Development is located within an area of farmland, public roads, and an industrial park to the southwest of Arklow, Co. Wicklow. The site is drained by a series of agricultural ditches, including the Springfield Stream, which flow into the Moneylane Stream and ultimately into the Avoca River.

There is no connectivity to any European sites within or outside the potential Zone of Influence.

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 1.

Table 1 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	None The Proposed Development site is located within areas of agricultural grassland, light industrial parks and public roads. There will be no connectivity to the Springfield Stream, which flows into the Moneylane Stream which will be under passed by Horizontal Directional Drilling. No mitigation is required to ensure there will be no impacts on any European sites or on their conservation objectives.
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	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.
Describe any likely changes to the European site:	
Examples of the type of changes to give consideration to include:	None.

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	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	N/A

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

In-combination effects are changes in the environment that result from numerous human-induced, small-scale alterations. In-combination effects 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 gaps in the area where the Proposed Development is located. The database was then queried for developments granted planning permission within 500m of the Proposed Development within the last three years, these are presented in Table 4 below.

Table 2.Planning applications granted permission in the vicinity of the Proposed Development.

Planning Ref.	Description of development	Comments
191171	housing estate on a 1.6744HA site, on the north side of Coolgreany Road, Arklow, comprising of 33 units in total: (A) the construction of six no. 4 bedroom, semi detached 2 storey houses, 26 no. 3 bedroom semi-detached 2 storey houses and one no. 4 bedroom, detached 2 storey house; (B) the construction of a new access road and footpaths (cul-de-sac) and pedestrian access off coolgreaney road and all associated boundary treatment works; (C) provision of a 5,897sqm open space are comprising of 4,097sqm of usable public open space suitable for recreational use; (D) all associated ancillary site development works	No potential for in-combination effects given the scale and location of the project.
191322	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	No potential for in-combination effects given the scale and location of the project.
19481	dormer type extension to existing bungalow and erect an extension to the side which will consist of the following (a) renovation and extension of the ground floor to create additional living space including the rearrangement of internal layouts with associated demolition works (b) the removal of the existing roof and replace it with a dormer roof space to accommodate bedrooms (c) renovate and extend the existing storage shed and workshop (d) ancillary works	No potential for in-combination effects given the scale and location of the project.
19545	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	No potential for in-combination effects given the scale and location of the project.
19649	extension to the rear of existing retail showrooms to provide 450 square metres of warehouse space for furniture storage and associated site works	No potential for in-combination effects given the scale and location of the project.
201032	installation of a new effluent treatment system and percolation area in full accordance with EPA Cop 2009 standards and all associated site works, together with a new bored well	No potential for in-combination effects given the scale and location of the project.
201060	section of building extended to make building square on north corner and elevation changes, and permission for a change of use to light industrial storage and the appropriate treatment and recycling or reclamation of metals and metal compounds from end of life vehicles, new front boundary security fencing, storage racking for up to 10 end of life vehicles awaiting depollution. The proposed development will be subject to a Waste Facility Permit and all associated works	No potential for in-combination effects given the scale and location of the project.
201265	change to an approved permission Reg. Ref. 20/667 with the addition of a single storey bedroom extension to the rear of a single storey cottage	No potential for in-combination effects given the scale and location of the project.
2013	change of use of partial area of unit 1 from commercial / recreational to preschool and associated works	No potential for in-combination effects given

Planning Ref.	Description of development	Comments
		the scale and location of the project.
20346	alterations and additions to an existing two-storey semi-detached dwelling comprising the construction of a new single-storey bedroom & en-suite extension to the side (north-west) elevation at ground floor level, together with the provision of a new velux roof light to the north-west side of the existing main roof all connecting into existing services and including all associated site works	No potential for in-combination effects given the scale and location of the project.
20632	erect a 2,300m2 manufacturing & engineering industrial unit with connecting 440m2 office building along with all associated site development works including storage yard, car parking, signage and connect to the existing services	No potential for in-combination effects given the scale and location of the project.
20667	demolish the existing 2m2 front porch and 40m2 substandard rear extension along with all outbuildings totaling 84m2 and erect 81m2 new single storey extensions to the rear and side of the existing 45m2 cottage along with minor alterations and revisions to the elevations and internal layout of the original cottage and erect an 84m2 garage, upgrade the existing effluent disposal system to current EPA standards, improve the existing vehicle entrance along with all associated site development works	No potential for in-combination effects given the scale and location of the project.

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 potential Zone of Influence 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 proposed development area and surrounding townlands in which the proposed 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 with 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

There is no connectivity to any European sites within or outside the potential Zone of Influence.

There are no predicted effects on any European sites given:

- The distance between the Proposed Development and any European Sites;
- There are no predicted emissions to air, water or the environment during the construction or operational phases that would result in significant effects.

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 either directly or indirectly 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 significant effects can be excluded at the screening stage.

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, 2002).

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 (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.

European Commission (2021) Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Brussels 28.9.21.

European Commission (2021) Guidance document on the strict protection of animal species of Community interest under the Habitats Directive, Brussels 12.10.21.

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 (2022) 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

Kish DSF Grid Connection

Name and location of the Natura 2000 site(s)

The nearest European sites to the Proposed Development is the Kilpatrick Sandhills SAC (Site Code 001742), approximately 4.5km to the southeast. The site is in a coastal location with no connectivity to the proposed development. Similarly, the Buckroney-Brittas Dunes and Fen SAC is a coastal site located further north of Arklow Town and has no connectivity to the proposed development.

The Proposed Development is located within an area of farmland, public roads, and an industrial park to the southwest of Arklow, Co. Wicklow. The site is drained by a series of agricultural ditches, including the Springfield Stream, which flow into the Moneylane Stream and ultimately into the Avoca River.

There is no connectivity to any European sites within or outside the potential Zone of Influence.

Description of the project or plan

The Proposed Development consists of three main components; the 110kV GIS Substation Site, Circuit Route A and Circuit Route B, which are described below.

110kV Gas Insulated Switchgear (GIS) Substation
Construction of a 2 storey 110kV Gas Insulated Switchgear (GIS) Substation, to be located on lands at Kish and Boglands, to the south of Arklow, County Wicklow. This comprises a 110kV Substation building that includes cable room, battery room, relay room, stair cores and circulation areas and welfare facilities, with an overall height of c. 14.5m, a Client Control Building, and site infrastructure including 4 no. transformer bays, fire walls (c. 10 m high), drainage works, all internal road/footpath access routes, landscaping and boundary treatment works, vehicular access, and provision of 8 no. car parking spaces in the overall compound. The proposed 110 kV Substation will serve the ICT Facility permitted under WCC Reg. Ref.: 201088.

Cable Circuits and New Masts
The underground cable (Cable Circuit A) is a single circuit 110 kV cable and communications ducts and 5 joint bays that will follow a liner route of 2,888 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV Arklow – Banoge overhead line. The 2,888 m route can be summarised as approximately:

- extending to the north-west c. 434 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- c. 800 m in the existing carriageway ducting along the R772 to the M11 Junction 21
- c. 300 m in carriageway through the M11 Junction 21
- Proceeding to the northwest c. 1,400 m in the existing carriageway along the L6187.
- At the terminus the cable connects to the existing 110 kV Arklow – Banoge overhead line via a proposed c. 17 m above ground level lattice mast adjacent to Knockeneahan Road (L2190).

The underground cable (Cable Circuit B) is a single circuit 110 kV cable and communications ducts and 4 joint bays that will follow a liner route of 2,164 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV Arklow – Banoge overhead line. The 2,164 m route can be summarised as approximately:

- extending to the north-west c. 416 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- 158 m in farmland crossing, and carriageway ducting along the R772
- 142 m under the M11 via HDD
- 600 m in private road (IDA), and future development lands (IDA)

- 900 m in farmland
- At the terminus the cable connects to the existing 110 kV Arklow – Banoge overhead line via a proposed c. 17 m above ground level lattice mast adjacent to Knockeneahan Road (L2190).

During construction, a temporary access will be established for the 110kV Substation from the Kish Business Park Road terminus at the western site of the site. It is proposed that the accesses and haul roads for vehicles, the contractors' compound and fencing will be utilised for all development on the main site.

It is proposed that during operation, the 110kV Substation will be accessed via controlled entry on the permitted inner relief road under WCC Reg. Ref. 201088, from the Kish Business Park road terminus at the western site of the site. This road will be adjacent to Armstrong Engineering and accessed via Clogga Road.

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 gaps in the area where the Proposed Development is located. The database was then queried for developments granted planning permission within 500m of the Proposed Development within the last three years, these are presented in the Table below.

Planning applications granted permission in the vicinity of the Proposed Development.

Planning Ref.	Description of development	Comments
191171	housing estate on a 1.6744HA site, on the north side of Coolgreany Road, Arklow, comprising of 33 units in total: (A) the construction of six no. 4 bedroom, semi detached 2 storey houses, 26 no. 3 bedroom semi-detached 2 storey houses and one no. 4 bedroom, detached 2 storey house; (B) the construction of a new access road and footpaths (cul-de-sac) and pedestrian access off coolgreaney road and all associated boundary treatment works; (C) provision of a 5,897sqm open space are comprising of 4,097sqm of usable public open space suitable for recreational use; (D) all associated ancillary site development works	No potential for in-combination effects given the scale and location of the project.
191322	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	No potential for in-combination effects given the scale and location of the project.
19481	dormer type extension to existing bungalow and erect an extension to the side which will consist of the following (a) renovation and extension of the ground floor to create additional living space including the rearrangement of internal layouts with associated demolition works (b) the removal of the existing roof and replace it with a dormer roof space to accommodate bedrooms (c) renovate and extend the existing storage shed and workshop (d) ancillary works	No potential for in-combination effects given the scale and location of the project.
19545	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	No potential for in-combination effects given the scale and location of the project.
19649	extension to the rear of existing retail showrooms to provide 450 square metres of warehouse space for furniture storage and associated site works	No potential for in-combination effects given the scale and location of the project.

Planning Ref.	Description of development	Comments
201032	installation of a new effluent treatment system and percolation area in full accordance with EPA Cop 2009 standards and all associated site works, together with a new bored well	No potential for in-combination effects given the scale and location of the project.
201060	section of building extended to make building square on north corner and elevation changes, and permission for a change of use to light industrial storage and the appropriate treatment and recycling or reclamation of metals and metal compounds from end of life vehicles, new front boundary security fencing, storage racking for up to 10 end of life vehicles awaiting depollution. The proposed development will be subject to a Waste Facility Permit and all associated works	No potential for in-combination effects given the scale and location of the project.
201265	change to an approved permission Reg. Ref. 20/667 with the addition of a single storey bedroom extension to the rear of a single storey cottage	No potential for in-combination effects given the scale and location of the project.
2013	change of use of partial area of unit 1 from commercial / recreational to preschool and associated works	No potential for in-combination effects given the scale and location of the project.
20346	alterations and additions to an existing two-storey semi-detached dwelling comprising the construction of a new single-storey bedroom & en-suite extension to the side (north-west) elevation at ground floor level, together with the provision of a new velux roof light to the north-west side of the existing main roof all connecting into existing services and including all associated site works	No potential for in-combination effects given the scale and location of the project.
20632	erect a 2,300m2 manufacturing & engineering industrial unit with connecting 440m2 office building along with all associated site development works including storage yard, car parking, signage and connect to the existing services	No potential for in-combination effects given the scale and location of the project.
20667	demolish the existing 2m2 front porch and 40m2 substandard rear extension along with all outbuildings totaling 84m2 and erect 81m2 new single storey extensions to the rear and side of the existing 45m2 cottage along with minor alterations and revisions to the elevations and internal layout of the original cottage and erect an 84m2 garage, upgrade the existing effluent disposal system to current EPA standards, improve the existing vehicle entrance along with all associated site development works	No potential for in-combination effects given the scale and location of the project.

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 potential Zone of Influence 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 proposed development area and surrounding townlands in which the proposed 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.

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 any European sites.

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 located within an area of farmland, public roads, and an industrial park to the southwest of Arklow, Co. Wicklow. The site is drained by a series of agricultural ditches, including the Springfield Stream, which flow into the Moneylane Stream and ultimately into the Avoca River.

There is no connectivity to any European sites within or outside the potential Zone of Influence.

Explain why these effects are not considered significant.

There are no predicted effects on any European sites given:

- The distance between the Proposed Development and any European Sites;
- There are no predicted emissions to air, water or the environment during the construction or operational phases that would result in significant effects.

List of agencies consulted: provide contact name and telephone or e-mail address

The requirement for Appropriate Assessment Screening was determined during pre-planning discussion with Wicklow County Council.

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. Fieldwork was carried out as part of the EIA process.

Where can the full results of the assessment be accessed and viewed

Wicklow County Council Planning web portal.

OVERALL CONCLUSIONS

There is no connectivity to any European sites within or outside the potential Zone of Influence.

There are no predicted effects on any European sites given:

- The distance between the Proposed Development and any European Sites;
- There are no predicted emissions to air, water or the environment during the construction or operational phases that would result in significant effects.

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 either directly or indirectly 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 significant effects can be excluded at the screening stage.

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.

APPENDIX 7.2

Badger Assessment of Lands at Kish, Arklow, County Wicklow and Potential impacts from the Proposed Development

Wildlife Surveys Ireland (Brian Keeley) 2022

A Badger Assessment of Lands at Kish, Arklow, County Wicklow And Potential Impacts from The Proposed Development

Brian Keeley B.Sc. Hons in Zool.

October 2022

Introduction

Most of Ireland's mammals enjoy protection under the Wildlife Act (1976) and the more recent updating of this legislation (Wildlife (Amendment) Act 2000, S.I. No. 94 of 1997, S.I. No. 378 of 2005, European Communities (Natural Habitats) (Amendment) Regulations, 2005) and consolidated by S.I. No. 477 of 2011 European Communities (Birds And Natural Habitats) Regulations 2011. In conjunction with the enactment of the Habitats Directive into Irish legislation, all native mustelid species are protected with further protection given to otters.

Determining the mammal fauna of an area may involve a high level of assessment if the aim of the survey is to catalogue all mammals but this is too detailed for the aim of creating mitigation for the proposed construction in the lands at Kish, Arklow in south Wicklow. This assessment is specific to the presence of badgers and their setts within lands proposed for the construction of a data centre.

The survey undertaken within the site allows a targeting of mitigation measures to the appropriate or most efficient sites to prevent accidental death or injury and to determine if it would be possible to develop a site without impact upon the conservation status of badgers in the area.

Fieldwork for the current report on badger distribution was carried out by Brian Keeley, an ecologist with over almost a third of a century of fieldwork experience over two separate years. This report addresses the main issues that would affect the badger fauna of this area considered in this assessment and created by construction and the presence of a new buildings and associated services and increased human activity.

Construction activities and subsequent occupancy / usage of buildings and the associated new lanes, tracks or roads create a number of significant short-term and long-term risks for resident badger populations, in addition to impacts upon other vertebrates and invertebrates.

The construction of a facility itself may involve the removal of key features of the surrounding environment and of the habitats of badgers and other mammal species, such as trees, hedgerow lines and grassland in which to feed. The most damaging operation is the potential for the destruction of badger dwellings (setts) during the vegetation clearance and early earthworks, were they to be present.

The clearance of hedgerow poses the risk of the removal of the badgers' home burrow and the associated burrows (all of which are known as setts) that are used seasonally or occasionally throughout the year. In winter, this is especially risky if the sett is not identified before hedgerow removal operations, as this is the time when badger cubs are born. In the classification used in this report, setts are considered to fall into four categories, which are best elaborated by long-term studies but can be interpreted to a relatively good accuracy in terms of status based on basic observations.

Using the most traditional description of badger ecology, the basic sett type within which badgers are typically present throughout the year is the main sett. This is almost always the sett within which cubs are born. Bedding outside the entrance to these setts often identifies their use as such and paw prints and dung pits or latrines nearby also assist in their categorisation. There are typically a number of entrances to a main sett, some of which may be disused. Paths leading from the main sett are often very easy to trace for some distance.

Annexe setts are similar in construction to main setts and are typically accessed by a number of entrances. They are often discernibly connected to a main sett by well-worn paths, which is within 150 metres of the annexe sett. Badgers do not necessarily use this type of sett throughout the year and they may be inactive at the time of any short-term study.

Subsidiary setts are again not always active throughout the year. There may be a number of entrances to the sett and they are not clearly associated with any other sett.

The last type of sett, the outlier sett, may only have one entrance and has no path leading to it. This type of sett is only sporadically used and may even be in areas subject to flooding or seasonally unsuitable to badger use. These setts may be overlooked if they have remained inactive for several weeks.

Setts may be under threat from construction if they lie directly in the line of a proposed building or a new lane or road. Setts outside of this land take area may also be threatened with damage from the normal activities of the heavy plant equipment required to build the house. For example, if a badger sett entrance were located outside of the land take of housing but led to a system of tunnels that lay under the working area of the heavy plant, there is a clear risk that the tunnels would be crushed under the repeated movement of equipment.

These tunnels may typically go as deep as two to three metres underground but are also liable to surface to shallower depth to avoid rocky substrate or water. In long established setts, tunnels may be as deep as 6 metres in Britain, but this is not reported for Ireland.

Thus, badger setts may be affected by the immediate impact upon them from the excavation and removal of the soil within which they are established or by the indirect destruction of tunnels that lie under the construction corridor of roads or buildings.

The population of badgers in Ireland has been revised downwards in recent years for various reasons. Areas where agriculture is of less intensity may provide safer conditions for badgers in terms of state control measures, but urban areas such as Arklow town create a high road risk as well as risk of interference that may be more persistent than in rural areas. Nonetheless, badgers survive in many areas close to human activities including farmland, gardens, along the rivers even in built-up areas or in the grounds of schools, colleges, convents, factories etc.

Methodology

The survey for the presence of badgers within the site was undertaken over two separate time periods: summer 2020 and summer 2022. The first assessment was undertaken on 15th June 2020 and 17th June 2020.

The area in question was checked to confirm the presence of badgers within the site on 15th June and the entire hedgerow and embankment were checked for any fresh signs of badgers. The remainder of the connecting hedgerow within the site was examined on 17th June for any other areas where badgers might be present; either resident or passing through the site as well as a re-check of the area examined on 15th June. Each treeline, area of scrub and hedgerow and the farm buildings to the east were examined in sequence working in an approximately clockwise direction from the entrance

Typical signs sought in this assessment were badger setts, badger paw prints and tracks, scratch marks on walls or concrete, badger latrines and dung pits, badger snuffle holes and digging and badger hairs.

The area around the sett including the sett entrance (or entrances) was examined for signs of badger activity. A Spypoint trail camera was installed outside the sett entrance and recorded over two nights to determine if the sett was occupied and most importantly to determine if the sett serves as a main sett.

The second assessment was undertaken over two visits in August 2022. The first visit was on 17th August 2022 and involved an examination of the lands for badger signs and the installation of a camera at a previously identified badger sett in the southern area of the lands. This camera was left in place until 31st August 2022. A second camera was placed along a nearby fence to determine if there was high badger activity including foraging within the lands. This second camera remained in place over the same time period (17th to 31st August 2022). Both cameras were examined for the times and dates of badger activity at each location to determine the level of badger activity and potential for occupancy.

Results of the assessment of the lands for badgers

There is a single entrance badger sett within the lands proposed for developing the Permitted ICT Facility (WCC Ref. Ref.: 20/1088) and the Proposed 110 kV Substation (there is the potential of a second entrance but this does not appear to be fully developed).

In June 2020, there was a visit to the sett of a badger on 17th June at 02.25 hours but the badger did not emerge from or return to the sett (i.e. the badger visited the sett, examined the outside of the sett but continued past it following these explorations). The time of arrival also suggests that the badger has been commuting over a distance before it reaches the sett and has not recently emerged from a sett; most importantly from the sett under examination in this assessment.

The camera footage indicated that there was a rat in residence in 2020 and also a rat present / resident in 2022. Further surveying in the adjoining lands provided no substantial evidence of badgers and there were no setts in the remaining proposed development area.

