2.6 Environmental Setting

2.6.1 Hydrology

The site is in the catchment of the Tolka River, whose main channel is approximately 3 km to the south of the site. There are no streams or water courses either on the site, on in the surrounding lands. The closest significant water feature is a tributary of the Tolka, which is approximately 15km to the south-east. The site is neither in nor adjacent to an area that is at risk of flooding and there are no records of any flood event either at, or in the vicinity of the site.

2.6.2 Geology & Hydrogeology

The subsoils in the west and south of the site and along the northern boundary comprise glacial tills, with gravels in the centre and east. The available site investigation information indicates the range in thickness from 1m in the west to more than 20m in the east. The underlying bedrock is a muddy limestone and is classed as a locally important aquifer.

2.6.3 Biodiversity

The development site had been used for agricultural purposes, with the western field used for animal grazing and the eastern one for tillage. The fields are no longer used for these purposes and are being recolonised by scrub and ruderal species. There are hedgerows/treelines along the southern and western boundaries and between the two fields, with hawthorn, blackthorn, elm and ash present. The nearest designated Natura 2000 Site the South Dublin Bay and River Tolka Estuary Special Protection Area, which is 8.0km to the south-east.

2.7 Archaeology

There are no known archaeological or cultural heritage features within the development boundary. Archaeological field surveys comprising the excavation of seven trial trenches at the locations shown on Figure 2.3 were carried out in 2021.

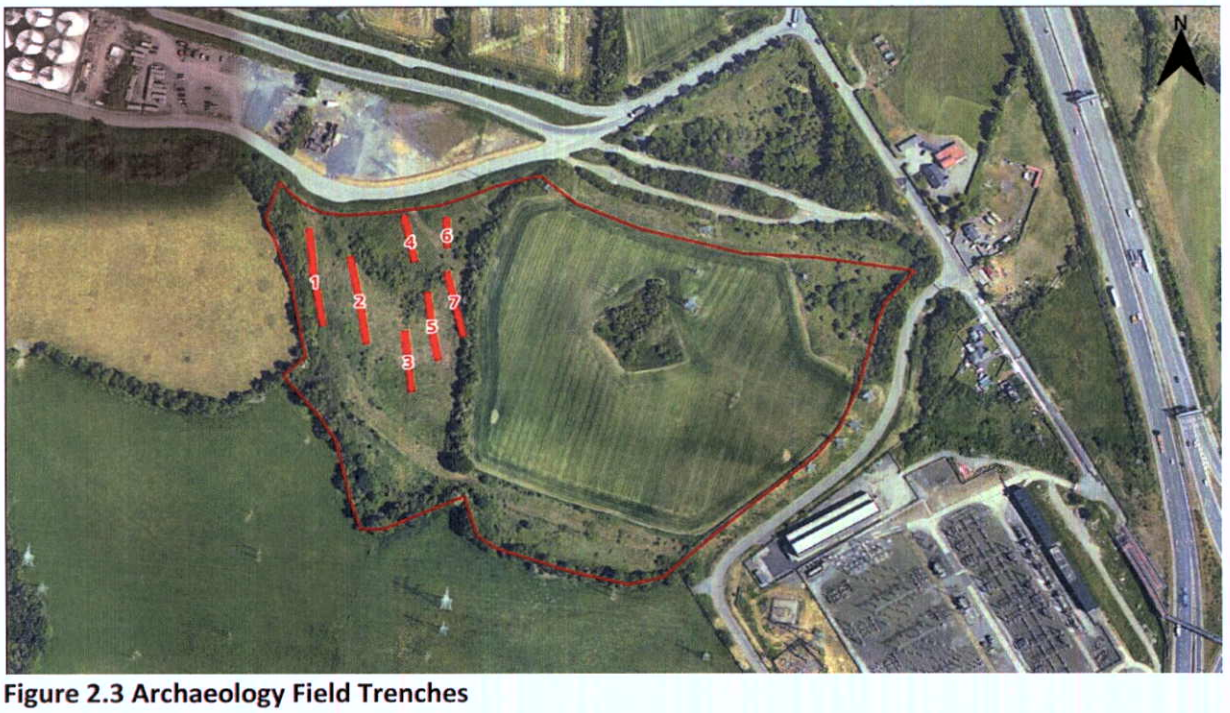

Figure 2.3 Archaeology Field Trenches

3. DEVELOPMENT DESCRIPTION

The proposed layout is shown Drawing No P001. The proposed development is Phase 1 of the proposed 9.655 ha Huntstown Circular Economy Hub (Hub). It comprises a Materials Recovery Facility (MRF) (5032m^2), a Food Container Cleaning Plant (5032m^2), paved open yards, weighbridge, car and bicycling parking areas, surface and foul water drainage systems and landscaping.

3.1 Building Design & Layout

3.1.1 Materials Recovery Facility

The building will be a steel portal frame structure with external preformed and profile sheeting on the walls and low pitch roof cladding. It will be 13.5 metres to the eves, with an upper ridge level of approximately 15 metres above ground level. Solar panels will be mounted on the roof and the edge of the roof will be surrounded by an anti-glint and glare parapet.

3.1.2 Food Container Cleaning Plant

The building will be a steel portal frame structure with external preformed and profile sheeting on the walls and low pitch roof cladding. It will be 12 metres to the eves, with an upper ridge level of 14 metres above ground level. There will be roof mounted solar panels surrounded by an anti-glint and glare parapet.

3.2 Services

3.2.1 Water Supply

Water for use in staff welfare facilities and the food container washing plant will be obtained from mains supply. Rainwater from the roofs of the MRF and the Food Container Cleaning Plant will be harvested for use as grey water in the staff toilets.

3.2.2 Wastewater

Sanitary wastewater from the staff toilets and treated wastewater from the washing plant will discharge to the Uisce Eireann foul sewer that runs along North Road.

3.2.3 Surface Water Drainage

Rainwater run-off from the building roofs will be harvested for on-site use. The car parking areas will have permeable paving. Run-off from the yards will be collected, passed through Class 1 Hydrocarbon Interceptor and discharged to ground via a soakaway.

Parapet level 92.700

5032m2 Tray Cleaning / Baling Facility.

Site 1.
9.655 hectares or thereabouts.

5032m2 Materials Recovery facility

Parapet level 93.840

HUNTSTOWN Td.

KILDONAN Td.

COLDWINTERS Td.

FINGLAS 220KV STATION

Site plan. O.S. Ref. Dublin 3131-01.

Scale:- 1: 500.

Site bounded by red line as shown.
Lands owned by applicant bounded by blue line.

Legend.

Proposec Pedestrian door.	PD
Proposec Lorry access door.	LD
Proposec Public lighting.	LP
Proposec Attenuation Area.	
Future access Connectivity route.	
Irish Water Permanent works area wayleave.	
Irish Water Temporary works area wayleave.	

Coyle
CIVIL & STRUCTURAL
No 3 High Street, Monaghan Town,
Co. Monaghan H18 X635
Tel: 047-72175
Website: www.coyles.ie
E-mail: info@coyles.ie

Project: Planning application to construct proposed new services industrial Units and vehicular parking areas, access roads and pedestrian footpaths, construct new entrance and all associated siteworks at Huntstown Td, Co. Fingal.

Client: Sretaw.

Sheet Title: Site plan.

Project No.		Date	
22-035		28-10-23.	
Drawing No: P001	Scale: As shown	Rev: M	Checked:

3.2.4 Electricity Supply

There will be a connection to the national grid and an electrical substation will be provided in the north east corner of the site. The electricity from the roof mounted solar panels will be used directly on site.

3.3 Development Phases

All of the key elements will be constructed in one phase.

4. CONSTRUCTION ACTIVITIES

4.1 Construction Programme

The works will comprise the following;

- Set up site office and contractors compound;
- Securing the site and erecting signage;
- Setting out;
- Stripping and stockpiling of topsoils;
- Provision of hardstand for delivery vehicles for unloading and turning;
- Provision of water, wastewater and stormwater services;
- Building and tank construction and paving, and
- Landscaping

4.2 Construction Schedule

The construction programme will be completed in three stages.

Stage 1 – Site Set Up

This will involve the provision of a temporary entrance off the Substation access road; site clearance, set up of site offices and contractors compound, provision of hardstand for vehicles, securing the site and erection of signage and will take one week.

Stage 2 – Site Clearance and Setting Out

This stage will involve the stripping and stockpiling of topsoils and grading to formation level and will take four weeks.

Stage 3 –Construction of new junction on the Substation access road, provision of internal roads and yards and the construction and fit out of the buildings along with the ancillary services and landscaping. This will be completed in approximately 65 weeks.

5. METHOD STATEMENT FOR CONSTRUCTION

5.1 Working Hours

The normal working hours shall be 07:00 to 19:00 Monday to Friday (excluding bank holidays) and 08:00 to 14:00 Saturdays, subject to restrictions that may be imposed by the planning permission. Works will not be carried out on Sundays and Public Holidays. Subject to the agreement of Fingal County Council out of hours activities may be required for certain elements.

5.2 Site Preparatory Works

Preparatory works involves Site Set Up by the Contractor which will include the following:

- Setting of access control to the development area and the erection of directional signage as specified in the Construction Stage Traffic Management Plan.
- All construction related traffic will access the site via the entrance off the access road to the Transmission Station.
- Provision of secure compound for the storage of all on-site machinery and materials.
- Construction of internal access roads.
- Provision of services and utilities, and
- Provision of security fencing and perimeter hoarding.

Prior to the commencement of construction, the Contractor will contact the relevant bodies (e.g. ESB, Eirgrid. Gas Networks Ireland, Uisce Eireann) and the landowner to check records and drawings to confirm the locations of existing buried services/utilities.

5.3 Construction Compound

The exact location of the compound will be confirmed in advance of commencement of the works (and agreed with Fingal County Council. The compound will include a site office and welfare facilities, hardstanding for plant and machinery and a designated waste storage area. Suitably robust fencing will be erected along the boundary.

It will be serviced with electrical power from an on-site generator and will include Portaloo toilet facilities. The generator will contain a built-in double contained fuel storage tank. All liquid chemicals will be stored in the construction compound in bunded storage areas.

5.4 Excavation Works

Topsoils and subsoils will be excavated to establish formation level for the buildings, roads and underground services, including the oil interceptors and surface water soakaways. Tracked 360-degree excavators will be used to strip the topsoil, and a dumper will be used to move the excavated materials to temporary stockpile locations from where surplus soils will be removed from the site.

5.5 Concrete Works

Concrete batching will not be carried out on-site. Excess concrete will be removed from the site and concrete washout will not be permitted on the site. Concrete pouring will be monitored to ensure there is no accidental discharge. Accidental spills will not be hosed down.

5.6 Surface Water/Drainage System

There are no surface water drains/water courses inside or adjacent to the site boundary.

5.7 Groundwater

The excavation works will not extend to below the water table and dewatering will not be required.

5.8 Materials – Source and Transportation

The selection and specification of construction materials will be informed by the local availability of these materials. Subject to the necessary constraints of performance, durability and cost, construction materials will be sourced from local suppliers and manufacturers, where possible.

5.9 Oils and Chemical Storage

All oils, fuels, paints and other chemicals will be stored in a secure, bunded, hardstand area. The bund capacity of the bulk oil storage tanks will at a minimum be 110% of the tank. For drum storage, a bund capacity of 25% of the maximum volume of material stored is required. The refuelling and servicing of mobile plant and equipment will only be carried out in a designated hardstand area, where oil spill containment and clean-up equipment will be maintained.

5.10 Traffic Management

A Traffic Management Plan (TMP) will be prepared prior to the start of the site clearance works. The Plan will take into consideration:

- Department of Transport Traffic Signs Manual 2021
- Department of Transport Guidance for the Control and Management of Traffic at Road Works (2010)
- Relevant conditions of the planning permission, and the

- Site Access

There will be a single site entrance. All construction and delivery traffic will access the site via the new junction. The traffic will include:

- Private vehicles use by construction site staff.
- Construction vehicles (excavators, cranes and dump trucks)
- Materials transport vehicles, typically heavy goods vehicles (HGV)

Many staff members will share transport and will generally arrive before 08:00 and leave after 18.00 thereby avoiding morning and evening peak hour traffic. There will, on average, be 5 HGV movement hourly at the busiest times.