In August 2022, there was again no evidence of occupancy of the sett, this time with an observation period of approximately 2 weeks. A badger was recorded at 01.40 hours on 20th August 2022. This was more than one day after the camera was set up. The presence at 01.40 hours suggests that the badger had travelled a distance to reach the sett and had not emerged from it. On the second camera, one badger was recorded at 02.28 hours on 18th August 2022 and at no other time. There is clearly badger activity within the site but this does not appear to be very high. While there was evidence of mammal movement in the site, it is difficult to ascertain the species concerned as there is considerable sheep activity within the site. Tracks into scrub could as easily indicate fox movements as badger movements.

There were no badger paw prints identified, no badger latrines or snuffle holes.

By definition, the sett cannot be considered a main sett and given that there were no setts found connected to the sett, the sett can be considered an outlier sett. The sett is used intermittently by a badger social group and may lie towards the edge of the territory. The entrance is clear of obstructions and there is some evidence of bedding having been brought to the sett by badgers.

It is clear that badgers pass through the lands while foraging as there can be a considerable range for an adult badger.

Potential Impacts Upon Badgers from The Proposed Construction

There is a Permitted ICT Facility (WCC Ref. Ref.: 20/1088), and a Proposed 110 kV Substation for the site this will include substantial modifications to the fencing and access to the site. These changes will result in the following:

Loss of a sett

There will be a loss of the existing sett (an outlier sett of a badger social group presumably in neighbouring lands). The removal of a sett may affect the survival of a social group in the area if there are not suitable locations within which a badger may establish an alternative sett. It is probable that there are several setts in the surrounding area. This may be a long-term moderate negative impact for badgers.

Loss of commuting corridor

There will be a loss of vegetation and the construction of buildings and units as part of the current project that may affect commuting badgers by removing cover that allows commuting in an unlit area. There will be an increase in the fencing around the site and this would affect the ability of badgers to move through the area.

Loss of feeding area

This will reduce feeding for badgers by reducing the hedgerow cover, shelter and substrate for invertebrates. This would be a long-term moderate negative impact.

Proposed Mitigation

Exclusion of the badger sett following procedure of monitoring and exclusion

NPWS advise that the receipt of planning approval is sufficient to allow the exclusion of a badger sett undertaken in a planned and careful process that avoids injury or death of badgers in the process. The exclusion procedure must be acceptable to NPWS and implemented by a badger specialist. Exclusion must not be undertaken if there is the possibility of badger cubs,

and this would rule out the months December to July unless it has been proven that sett is not a main sett or breeding sett.

Exclusion shall require the use of badger gates and mesh and may require up to 3 weeks to complete in most circumstances.

The sett shall be monitored by the installation of a camera to monitor the sett prior to the erection of a one-way gate to prevent badger entry (or re-entry).

NPWS shall be advised of the commencement of procedures and of the outcome of procedures. Where there is any question of risk to badgers, NPWS must be contacted immediately.

Construction of artificial badger sett within the site

It is proposed that a two-chambered badger sett is constructed within the site of the Permitted ICT Facility (as set out in the Environmental Impact Assessment Report for WCC Ref. Ref.: 20/1088) to provide an alternative to the sett removed for the Permitted ICT Facility and the Proposed 110 kV Substation. The sett shall have chambers constructed using concrete slabs with either concrete or breeze blocks or alternatively wood and plastic. Use of 900 mm x 600 mm concrete paving slabs associated with 150 mm bed concrete or alternatively timber chambers may be constructed from marine ply.

Pipes between chambers and leading to the outside may be of twinned walled drainage pipe. The proposed design is given below:

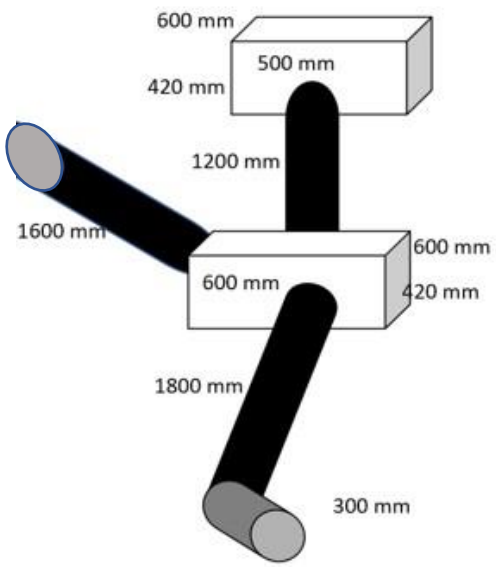


Figure 1: Artificial badger sett design

Location of artificial sett

It is proposed that the sett shall be located in the northern edge of the site as shown below by the red box:

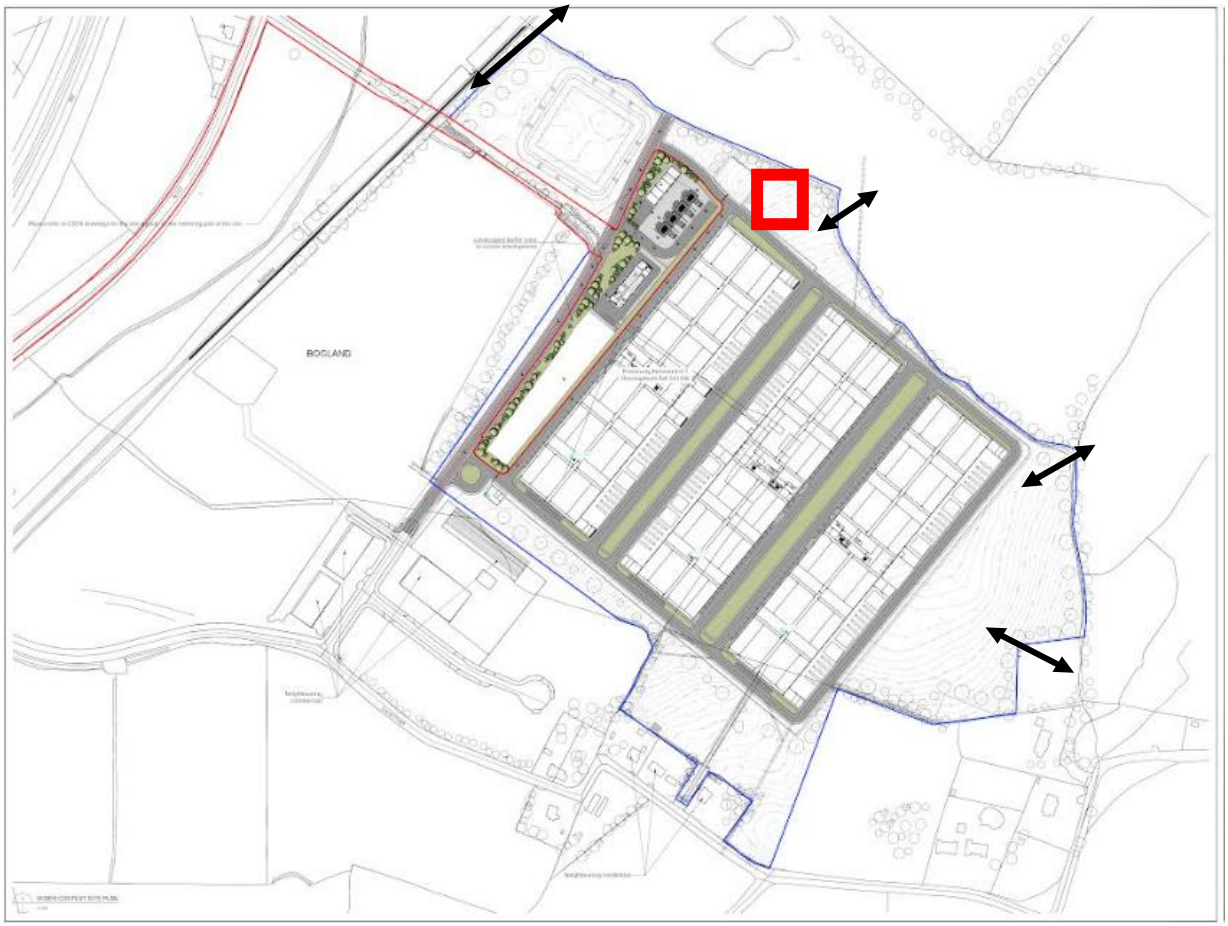


Figure 2: Badger access to site (see Proposed Site Masterplan DUB30-02-ZZZ-L00-DR-RAU-AR-1003

The location for the artificial sett is shown on the central section of the northern boundary. The black arrows indicate areas where badger access will be provided while preventing human and livestock access.

Figure 3: Close-up of proposed replacement sett location and access point for badgers to the site following fence installation

Badger accessible fencing surrounding the site

Fencing around the site could prevent human / livestock / canine access to the entire site while allowing badger access by providing a number of access points with the following specifications:

There shall be three access areas along the northern fence to allow badger entry, These shall be by means of 300 mm pipes that shall pass under the perimeter fence and into the ground and re-emerge from the ground on each side of the fence. Pipes need not exceed 4 metres in length to allow badger entry and prevent humans and livestock, Locations for access areas are shown by black bars in the above figure.

Impacts After Mitigation

There will be a long-term loss of badger dwelling places in the area and a reduction in feeding and commuting. This may affect a badger social group over a sustained period (e.g., years to decades). It is improbable that this would affect the conservation status of badgers in the Wicklow / Wexford area.

Plate 1: Badger visit to the sett on 17th June 2020 at 02.25 am

Plate 2: Brown rat resident within the outlier sett

Plate 3: 2022 camera results at sett:

18th August Brown rat followed by Badger 20th August 2022

Plate 4: Badger 27th August 2022

Plate 5: Mouse activated the camera and also Rat activated the camera

Plate 6: Camera installed along field edge

17th to 31st August 2022 Badger (top) and fox (bottom)

Plate 7: Blackbird, song thrush and young robin outside of the outlier sett 2020

APPENDIX 7.3

Bat Survey Report

Eire Ecology 2020

BAT SURVEY REPORT

Information and Communications Technology (ICT) Facility

at Kish Business Park, Arklow, Co. Wicklow

JUNE 26, 2020

CRAG WICKLOW LTD.

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TABLE OF CONTENTS

1 INTRODUCTION

This report details the findings of a bat survey completed as part of a planning application for development of an Information and Communications Technology (ICT) facility at Kish Business Park, Arklow, Co. Wicklow.

This report aims to;

- Examine buildings and trees on site for their potential to host bat roosts
- Identify species of bats using the site.
- Examine potential feeding and commuting routes.
- Potential impacts of bats by the proposed development.

The surveys undertaken are in line with recommendations in Chapter 11 of the Bat Conservation Trust 'Good Practice Guidelines, 3rd edition, 2016' (BCT, 2016) and The Irish Wildlife Manual No. 25' (Kelleher, 2006). The survey was designed and carried out by John Curtin B.Sc. (Env.). John has been carrying out bat surveys since 2012 and has completed over 100 surveys during this time. John has also completed the Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop which are the standard training for the carrying out of bat surveys in Ireland. He follows the Bat Conservation Ireland 'Good Practice Guidelines' (Aughney *et al*., 2008). In addition, John is an active member of Bat Conservation Ireland, which monitor bat populations in Ireland, and facilitate the education of bat communities to the public.

John holds the following licenses.

Description	Licence No
Licence to capture protected wild animals for educational, scientific or other purposes (bats)	C200/2019
Roost disturbance (bats)	Der/Bat 2019-74
Licence to photograph / film wild animals (bats)	123/2019

The site in question refers to lands agricultural pasture, treelines and hedgerows alongside a derelict house and sheds adjacent to the Kish Business Park.

In order to assess the presence and activity of bats within the proposed development grounds, three dusk and dawn night time detector surveys were conducted within the site. (See **Table 1-1**)

Table 1-1: Surveys completed

Date	Survey type
22nd May 2020	Daylight search
22nd – 23rd May 2020	Dusk and dawn bat detector survey
09th June	Daylight search
09th - 10th June 2020	Dusk and dawn bat detector survey
17th of June	Daylight search
17th - 18th of June 2020	Dusk and dawn bat detector survey

A thorough examination of the buildings using ladder, high powered torch, a Seek Reveal XR FF thermal imaging device and a Ridgid CA-300 Inspection Camera (under Licence No: 111/2017) on site revealed some potential roost features however no evidence of bat occupancy could be found.

Trees on site were also examined for potential roost features (PRF), however, trees on site were mainly semi mature and of low potential. A railway bridge located to the north of the site was also examined however also had low bat potential.

2 DESKTOP STUDY

2.1 BATS IN IRELAND – LEGISLATIVE PROTECTION

There are two main pieces of legislation which cover wildlife protection in Ireland – the Wildlife Act and the Habitats Regulations. These are outlined below, with particular reference to the protection afforded to bat species in Ireland.

The Wildlife Acts 1976 and 2000

The primary pieces of national legislation for the protection of wildlife in Ireland are the Wildlife Act (1976) and the Wildlife [Amendment] Act (2000). All species of bats in Ireland are listed on Schedule 5 of the 1976 Act, and are therefore subject to the provisions of Section 23, which make it an offence to:

- Intentionally kill, injure or take a bat
- Possess or control any live or dead specimen or anything derived from a bat
- Willfully interfere with any structure or place used for breeding or resting by a bat

- Willfully interfere with a bat while it is occupying a structure or place which it uses for that purpose

The Habitats Regulations 1997-2005

The EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992) seeks to protect rare and vulnerable species and the habitats in which they are commonly found, and requires that appropriate monitoring of populations be undertaken. All bat species found in Ireland are listed under Annex IV of the Directive, while the lesser horseshoe bat is afforded further protection under Annex II. The Habitats Directive has been transposed into Irish law by the European Communities (Natural Habitats) Regulations 1997. All bat species are listed on the First Schedule and Section 23 of the regulations makes it an offence to:

- Deliberately capture or kill a bat
- Deliberately disturb a bat
- Damage or destroy a breeding site or resting place of a bat

Provision is made in the Regulations for the Environment Minister to grant, in strictly specified circumstances set out in that Regulation, a derogation license permitting any of the above activities "where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range".

2.2 SITE LOCATION

The proposed site lies in the townland of Bogtown (Grid Ref. E723636 N670909).

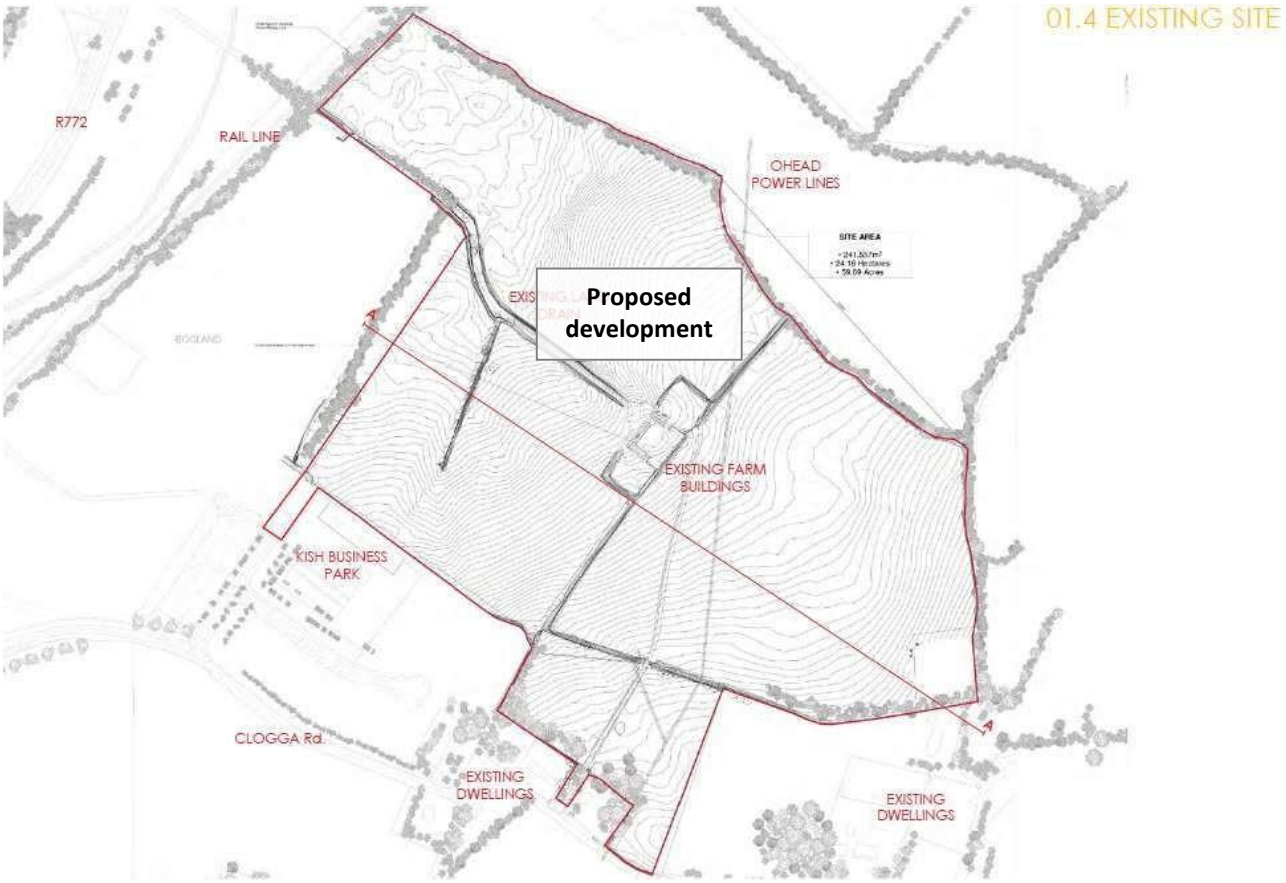


Figure 2-1: Location of proposed development

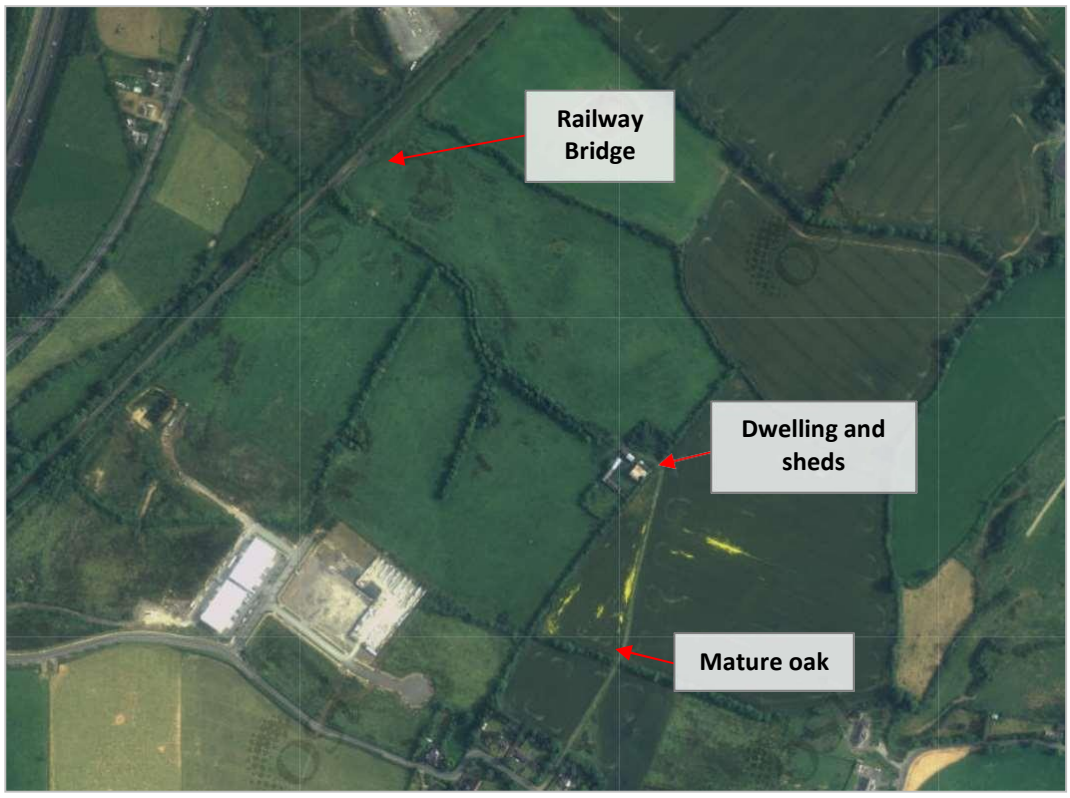


Figure 2-2: Location of structures

2.3 BAT SPECIES RECORDED IN THE SURROUNDING AREA

The NBDC database was consulted for details on bat records held for the site and the surroundings. The database was consulted on the 25/06/2020 for details on historical records from the site, the surrounding 2km (T27FL) and the 10km hectad; T27. Results are outlined in **Table 2-1**. Three of the nine confirmed resident bat species known to occur in Ireland have been recorded within the 2km square the subject site resides in. Records do not mention roosts rather referring to observations made by Enda Mullen and Faith Wilson. An additional three species have been recorded in the 10km Hectad, all from a bat walk lead by Enda Mullen.