The TMP will address the following

- Provision of Warning/Advanced Warning Signs at appropriate locations.
- Speed limits.
- Designated parking areas.
- Maintaining cleanliness of the public roads on the approaches to the site.

5.11 Health and Safety

As required by the Safety, Health and Welfare at Work (Construction) Regulations 2013, the Contractor appointed to complete the development will prepare a Health and Safety Plan that address site specific health and safety issues from the start to the completion of the construction.

The Contractor will provide 'Site Induction' training for all construction staff and ensure all site staff have current 'Safe Pass' cards. All construction staff will receive a full safety briefing and will be provided with all of the safety equipment required by their assigned tasks.

5.12 Site Security

The Contractor will be responsible for site security, including erecting and maintaining adequate fencing.

6. ENVIRONMENTAL PREVENTION & MITIGATION MEASURES

The Construction Stage involves site clearance, excavation, the construction of the processing and storage buildings, electrical sub-station, yards and roadways and the provision of the associated wastewater and surface water drainage systems. HGVs will deliver construction materials and the mobile plant will include excavators, lifting equipment, dumper trucks, compressors, and generators.

The construction works have the potential to impact on the environment through the generation of noise and dust and impacts on air quality, groundwater and ecology. The Main Contractor shall appoint an experienced Environmental Clerk of Works who will be responsible for ensuring the mitigation measures specified in this CEMP are effectively implemented throughout the Construction Stage. This will include the provision of staff induction training and regular 'toolbox' talks.

6.1 Noise & Vibration

The Main Contractor shall be responsible for compliance with the requirements of BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014 (Code of Practice for Noise and Vibration Control on Construction and Open Sites) and the Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 5 Noise and Vibration.

Although construction phase noise emissions will be short term and given the distance between the site and the nearest sensitive receptor (circa 1km) the following mitigation measures will be implemented.

- Works will in general be confined to the period Monday-Friday 0700-1900, and Saturday 8000-1400.
- Hooting will be prohibited onsite. Drivers of plant and vehicles will be instructed to avoiding hooting at all times.
- Plant used on-site will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers shall be immediately replaced.
- Plant items will only be left running during works and will be switched off at all other times. Plant will not be left idling.
- Selection of quiet plant/location of plant; plant which will have the least impact in term of noise will be selected and will be positioned as far away as practical from noise sensitive receptors.
- All vehicles and mobile plant will have effective exhaust silencers, and these will be subject to regular maintenance to ensure they remain fit for purpose. All diesel fuelled plant will have effective air intake silencers.
- Pneumatic percussive tools (air drills, hammers, rammers etc) will be fitted with the manufacturer's recommended mufflers or silencers.

- All noise complaints will be logged by the Clerk of Works in a register and investigated immediately. Details of follow-up action will be included in the register.

6.2 Air

6.2.1 Dust

Dust emissions are likely to arise from earthworks, wind blow from temporary soil stockpiles; construction traffic movements; handling of construction materials and landscaping. Given the distance between Phase 1 and the nearest sensitive receptor the risk of dust soiling at the nearest residences is low; however the following control measures will be implemented at a minimum:

- The Contractor shall prepare a site-specific Dust Management Plan prior to the start of the works.
- Spraying of exposed earthworks, soil stockpiles and site haul roads during dry weather using mobile bowser units.
- Provision of a power wash at the site entrance road to remove dirt from vehicles before they leave the site.
- Paved roads will be regularly swept to remove mud and debris and traffic movements on non-paved areas will be restricted to essential site traffic
- Control of vehicle speeds.
- Material drop heights from plant to plant or from plant to stockpile will be minimised.
- The junction on the access road to the Substation will be inspected daily for cleanliness and cleaned as required using a mechanical road sweeper.

6.2.2 Engine Exhaust Emissions

The following mitigation measures will be implemented

- Construction materials will where possible be sourced locally so as to minimise transport distances.
- Engines will be turned off when machinery is not in use, and
- Regular maintenance of vehicles, plant and equipment.

6.3 Land & Soil

The following mitigation measures will be implemented to minimise the risk of soil contamination:

- Excavation and the stripping of topsoil and subsoils will only be undertaken when absolutely necessary as this can lead to sediment run off and leaching of nutrients from soils into the groundwater.
- Excavated soils not immediately reused will be stockpiled to minimise the effects of weathering.
- Good housekeeping (daily site clean-ups, use of disposal bins, etc.) and the proper use, storage and disposal of substances and their containers.
- Regular plant maintenance to minimise oil leaks.
- Diesel fuelled plant refuelling will only be undertaken by trained personnel in areas where appropriate spill control materials are to hand (spill mats, oil dry). Any spillages will be immediately contained, and the contaminated soil excavated and sent to an appropriately licensed waste management facility.
- Pouring of cementitious materials will be carried out where possible in dry periods based on weather forecasts. Plastic covers will be available in case of a sudden rainfall event.
- The concrete pumping will be monitored to ensure no accidental discharge.
- Excess concrete will be removed from the site and concrete washout, with the exception of chute cleaning, will not be permitted on the site
- There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials

6.4 Water

There are no water courses or drains either inside or adjacent to the site boundary. The mitigation measures described in Section 6.3 are equally relevant to the protection of groundwater beneath the site.

6.5 Archaeology

- Prior to the start of the site clearance a suitably qualified and experienced Archaeologist shall be appointed to monitor all topsoil stripping/general ground reduction works in the areas of the site where field surveys were not completed in 2021.
- In the event of additional subsurface features of archaeological interest being uncovered during the monitoring, works in the immediate area of such features shall cease and the Archaeologist will seek the advice of the National Monuments Service, Department of Housing, Local Government and Heritage to determine what additional action should be implemented.

- Should additional archaeological/historical artefactual material be recovered during such works, then the Archaeologist will ensure that the requirements of the National Museum of Ireland with regard to such items should be implemented. This may include specialist archaeological identification and reporting and conservation, if required.

- Following completion of the combined programmes of archaeological excavation and monitoring, and any other possible archaeological interventions/investigations, the Archaeologist shall prepare a full and final report for submission to the Planning Authority and the Department of Housing, Local Government and Housing and National Museum of Ireland.

6.6 Biodiversity

All works will be confined to within the development site boundary. A minimum 2 m buffer shall be maintained between all working, storage and parking areas and the treelines along the western and southern boundary.

6.6.1 Lighting

- Site lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area and

- Site lighting will be positioned and directed so that it does not unnecessarily intrude on adjacent ecological receptors. The primary area of concern is the potential impact at the woodland and treelines. There will be no directional lighting focused towards these areas and cowling and focusing lights downwards will minimise light spillage.

6.6.2 Habitats

- Where possible the hedgerows will be removed outside the period 1st March to 31st August.

- The mitigation measures to protect the trees that will be retained shall comply with Arboriculture Method Statement for works within the root protection area of the tree

- Tree and shrub planting and the management of landscaping works will be undertaken by a suitably qualified landscape contractor.

6.6.3 Bats

- The Main Contractor will take all the required measures to ensure works do not harm individual bats by altering working methods or timing to avoid bats, if necessary.

- A number of trees will be removed prior to/during construction. A bat specialist will be retained to ensure that the loss of trees is minimised, and those trees earmarked for retention are adequately protected.

- Tree-felling will be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.

- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.

- Trees will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.

- Treelines outside the proposed development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage.

- During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards the boundary habitats and focusing lights downwards will be utilised to minimise light spillage.

- Lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010) and *Guidance note 08/18. Bats and artificial lighting in the UK. Bats and the built environment series* (Bat Conservation Trust 2018).

6.6.4 Landscape

It is proposed to and to supplement the existing boundary hedgerows with native species.

7. MONITORING

An Environmental Monitoring Programme will be implemented for the duration of the works. The scope will be based on the conditions of the planning permission and will be confirmed with Fingal County Council in advance of the works. The preliminary scope is below.

7.1 Archaeology

An experienced Archaeologist will attend on site during the stripping of the topsoil to monitor for archaeological features.

7.2 Dust Deposition

If required by Fingal County Council, dust deposition monitoring will be carried out at locations and frequencies agreed with the Council. The monitoring will be carried out using Bergerhoff gauges specified in the German Engineering Institute VDI 2119 document entitled 'Measurement of Dustfall Using the Bergerhoff Instrument' (Standard Method).

The gauges will be set up such that the containers were approximately 2m above the ground surface. To inhibit the growth of algae, 10ml of copper sulphate will be added to each jar. The monitoring period shall be between 28 and 32 days. The proposed deposition limit is 350 mg/m2/day

7.3 Biodiversity

A bat specialist will attend the site during tree felling to check for the presence of bats.

7.4 Noise Monitoring

If required by the Council noise monitoring will be carried out at noise sensitive locations and frequency agreed with the Council. The monitoring will be in accordance with International Standard ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels (2017). The noise limits will be as conditioned in the planning permission.

7.5 Works Area

The site will be inspected daily to ensure that buffer zones between the working areas and hedgerows are maintained and that the oil and chemical storage and handling areas and the waste storage areas are appropriately managed.

7.6 Landscape Works

Regular inspections will be conducted out to ensure that the landscaping is carried out in accordance with the landscape plans and the tree protection measures are correctly implemented.

7.7 Reporting

The results of the monitoring will be submitted to Fingal County Council.

APPENDIX 4.1

B.A.T

BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS). The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).

The EPA licence will specify the scope of the EMS that must be implemented at the MRF. In addition details of the accredited EMS that will be adopted in the operational stage are in Section 3.6 of the EIAR

BAT 2. In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.

(a) Set up and implement waste characterisation and pre-acceptance procedures/

(b) Set up and implement waste acceptance procedures

Waste characterisation and pre-acceptance procedures will be put in place at the MRF as described in Section 3.8.1 of the EIAR. .

(c) Set up and implement a waste tracking system and inventory

The EPA licence will require detailed records of each waste load accepted and dispatched from the installation as described in Sections 3.8.1 and 3.8.3 of the EIAR.

(d) Set up and implement an output quality management system

The objective of the MRF is to maximise the recycling and recovery of incoming materials and documented operational procedure will be prepared that demonstrate how this objective will be achieved. The procedures will be an integral part of the EMS.

(e) Ensure waste segregation

(f) Ensure waste compatibility prior to mixing or blending of waste

(g) Sort incoming solid waste

Upon arrival all wastes will be inspected and then directed to designated processing/storage areas. Operational procedures will be prepared prior to the acceptance of the additional waste types to ensure that appropriate compatibility and blending requirements are implemented.

BAT 3. In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1).

The scope (e.g. level of detail) and nature of the inventory is generally related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).

An inventory of all emissions from the MRF is included in the EIAR

BAT 4. In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below:

(a) Optimised storage location
(b) Adequate storage capacity
(c) Safe storage operation
(d) Separate area for storage and handling of packaged hazardous waste.

A Waste Storage Plan will be prepared as described in Section 3.11 of the EIAR

BAT 5. In order to reduce the environmental risk associated with the handling and transfer of waste BAT is to set up and implement handling and transfer procedures.

Handling and transfer procedures will be prepared as part of the implementation of the EMS.

BAT 6. For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).

Not applicable, as there will no wastewater emissions to water.

BAT 7. BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Not applicable as there will no emissions to water.

BAT 8. BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

The odour control system will be a channelled emission to air and the monitoring requirements will be set in the EPA licence.

BAT 9. BAT is to monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.

Not applicable, as solvents will not be regenerated or treated at the MRF

BAT 10. BAT is to periodically monitor odour emissions.

The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.

Odour monitoring will be carried out as referenced in Section 10.9.2 of the EIAR

BAT 11. BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and wastewater, with a frequency of at least once per year.

The annual consumption of water, raw material as well as the generation of residues and wastewater will be monitored and reported in the Annual Environmental Report (AER). Wastewater emissions to the foul sewer will be monitored.

BAT 12. In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan as part of the environmental management system (see BAT 1).

The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.

An odour management plan will be been prepared as described in Section 10.8.3.3 of the EIAR.

BAT 13. In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to use one or a combination of the techniques given below

(a) Minimising residence times

(b) Using chemical treatment

(c) Optimising aerobic treatment

Refer to BAT 12

BAT 14. In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour BAT is to use an appropriate combination of the techniques given below.