Table 2-1**:** Irish bat species recorded in the T27 10km grid

Scientific name	Common name	Date of last record	Designation	Distance from subject site
Myotis daubentonii	Daubenton's Bat	26/08/2014	EU Habitats Directive >> Annex IV || Wildlife Acts	3.3km to north. Recorded during walk
Myotis mystacinus	Whiskered Bat	26/08/2020	EU Habitats Directive >> Annex IV || Wildlife Acts	3.3km to north. Recorded during walk
Nyctalus leisleri	Leisler's Bat	12/07/2005	EU Habitats Directive >> Annex IV || Wildlife Acts	1.39km to the south-west
Pipistrellus pipistrellus sensu lato	Pipistrelle	12/07/2005	EU Habitats Directive >> Annex IV || Wildlife Acts	1.39km to the south-west
Pipistrellus pygmaeus	Soprano Pipistrelle	26/08/2014	EU Habitats Directive >> Annex IV || Wildlife Acts	3.3km to north. Recorded during walk
Plecotus auritus	Brown Long-eared Bat	16/10/2008	EU Habitats Directive >> Annex IV || Wildlife Acts	890m to the south-west

3 SURVEY FINDINGS

3.1 SURVEY METHODOLOGY

A detailed inspection of the buildings was undertaken during daylight hours on the 22nd of May and the 09th of June. The aim was to compile information on actual and potential access points and roosting locations. This was done by searching for evidence of bats including live and dead specimens, droppings, feeding remains, urine splashes, fur oil staining and noises.

The exterior of the buildings were inspected first from ground level, with the aid of binoculars. The search included the ground, accessible windowsills, walls, eaves, roof slates, gutters, downspouts and the roof ridge. A systematic search of all accessible interiors was also undertaken. Searches were carried out with the aid of binoculars, torches, an endoscope, thermal imaging device and a ladder and focused on walls, floors, roof beams, windowsills, lintels, shelves etc.

3.2 SURVEY CONSTRAINTS

The surveys were undertaken in May and June 2020, within the main bat active season (May - August) (Kelleher, 2006). The dusk survey of the May survey was undertaken in a moderate breeze which may have somewhat inhibited bats flying in open areas. It is the surveyors experience that under these conditions bats are far more likely to be found flying within roost buildings thus these conditions can aid in the discovery of bats within roosts. Surveys conducted on the 09th and 17th of June were carried out during good weather conditions.

3.2.1 Habitats on site

The boundary hedgerows and treelines consists of semi mature alder, ash, beech willow, elder, hawthorn and blackthorn. A mature oak can be found along the entrance track (see figure 2-2). The fields are used as pasture for sheep as well as tillage (wheat). Several of the hedgerows also contained sections of bramble scrub.

The surrounding lands are well represented with agricultural land and associated hedgerows. Woodland is somewhat scarce in the locality with the closest located some 560m to the east at the Arklow Rock-Askintinny pNHA some 2.2km to the north-east by Ballyraine Upper

Figure 3-1: Aerial displaying network of treelines and small woodlands surrounding subject site

Plate 3-1: Central treeline west of sheds

Plate 3-2: Treeline to west looking south

Plate 3-3: Treeline by southern entrance

Plate 3-4: Central hedgerow along entrance track

3.2.2 Daylight inspection

Searches were completed using ladder, high powered torch and endoscope.

Buildings on site consist of a derelict dwelling with adjoin shed and an additional shed to the north-east of the dwelling. Several ruined sheds consisting of walls were also present. A railway bridge was also noted to the north of the site.

The dwelling was found to consist of mortared stone walls and corrugated metal roof. This metal roof replaced the original slated roof and appears to be in place for a considerable time. (See **Plate 3-5** and **3-6**). A thorough examination of the buildings using ladder, high powered torch and a Seek Reveal XR FF thermal imaging device on site revealed some roosting potential for roosting bats, particularly crevice dwelling bats however no evidence was found. Numerous openings such as windows and doors provide potential access however also allows considerable light intrusion thus decreasing the suitability of a day roost. No signs of bat droppings, staining or scratch marks were found on the floor, walls or rafters.

Plate 3-5: View of southern side of main shed

Plate 3-6 Northern view of shed

Plate 3-7: Internal view of main shed

Plate 3-8: Top of rafters

The adjoining shed consists of mortared stone walls and slated roof. Several holes were noted in the slate. Again this shed was searched for signs of bat occupancy however no evidence was found.

Plate 3-9 Western shed

Plate 3-10: Internal view of western shed

The North eastern sheds are of a similar construct to the other buildings onsite. Again these were checked however no evidence of bat occupancy was noted.

Plate 3-11: north-eastern sheds

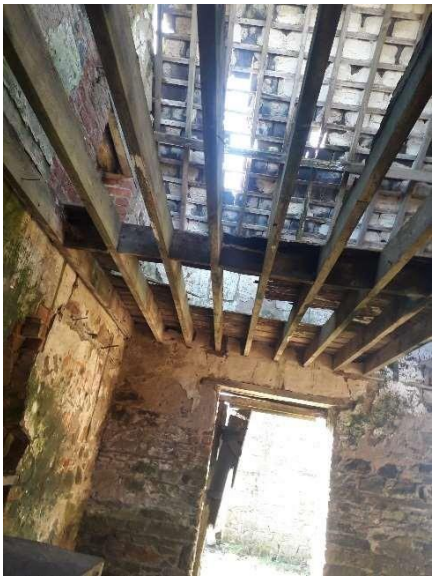


Plate 3-12: Internal view of north-eastern sheds

The railway bridge located to the north, adjoining the site was also examined. The bridge is of mortared brick construct underneath the arch and has stone on the sides. No deep crevices were noted and no evidence of bats was found.

Plate 3-13: Bridge to north

Plate 3-14 Much of the joints were well plastered without deep crevices

Trees on site were also examined for potential to house bat roosts. Only one tree was noted with potential, an oak located on the central hedgerow where the farm access track enters the site to the east . As leaves were present an initial potential roost feature survey was not possible so the surveyor dedicated an emergence survey to this location.

3.1 BAT DETECTOR SURVEYS

Mobile detector surveys were carried out completing looped transects of the site during the dusk and dawn periods to survey for commuting, feeding and potential roost sites. Towards sunset and sunrise the surveyor focused attention on potential roost features in order to examine for emerging bats. On the 22nd of May the survey commenced at 20:59; half an hour before sunset and continued for three

hours. The survey then recommenced two hours before sunrise at 03:15 and continued until sunrise. On the 09th surveys started at 21:32 and 02:58 while on the 17th surveys started at 21:22 and 02:56. Each contact with a bat was recorded. Where possible, a positive identification to species level was made. Information on the behavior was also recorded where available.

The bat detector used during the walked surveys was a Wildlife Acoustics Inc. (Massachusetts, USA) Echo Meter EM3 bat detector which is triggered to record when a bat call is emitted louder than 18dB for 1sec. This detector uses full spectrum sampling; detecting all frequencies simultaneously, meaning that multiple bat calls can be recorded at the same time.

A contact as shown below 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'.

Details of weather conditions are displayed in table 3-1 below.

Table 3-1: Weather conditions

Date	Sunset / Sunrise	Time	Wind Speed	Direction	Temp	Cloud	Rain
22/05/2020	21:29	20:55		W	15.5	60%	Shower at 22:10
		00:05		W	9.8		
23/05/2020	05:15	03:10	1.6 -2.8	W	9.2		Dry
		05:20	0.9 -2.4	W	9.4	100%	
09/06/2020	21:50	21:15	0	-	12.1	100%	Dry
		00:32	0.6ms	SW	11.6		
10/06/2020	04:58	02:55	0.8ms	S	11		Drizzle at 03:20
		05:00	0.6ms	S	11	80%	
17/06/2020	21:55	21:20	0	-	18	100%	Dry
		00:30	0	-	15.5		
18/06/2020	04:56	02:50	0.6	W	11.2		Dry
		05:00	0	-	13	20%	

3.1.1 Results of survey on the 22nd of May

This surveys showed very low bat activity. The surveyor was based by the derelict dwellings waiting for emerging bats from the start of survey until 22:45. This area was sheltered with low wind

conditions. No bat activity occurred in this period. After this time the surveyor completed looped transects of the treelines and hedgerows within the site. At 23:12 a brief unseen Myotis species was recorded by the hedgerow to the north-east of the farmstead. A similar call was recorded at 23:26 by the treelines at the site entrance. The dawn survey was primarily based by the buildings examining for bats returning to roosts. No bats were recorded.

3.1.2 Results of survey on the 09th of June

Similar to the previous survey activity within the site was very low. The surveyor was again based by the derelict farmstead during the emergence period. The first recorded registration occurred at 22:26 some 36 minutes after sunset when a Leisler's bat (*Nyctalus leisleri*) was briefly recorded by the sheds. This species is the earliest bat to emerge often found flying at sunset. At 23:44 a brief Common Pipistrelle (*Pipistrellus pipistrellus)* was also recorded close to here. The final registration occurred at 00:15 along the central hedgerow bisecting the entrance path when a Common Pipistrelle was noted feeding. The dawn survey took place based by the bridge to the north of the site. At 04:04 a Common Pipistrelle was recorded flying while at 04:25 both Common Pipistrelle and a Leisler's bat were recorded. This was the last sighting and occurred 33 minutes prior to dawn. No roosting behavior was noted by the railway bridge.

3.1.3 Results of survey on the 17th of June

During this survey four bat species were recorded; Common Pipistrelle, Soprano Pipistrelle (*Pipistrellus pygmaeus*), Nathusius Pipistrelle (*Pipistrellus nathusii*) and Leisler's Bat. The first recording was from a very brief unseen Leisler's at 22:19 24 minutes after sunset by the farm buildings. At 22:34 a Nathusius Pipistrelle was observed hunting along the hedgerow adjacent to the farmstead until 22:40. This species is noticeably larger than other Irish Pipistrelle's and had a peak frequency of 40kHz. At 22:37 a Common Pipistrelle was noted, followed by a Soprano Pipistrelle bat flying along hedgerows near the derelict dwelling.

Sporadic sighting occurred during the transect walks of the site with a Soprano Pipistrelle recorded flying to the east of the site by the boundary hedgerow.

The dawn survey took place based by the mature oak tree by the central hedgerow that bisects the pathway into the site. Several recordings from Leisler's bats were recorded here with one call at 04:30 showing two bats. The final bat pass occurred at 04:37 some 19 minutes before sunrise. This bat flew in a southerly direction off site.

4 IMPACT ASSESSMENT

The survey above provides a preliminary study of bat usage of tillage and pasture fields in the townland of Bogland, Arklow, Co. Wicklow.

- Disturbance

  Works associated with development or building work are likely to lead to an increase in human presence at the site, extra noise and changes in the site layout and local environment.

- Loss of feeding habitat

  The development of this site involves the removal of treelines and hedgerows that represent landscape features used primarily by Pipistrelle species and Leisler's bats. No evidence of commuting bats was noted from the survey. Given the amount of hedgerow features located in the surroundings the loss of the internal treelines and hedgerows will result in a low level permanent reduction of this habitat for local bat populations.

- Lots of potential roosting habitats.

  The buildings within the centre of the site do contain potential roosting habitat particularly for crevice dwelling bats. Despite three dusk and dawn surveys however, no evidence of roosting bats could be found.

5 MITIGATION AND COMPENSATION

Mitigation measures have been devised under guidance from the Irish Wildlife Manuals, No. 25, (Kelleher & Marnell 2006) and a review of the success of bat boxes in houses (BCT 2006).

5.1 RETENTION OF TREES AND SCRUB

Treelines located at the periphery of the site will be retained. Lighting will be restricted closer to these habitats.

5.2 LIGHTING ALONG PERIPHERY TREELINES

Guidance on lighting has been based on the Bats & Lighting document; (BCI, 2010), the Bats and artificial lighting in the UK Guidance Note 08/18 (BCT, 2018) and Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No. 8 (Voigt, 2018). Lighting can alter the behaviour of bats and the insects they prey on. Night flying insects can be attracted to lights particularly sources that emit an ultraviolet component or have a high blue spectral content. Whilst some species of bat such as Leisler's and Pipistrelle species can take advantage of this occurrence, other species such as Daubenton's bat and brown long-eared avoid such areas. Lighting can create barriers for bat species both entering roosts and using commuting routes such as rivers, treelined roads and woodland edges. 'Consideration should be given to ensure that dark wildlife corridors remain in the landscape to allow bats and other wildlife to travel safely to and from feeding habitats.'

A study by Emery (Emery, 2008) concluded that shielding and masking of street lights can reduce light spillage by as much as 40%. While internal and external louvers are more effective, the external louvers can reduce light spillage by as much as 97%.

- Bats and artificial lighting in the UK (BCT, 2018) suggest the avoidance of lighting on key habitats and features.
- It is important to maintain Dark Zones for foraging bats in areas where lighting is not necessary. However, where lighting is required, this lighting should be placed at a minimum height using the lowest lux value permitted for health and safety.
- The lighting should be directional on to paths and buildings only with no spillage of light to adjoining habitats. To reduce light spillage from luminaries, lights that are designed not to emit light at angles greater than 70^{o} from the vertical plane should be used. Consequently a flat glass protector is often used to reduce light spillage. Other methods to control light spillage:
    a) Shields: these can be mounted on lamps to control direction of the light
    b) Masking: part of the luminaries is painted to block light to control the direction of the light
    c) Louvers': either as internal or external slates organized in rows or at angles depending on the direction of light control.
- No white light should be permitted as this has the greatest impact on bats. Lighting should be fitted with LED luminaires using warm white colors < than 2700 Kelvins. Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

5.3 ERECTION OF BAT BOXES

As mitigation for the loss of potential roost features located within the buildings, three 1FF Schwegler bat boxes (or similar) will be erected by the bridge to the north. This area has good potential for bats. Two boxes should be set on the north-western side of the bridge as this area is very sheltered with good cover from adjacent treelines while an additional box can be placed on the southern wall.

6 CONCLUSION

This report details the findings of a bat survey completed as part of a planning application for the construction of a ICT Facility at Kish, Co. Wicklow.

The results of the surveys presented above show that although no evidence odd roosting bats was found the site is being used at a low level primarily by Pipistrelle species and Leisler's bats for feeding.

Impacts on bats have been assessed. The overall impact on bats following mitigation is low due to the lack of evidence of roosting bats. The loss of the internal treelines and hedgerows will have a long term, local negative effect on bats given the loss of these landscape features. The retention of external treelines and the lack of planned lighting here will minimise such losses. In addition the erection of bat boxes will offset the loss of potential roost features lost with the demolition of the sheds. As such the overall impacts on bats following mitigation will be low.

Appendix A – Site Layout

APPENDIX 9.1

GLOSSARY OF ACOUSTIC TERMINOLOGY

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

INDICATIVE CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN

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.

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 which indicates the following criteria and hours of operation.

Table 9A.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 9A.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 9A.1 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/m2 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.

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 1m x 1m x 0.1m will be required.

Verified Photomontages

To be read in conjunction with
the Landscape and Visual Impact Assessment chapter in the EIAR

Proposed

SID - Substation and Grid Connection

Prepared by Model Works Ltd
for AWN Consulting Ltd

October 2022

.MODEL WORKS

MODEL WORKS

project: SID - Substation and Grid Connection

location:

viewpoint: **View Map**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 16:33
Canon 5D Mark II
24 mm Lens

location:
E 722251.145 N 671874.364

viewpoint: **View 01 Baseline**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 16:33
Canon 5D Mark II
24 mm Lens

location:
E 722251.145 N 671874.364

viewpoint: **View 01 Proposed**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 16:15
Canon 5D Mark II
24 mm Lens

location:
E 722145.629 N 672067.076

viewpoint: **View 02 Baseline**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

.MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 16:15
Canon 5D Mark II
24 mm Lens

location: E 722145.629 N 672067.076

viewpoint: **View 02 Proposed**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

.MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 16:40
Canon 5D Mark II
24 mm Lens

location:
E 722116.736 N 671919.895

viewpoint: **View 03 Baseline**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

.MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 16:40
Canon 5D Mark II
24 mm Lens

location:
E 722116.736 N 671919.895

viewpoint: **View 03 Proposed**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 12:56
Canon 5D Mark II
24 mm Lens

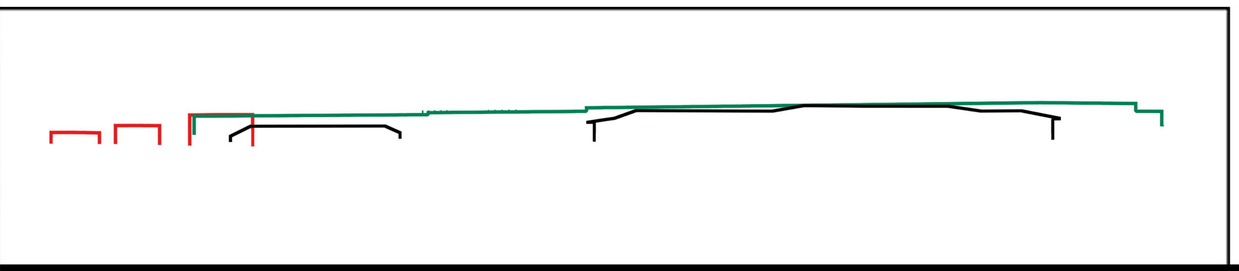
location:
E 722883.157 N 670756.47

viewpoint: **View 01 Baseline**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)



Green Line: ICT facility permitted under Reg. Ref. 20/1088

Red Line: Proposed substation

Black Line: Existing buildings

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 02-09-2022 12:56
Canon 5D Mark II
24 mm Lens

location: E 722883.157 N 670756.47

viewpoint: **View 01 Proposed**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS	*project:*	SID - Substation and Grid Connection	*photography:*	02-09-2022 13:22 Canon 5D Mark II 24 mm Lens	*location:*	E 723213.988 N 670709.811	*viewpoint:* **View 02 Baseline** *issued:* 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

.MODEL WORKS	*project:*	SID - Substation and Grid Connection	*photography:*	02-09-2022 13:22 Canon 5D Mark II 24 mm Lens	*location:*	E 723213.988 N 670709.811	*viewpoint:* **View 02 Proposed** *issued:* 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 11-10-2022 13:01
Canon 5D Mark II
24 mm Lens

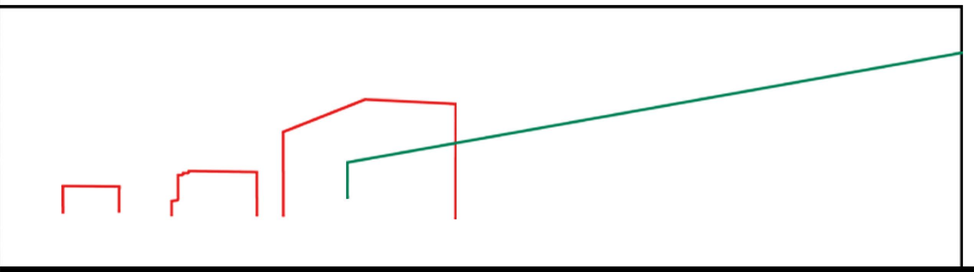
location: E 723213.988 N 670709.811

viewpoint: **View 03 Baseline**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)



Green Line: ICT facility permitted under Reg. Ref. 20/1088

Red Line: Proposed substation

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 11-10-2022 13:01
Canon 5D Mark II
24 mm Lens

location:
E 723213.988 N 670709.811

viewpoint: **View 03 Proposed**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 11-10-2022 13:50
Canon 5D Mark II
24 mm Lens

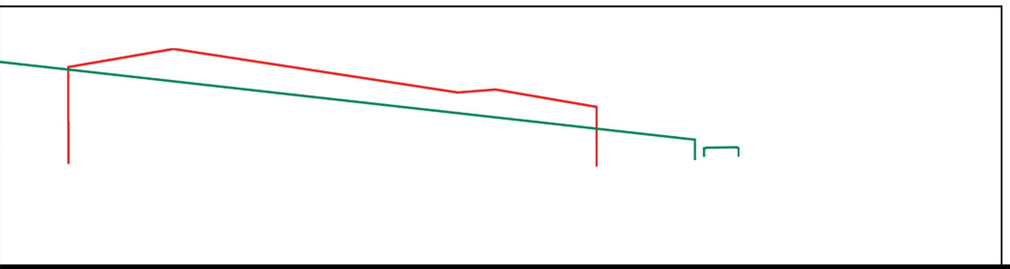
location:
E 723528.764 N 671204.003

viewpoint: **View 04 Baseline**

issued: 24-10-2022

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)



Green Line: ICT facility permitted under Reg. Ref. 20/1088

Red Line: Proposed substation

MODEL WORKS

project: SID - Substation and Grid Connection

photography: 11-10-2022 13:50
Canon 5D Mark II
24 mm Lens

location: E 723528.764 N 671204.003

viewpoint: **View 04 Proposed**

issued: 24-10-2022

APPENDIX 11.1

RECORDED ARCHAEOLOGICAL MONUMENTS

PREPARED BY CRDS LTD.