Refer to BAT 12 and Section 10.8.3.4 of the EIAR

BAT 15. BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.

Not Applicable.

BAT 16. In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.

Not Applicable.

BAT 17. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see *BAT 1)*

The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated.

Although the development will not cause noise or vibration nuisance at a sensitive receptor the best practice measures described in Section 10.8.3.2 of the EIAR will be implemented.

BAT 18. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.

(a) Appropriate location of equipment and buildings

All waste handling and processing will be carried out on inside the buildings.

BAT 19. In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water BAT is to use an appropriate combination of techniques.

All operational areas are paved. The permeable paving the car park is designed to filter out hydrocarbons. Rainwater from operational yards will pass through an oil interceptor before discharging to the soakaway.

BAT 20. In order to reduce emissions to water, BAT is to treat waste water using an appropriate combination of techniques.

- ***Table 6.1*** **BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body**

Not applicable as there will not be a direct discharge of a treated wastewater to a receiving water body.

- **Table 6.2: BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body**

Not applicable, as there is no indirect discharge of treated wastewater to a receiving water body.

BAT 21. In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the specified techniques as part of the accident management plan (see BAT 1)

(a) Protection measures
(b) Management of incidental /accidental emissions
(c) Incident/accident registration and assessment system.

The mitigation measures that will be implemented to prevent or limit the environmental consequences of accidents and incidents are described in the relevant Chapters of the EIAR. As described in Section 3.16 of the EIAR and Accident Prevention Policy and Emergency Response Procedure will be prepared.

BAT 22. In order to use materials efficiently, BAT is to substitute materials with waste.

C&D waste will be processed to produced recycled aggregates that meet End of Waste criteria meaning they will replace quarry won materials.

BAT 23. In order to use energy efficiently, BAT is to use both of the following techniques

(a) Energy efficiency plan

(b) Energy balance record

The energy efficiency measures that will be provided are described in Section 3.14 of the EIAR.

BAT 24. In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging as part of the residues management plan (see BAT 1).

Some applicability restrictions derive from the risk of contamination of the waste posed by the reused packaging.

It is an objective to achieve a 98% recovery and recycling rate for all of the wastes accepted at the MRF.

APPENDIX 4.2

AERONAUTICAL ASSESSMENT

Aeronautical Assessment Report

re

Circular Economy Hub

at
Huntstown,
(to east of Mulhuddart)
County Dublin

for
Rathdrinagh Land ULC
(t/a Irish Recycling Ltd.)

April 2023

O'DWYER & JONES DESIGN PARTNERSHIP
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Note: In all maps /diagrams /aerial photos in this report which do not contain a North Point, north lies to the top.

1. Scope of Report, and Description and Zoning of the Site

1.1 Purpose of this Report:

This Report assesses the aviation impact of the development of Phase #1 of a proposed "Circular Economy Hub" on a site of 9.863 ha. approx. overall at Huntstown in County Dublin. Phase #1 comprises two main buildings: a Materials Recovery Facility, and a Food Container Cleaning Plant.

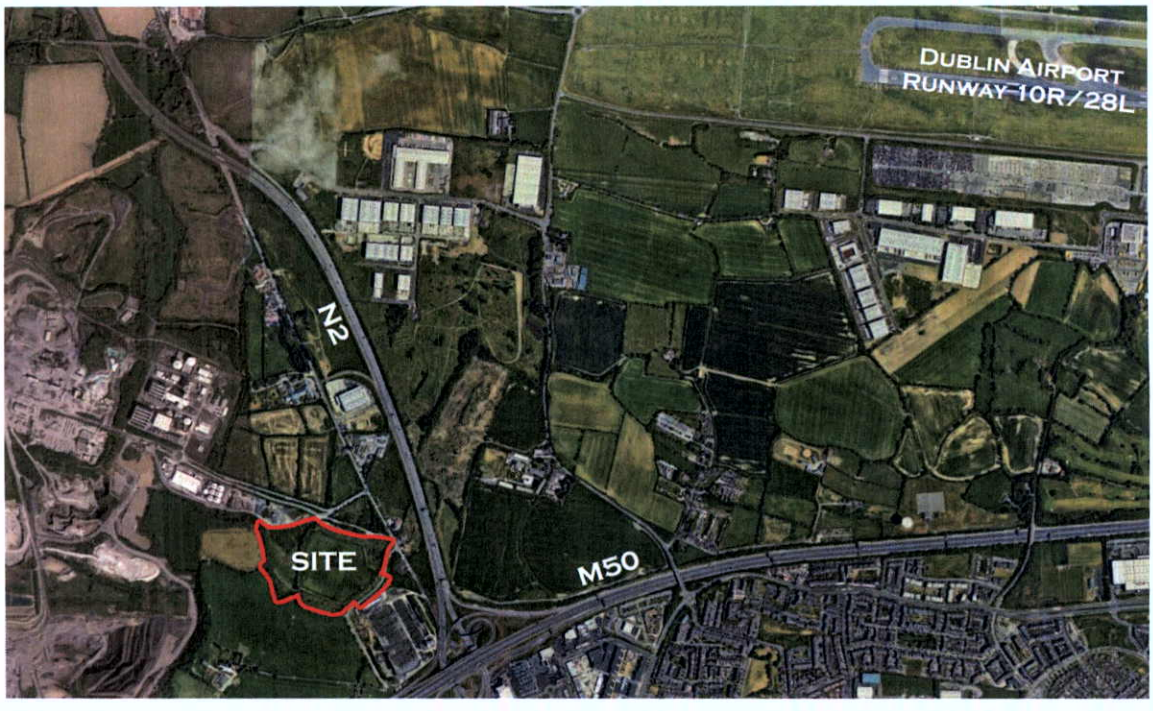
In particular this Report addresses the requirement stated on page 313 of the current Fingal Development Plan 2023-29 (under *Dublin Airport - Safety*) that "*the effects of proposed development on the safety of aircraft and the safe and efficient navigation thereof*" be assessed.