Recorded Archaeological Monuments located within c. 1.5km of the proposed development are listed below (source Sites and Monuments Record for Co. Wickow; www.archaeology.ie).

WI045-003001-

Class: Church
Townland: BOGLAND
RMP: Scheduled for inclusion in the next revision
Description: Situated in a marshy area, now drained. The site is shown on the 1838 OS 6-inch map as a rectangular structure within a small rectangular graveyard (max. dims. c. 30m NW-SE; 20m NE-SW) and is named 'Site of Killynee Chapel and Graveyard'. It has been completely removed in the construction of the railway line.
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: 26 September 2013

WI045-003002-

Class: Graveyard
Townland: BOGLAND
RMP: Scheduled for inclusion in the next revision
Description: Situated in a marshy area, now drained. The site is shown on the 1838 OS 6-inch map as a rectangular structure within a small rectangular graveyard (max. dims. c. 30m NW-SE; 20m NE-SW) and is named 'Site of Killynee Chapel and Graveyard'. It has been completely removed in the construction of the railway line.
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: 26 September 2013

WI045-004----

Class: Ritual site - holy well
Townland: ROCK BIG
RMP: Scheduled for inclusion in the next revision
Description: Situated on level ground, the well is surrounded by concrete shoring and supplies the nearby farm. When the concrete was put in there were no traces of any features around with the well, which may be associated with the church and graveyard (WI045-010001-) c. 100m to the SE at Ballinbanoge.
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

WI045-005----

Class: Church
Townland: ROCK BIG
RMP: Not scheduled for inclusion in the next revision
Description: Situated on a marked NE-facing slope overlooking the seashore. Price (1967, 484) mentions the site of a church, then only a mound

of rubble. It is now occupied by a quarry office, and there is no local memory of the site. Two holy wells (WI045-006-, WI045-007-) lie to the S. Any evidence of this monument has been entirely removed.
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

WI045-005001-

Class: Graveyard
Townland: ROCK BIG
RMP: Scheduled for inclusion in the next revision
Description: Situated on a marked NE-facing slope overlooking the seashore. Marked 'Site of Chapel Hogan' on the 1838 OS 6-inch map. Price (1967, 484) mentions the site of a church, then only a mound of rubble. It is now occupied by a quarry office, and there is no local memory of the site. Two holy wells (WI045-006-, WI045-007-) lie to the S.
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: 26 September 2013

WI045-006----

Class: Ritual site - holy well
Townland: ROCK BIG
RMP: Scheduled for inclusion in the next revision
Description: Situated on a rocky N-facing slope overlooking the sea, to the S of a church site (WI045-005----). The well has dried up since the quarry opened nearby, and the site is occupied by a Marian shrine and a hawthorn on which offerings are suspended in May.
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

WI045-007----

Class: Ritual site - holy well
Townland: ROCK BIG
RMP: Not scheduled for inclusion in the next revision
Description: Situated on a rocky E-facing slope overlooking the sea, S of the Lady's Well. Like the Lady's Well (WI045-006----), this too appears to have dried up since the quarry opened. No visible remains.
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

WI045-010001-

Class: Church
Townland: BALLINABANOGE

RMP: Scheduled for inclusion in the next revision
Description: Situated at the base of a steep NE-facing slope. There is no trace of the church apart from a rectangular platform (dims. c. 20m NW-SE; 15m NE-SW) within a marshy hollow, said locally to be the site of the church. The graveyard lies to the SW and is defined by the road at the SE and by a field boundary at the NW. It is known locally as a graveyard, and it is said that shipwrecked sailors were buried here. Noted in the OS letters (O'Flanagan 1928, 137) as a children's burial ground, which suggests either that the graveyard was not consecrated, or was used for unbaptised babies and victims of drowning after it had fallen out of general use. St Iver's holy well lies to the N (WI045-004----).
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
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.

WI045-010002-

Class: Graveyard
Townland: BALLINABANOGE
RMP: Scheduled for inclusion in the next revision
Description: Situated at the base of a steep NE-facing slope. There is no trace of the church apart from a rectangular platform (dims. c. 20m NW-SE; 15m NE-SW) within a marshy hollow, said locally to be the site of the church. The graveyard lies to the SW and is defined by the road at the SE and by a field boundary at the NW. It is known locally as a graveyard, and it is said that shipwrecked sailors were buried here. Noted in the OS letters (O'Flanagan 1928, 137) as a children's burial ground, which suggests either that the graveyard was not consecrated, or was used for unbaptised babies and victims of drowning after it had fallen out of general use. St Iver's holy well lies to the N (WI045-004----).
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: 26 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.

WI045-010003-

Class: Children's burial ground
Townland: BALLINABANOGE
RMP: Scheduled for inclusion in the next revision
Description: Situated at the base of a steep NE-facing slope. There is no trace of the church apart from a rectangular platform (dims. c. 20m NW-SE; 15m NE-SW) within a marshy hollow, said locally to be the site of the church. The graveyard lies to the SW and is defined by the

road at the SE and by a field boundary at the NW. It is known locally as a graveyard, and it is said that shipwrecked sailors were buried here. Noted in the OS letters (O'Flanagan 1928, 137) as a children's burial ground, which suggests either that the graveyard was not consecrated, or was used for unbaptised babies and victims of drowning after it had fallen out of general use. St Iver's holy well lies to the N (WI045-004----).
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: 26 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.

WI045-014001-

Class: Enclosure

Townland: BALLYNATTIN

RMP: Not scheduled for inclusion in the next revision

Description: Discovered in 1998 during archaeological monitoring of works associated with the IDA Industrial Park (Excavation Licence 98E0257). Excavation revealed a rectangular area (14m E-W x 8m) defined by a U-shaped trench (Wth 0.34m-0.44m; D 0.04m - 0.2m) with an entrance (Wth 1.35m) on the S side. There was a large amount of charcoal and burning present which led the excavator to suggest 'that the trench held a wooden palisade that burnt down. The presence of only one post-hole, that at the east side of the entrance, suggests that the trench may have contained a sill-beam in which posts were set that have now decayed without trace.' (Cotter 2000, 220). Finds included one sherd of pottery and numerous pieces of flint. (ibid)

Compiled by: Claire Breen

Date of upload: 24 January 2013

References: Cotter, E. 2000 Ballynattin. In I. Bennett (ed.), Excavations 1998: summary accounts of archaeological excavations in Ireland, 220 (No. 686). Bray. Wordwell

WI045-015----

Class: Burnt mound

Townland: BALLYNATTIN

RMP: Not scheduled for inclusion in the next revision

Description: This is the record for two adjacent burnt mounds excavated by Anne Connolly (97E0128) as part of the Arklow bypass scheme. One was a subcircular spread of burnt material (c. 7m NE-SW; 5.5m (NW-SE; depth 0.2m) from which one fragmented piece of worked flint was recovered. The second spread of burnt material was broadly subcircular in shape (12.5m NE-SW; 10.8m NW-SE; max. depth 0.45m). Associated with these a wooden platform consisting of narrow lengths of wood covering an area 1.9m in length and 1.4m in width. Beneath this platform was a series of wooden stakes which did not form any clear patterns. A sample from this wood was dated by dendrochronology and had a felling date of late-856 BC/early-855 BC.

	(http://www.excavations.ie/Pages/Details.php?Year=&County=Wicklow&id=4119)
Compiled by:	Denis Power
Date of upload:	25 January 2013

WI045-017----

Class:	Fulacht fia
Townland:	BALLYNATTIN
RMP:	Not scheduled for inclusion in the next revision
Description:	A possible fulacht fia, slot-trenches, pits and post-holes were excavated here in 2003 (Excavation Licence 03E1692) in advance of the development of the Arklow IDA Enterprise Park (Tierney 2006, 541-2).
Compiled by:	Claire Breen
Date of upload:	17 January 2013
References:	Tierney, J. 2006 Ballynattin, Arklow. In I. Bennett (Ed.) Excavations 2003: summary accounts of archaeological excavations in Ireland, 541-2 (No. 2063). Bray. Wordwell.

WI045-020----

Class:	Excavation - miscellaneous
Townland:	BALLYNATTIN
RMP:	Scheduled for inclusion in the next revision
Description:	A number of pits and burnt areas were uncovered here as part of the construction work associated with an extension to the 'Euroconex' car park in 2005 (Excavation Licence 04E0937 ext.). The features were preserved in situ. (Ó Faoláin 2008, 414-5)
Compiled by:	Claire Breen
Date of upload:	10 January 2013
References:	Ó Faoláin, S. 2008 Euroconex, IDA Business & Technology Park, Ballynattin. In I. Bennett (ed.), Excavations 2005: summary accounts of archaeological excavations in Ireland, 414-5(No. 1695). Bray. Wordwell.

WI045-023----

Class:	Excavation - miscellaneous
Townland:	COOLADANGAN
RMP:	Not scheduled for inclusion in the next revision
Description:	This is the record for the excavation of various features by Kevin Martin (E3511) on the Gorey-Arklow link road. The excavation revealed a circular alignment of postholes representing a structure and associated pits, a large N-S running ditch, and an isolated hearth. No dating evidence was recovered though the excavator considered these features probably prehistoric in date. (Martin 2008)
Compiled by:	Denis Power
Date of upload:	22 January 2013
References:	Martin, K. 2008 Preliminary Report A003/053, E3511, N11 Gorey to Arklow Link. Unpublished excavation report submitted to Heritage and Planning Division, National Monuments Service, Department Arts, Heritage and the Gaeltacht, Dublin.

WX003-014----

Class:	Ringfort - unclassified
Townland:	HOLLYFORT (Gorey By., Ballylarkin ED)

RMP:	Scheduled for inclusion in the next revision
Description:	Marked faintly as a circular enclosure (diam. c. 35m) and described as 'site of rath' on the 1839 ed. of the OS 6-inch map. It is situated on a slight NW-facing slope, but no feature is visible at ground level in reclaimed pasture. The above description is derived from the published 'Archaeological Inventory of County Wexford' (Dublin: Stationery Office, 1996). In certain instances, the entries have been revised and updated in the light of recent research.
Compiled by:	Michael Moore
Date of revision:	14 February 2012

WX003-015----

Class:	Fortification
Townland:	WHITEPARK
RMP:	Scheduled for inclusion in the next revision
Description:	Marked 'Entrenchment (site of)' on the 1839 and 1940 eds of the OS 6-inch map and depicted as a small rectangular field or paddock (dims. c. 35m NW-SE; c. 25m NE-SW) on the earlier map, which may represent the quarry that destroyed what were thought to be earthworks connected with the Cromwellian era (Lewis 1837, vol. 2, 15) and 1798 when it is thought to have been occupied by British solders (OSFM). No antiquity is visible at ground level. The above description is derived from the published 'Archaeological Inventory of County Wexford' (Dublin: Stationery Office, 1996). In certain instances, the entries have been revised and updated in the light of recent research.
Compiled by:	Michael Moore
Date of revision:	20 November 2012
References:	Lewis, S. 1837 A topographical dictionary of Ireland, 2 vols. London. Lewis and Co. OSFM. Ordnance Survey Field Memorandums. A collection of survey notes and descriptions of monuments on pro-forma sheets compiled by Ordnance Survey field staff in the course of the 1:2500 map revision of various counties, mostly dating from 1931 – early 1960s. These unpublished manuscripts form part of the records of the Archaeological Survey of Ireland, National Monuments Service Archive, Dublin.

APPENDIX 11.2

EXCAVATIONS

PREPARED BY CRDS LTD.

The excavation bulletin website (www.excavations.ie) was consulted to identify previous excavations that have been carried out in the vicinity of the proposed development. This database contains summary accounts of excavations carried out in Ireland from 1970 to 2019. The following townlands were assessed - Ashwood Upper, Askintinny, Ballintombay, Ballynattin, Ballyrooaun, Bogland, Hollyfort, Kish, Knockanrahan Upper, Money Big, Money Little, Rock Big, Rock Little, Rockbog, Springfield, Tinahisk Upper and Whitepark.

1997:609 - BALLYNATTIN, Wicklow

County: Wicklow
Site name: BALLYNATTIN
SMR No.: N/A
Licence No.: 97E0128
Author: Anne Connolly, Archaeological Services Unit Ltd, Oranmore Industrial Park, Claregalway Road, Oranmore, Co. Galway, for Valerie J. Keeley Ltd.
Site type: Burnt mound
ITM: E 722494m, N 671276m

An excavation of a burnt mound, identified during licensed monitoring along the proposed bypass of Arklow town, was carried out from April to July 1997. The site was situated c. 1.5 miles south of Arklow, to the west of the main Dublin–Wexford road (N11).

Two main cuttings were excavated to natural along the land-take at Ballynattin townland. Cutting 1 investigated the burnt mound identified during the initial soil-stripping. A further spread of burnt material was identified in the course of the archaeological work and Cutting 2 was opened to fully resolve the archaeology of this area.

Excavation of Cutting 1 revealed a subcircular, compact burnt stone and charcoal concentration, which measured c. 7m north-east/south-west and 5.5m north-west/south-east. This burnt material had a maximum depth of 0.2m. Finds from this material consisted of shattered flint, with one fragmented worked piece being recovered.

Excavation of Cutting 2 was undertaken to investigate a substantial spread of burnt stone and charcoal, located some 25m to the south of Cutting 1. This burnt spread was of an irregular though broadly subcircular shape, and measured 12.5m north-east/south-west and 10.8m north-west/south-east. It had a maximum depth of 0.45m at its centre, though it was significantly shallower on its south-west side. It did not yield any finds with the exception of some shattered flint.

A second, smaller subcircular burnt spread was located to the north-west of the main area. It had a diameter of 2.6m and an average depth of 0.15m. Excavation revealed two further small, shallow, irregular burnt deposits underlying this subcircular burnt spread, each with a layer of light silty clay occurring between them. Underlying all these layers was a yellow silty clay, which seems to have been formed naturally through silting. It had a depth of 0.3m.

Immediately to the north-west of and underlying the main burnt spread, and to the south-east of and partly underlying the series of small subcircular burnt spreads, a wooden feature was revealed. It underlay the yellow silty clay and overlay a mixed layer of fine sand. The wooden feature consisted of c. 23 narrow lengths of wood laid in a north–south direction, forming a deliberately prepared surface. It measured 1.9m in length, 1.4m in width and 0.1m– 0.15m in average depth.

On removal of this wooden feature, a series of moderately preserved wooden stakes was excavated. They did not form any very clear patterns, though they had definitely been pointed to facilitate their being driven into the underlying sand. A sample from this wood underlying the wooden feature was dated by the Palaeoecology Centre in Queen's University, Belfast, and a felling date of late 856 BC or early 855 BC was

recorded. Wood samples were identified by Ellen O'Carroll, Irish Archaeological Wetlands Unit, and were found to be predominantly of alder (61%), with willow, ash, hazel, oak, birch and holly also represented. There were no finds associated with the wooden feature or the underlying strata.

1998:686 - BALLYNATTIN, Wicklow

County: Wicklow
Site name: BALLYNATTIN
SMR No.: N/A
Licence No.: 98E0257
Author: Eamonn Cotter, Ballynanelagh, Rathcormac, Co. Cork.
Site type: Prehistoric enclosure
ITM: E 722494m, N 671276m

The site was discovered during archaeological monitoring, by Sarah McCutcheon, of topsoil removal from a 14m-wide corridor designed to provide access and services for a new industrial park development by the IDA, close to the new Arklow Bypass. It appeared under the topsoil as a band (c. 0.4m wide) of charcoal and burnt clay enclosing a rectangular area.

Excavation revealed the enclosing element to be a trench ranging from 0.34m to 0.44m wide and from 0.04m to 0.2m deep, enclosing a rectangular area measuring c. 14m east-west x 8m. The trench was U-shaped in profile with near-vertical sides. The enclosure had rounded corners, and, although little survives of the east side owing to disturbance by a modern field fence, this side appears to have been curved rather than straight. The entrance to the enclosure was in the south side and was 1.35m wide. A circular cut (diameter 0.27m, depth 0.09m) on the east side of the entrance is likely to be the base of a post-hole.

The fill of the trench consisted of a soft, light brown soil with charcoal concentrations of varying densities and numerous patches of burnt, ashy material. Numerous fragments of burnt wood of small diameter were found, suggesting the presence of twigs, such as might have been used in a post-and-wattle fence. Charcoal concentrations were most dense at the east end of the south side and midway along the north side, where the trench was at its deepest. In these areas the charcoal layer was c. 0.05m thick and was underlain by a 0.1m-thick layer of greyish, silty soil.

The amount of charcoal and burning present suggests that the trench held a wooden palisade that burnt down. The presence of only one post-hole, that at the east side of the entrance, suggests that the trench may have contained a sill-beam in which posts were set that have now decayed without trace.

One sherd of pottery and numerous pieces of flint were recovered, and, while none of these was definitively diagnostic, they suggest a late prehistoric date, possibly Bronze Age.

2003:2063 - Ballynattin, Arklow, Wicklow

County: Wicklow
Site name: Ballynattin, Arklow
SMR No.: N/A
Licence No.: 03E1692
Author: John Tierney, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
Site type: Prehistoric
ITM: E 722494m, N 671276m

This work was carried out in advance of the development of the Arklow IDA Enterprise Park at Ballynattin. There is currently a 130m internal main roadway developed within the site that serves to access Euroconnex Technologies. Excavation of this road (and where it continued northwards through the centre of the site) was monitored by Sarah McCutcheon. A 14m-wide corridor along the length of the proposed main access road

(stretching from the entrance to the northern roundabout) was excavated for services to be installed. Subsequently, the features (prehistoric enclosure, possibly Bronze Age) unearthed during monitoring were excavated by Eamonn Cotter (Excavations 1998, No. 686, 98E0257). The prehistoric enclosure was situated in the south-east corner of the currently proposed Vitra Tiles site. Immediately east of the Arklow Bypass, a burnt mound was excavated by Anne Connolly in 1997 (Excavations 1997, No. 609, 97E0128). This site is c. 100m to the east of the IDA business park.