1.2 Description of the Site:

The site *(outlined in red on the aerial view below)* is located at the west end of Huntstown townland, to north-west of the M50's Junction 5 (where it joins the N2 Roadway) in north County Dublin.

Dublin Airport is to the north-east of the site, with Threshold 10R (of Dublin Airport's east-west Runway 10R/28L) at around 2.4km from the nearest corner of the site, and with the flight path to that runway at around 1.7km north of the site.

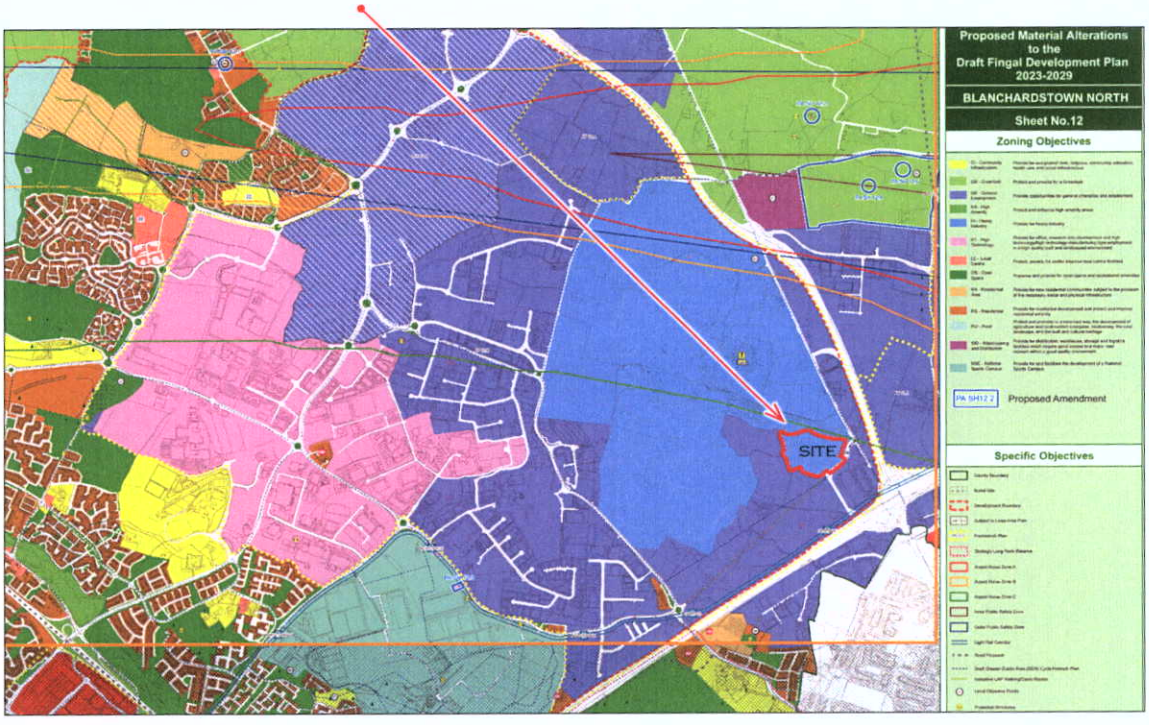
Ground levels on the site vary from around 78m to 86m OD (i.e. 11m-19m above Dublin Airport's datum level), with proposed building floor levels at 78.7m OD.



1.3 **Zoning of the Site:**

All of the site is zoned "HI – Heavy Industry" *(coloured blue)* in the current Fingal Development Plan 2023-29, with Zoning Objective to *"Provide for Heavy Industry."*

The site's location is arrowed on the extract below from Fingal Development Plan Map 12.



1.4 On the Fingal Development Plan Maps it can be seen that this site lies well outside all Airport Public Safety Zones, and just outside the new Airport Noise Zone C (whose outer edge appears as a green line directly north of the Huntstown site).

1.5 Recent significant aviation changes which affect Fingal include the following:

(i) In **December 2017**, the Standards relating to nine international and regional airports in Ireland, including **Dublin Airport**, came **under E.A.S.A.** [European Aviation Safety Agency] control, rather than I.C.A.O. [International Civil Aviation Organization] control as previously, with several changes to airport design specifications (including narrower Approach Surfaces). [This change is referred to in Objective DAO21 on page 313 of the current Fingal Plan 2023-29.]

(ii) In **November 2018, I.C.A.O. issued revised 'Annex 14' Standards** bringing these in line with the new E.A.S.A. airport specifications. [This affects the areas of Fingal above which the "obstacle limitation surfaces" for Casement and Weston Aerodromes extend.]

(iii) In **October 2021**, the UK Modelling Criteria – used as the basis (in 2005) for the **Dublin Airport's Public Safety Zones** – were discontinued (as outdated) in the UK, where much smaller standardized PSZs now apply.

2. Relevant Paragraphs in the current Fingal Development Plan 2023-2029

2.1 Paragraphs relevant to Heavy Industry include the following on page 464 of the Plan:

ZONING OBJECTIVE "HI" HEAVY INDUSTRY

Objective

Provide for heavy industry.

Vision

Facilitate opportunities for industrial uses, activities and processes which may give rise to land use conflict if located within other zonings. Such uses, activities and processes would be likely to produce adverse impacts, for example by way of noise, dust or visual impacts. HI areas provide suitable and accessible locations specifically for heavy industry and shall be reserved solely for such uses.

USE CLASSES RELATED TO ZONING OBJECTIVE

Permitted in Principle		
Abattoir	Concrete/Asphalt	Fuel Depot/Fuel Storage
Heavy Vehicle Park	Industry – Extractive / Quarrying	Industry – High Impact
Office Ancillary to Permitted Use	Open Space	Plant Storage
Restaurant/Café[5]	Retail – Local < 150 sqm nfa[5]	Sustainable Energy Installation[35]
Telecommunications Structures	Utility Installations	Waste Disposal and Recovery Facility (High Impact)

2.2 Section 8 of the Development Plan (on pages 294 to 315) deals with Dublin Airport.

Policy DAP1 (on pp. 303 & 441 of the Plan) refers to the Dublin Airport Local Area Plan of 2020 – one of the Plan's two current "Operational LAPs" – and Objectives DA01 and DA02 (on page 303, and reproduced below) provide for the Safeguarding of Dublin Airport "in accordance with the Dublin Airport Local Area Plan 2020":

In order to meet the demand forecast (as detailed below), enabling infrastructure will have to be provided and it is important that all future development proposals shall not prejudice the orderly operation and continued growth at Dublin Airport. All proposals shall take into account safeguarding associated with key operational features of the airport which include runways, taxiways, obstacle surfaces, radar and control tower sightlines.

Objective DAO1 – Safeguarding Dublin Airport

Facilitate the operation and future development of Dublin Airport, in line with Government policy and the *Dublin Airport Local Area Plan 2020*, or any subsequent LAP or extension of same, recognising its role in the provision of air transport, both passenger and freight.

Objective DAO2

Safeguard the current and future operational, safety, technical and developmental requirements of Dublin Airport and provide for its ongoing development in accordance with the *Dublin Airport Local Area Plan 2020*, or any subsequent LAP or extension of same, having regard to both the environmental impact on local communities and the economic impact on businesses within the area.

2.3 Paragraphs on page 313 of the 2023-2029 Plan refer to Aviation Safety:

Aviation Safety at and around Dublin Airport (and in Fingal in general) is provided for under Objectives DAO14, DAO18, DAO19, DAO20, DAO21, & DAO22 *(reproduced in part below)*. Objective DAO22 refers to Weston Aerodrome. Casement Military Aerodrome (which affects airspace above Fingal to a greater extent than Weston) in not mentioned is the Fingal Plan.

Objective DAO19
Support the review of Public Safety Zones associated with Dublin Airport and implement the policies to be determined by the Government in relation to these Public Safety Zones.
Objective DAO20
Take into account relevant publications issued by the Irish Aviation Authority in respect of the operations of and development in and around Dublin Airport.
Objective DAO21
Continue to take account of the advice of the Irish Aviation Authority with regard to the effects of any development proposals on the safety of aircraft or the safe and efficient navigation thereof. To refer planning applications for any proposals that may be developed in the environs of the airport to the Irish Aviation Authority and daa in accordance with the Obstacle Limitation Requirements of Regulation (EU) No 139 / 2014 (EASA Certification Specifications), previously required under ICAO Annex 14, and which are depicted on the aerodrome operator's map.
Objective DAO22
Have regard to the safety and environmental impacts of aircraft movements associated with Weston Aerodrome in the assessment of any relevant development proposal.

2.4 Aviation Safeguarding and the Dublin Airport Local Area Plan 2020:

The Monitoring (etc.) of the Dublin Airport LAP is referred to on p.441 of the Plan:

Chapter 8 – Dublin Airport

Policy	Implementation	Monitoring (key performance indicator/data source)
Policy DAP1 – Dublin Airport Local Area Plan 2020	Development Management, Airport authorities and external bodies	Safeguard future development of airport to accommodate projected growth. Data source: Various

Within the Dublin Airport Local Area Plan 2020, "Obstacle Limitation", and aviation "Operational Safeguarding" in the vicinity of the Dublin Airport, are referred to on its page 54, and they are provided for in particular in the LAP's Objective OS01 >>.

The Irish Aviation Authority Obstacle Limitation Safeguarding Map sets out the guidance on the type and height of any structures that may be developed at Dublin Airport and its environs.

Fingal County Council will continue to be advised by the relevant statutory bodies regarding the effects of proposed development on the safety of aircraft navigation through the development management process.

OPERATIONAL SAFEGUARDING OBJECTIVE

OBJECTIVE OS01

Control the type and height of any structures that may be developed in the environs of the Airport (in consultation with the Irish Aviation Authority and Dublin Airport) in accordance with the Obstacle Limitation Requirements of Regulation (EU) No 139/2014 (EASA Certification Specifications), previously required under ICAO Annex 14 and which are depicted on the aerodrome operator's safeguarding map.

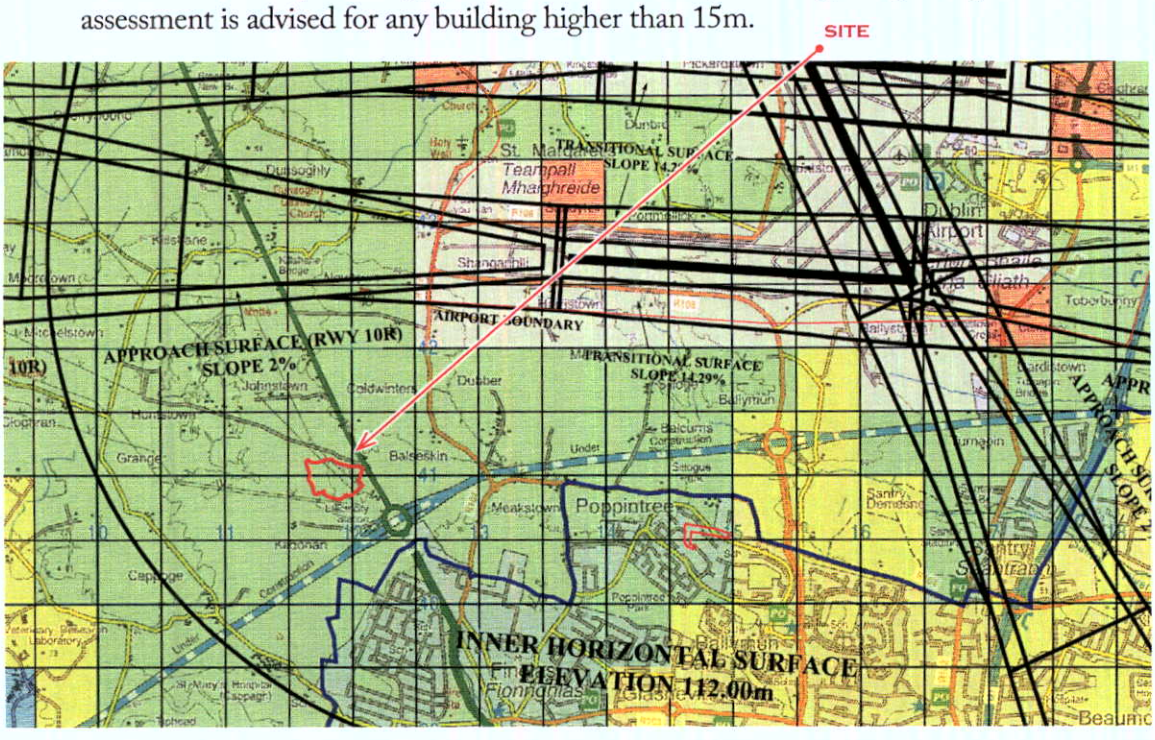
3. Aviation Obstacle Limitation Requirements Which Affect the Site

3.1 The Obstacle Limitation Requirements and Surfaces which currently apply at Dublin Airport are those set down by the European Aviation Safety Agency [EASA] in its Aerodrome Certification Specifications (EASA document CS-ADR-DSN), as noted in Objective OS01 of the Dublin Airport LAP on the previous page. These EASA Specifications supersede the ICAO 'Annex 14' Standards which applied at Dublin Airport up to November 2017.