Test excavations were carried out on the Haul Road and the proposed Vitra Tiles site in advance of proposed development works at the IDA business and technology park. Several trenches were machine excavated. Trenches 2 and 5 at the western end of the Haul Road contained probable archaeological features. Further testing was carried out on 17 November 2003, when it was discovered that the Vitra Tiles site had been stripped of all topsoil and the position of the Haul Road had been set out. At this time, the extent of the test-trench around the archaeology in Trenches 2 and 5 was extended. This testing yielded five areas which subsequently had to be excavated. These were excavated between 8 and 19 December 2003. Trenches 2 and 5 were extended and excavated as Cuttings 2 and 3. No other potential archaeological features were encountered within the other test-trenches along this road. The geophysical survey of this part of the site indicates no definite evidence for in situ archaeological remains.

There was a small spread of burnt-mound material in the south-east corner of the Vitra Tiles site. This is probably related to the prehistoric enclosure excavated in July 1998. The presence of this feature and a spread of burnt material at the western end of the test-trench indicates the possibility of the presence of archaeological sediments and features in the southern end of the Vitra Tiles site. In Cutting 1, Contexts 77-81 are the remains of heat-shattered stone spreads rather than burnt mounds in the strict sense. The layers may be the result of other episodes of burning. No datable artefacts were recovered from Cutting 1. Contexts 82-84 are heat-shattered stone layers and trough fills which comprise a fulacht fiadh.

Cutting 2 is located on the route of the 'Haul Road' and was formerly Trench 2 of the original testing. Orientated east-west, the excavated area measured 5m by 4m. A number of features, consisting of two slot-trenches, four pits, nine stake-holes and two possible post-holes, were excavated. Four pottery sherds and three pieces of flint were recovered from the testing. Two of the pieces of flint were from Feature 3, which is in the vicinity of the fill of a natural hollow, a stake-hole cut and the fill of a pit. Another came from the cut of a pit. The pits seem to be for containing fire waste; the fills are all similar: pinkish-brown clayey silt with flecks of charcoal. It is not known where the actual fire producing this waste was located, but it was presumably nearby. None of the pits in Cutting 2 were subjected to in situ burning but appear to have been used as rubbish pits. The posts and stakes in the other cuts may have comprised two fences, one orientated north-east/south-west. The other fence comprises a double fence orientated north-west/south-east. A slot-trench is the innermost line of the double fence and Contexts 42, 29, 37, 39 and 6 comprise the outer line of the double fence. Again, the function of these is not certain. The 'corner' where these fences meet may be a post-hole that was dug out after use and backfilled, rather than a pit.

The archaeology in Cutting 2 appears to be broadly contemporary with the enclosure excavated in 1998, which is c. 150m to the north-east, and with the fulachta fiadh uncovered in the vicinity.

Cutting 3 (formerly Trench 5) is located on the route of the 'Haul Road'. The excavated area measures 7m north-south by 5m. The excavated features consist of seven pits, three stake-holes and one ditch. Their function is not certain. There may have been a curved screen providing a possible windbreak (the stake-holes); the function of the pits is unknown. Most of the fills appear to have been subjected to burning. The in situ burning uncovered during testing may be a patch of burnt clay located at the south-east corner of the cutting running under the east baulk. The area burnt was not

extensive, but it is likely that the hearth was regularly cleaned and that the debris removed from the hearth was then deposited into the nearby pits. The pit fills may represent the remains of more extensive layers which have been eroded and truncated by ploughing, surviving only because they were deposited into the deeper pits.

The ditch uncovered during testing, Feature 12, may be Context 51. The fill of the ditch contained pieces of possibly worked flint. These may have been disturbed from an area which the ditch truncated or removed during its excavation. The date of the ditch is uncertain, but its function is more than likely to drain water, as the sondage excavated through it filled with water soon after excavation. It is possible that this ditch is similar to the enclosing ditch excavated by Eamonn Cotter, which also contained pieces of worked flint.

The archaeology uncovered in Cuttings 2 and 3 may be the partial remainder of very temporary habitation sites and extends outside the Haul Road both to the south and the north.

2004:1841 - IDA PARK, BALLYNATTIN, ARKLOW, Wicklow

County:	Wicklow
Site name:	IDA PARK, BALLYNATTIN, ARKLOW
SMR No.:	N/A
Licence No.:	04E0712
Author:	John Tierney, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
Site type:	Prehistoric
ITM:	E 724086m, N 673442m

Excavation was undertaken of potential archaeological features uncovered during unlicensed monitoring. The remains of three potential Bronze Age structures, each disturbed by agricultural activity and/or recent groundworks associated with the construction of a haul-road, were uncovered. Approximately only one-third of each structure survived for excavation. Structures A and C comprised curvilinear slot-trenches. Both features contained sherds of prehistoric pottery within their fills. There was little indication of associated posts to suggest that these were roofed structures. Structure B was circular in formation and comprised nine postholes and 36 stake-holes. Three of the post-holes occurred within the structure and these are suggestive of internal supports for a possible roof. Two slot-trench-type cuts were excavated along the northern exterior of this structure. These cuts may represent a drainage feature or may further support the hypothesis that the structure was roofed for domestic use. A furnace was excavated to the east of the site. A saddle quern retrieved from within the fill of this feature would suggest that the furnace may have been used to dry corn or other tillage produce. Other features excavated included two hearths, with associated stake-holes, pits, groupings of post-holes and stake-holes, and spreads or dumps of material potentially associated with prehistoric activity. A ditch, which was excavated in two of the areas, had an associated cobbled surface dating to the late 18th century. Field boundaries, drainage systems and furrows were also encountered. Post-excavation work is ongoing.

2004:1842 - IDA PARK, BALLYNATTIN, ARKLOW, Wicklow

County:	Wicklow
Site name:	IDA PARK, BALLYNATTIN, ARKLOW
SMR No.:	N/A
Licence No.:	04E0937
Author:	Bruce Sutton, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
Site type:	No archaeological significance
ITM:	E 724086m, N 673442m

Test-trenching was carried out for the proposed development of a carpark at Euroconex Technologies in the business and technology park, at Ballynattin, Arklow, Co. Wicklow. Three trenches were excavated, each measuring 50m by 2m. Nothing of an archaeological nature was uncovered during the testing.

2005:1694 - BALLYNATTIN, Wicklow

County: Wicklow
Site name: BALLYNATTIN
SMR No.: N/A
Licence No.: 04E0937 EXT.
Author: Simon Ó Faoláin, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
Site type: Possibly prehistoric
ITM: E 723244m, N 671380m

Test excavations were undertaken in advance of the proposed construction of an extension to a carpark at Euroconex Technologies Ltd, Business and Technology Park, Ballynattin, Arklow, Co. Wicklow. A significant number of archaeological sites had been excavated in the area of this park in the past. Works were carried out on 23 August 2005. Three test-trenches were excavated in a staggered layout, all aligned with their long axes running south-west to north-east, the same as the long axis of the proposed carpark extension. All three trenches measured 50m long by 2m wide.

The features uncovered during testing were considered as three groups: modern, probably modern and possibly archaeological.

The large disturbed area in the south-western part of the area tested, and a pair of post-holes also in the same area, were clearly modern in origin.

Included as 'probably modern' are two features which are similar in form and are probably plough furrows. They run parallel with the test-trenches, which are in turn aligned parallel with the long sides of the existing field boundary, a fact which makes them more likely to be ploughmarks.

The possibly archaeological features all contained charcoal and in some cases had evidence of fire-reddening and/or burnt stone or clay. Limited investigation of their fill recovered no artefacts, modern or otherwise.

Given that extensive prehistoric archaeology has been excavated in a number of locations in the immediate vicinity and that a worked flint was recovered from one of the trenches, the possibility that these features may be further evidence of prehistoric activity was considered significant and monitoring of groundworks was recommended.

2005:1695 - EUROCONEX, IDA BUSINESS & TECHNOLOGY PARK, BALLYNATTIN, Wicklow

County: Wicklow
Site name: EUROCONEX, IDA BUSINESS & TECHNOLOGY PARK, BALLYNATTIN
SMR No.: N/A
Licence No.: 04E0937 EXT.
Author: Simon Ó Faoláin, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
Site type: Possible prehistoric activity
ITM: E 722494m, N 671276m

This is one of several phases of work carried out on the IDA Business Park in Ballynattin, Arklow. Euroconex Technologies Ltd is located in the north-west corner of the business park. Testing of the carpark was carried out by Bruce Sutton (Excavations 2004, No. 1842, 04E0937). Testing of a carpark extension, to the south of the Euroconex building and to the east of the existing carpark, was carried out by the writer (see No. 1694 above, 04E0937 ext.). The extension was subsequently monitored in September 2005; this summary details the findings of the monitoring.

The entire area was stripped of topsoil, 0.3m in depth, down to the level of the subsoil. A number of possible archaeological features were uncovered. A number of possible pits measured an average of 0.3m by 0.3m, were circular in plan and were filled with a mid-pinkish-orange clayey silt with sub-angular moderate medium pebbles and small stones, with moderate flecks and small pieces of charcoal. Two small areas of burning in situ were also uncovered. The possible pits and burnt areas were concentrated in the western half of the proposed extension. The features, on the surface, are similar morphologically to those excavated by John Tierney in the adjoining site in the IDA Business Park in Ballynattin (Excavations 2004, No. 1841, 04E0712). Evidence for modern disturbance, including a large pit filled with scrap metal, furrows and field drains, was also uncovered.

As the carpark extension was not excavated below the level of the top of the subsoil, the features were preserved in situ. The location of the possible features was surveyed electronically. The features were then covered with a protective membrane of terram, which in turn was covered with pea gravel and trunking.

2005:1696 - BALLYNATTIN, Wicklow

County:	Wicklow
Site name:	BALLYNATTIN
SMR No.:	N/A
Licence No.:	05E0741
Author:	Melanie McQuade, Margaret Gowen & Co. Ltd, 27 Merrion Square, Dublin 2.
Site type:	Burnt mound and prehistoric settlement
ITM:	E 722494m, N 671276m

As part of an assessment, eleven trenches were excavated across a proposed development site. The test-trenches targeted anomalies identified in the geophysical survey (05R060) and some trenches were excavated outside the survey area. The stratigraphy over much of the site comprised 0.28m of topsoil overlying natural subsoil. On the north of the site deep sand deposits (over 1m deep) indicate the presence of a palaeo-channel. A struck flint with evidence for retouch was recovered near to the channel. It was not associated with any archaeological features but provides further evidence for prehistoric activity on site.

A burnt mound measuring 23.7m by 8.3m and up to 0.33m deep was uncovered on marshy ground on the west of the proposed development. A thin spread of burnt material, 1.55m by 0.5m, was uncovered to the north of the burnt mound. Its presence suggests that there may have been contemporary settlement activity in the area. A post-hole, 0.18m in diameter, and two areas of burning were identified to the west of the burnt mound. The burnt areas were 2m by 0.75m and 0.9m by 0.48m. Two further post-holes, with diameters of 0.15m and 0.3m, were identified further to the west and are indicative of settlement activity upslope from the burnt mound. No evidence for the date of these features was uncovered during testing but, given their proximity to the burnt mound, they could potentially be prehistoric.

Further evidence for settlement activity, which could potentially be prehistoric in date, came from a post-hole, a stone feature and a circular pit on the south-east of the site. The post-hole was 0.25m in diameter and the stone feature was 0.9m east–west by 1m. The pit was 0.85m in diameter and was filled with charcoal and burnt stone. There was a 1.1m-wide ditch (F29) near to these features. It was 0.18m deep and had some charcoal and burnt earth in its fill.

A series of linear features identified in the geophysical survey were uncovered across the site and, with the possible exception of F29, they were probably field drains and ditches related to agricultural use of the land.

APPENDIX 11.3

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 (https://www.buildingsofireland.ie/).

Reg No	**16322011** **Arklow Cemetery, KNOCKANRAHAN UPPER, Arklow**

Rating	Regional
Cat of Special Interest	Architectural
Original Use	Building misc
In Use As	Building misc
Date	1860 - 1880
Coordinates	323101, 172824
Date Recorded	--/--/--
Date Updated	--/--/--
Description	Detached three-bay single-storey Classical style gate lodge, built c.1870. The building is constructed in dressed coursed granite. The panelled front door is set within a flat-headed opening with a fine raised stone surround; this is set within a projecting bay which has fine pilasters to each corner with a dentilled frieze over and all surmounted by a slightly projecting pediment with a laurel wreath motif. Window openings are all flat-headed with metal top-hung replacement windows. Main gables are as per that of the projecting bay. The pitched roof is slated and rainwater goods are cast-iron; the chimneystack is rendered with granite corbelled cap and clay chimney pots. The lodge is sited by the curved gate screen with wrought-iron gates and square panelled gate pillars with pyramidal caps.
Appraisal	Delightful cemetery gate lodge of c.1870 which is original, in good condition and an excellent asset to the heritage of the area.

Reg No	**16322008**
	Coolgreaney Road, LAMBERTON, Arklow

Rating	Regional
Cat of Special Interest	Architectural, Social, Technical
Original Use	Water tower
In Use As	Water tower
Date	1945 - 1965
Coordinates	323253, 173146
Date Recorded	15/02/2013
Date Updated	--/--/--
Description	Detached three-stage water tower, built c.1955. The tower is constructed in reinforced concrete and comprises of a circular shaft which supports an inverted cone, which in turn supports a drum shape. It is set to the north-west side of Coolgreaney Road. It serves the town of Arklow.
Appraisal	Stark, but somehow, elegant water tower. A fine example of mass concrete construction.

APPENDIX 11.4

NATIONAL ARCHIVES CENSUS RECORDS 1901 & 1911

PREPARED BY CRDS LTD.

1901 Census - www.census.nationalarchives.ie/

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status
Kinch	William	Ballynattin	59	M	Co Wicklow	Farmer	Church of Ireland	Read and w rite		Head of Family	Widow er
Kinch	Thomas	Ballynattin	24	M	Co Wicklow	Farmers Son	Church of Ireland	Read and w rite		Son	Not Married
Kinch	Jane	Ballynattin	22	F	Co Wicklow	Farmers Daughter	Church of Ireland	Read and w rite		Daughter	Not Married
Kinch	William	Ballynattin	20	M	Co Wicklow	Farmers Son	Church of Ireland	Read and w rite		Son	Not Married
Kinch	Maria	Ballynattin	18	F	Co Wicklow	Farmers Daughter	Church of Ireland	Read and w rite		Daughter	Not Married
Kinch	Alice	Ballynattin	16	F	Co Wicklow	Scholar	Church of Ireland	Read and w rite		Daughter	Not Married
Kinch	Gretta	Ballynattin	10	F	Co Wicklow	Scholar	Church of Ireland	Read and w rite		Daughter	Not Married
Ballynattin	**7**										

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status
Keegan	James	Bogland	30	M	Co Wexford	Farm Servant	Roman Catholic	Read and w rite		Head of Family	Married
Keegan	Elizabeth	Bogland	25	F	Co Wicklow		Roman Catholic	Read and w rite		Wife	Married
Keegan	Margaret	Bogland	5	F	Co Wicklow	Scholar	Roman Catholic	Cannot read		Daughter	Not Married
Keegan	Eliza	Bogland	3	F	Co Wicklow	Scholar	Roman Catholic	Cannot read		Daughter	Not Married
Keegan	John	Bogland	2	M	Co Wicklow	Scholar	Roman Catholic	Cannot read		Son	Not Married
Bogland	**5**										

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status
Murphy	John	Ballintombay	38	M	Co Wicklow	Herd	Roman Catholic	Read and w rite		Head of Family	Married
Murphy	Kate	Ballintombay	35	F	Co Wicklow		Roman Catholic	Read and w rite		Wife	Married
Murphy	Martin	Ballintombay	4	M	Co Wicklow	Scholar	Roman Catholic	Cannot read		Son	Not Married
Murphy	Catherine	Ballintombay	3	F	Co Wicklow	Scholar	Roman Catholic	Cannot read		Daughter	Not Married
Murphy	Sarah	Ballintombay	2	F	Co Wicklow		Roman Catholic	Cannot read		Daughter	Not Married
Murphy	Michael	Ballintombay	0	M	Co Wicklow		Roman Catholic	Cannot read		Son	Not Married
Kerw an	Mary	Ballintombay	18	F	Co Wicklow	Domestic	Roman Catholic	Read and w rite		Servant	Not Married
Conw ay	Annie	Ballintombay	37	F	Co Wicklow		Roman Catholic	Read		Sister in Law	Not Married
Byrne	Christopher	Ballintombay	44	M	Co Wicklow	Farmer	Roman Catholic	Read and w rite		Head of Family	Not Married
Byrne	Sarah	Ballintombay	42	F	Co Wicklow	Farmers Sister	Roman Catholic	Read and w rite		Sister	Not Married
Byrne	Andrew	Ballintombay	40	M	Co Wicklow	Farm Labourer	Roman Catholic	Read and w rite		Brother	Not Married
Byrne	Michael	Ballintombay	38	M	Co Wicklow	Farm Labourer	Roman Catholic	Read and w rite		Brother	Not Married
Birthistle	Mary	Ballintombay	55	F	Co Wexford	House Keeper	Roman Catholic	Read and w rite		Head of Family	Widow
Doyle	Charles	Ballintombay	25	M	Co Wexford	Farm Labourer	Roman Catholic	Read and w rite		Servant	Not Married
Brien	Eliza	Ballintombay	30	F	Co Wicklow	Domestic Servant	Roman Catholic	Read and w rite		Servant	Not Married
Ballintombay	**15**										

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status
OBrien	Elizabeth	Cooladangan	75	F	Co Wicklow	Housekeeper	Roman Catholic	Read and w rite		Head of Family	Widow
OBrien	Valentine	Cooladangan	45	M	Co Wicklow	Farmer	Roman Catholic	Read and w rite		Son	Not Married
OBrien	Ellen	Cooladangan	40	F	Co Wicklow	Farmers Daughter	Roman Catholic	Read and w rite		Daughter	Not Married
OBrien	Elizabeth	Cooladangan	39	F	Co Wicklow	Farmers Daughter	Roman Catholic	Read and w rite		Daughter	Not Married
OBrien	Annie	Cooladangan	35	F	Co Wicklow	Farmers Daughter	Roman Catholic	Read and w rite		Daughter	Not Married
OBrien	John	Cooladangan	32	M	Co Wicklow	Farmer	Roman Catholic	Read and w rite		Son	Not Married
Murray	James	Cooladangan	44	M	Co Wicklow	J.P.Coroner Farmer	Roman Catholic	Read and w rite		Head of Family	Married
Murray	Ellen	Cooladangan	39	F	Co Wicklow		Roman Catholic	Read and w rite		Wife	Married
Murray	Rose	Cooladangan	11	F	Co Wicklow	Scholar	Roman Catholic	Read and w rite		Daughter	Single
Murray	Clare	Cooladangan	8	F	Co Wicklow	Scholar	Roman Catholic	Read and w rite		Daughter	Single
Murray	Kathleen	Cooladangan	3	F	Co Wicklow	Scholar	Roman Catholic	Cannot read		Daughter	Single
Murray	Daniel	Cooladangan	1	M	Co Wicklow	Farmer's Son	Roman Catholic	Cannot read		Son	Single
Murray	Laurence	Cooladangan	38	M	Co Wexford	Farm Servant	Roman Catholic	Read and w rite		Servant	Single
Lyons	Thomas	Cooladangan	25	M	Co Wicklow	Farm Servant	Roman Catholic	Read and w rite		Servant	Single
Mc Manus	Ellen	Cooladangan	28	F	Co Wicklow	Domestic Servant	Roman Catholic	Read and w rite		Servant	Widow
Byrne	Julia	Cooladangan	16	F	Co Wicklow	Domestic Servant	Roman Catholic	Read and w rite		Servant	Single
Kennedy Kavanagh	Bridget	Cooladangan	74	F	Co Wicklow	Housekeeper	Roman Catholic	Cannot read		Head of Family	Widow
Kavanagh	James	Cooladangan	50	M	Co Wicklow	Farm Labourer	Roman Catholic	Read and w rite		Son	Not Married
Kavanagh	Anne	Cooladangan	48	F	Co Wicklow	Domestic	Roman Catholic	Read and w rite		Daughter	Not Married
Cooladangan	**19**										

Total	**46**

1911 Census - www.census.nationalarchives.ie/

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status	Years Married	Children Born	Children Living
Kinch	William	Ballynattin	63	M	Co Wicklow	Farmer	Church of Ireland	Read and write		Head of Family	Married			
Kinch	Jane	Ballynattin	64	F	Co Wicklow	Housekeeper	Church of Ireland	Read and write		Wife	Married	30	11	8
Kinch	Jane	Ballynattin	27	F	Co Wicklow	Farmers Daughter	Church of Ireland	Read and write		Daughter	Single			
Kinch	Allice	Ballynattin	23	F	Co Wicklow	Farmers Daughter	Church of Ireland	Read and write		Daughter	Single			
Kinch	Gretta	Ballynattin	18	F	Co Wicklow	Scholar	Church of Ireland	Read and write		Daughter	Single			
Kinch	Wm	Ballynattin	25	M	Co Wicklow	Farmers Son	Church of Ireland	Read and write		Son	Single			
Sande Hand	Mary	Ballynattin	27	F	Co Wexford	Domestic Servant	R Catholic	Read and write		Servant	Single			
Kavanagh	Peter	Ballynattin	33	M	Co Wicklow	Agricultural Labourer	R Catholic	Cannot read or write		Head of Family	Married			
Kavanagh	Julia	Ballynattin	36	F	Co Wicklow	Housekeeper	R Catholic	Read and write		Wife	Married	6	2	2
Kavanagh	Elizabeth	Ballynattin	4	F	Co Wicklow	Scholar	R Catholic	Cannot read or write		Daughter	Single			
Kavanagh	John	Ballynattin	1	M	Co Wicklow		R Catholic			Son				
Ballynattin	**11**				**1901**	**7**		**Difference**	**4**					

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status	Years Married	Children Born	Children Living
Keegan	James	Bogland	50	M	Co Wexford	Caretaker	Roman Catholic	Read and write		Head of Family	Married			
Keegan	Bessie	Bogland	36	F	Co Wicklow	Housekeeper	R Catholic	Read and write		Wife	Married	17	9	8
Keegan	Lizzie	Bogland	13	F	Co Wicklow	Scholar	R Catholic	Read and write		Daughter	Single			
Keegan	John	Bogland	12	M	Co Wicklow	Scholar	R Catholic	Read and write		Son	Single			
Keegan	James	Bogland	10	M	Co Wicklow	Scholar	R Catholic	Read and write		Son	Single			
Keegan	Richard	Bogland	9	M	Co Wicklow	Scholar	R Catholic	Read		Son	Single			
Keegan	Edward	Bogland	7	M	Co Wicklow	Scholar	R Catholic	Cannot read		Son	Single			
Keegan	Mary	Bogland	5	F	Co Wicklow	Scholar	R Catholic	Cannot read		Daughter	Single			
Keegan	Gregaory	Bogland	0	M	Co Wicklow		R Catholic	Cannot read		Son				
Bogland	**9**				**1901**	**5**		**Difference**	**4**					

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status	Years Married	Children Born	Children Living
Byrne	Christopher	Ballintombay	50	M	Co Wicklow	Farmer	R Catholic	Read and write		Head of Family	Single			
Reynolds	Patrick	Ballintombay	38	M	Wexford	Caretaker	Roman Catholic	Read and write	English	Head of Family	Married			
Reynolds	Mary	Ballintombay	25	F	Wexford	House Keeper	Roman Catholic	Read and write	English	Wife	Married	3	1	1
Reynolds	James	Ballintombay	2	M	Wicklow		Roman Catholic			Son				
Woolahan	Bridget	Ballintombay	74	F	Co Wicklow	Housekeeper	R Catholic	Cannot read or write		Head of Family	Widow			
Woolahan	Myles	Ballintombay	33	M	Co Wicklow	Railw ayman Labourer	R Catholic	Read and write		Son	Single			
Kough	Patrick	Ballintombay	45	M	Co Wexford	Farmer	R Catholic	Read and write		Head of Family	Married			
Kough	Anastalia	Ballintombay	35	F	Co Wicklow		R Catholic	Read and write		Wife	Married	2	1	1
Kough	Annie M	Ballintombay	1	F	Co Wicklow		R Catholic			Daughter				
Brien	Mary	Ballintombay	20	F	Co Wexford	Domestic Servant	R Catholic	Read and write		Servant	Single			
Ballintombay	**10**				**1901**	**15**		**Difference**	**-5**					

Surname	Forename	Townland/Street	Age	Sex	Birthplace	Occupation	Religion	Literacy	Irish Language	Relation to Head of Household	Marital Status	Years Married	Children Born	Children Living
Murray	James	Cooladangan	54	M	Co Wicklow	I P Coranes and Farmer	Roman Catholic	Read and write		Head of Family	Married	29		
Murray	Ellen Mary	Cooladangan	49	F	Co Wicklow		Roman Catholic	Read and write		Wife	Married	29	13	10
Murray	James J	Cooladangan	23	M	Co Wicklow	Bookeeper	Roman Catholic	Read and write		Son	Single			
Murray	Rose Mary	Cooladangan	21	F	Co Wicklow		Roman Catholic	Read and write		Daughter	Single			
Murray	Mary Clare	Cooladangan	18	F	Co Wicklow		Roman Catholic	Read and write		Daughter	Single			
Murray	Kathleen Mary	Cooladangan	13	F	Co Wicklow	Scholar	Roman Catholic	Read and write		Daughter	Single			
Murray	Daniel Joseph	Cooladangan	11	M	Co Wicklow	Scholar	Roman Catholic	Read and write		Son	Single			
Murray	Patrick Joseph	Cooladangan	8	M	Co Wicklow	Scholar	Roman Catholic	Read and write		Son	Single			
Murray	Eileen Mary	Cooladangan	6	F	Co Wicklow	Scholar	Roman Catholic	Cannot read		Daughter	Single			
Murray	Margaret Mary	Cooladangan	3	F	Co Wicklow	Scholar	Roman Catholic	Cannot read		Daughter	Single			
Murray	Emily Mary	Cooladangan	1	F	Co Wicklow		Roman Catholic	Cannot read		Daughter				
Hannon	Richard	Cooladangan	23	M	Co Wicklow	Farm Servant	Roman Catholic	Read and write		Servant	Single			
Kavanagh	Murtagh	Cooladangan	32	M	Co Wicklow	Farm Servant	Roman Catholic	Read		Servant	Single			
Maulter	Agnes	Cooladangan	16	F	Co Wexford	Domestic Servant	Roman Catholic	Read and write		Servant	Single			
Murray	Hugh	Cooladangan	62	M	Co Wexford	Farmer	R Catholic	Read and write		Head of Family	Married			
Murray	Johanna M	Cooladangan	62	F	Co Wexford	Housekeeper	R Catholic	Read and write		Wife	Married	17	1	
Wall	Mary	Cooladangan	27	F	Co Wexford	Domestic Servant	R Catholic	Read and write		Servant	Single			
Curran	James	Cooladangan	32	M	Co Wexford	Agricultural Labourer	R Catholic	Read and write		Servant	Single			
Kinsalla	James	Cooladangan	40	M	Co Wexford	Agricultural Labourer	R Catholic	Cannot read or write		Servant	Married			
Cooladangan	**19**				**1901**	**19**		**Difference**	**0**					

Total	**49**				**1901**	**46**		**Difference**	**3**					

APPENDIX 11.5

EXTRACTS FROM THE WICKLOW COUNTY COUNCIL DRAFT DEVELOPMENT PLAN (CHAPTER 8 – HERITAGE)

PREPARED BY CRDS LTD.

The following are extracts from the Wicklow County Development Plan 2021-2027 (2022-2028) (https://consult.wicklow.ie/en/consultation/draft-wicklow-county-development-plan-2021-2027/chapter/chapter-8-built-heritage):

CHAPTER 8
BUILT HERITAGE

8.0 Introduction

The purpose of this chapter is to set out strategies and objectives with regard to the built heritage of the County. The maps and schedules associated with this chapter are presented at the end of the chapter.

The built heritage of Wicklow refers to all man-made features, buildings or structures in the environment. This includes a rich and varied archaeological and architectural heritage to be found throughout the countryside and within the historic towns and villages of the county.

Archaeological sites, features and objects both above and below ground, or underwater are evidence of human settlement from our earliest ancestors down to more recent centuries and provide information on how people in the area lived, worked and died.

The architectural heritage relates to visible structures or buildings above ground of special value locally, regionally, nationally or even internationally. It covers many different building types, such as domestic houses, churches and shop premises but also includes other built elements such as bridges, piers, roads, engine houses, railways, holy wells, boundary walls to large estates, millraces, sluices and street furniture.

The architectural and archaeological heritage of a town, village or place contributes greatly to the distinctive character of each local area. The Council is committed to safeguarding this heritage so that future generations may also enjoy this inheritance. This can be achieved by sensitively managing changes that occur to this heritage and by ensuring that significant elements, features or sites are retained.

Built Heritage Strategy

- To ensure that the protection and conservation of the built heritage of Wicklow is an integral part of the sustainable development of the county and safeguard this valuable, and in many instances, non-renewable resource through proper management, sensitive enhancement and appropriate development;
- To safeguard archaeological sites, monuments, objects and their settings above and below ground and water listed in the Record of Monuments and Places (RMP), and any additional newly discovered archaeological remains;
- To identify and protect archaeologically sensitive historic landscapes;
- To ensure the protection of the architectural heritage of Wicklow through the identification of Protected Structures, the designation of Architectural Conservation Areas, the safeguarding of designed landscapes and historic gardens, and the recognition of structures and elements that contribute positively to the vernacular and industrial heritage of the County; and
- To support the actions in the County Wicklow Heritage Plan, in order to enhance the understanding, appreciation and protection of Wicklow's built heritage.

Industrial heritage refers to such structures as mills, watermills, windmills, roads, bridges, railways, canals, harbours, dams and features associated with utility industries such as water, gas and electricity. It is an important part of Wicklow's socio economic history and contributes greatly to the interest of the Wicklow landscape.

County Wicklow has a long and rich heritage of mining, starting in the Bronze Age and continuing until the 20th century. This mining was principally for copper and lead as well as lesser amounts of sulphur, iron, ochre, gold, silver and zinc. The main areas of mining activity were the Avoca Valley, Glendalough and Glendasan Valleys and in Glenmalure. Much evidence remains at each of these sites of former mining activity in the form of engine houses, machinery, adits, spoil heaps and drainage channels.

A particularly unique piece of Wicklow heritage is the Military Road, a feat of engineering developed to open up rebel territory, previously remote and only accessible with great difficulty. This road, which ran from Rathfarnham in south County Dublin to Aghavannagh in the south of County Wicklow, and with a spur running from Glencree to Enniskerry, took nine years to complete between 1800-1809. Security was a priority and barracks were constructed along the route of the road to ensure public safety and transport security.

8.5 Built Heritage Objectives

Archaeology Objectives

CPO 8.1 To secure the preservation of all archaeological monuments included in the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, and of sites, features and objects of archaeological interest generally. In the development management process, there will be a presumption of favour of preservation in-situ or, as a minimum, preservation by record. In securing such preservation the planning authority will have regard to the advice and recommendations of the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht.

CPO 8.2 No development in the vicinity of a feature included in the Record of Monuments & Places (RMP) or any other site of archaeological interest will be permitted which seriously detracts from the setting of the feature or which is seriously injurious to its cultural or educational value.

CPO 8.3 Any development that may, due to its size, location or nature, have implications for archaeological heritage (including both sites and areas of archaeological potential / significance as identified in Schedules 08.01 & 08.02 and Maps 8.01 & 8.02 of this plan) shall be subject to an archaeological assessment.

CPO 8.4 To require archaeological assessment for all developments with the potential to impact on the archaeological heritage of riverine, intertidal or sub tidal environments.

CPO 8.5 To facilitate public access to National Monuments in State or Local Authority care, as identified in Schedule 08.02 and Map 8.02 of this plan.

CPO 8.6 To protect the integrity of Baltinglass Hills archaeological landscape including identified monuments and their wider setting by resisting development that may adversely impact upon the significance and understanding of this important landscape.

CPO 8.7 To support the inscription of Glendalough to Ireland's tentative UNESCO World Heritage Site list and promote a conservation led approach to facilitating visitor access and enjoyment of this internationally significant landscape.

CPO 8.8 To protect and promote the characteristics of historic towns in County Wicklow identified as zones of archaeological potential in the Record of Monuments and Places (RMP), ensuring that cognisance is given in relevant development proposals to retaining existing street layout, historic building lines and traditional plot widths where these derive from medieval or earlier origins.

CPO 8.9 To protect and promote the conservation of historic burial grounds (those that are generally no longer in use but which may contain sites and features on the Record of Monuments and Places (RMP) and/or RPS) and support greater public access to these where possible.

Architectural Heritage Objectives

CPO 8.10 To protect, conserve and manage the built heritage of Wicklow and to encourage sensitive and sustainable development to ensure its preservation for future generations.

CPO 8.11 To support the work of the National Inventory of Architectural Heritage (NIAH) in collecting data relating to the architectural heritage, including the historic gardens and designed landscapes, of the County, and in the making of this information widely accessible to the public, and property owners.

CPO 8.12 To have regard to 'Architectural Heritage Protection: Guidelines for Planning Authorities' (Department of Arts, Heritage and the Gaeltacht, 2011) in the assessment of proposals affecting architectural heritage.

Record of Protected Structures Objectives

CPO 8.13 To ensure the protection of all structures, items and features contained in the Record of Protected Structures.

CPO 8.14 To positively consider proposals to alter or change the use of protected structures so as to render them viable for modern use, subject to architectural heritage assessment and to demonstration by a suitably qualified Conservation Architect / or other relevant expertise that the structure, character, appearance and setting will not be adversely affected and suitable design, materials and construction methods will be utilised.

CPO 8.15 All development works on or at the sites of protected structures, including any site works necessary, shall be carried out using best heritage practice for the protection and preservation of those aspects or features of the structures / site that render it worthy of protection.

CPO 8.16 To support the re-introduction of traditional features on protected structures where there is evidence that such features (e.g. window styles, finishes etc) previously existed.

CPO 8.17 To strongly resist the demolition of protected structures or features of special interest unless it can be demonstrated that exceptional circumstances exist. All such cases will be subject to full heritage impact assessment and mitigation.

Other Structures & Vernacular Architecture Objectives

CPO 8.18 To seek (through the development management process) the retention, conservation, appropriate repair and reuse of vernacular buildings and features such as traditional dwellings and outbuildings, historic shopfronts, thatched roofs and historic features such as stonewalls and milestones. The demolition of vernacular buildings will be discouraged.

CPO 8.19 Development proposals affecting vernacular buildings and structures will be required to submit a detailed, true measured survey, photographic records and written analysis as part of the planning application process.

CPO 8.20 Where an item or a structure (or any feature of a structure) is considered to be of heritage merit (where not identified in the RPS[2]), the Planning Authority reserves the right to refuse permission to remove or alter that structure / item, in the interests of the protection of the County's architectural heritage.

Architectural Conservation Area Objectives

CPO 8.21 Within Architectural Conservation Areas, all those buildings, spaces, archaeological sites, trees, street furniture, views and other aspects of the environment which form an essential part of their character, as set out in their character appraisals, shall be considered for protection. The repair and refurbishment of existing buildings within the ACA will be favoured over demolition/new build in so far as practicable.

CPO 8.22 The design of any development in Architectural Conservation Areas, including any changes of use of an existing building, should preserve and / or enhance the character and appearance of the Architectural Conservation Area as a whole. Schemes for the conservation and enhancement of the character and appearance of Architectural Conservation Areas will be promoted. In consideration of applications for new buildings, alterations and extensions affecting Architectural Conservation Areas, the following principles will apply:

- Proposals will only be considered where they positively enhance the character of the ACA.
- The siting of new buildings should, where appropriate retain the existing street building line.
- The mass of the new building should be in scale and harmony with the adjoining buildings, and the area as a whole, and the proportions of its parts should relate to each other, and to the adjoining buildings.
- Architectural details on buildings of high architectural value should be retained wherever possible. Original features, which are important to a building's character such as window type, materials, detailing, chimneys, entrances and boundary walls, both within and outside the architectural conservation area should be retained where possible.
- A high standard of shopfront design relating sympathetically to the character of the building and the surrounding area will be required.
- The materials used should be appropriate to the character of the area. Planning applications in ACAs should be in the form of detailed proposals, incorporating full elevational treatment and colours and materials to be used.
- Where modern architecture is proposed within an ACA, the application should provide details (drawings and/or written detail) on how the proposal contributes to, or does not detract from the attributes of the ACA.

CPO 8.23 To consider the designation of further ACAs for towns and villages in County Wicklow, when preparing future local plans, and as deemed appropriate.

CPO 8.24 To establish, where it is considered appropriate, "Areas of Special Planning Control", if it is considered that all or part of an Architectural Conservation Area is of special importance to the civic life or the architectural, historical, cultural or social character of a town or village in which it is situated.

[2] The National Inventory of Architectural Heritage can sometimes be utilised as a source of information with regard to the architectural value of any such items or structures.

Historical & Cultural Heritage Objectives

CPO 8.25 To protect and facilitate the conservation of structures, sites and objects which are part of the County's distinct local historical and cultural heritage, whether or not such structures, sites and objects are included on the RPS.

CPO 8.26 To facilitate access to and appreciation of areas of historical and cultural heritage, through the development of appropriate trails and heritage interpretation, in association with local stakeholders and site landowners, having regard to the public safety issues associated with such sites.

CPO 8.27 To facilitate future community initiatives to increase access to and appreciation of railway heritage, through preserving the routes of former lines free from development.

CPO 8.28 Any road or bridge improvement works along the Military Road shall be designed and constructed with due regard to the history and notable features of the road (in particular its original support structures, route and alignment), insofar as is possible and reasonable given the existing transport function of the road.

APPENDIX 11.6

REFERENCES

PREPARED BY CRDS LTD.

- Eogan, G. 1965. A catalogue of Irish Bronze swords. Dublin: Stationery Office.
- Eogan, G. 1983. Hoards of the Irish Later Bronze Age. Dublin: University College Dublin.
- Eogan, G. 1994. The Accomplished Art, Gold and Gold working in Britain and Ireland during the Bronze Age. Oxford: Oxbrow Books.
- Harbison, P. 1968. Catalogue of Irish Early Bronze Age associated finds containing copper or bronze. Proceedings of the Royal Irish Academy 67C, 35-91.
- Harbison, P. 1969a. The daggers and the halberds of the Early Bronze Age in Ireland. Prähitorische Bronzefunde, Abteilung VI, Band 1. C.H. Munich: Beck.
- Harbison, P. 1969b. The axes of the Early Bronze Age in Ireland. Prähitorische Bronzefunde, Abteilung IX, Band 1. Munich.
- Lewis, S. 1837. Topographical Dictionary of Ireland, 2 vols. London: S. Lewis & Co.
- Nicholls, J, 2011. The Hub Phase 2, Bracetown Business Park, Co. Meath (Target report from geophysical survey TAG09011, detection license 09R0058).
- Nicholls, J, 2020. Wicklow Data Centre, Bogland & Kish Townlands, Arklow, County Wicklow (Target report from geophysical survey TAG2020IE4, detection license 20R0025).
- Raftery, B., 1983. A catalogue of Irish iron age antiquities. Marburg.
- Waddell, J. 1998. *The Archaeology of Prehistoric Ireland*, Galway University Press. Galway.

Online sources:

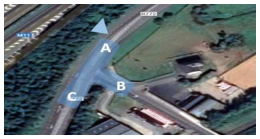
- www.archaeology.ie
- www.askaboutireland.ie/griffith-valuation
- www.buildingsofireland.ie
- www.downsurvey.tcd.ie/down-survey-maps.php#bm=Arklow&c=Wicklow
- www.excavations.ie
- www.google.com/maps
- www.nationalarchives.ie/
- www.osi.ie

APPENDIX 12.1

TRAFFIC SURVEY DATA

Survey Name :	ITS J-393 Echelon Dub 30
Site:	1
Date:	04/02/2020
Time:	07:00 - 19:00
Location:	52.7746535,-6.180021
Classification:	CAR, LGV, OGV1, OGV2, PSV, M/C, P/C.

Irish Traffic Surveys



	A => A								A => B								A => C							
TIME	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT
07:00	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	28	2	0	1	0	0	0	31
07:15	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4	22	7	1	6	0	0	1	37
07:30	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	22	5	3	1	0	1	0	32
07:45	0	0	0	0	0	0	0	0	21	1	0	0	0	0	0	22	42	11	2	2	1	0	0	58
H/TOT	0	0	0	0	0	0	0	0	29	2	0	0	0	0	0	31	114	25	6	10	1	1	1	158
08:00	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4	40	8	5	4	0	0	0	57
08:15	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	50	12	1	3	0	0	1	67
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	13	0	0	0	0	1	95
08:45	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	7	61	12	2	1	0	0	0	76
H/TOT	0	0	0	0	0	0	0	0	12	2	0	0	0	0	0	14	232	45	8	8	0	0	2	295
09:00	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5	68	6	3	0	0	0	0	77
09:15	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6	47	8	4	3	0	0	0	62
09:30	0	0	0	0	0	0	0	0	2	1	0	0	0	0	1	4	40	12	2	3	0	2	0	59
09:45	0	0	0	0	0	0	0	0	3	2	0	0	0	0	1	6	49	12	1	2	0	0	0	64
H/TOT	0	0	0	0	0	0	0	0	14	5	0	0	0	0	2	21	204	38	10	8	0	2	0	262
10:00	0	0	0	0	0	0	0	0	8	1	0	0	0	0	0	9	40	2	1	3	1	0	1	48
10:15	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	30	9	4	0	0	0	0	43
10:30	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	40	5	3	3	0	0	0	51
10:45	0	0	0	0	0	0	0	0	7	0	2	0	0	0	0	9	40	9	6	0	0	0	0	55
H/TOT	0	0	0	0	0	0	0	0	23	1	2	0	0	0	0	26	150	25	14	6	1	0	1	197
11:00	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6	48	4	5	3	0	0	0	60
11:15	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	10	39	12	1	0	0	0	1	53
11:30	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	38	14	2	6	0	0	0	60
11:45	0	0	0	0	0	0	0	0	6	3	0	0	0	0	0	9	36	6	2	1	2	0	0	47
H/TOT	0	0	0	0	0	0	0	0	26	4	0	0	0	0	0	30	161	36	10	10	2	0	1	220
12:00	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	57	8	1	3	0	0	0	69
12:15	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	47	6	0	2	0	0	3	58
12:30	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	68	8	3	1	0	0	0	80
12:45	0	0	0	0	0	0	0	0	7	0	0	0	0	0	1	8	66	8	1	4	1	2	0	82
H/TOT	0	0	0	0	0	0	0	0	20	0	0	0	0	0	1	21	238	30	5	10	1	2	3	289
13:00	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	48	5	1	1	0	0	0	55
13:15	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7	60	4	2	0	0	0	0	66
13:30	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	11	54	7	1	4	0	0	0	66
13:45	0	0	0	0	0	0	0	0	11	1	1	0	0	0	0	13	45	8	0	2	1	0	0	56
H/TOT	0	0	0	0	0	0	0	0	30	3	1	0	0	0	0	34	207	24	4	7	1	0	0	243
14:00	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	11	91	7	3	3	1	1	1	107
14:15	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	67	7	1	3	0	0	0	78
14:30	0	0	0	0	0	0	0	0	3	2	1	0	0	0	1	7	60	13	2	2	0	0	0	77
14:45	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	48	6	1	5	0	0	0	60
H/TOT	0	0	0	0	0	0	0	0	21	3	1	0	0	0	1	26	266	33	7	13	1	1	1	322
15:00	0	0	0	0	0	0	0	0	11	1	0	0	0	0	0	12	71	15	2	1	1	0	0	90
15:15	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	12	56	3	3	3	0	0	0	65
15:30	0	0	0	0	0	0	0	0	11	2	0	0	0	0	0	13	54	6	5	2	0	0	0	67
15:45	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9	64	5	3	2	1	0	0	75
H/TOT	0	0	0	0	0	0	0	0	43	3	0	0	0	0	0	46	245	29	13	8	2	0	0	297
16:00	1	0	0	0	0	0	0	1	4	3	0	0	0	0	1	8	84	12	1	6	0	0	0	103
16:15	0	0	0	0	0	0	0	0	9	2	0	0	0	0	0	11	84	21	3	2	1	0	0	111
16:30	0	0	0	0	0	0	0	0	10	2	0	0	0	0	0	12	87	16	0	3	0	0	0	106
16:45	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6	81	19	2	1	1	0	0	104
H/TOT	1	0	0	0	0	0	0	1	28	8	0	0	0	0	1	37	336	68	6	12	2	0	0	424
17:00	0	0	0	0	0	0	0	0	9	2	0	0	0	0	0	11	111	12	2	1	3	0	0	129
17:15	0	0	0	0	0	0	0	0	2	3	1	0	0	0	0	6	94	9	1	0	0	0	0	104
17:30	0	0	0	0	0	0	0	0	7	3	0	0	0	0	0	10	86	13	0	0	0	0	0	99
17:45	0	0	0	0	0	0	0	0	5	2	0	1	0	0	0	8	81	7	2	1	0	0	0	91
H/TOT	0	0	0	0	0	0	0	0	23	10	1	1	0	0	0	35	372	41	5	2	3	0	0	423
18:00	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5	69	5	0	0	2	0	0	76
18:15	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	73	5	0	0	0	1	0	79
18:30	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	8	52	2	0	1	0	0	0	55
18:45	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	25	2	0	0	0	0	0	27
H/TOT	0	0	0	0	0	0	0	0	14	4	0	0	0	0	0	18	219	14	0	1	2	1	0	237
12 TOT	1	0	0	0	0	0	0	1	283	45	5	1	0	0	5	339	2744	408	88	95	16	7	9	3367

B => A								B => B								B => C							
CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2	3	0	0	0	0	0	5	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	6
8	2	0	0	0	0	0	10	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	4
13	5	0	0	0	0	0	18	0	0	0	0	0	0	0	0	10	2	1	0	0	0	0	13
5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	7
4	1	1	0	0	0	0	6	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	4
5	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7
7	1	0	0	0	0	0	8	0	0	0	0	0	0	0	0	7	0	0	0	1	0	0	8
21	3	1	0	0	0	0	25	0	0	0	0	0	0	0	0	23	1	1	0	1	0	0	26
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
5	2	0	0	0	0	0	7	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	5
9	1	0	0	0	0	0	10	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4
25	4	0	0	0	0	0	29	0	0	0	0	0	0	0	0	11	3	0	0	0	0	0	14
7	1	1	0	0	0	0	9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
5	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7
17	2	1	0	0	0	1	21	0	0	0	0	0	0	0	0	11	1	0	0	0	0	0	12
8	0	1	0	0	0	0	9	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
4	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	5
6	2	0	0	0	0	0	8	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4
4	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	3	2	1	0	0	0	0	6
22	4	1	0	0	0	0	27	0	0	0	0	0	0	0	0	11	6	1	0	0	0	0	18
3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
1	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4
3	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	7
9	0	1	1	0	0	0	11	0	0	0	0	0	0	0	0	11	1	1	1	0	0	0	14
8	1	0	0	0	0	0	9	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7
7	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	3
5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
26	2	0	0	0	0	0	28	0	0	0	0	0	0	0	0	11	2	0	1	0	0	0	14
8	0	1	0	0	0	0	9	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	5
8	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	3
5	2	0	0	0	0	1	8	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	5
5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
26	2	1	0	0	0	1	30	0	0	0	0	0	0	0	0	11	3	1	1	0	0	0	16
6	0	1	0	0	0	1	8	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2
4	3	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5
5	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
18	5	1	0	0	0	1	25	0	0	0	0	0	0	0	0	6	3	0	1	0	0	0	10
6	0	1	0	0	0	0	7	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	5
22	2	0	0	0	0	0	24	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	8
3	2	0	0	0	0	1	6	0	0	0	0	0	0	0	0	6	4	0	0	0	0	0	10
33	4	1	0	0	0	1	39	0	0	0	0	0	0	0	0	21	8	0	0	0	0	0	29
4	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	8	2	0	0	0	0	0	10
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	6
7	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	8
5	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	7	3	0	0	0	0	0	10
22	3	0	0	0	0	0	25	0	0	0	0	0	0	0	0	24	10	0	0	0	0	0	34
16	2	0	0	0	1	0	19	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	7
4	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
8	1	0	0	0	0	0	9	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
5	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	5	0	0	0	1	0	39	0	0	0	0	0	0	0	0	9	3	0	0	0	0	0	12
265	39	7	1	0	1	4	317	0	0	0	0	0	0	0	0	159	43	5	4	1	0	0	212

C => A								C => B								C => C							
CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT
23	4	3	1	1	0	0	32	4	1	0	1	0	0	0	6	0	0	0	0	0	0	0	0
39	11	0	2	1	0	0	53	2	2	0	2	0	0	0	6	0	0	0	0	0	0	0	0
51	16	1	1	1	0	0	70	3	1	0	1	0	0	0	5	0	0	0	0	0	0	0	0
81	17	2	0	0	1	0	101	14	2	1	1	0	0	0	18	0	1	0	0	0	0	0	1
194	48	6	4	3	1	0	256	23	6	1	5	0	0	0	35	0	1	0	0	0	0	0	1
58	14	2	1	1	0	0	76	3	0	0	3	0	0	0	6	0	0	0	0	0	0	0	0
84	14	5	1	0	0	0	104	1	2	1	1	0	0	0	5	0	0	0	0	0	0	0	0
81	10	2	0	1	0	0	94	3	2	0	2	0	0	0	7	0	0	0	0	0	0	0	0
94	12	3	2	0	0	0	111	6	0	0	2	0	0	0	8	0	0	0	0	0	0	0	0
317	50	12	4	2	0	0	385	13	4	1	8	0	0	0	26	0	0	0	0	0	0	0	0
85	10	3	4	1	0	0	103	3	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0
60	9	5	2	0	0	0	76	4	1	0	2	0	0	0	7	1	0	0	0	0	0	0	1
48	3	2	3	0	1	1	58	1	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0
60	9	1	0	1	0	0	71	2	0	1	1	0	0	0	4	0	0	0	0	0	0	0	0
253	31	11	9	2	1	1	308	10	1	1	6	0	0	0	18	1	0	0	0	0	0	0	1
52	8	1	1	1	0	1	64	0	1	0	2	0	0	0	3	0	0	0	0	0	0	0	0
41	11	4	2	0	0	0	58	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
37	14	3	2	0	0	0	56	4	0	1	3	0	0	0	8	0	0	0	0	0	0	0	0
52	7	1	2	1	0	0	63	3	1	0	3	0	0	0	7	0	0	0	0	0	0	0	0
182	40	9	7	2	0	1	241	7	2	1	9	0	0	0	19	0	0	0	0	0	0	0	0
38	10	1	2	1	0	0	52	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
40	9	3	1	0	0	1	54	1	1	0	0	0	0	0	2	1	0	0	0	0	0	0	1
35	3	1	1	0	0	0	40	1	1	0	2	0	0	0	4	0	0	0	0	0	0	0	0
58	8	2	1	1	0	0	70	0	0	1	4	0	0	0	5	0	0	0	0	0	0	0	0
171	30	7	5	2	0	1	216	2	3	1	6	0	0	0	12	1	0	0	0	0	0	0	1
44	4	4	3	1	0	0	56	1	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0
40	9	2	2	0	0	0	53	1	1	1	3	0	0	0	6	0	0	0	0	0	0	0	0
50	7	1	3	0	0	0	61	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
37	5	2	0	0	0	0	44	2	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0
171	25	9	8	1	0	0	214	5	1	1	7	0	0	0	14	0	0	0	0	0	0	0	0
61	4	1	2	1	1	1	71	3	0	0	6	0	0	0	9	0	0	0	0	0	0	0	0
53	2	2	1	0	1	0	59	2	1	1	3	0	0	0	7	0	0	0	0	0	0	0	0
83	8	0	1	0	0	0	92	3	0	1	1	0	0	0	5	0	0	0	0	0	0	0	0
66	8	1	1	1	0	0	77	4	1	0	1	0	0	0	6	0	0	0	0	0	0	0	0
263	22	4	5	2	2	1	299	12	2	2	11	0	0	0	27	0	0	0	0	0	0	0	0
70	8	1	1	1	0	0	81	2	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0
57	10	2	1	0	0	0	70	2	3	0	3	0	0	0	8	0	0	0	0	0	0	0	0
55	9	1	3	0	0	3	71	2	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0
73	7	3	1	0	0	0	84	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
255	34	7	6	1	0	3	306	6	3	0	7	0	0	0	16	0	0	0	0	0	0	0	0
82	6	0	2	1	0	0	91	2	1	1	2	0	0	0	6	0	0	0	0	0	0	0	0
79	8	2	0	0	0	0	89	2	1	0	2	0	0	0	5	0	0	0	0	0	0	0	0
69	18	2	1	0	0	0	90	2	2	0	6	0	0	0	10	0	0	0	0	0	0	0	0
64	13	5	0	1	0	0	83	3	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0
294	45	9	3	2	0	0	353	9	4	1	11	0	0	0	25	0	0	0	0	0	0	0	0
65	19	2	1	1	0	0	88	0	2	0	2	0	0	0	4	0	0	0	0	0	0	0	0
71	8	2	1	0	0	2	84	2	1	0	2	0	0	0	5	0	0	0	0	0	0	0	0
90	18	2	2	0	0	0	112	4	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0
79	21	3	1	0	0	0	104	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0
305	66	9	5	1	0	2	388	6	4	0	5	0	0	1	16	0	0	0	0	0	0	0	0
70	12	1	0	0	0	1	84	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
112	19	2	1	0	0	0	134	3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0
78	12	0	0	0	0	0	90	6	2	0	0	0	0	0	8	0	0	0	0	0	0	0	0
82	15	2	0	1	1	0	101	6	2	0	0	0	0	0	8	0	0	0	0	0	0	0	0
342	58	5	1	1	1	1	409	17	5	0	0	0	0	0	22	0	0	0	0	0	0	0	0
72	12	0	0	1	0	0	85	8	1	0	0	0	0	0	9	0	0	0	0	0	0	0	0
66	12	0	0	0	0	0	78	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
52	7	0	0	0	0	0	59	2	2	0	0	0	0	0	4	0	0	0	0	0	0	0	0
26	3	0	0	0	0	0	29	1	2	0	0	0	0	0	3	0	0	0	0	0	0	0	0
216	34	0	0	1	0	0	251	12	5	0	1	0	0	0	18	0	0	0	0	0	0	0	0
2963	483	88	57	20	5	10	3626	122	40	9	76	0	0	1	248	2	1	0	0	0	0	0	3

Site Location

Site Location

	Job number: TRA/22/168	Job Date: Week Commencing Friday 10th June 2022	Drawing No: TRA/22/168-01	traffinomics.ie
	Client: CST Group		Author: SPW	

TRAFFINOMICS LIMITED

KISH CO. WICKLOW TRAFFIC COUNT **SUMMARY** **WEEK COMMENCING:** **Friday 10 June 2022**
AUTOMATIC TRAFFIC COUNT **TRA/22/168**

SITE 01

LOCATION: L6187 Ballynattin Road, North of M11 Junction 21 - (Google Map s Ref: 52.774651, -6.183637)

SPEED SURVEY SUMMARY:

NORTHBOUND	85% Speed = 62.55 km/h, 95% Speed = 67.50 km/h, Median = 55.17 km/h	Maximum = 89.4 km/h, Minimum = 10.3 km/h, Mean = 54.8 km/h
SOUTHBOUND	85% Speed = 63.63 km/h, 95% Speed = 67.86 km/h, Median = 56.43 km/h	Maximum = 92.7 km/h, Minimum = 14.9 km/h, Mean = 56.1 km/h

VOLUMETRIC VEHICLE COUNTS:

Direction	Time	Friday 10 June 2022	Saturday 11 June 2022	Sunday 12 June 2022	Monday 13 June 2022	Tuesday 14 June 2022	Wednesday 15 June 2022	Thursday 16 June 2022	No. Vehicles	7 day Mean
NORTHBOUND	**07-19**	1069	585	487	962	1050	978	1028	6159	880
SOUTHBOUND	**07-19**	900	568	453	818	880	862	905	5386	769
NORTHBOUND	**00-00**	1229	749	625	1099	1231	1140	1239	7312	1045
SOUTHBOUND	**00-00**	1069	691	570	949	1042	1006	1072	6399	914

PEAK FLOW SUMMARY: 0 2298 1440 1195 2048 2273 2146 2311 2215.2

Peak	AM	IP	PM
Most Frequent Peak Hour	0800	1300	1700
Average Vehicles per Peak Hour	108	81	106

APPENDIX 13.1

CONFIRMATION OF FEASIBILITY CDS21001316

IRISH WATER 2022

Thamara Budal

4th Floor Adelphi Plaza
Upper George's Street
Dun Laoghaire
Co. Dublin

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

4 January 2022

Re: CDS21001316 pre-connection enquiry - Subject to contract | Contract denied

Connection for Business Connection of 3 unit(s) at Boglands, Arklow, Co. Wicklow

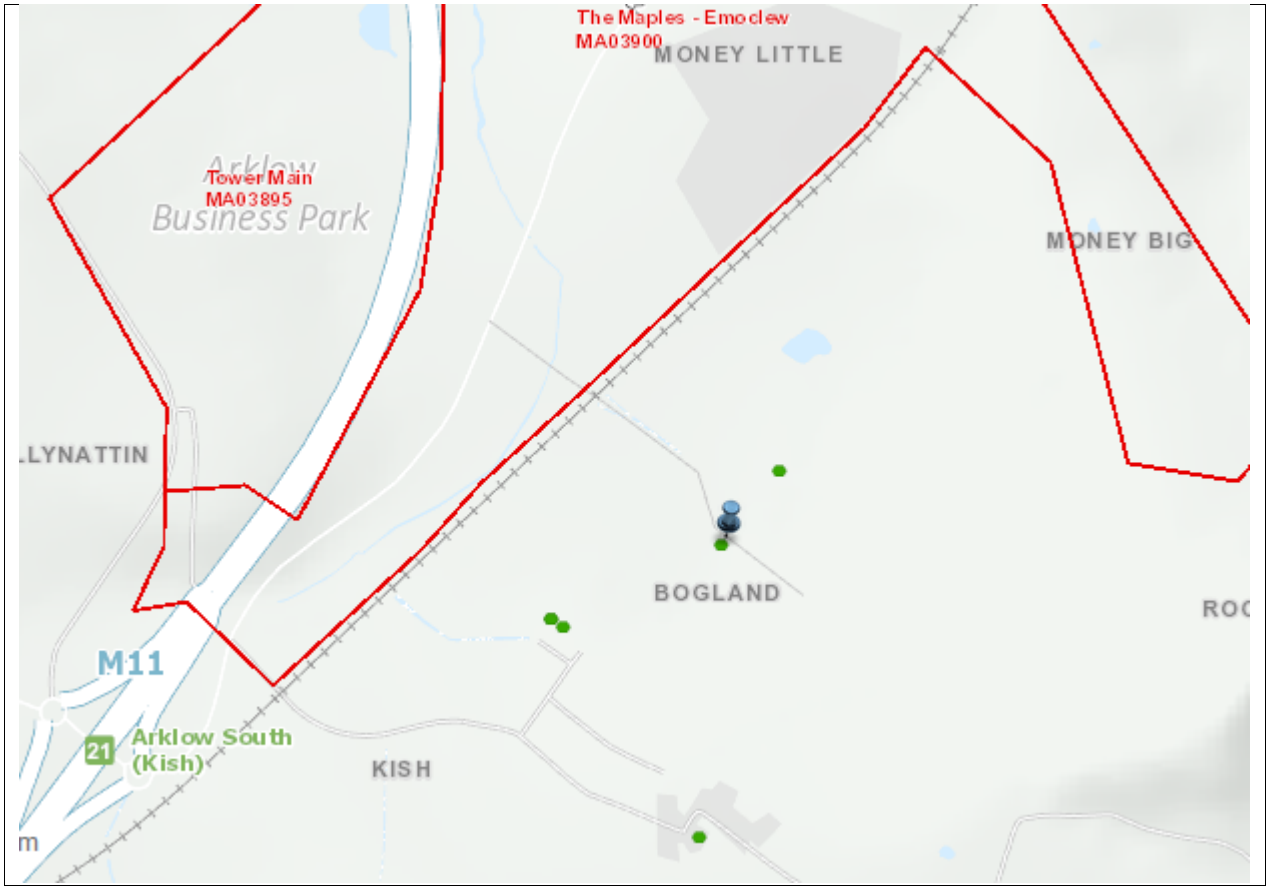
Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Boglands, Arklow, Co. Wicklow (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible Subject to upgrades
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	To connect this development to Irish Water's Water Network significant upgrades are required, this include the upsizing of approx. 50m of existing watermain to 150mm, and the construction of approx. 50m of new 150mm watermain, on site storage will also be required for this development.
Wastewater Connection	Should you wish to connect prior to completion of the Arklow WwTP onsite treatment will be required, treating to 25:35:125 BOD:TSS:COD. This on-site wwtw will not be taken over by IW and furthermore once wwtw is bypassed(when Arklow wwtw operational) the flows shall be fully discharged between 22.00 and 07:00, to balance loads to the new Irish Water wastewater treatment plant.

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:



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Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

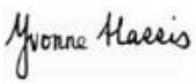
General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**

2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Patrick O'Neill from the design team on 01 89 25250 or email patoneil@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

APPENDIX 14.1

RESOURCE AND WASTE MANAGEMENT PLAN

AWN, 2022

awnconsulting

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
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RESOURCE & WASTE MANAGEMENT PLAN FOR A PROPOSED 110 KV SUBSTATION AND UNDERGROUND GRID CONNECTION ARKLOW, CO. WICKLOW

Report Prepared For

Crag Wicklow Limited

Report Prepared By

Niamh Kelly, Environmental Consultant
&
Chonaill Bradley, Principal Environmental Consultant

Our Reference

NK/227501.0241WMR01

Date of Issue

17 October 2022

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AWN Consulting Limited
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T Donnelly, T Hayes, D Kelly, E Porter

Document History

Document Reference		Original Issue Date	
NK/227501.0241WMR01		17 October 2022	
Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature		
Name	Niamh Kelly	Chonaill Bradley
Title	Environmental Consultant	Principal Environmental Consultant
Date	17 October 2022	17 October 2022

CONTENTS

Page

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Resource & Waste Management Plan (RWMP) on behalf of Crag Wicklow Ltd. The Proposed Development primarily comprises the provision of two no. 110kV transmission lines (Circuit Route A & Circuit Route B) and a 110kV Gas Insulated Switchgear (GIS) substation compound and Transformers / MV switch room compound along with associated and ancillary works.

This plan will provide information necessary to ensure that the management of Construction & Demolition (C&D) waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [4]. In particular, this Plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout a project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible

2.0 CONSTRUCTION & DEMOLITION RESOURCES AND WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998*, Changing Our Ways* [5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

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 entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, *'A Waste Action Plan for a Circular Economy'* [7] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) [8] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The Environmental Protection Agency (EPA) of Ireland issued '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* in November 2021 [9]*.* These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 [10]. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RWM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m^2; and

- Demolition projects generating in total less than 100m^3 in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 projects.

This development requires a RWMP as a Tier 2 development as it is above following criterion:

- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [11] , published by FÁS and the Construction Industry Federation in 2002 and the previous guildines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

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.

2.2 Regional Level

The proposed development is located in the Local Authority area of Wicklow County Council (WCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the WCC area published in May 2015. A new *National Waste Management Plan for a Circular Economy* is expected to be published in 2022 and will supersede the three current regional waste management plans in Ireland.

The current EMR Waste Management Plan sets out the following strategic 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.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The WCC *Wicklow County Development Plan 2016 – 2022* [12] 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 facilities necessary to achieve implementation of the objectives of the Regional Waste Management Plan.*

The Draft WCC *Wicklow County Development Plan 2022 – 2028* [13] sets out a number of policies and objectives for Wicklow County in line with National, Regional and County Objectives. The goals around waste aim to are to contribute to the three pillars of 'sustainable healthy communities', 'climate action' and 'economic opportunity'. The Solid Waste Management Objective are:

CPO 15.1 *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 to minimise waste generation and the plan to protect the environment with the safe and efficient disposal of waste from the site.*

CPO 15.2 *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).*

CPO 15.3 *To facilitate the development of existing and new waste prevention and recovery facilities and in particular, to facilitate the development of 'green waste' recovery sites.*

CPO 15.4 *To facilitate the development of waste-to-energy facilities, particularly the use of landfill gas and biological waste.*

CPO 15.5 *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 to promote reuse or for*

the recovery and disposal of household waste arising within its functional area.

CPO 15.6 *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 development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 as amended [14].

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act* as amended 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 recycling, recovery or disposal (including its method of 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 destination. 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 Developer ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and 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 and Amendments* or a Waste or Industrial Emissions 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 DESIGN APPROACH

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality,

buildability, second life and management post demolition and construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

The approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (buildings, structures, equipment, materials, soils, etc.);
- The potential for refurbishment and refit of existing structures or buildings rather than demolition and new build;
- Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the Client requirements; and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They should also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as ‘Just-in-Time’ delivery and use ordering procedures that avoid excessive waste. The Green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.;
    - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.;
- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using pre-cast hollow-core flooring instead of in-situ ready mix flooring or timber flooring to reduce the residual volumes of concrete/formwork and wood/packaging, respectively; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite . This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE DEVELOPMENT

4.1 Location, Size and Scale of the Development

The Proposed Development primarily comprises the provision of two no. 110kV transmission lines (Circuit Route A & Circuit Route B) and a 110kV Gas Insulated Switchgear (GIS) substation compound and Transformers / MV switch room compound along with associated and ancillary works and is described as follows:

The Proposed Development consists of three main components the 110 kV Substation Site, Circuit Route A, Circuit Route B these areas are described below.

<u>110kV Gas Insulated Switchgear (GIS) Substation</u>

Construction of a 2 storey 110kV Gas Insulated Switchgear (GIS) Substation to be located on lands at Kish and Boglands, to the south of Arklow, County Wicklow. The proposed comprises a 110kV Substation building that includes, cable room, battery room relay room, stair cores and circulation areas, welfare facilities, with an overall height of c. 14.5 m, a Client Control Building that of c. 6 m, and site infrastructure 4 no. transformer bays, fire walls (c. 10 m high), drainage works, all internal road/footpath access routes, landscaping

and boundary treatment works, vehicular access and provision of 8 no. car parking spaces in the overall compound. Disabled parking spaces and electric car charging ports are not proposed due to occupancy and usage of the substation. The proposed 110 kV Substation will serve the ICT Facility permitted under WCC Reg. Ref.: 201088.

The proposed 110 kV Substation layout is shown on Figure 2.2 below.

Cable Circuits and New Masts

The underground cable (Cable Circuit A) is a single circuit 110 kV cable and communications ducts and 5 joint bays that will follow a liner route of 2,934 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV overhead line. The 2,934 m route can be summarised as approximately:

- Extending to the north-west c. 434 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- c. 800 m in the existing carriageway ducting along the R772 to the M11 Junction 21.
- c. 300 m in carriageway through the M11 Junction 21 Proceeding to the northwest c. 1,400 m in the existing carriageway along the L6187.
- At the terminus the cable connects to the existing 110 kV overhead line via a proposed c. 17 m above ground level mast adjacent to Knockeneahan Road (L2190).

The underground cable (Cable Circuit B) is a single circuit 110 kV cable and communications ducts and 4 joint bays that will follow a liner route of 2,216 m; originating at the proposed 110 kV Substation and terminating at the existing 110 kV overhead line. The 2,216 m route can be summarised as approximately:

- Extending to the north-west c. 416 m from the proposed 110 kV Substation including a 103 m horizontal directional drilling (HDD) crossing under the Dublin-Rosslare rail line via.
- 158 m in farmland crossing, and carriageway ducting along the R772
- 142 m under the M11 via HDD
- 600 m in private road (IDA), and future development lands (IDA)
- 900 m in farmland
- At the terminus the cable connects to the existing 110 kV overhead line via a proposed c. 17 m above ground level mast adjacent to Knockeneahan Road (L2190).

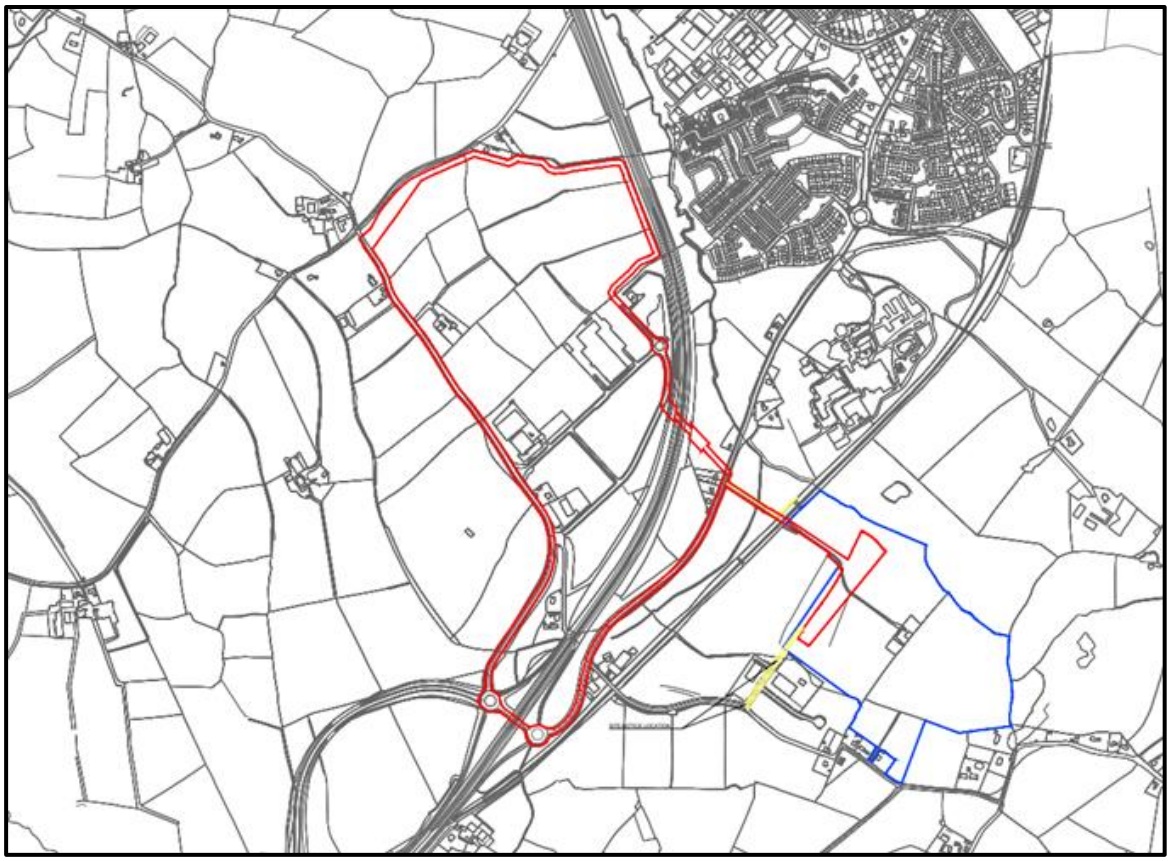

Figure 3.1 Proposed Site Location Map (Drawing Number: DUB30-02-ZZZ-L00-DR-RAU-AR-1001)

4.2 Details of the Non-Hazardous Wastes to be Produced

There will be soil and stone excavated to facilitate the installation of the transmission line, site levelling and construction of new foundations. It is estimated that c. 0.046 m^3 of material will be excavated to facilitate the proposed development. The 110 kV Substation site requires a net fill of 22,091 m^3. The recontouring of the 110 kV Substation lands will be undertaken as part of the ICT Facility permitted under WCC Reg. Ref.: 201088. The permitted ICT Facility required a net export of soil / stones. The proposed development will therefore utilise cut material from the ICT Facility site and will not require the importation of fill material.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, plastics, metals and waste from contractors generated. Plastic and cardboard waste from packaging and supply of materials will also 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 on site 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.

4.3 Potential Hazardous Wastes Arising

4.3.1 Contaminated Soil

Site investigations were undertaken in January/February 2020 by Ground Investigations Ireland (GII) within adjacent lands to the immediate East of the development area for the Permitted ICT Facility. These investigations consisted of 12 No trial pits (Table 5.1) and 4 no. boreholes.

Soil samples were compared with Waste Acceptance Criteria (WAC) and UK soil criteria based on land use. The WAC data provides assessment for suitability for disposal to landfill based on design of the landfill i.e. inert, Stable Non-reactive Hazardous Waste and Hazardous Waste Landfill. All samples were found to be below inert waste landfill criteria limits and no indications of contamination were recorded during the site investigation works.

If any potentially contaminated material is encountered, it will need to be segregated from clean / inert material, 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'* [15] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [16], which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify WCC and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel / oil, and 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.

4.3.3 Invasive Plant Species

A site walkover survey will take place prior to any excavations taking place of the proposed development site to determine the presence or absence of any Third Schedule invasive species. This will include a walkover of the entire site, and around part of the outside perimeter to search for any invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011. If any are detected during the construction phase of the development, then an invasive species management plan will be produced and submitted to WCC.

4.3.4 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, WEEE (containing hazardous components), printer toner / cartridges, batteries (Lead, Ni-Cd or Mercury) and / or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.0 ROLES AND RESPONSIBILITIES

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a RM should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client are the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site;
- The Client is to request the end-of-project RWMP from the Contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should also include data on waste types (e.g. waste characterisation data, contaminated land assessments,

site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Managing and valuing the demolition work with the support of quantity surveyors;
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future construction Contractors have not yet been decided upon for this RWMP. However, once select they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the RWMP throughout the construction phase (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines;
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;
- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) should be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6.0 KEY MATERIALS & QUANTITIES

6.1 Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information should be updated for these targets once these targets have been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that may be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m^3) of waste generated per construction value;

- Weight (tonnes) or Volume (m^3) of waste generated per construction floor area (m^2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

6.2 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 6.1. The List of Waste (LoW) code (applicable as of 1 June 2015) (also referred to as the European Waste Code (EWC)) for each waste stream is also shown.

Table 6.1 Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

** Individual waste type may contain hazardous substances*

6.3 Construction and Demolition Waste Generation

Table 6.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports* [17] and the joint *EPA & GMIT study* [18].

Table 6.2 Waste materials generated on a typical Irish construction site

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

The construction element of the proposed development will consist of the construction of a 110 KV substation and underground grid connection.

There will be no structural demolition associated with the proposed development. There will be the removal of a small section of redundant overhead line cable associated with the installation of the 2 no. new masts. This will generate waste metals (including their alloys), mixed metals, iron and steel, and cable.

Table 6.3, below, shows the estimated construction waste generation for the proposed development based on the area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated amounts for the main waste types (with the exception of soils and stones) are based on waste generation rate per m^2. These have been calculated from the schedule of development areas provided by the design team.

Table 6.3 Predicted on and off-site reuse, recycle and disposal rates for construction waste

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	44.0	10	4.0	80	35.0	10	4.0
Timber	37.0	40	15.0	55	21.0	5	2.0
Metals	13.0	5	4.0	90	8.0	5	1.0
Concrete	11.0	30	1.0	65	10.0	5	1.0
Other	8.0	20	2.0	60	5.0	20	0.0
Total	**113.0**		**26.0**		**79.0**		**8.0**

In addition to the waste streams in Table 6.3, it is estimated that c. 0.046 m^3 of material will be excavated to facilitate the proposed development. The 110 kV Substation site requires a net fill of 22,091 m^3. The recontouring of the 110 kV Substation lands will be undertaken as part of the ICT Facility permitted under WCC Reg. Ref.: 201088. The permitted ICT Facility required a net export of soil / stones. The proposed development will therefore utilise cut material from the ICT Facility site and will not require the importation of fill material.

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 proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

6.4 Proposed Resource and Waste Management Options

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, where feasible. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Dublin region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off- site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off- site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR / permit / licence for the receiving waste facility for all waste removed off- site for appropriate reuse, recycling, recovery and / or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals, if required.

The anticipated management of the main waste streams is outlined as follows:

Soil and Stone

The waste 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. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

It is envisaged that all excavated material will be reused on site. If material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 15 (By-products) (Previously Article 27 and referred to as Article 27 in this report) of European Union (Waste Directive) Regulations 2011-2020, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed

from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27. 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. Article 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Acts 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. 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 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).

Bedrock

While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off- site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on- site, the appropriate mobile waste facility permit will be obtained from WCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off- site.

Concrete Blocks, Bricks, Tiles & Ceramics

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. If concrete is to be crushed on- site, the appropriate mobile waste facility permit will be obtained from WCC.

Hard Plastic

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 disposed of in a separate skip and recycled off- site.

Metal

Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard

There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phases will be stored in a separate skip, pending collection for recycling. The site Manager 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 & Electronic Equipment (WEEE)

Any WEEE will be stored in dedicated covered cages / receptacles / pallets pending collection for recycling.

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 off- site.

Non-Recyclable Waste

C&D 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 8.0) 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.

Asbestos Containing Materials

Any asbestos or ACM found on- site should be removed by a suitably competent contractor and disposed of as asbestos waste. All asbestos removal work or encapsulation work must be carried out in accordance with *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.*

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if 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.

On-Site Crushing

It is currently not envisaged that the crushing of waste materials will occur on- site. However, if the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from WCC and the destination of the accepting waste facility will be supplied to the WCC waste unit.

6.5 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project Waste Manager (see Section 8.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RM (see Section 8.0) 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 waste COR / permit or EPA Waste / Industrial Emissions Licence for that site will be provided to the nominated project RM (see Section 8.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from DCC (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-Site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-Site waste management records.

All information will be entered in a waste management recording system to be maintained on-Site.

7.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

7.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle / recovery / disposal costs associated with the requirement for a waste contractor to take the material

off-Site. Clean and inert soils, gravel, stones, etc., which cannot be reused on-Site may be used as access roads or capping material for landfill sites, etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

7.2 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 charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

7.3 Disposal

Landfill charges 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 collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

8.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

8.1 Waste Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the RM to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM 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 RM 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 RWMP.

8.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the RM and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the RWMP 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 (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

9.0 TRACKING AND TRACING / RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log should be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC / LoW

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the WCC Waste Regulation Unit when requested.

Alternatively, each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility

Permits and Waste Licences will be maintained on site at all times and will be periodically checked by the RM. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

10.0 OUTLINE WASTE AUDIT PROCEDURE

10.1 Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the C&D phase of the proposed development. Contact details for the nominated RM will be provided to the WCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

10.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the construction phase of the proposed development.

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 recovery / reuse / recycling 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.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

11.0 CONSULTATION WITH RELEVANT BODIES

11.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the WCC Waste Regulation Unit.

WCC will also be consulted, as required, throughout the excavation and construction phases 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.

11.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by thw construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding 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.

12.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended.
2. Environmental Protection Agency Act 1992 amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
7. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020).
8. DCCAE, *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less*' (2021)
9. Environmental Protection Agency (EPA) *'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)*
10. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
11. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and* site *Managers* (2002).
12. Wicklow County Council (WCC), Wicklow County Development Plan 2016-2022 (2016).
13. WCC, Draft Wicklow County Development Plan 2022-2028 (2022).
14. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
15. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
16. 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.
17. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
18. EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).