3.2 The "aerodrome operator's map" referred to in Objective DAO21 of the current 2023-29 Fingal Plan *(illustrated at para. 2.3 above)* – also referred to as the "aerodrome operator's safeguarding map" in Operational Safeguarding Objective OS01 of the Dublin Airport Local Area Plan 2020 *(illustrated at para. 2.4 above)* – is the 'Safeguarding Chart' for Dublin Airport of July 2017, prepared by SLC Associates.

This Chart provides a multi-coloured 0.5 × 0.5km grid with guidelines as to building heights in each grid-square – 0m, 10m, 15m, 45m, 90m – above which it is advised that a proposed development be referred for consultation "with the airport licensee" (i.e. with DAA). It also indicates the principal Obstacle Limitation Surfaces which apply around Dublin Airport (and although stated to be based on former ICAO dimensions in the *IAA Aerodrome Licensing Memorandum* of 2014 – broadly corresponds with current EASA requirements).

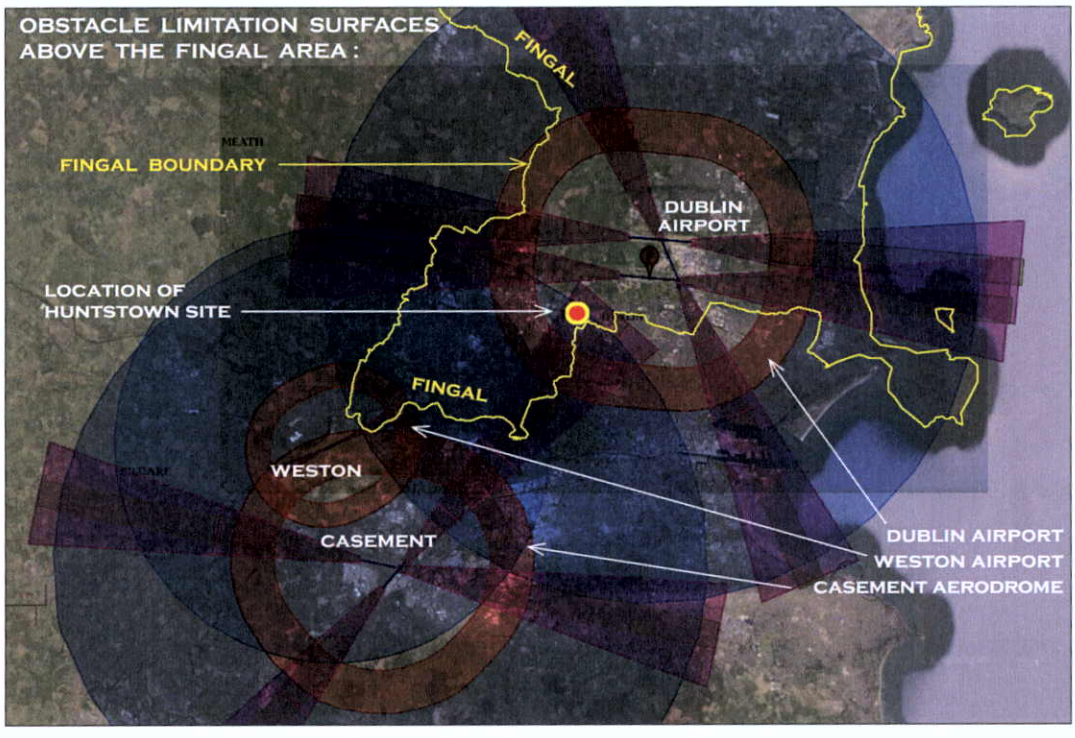
3.3 Below is an extract from this Safeguarding Chart. The Huntstown site (outlined in red below) lies within green grid-squares which have a height dimension of 15m – above which a referral to the airport licensee (DAA) is requested. The proposed 16m-tall Materials Recovery building, to south side of the site, lies in a green grid-square in which assessment is advised for any building higher than 15m.



3.4 **The EASA & ICAO 'Obstacle Limitation Surfaces' which affect Fingal:**

These "Surfaces" are indicated in the diagram below (which is based on Irish Airport Authority "Asset" data of 2019, onto which we have overlaid the outline of Fingal).

The "Surfaces" shown below include the new EASA "Obstacle Limitation Surfaces" for Dublin Airport, and the ICAO "Surfaces" for Casement Aerodrome and Weston Airport. These constitute the principal height restrictions which now apply in the vicinity of the various airports/aerodromes. In the south-west part of Fingal, the "Surfaces" of all three airports overlap (with the lowest Surface being the limiting one).



3.5 The following "Obstacle Limitation Surfaces" lie directly above the Huntstown site:

(i) The Inner Horizontal Surface for Dublin Airport;
(ii) The Approach Surface to Casement Aerodrome's Runway 22;
(iii) The Outer Horizontal Surface for Casement Aerodrome.

The following "Surfaces" are close to (but not directly above) the Huntstown site:

(iv) The Transitional Surface to the south side of Dublin's Runway 10R/28L;
(v) The Approach Surface to Dublin Airport's Runway 10R;
(vi) The Take-Off Climb Surface from Dublin Airport's Runway 28L;
(vii) The Take-Off Climb Surface from Casement Aerodrome's Runway 04.

3.6 A more detailed drawing of all of the above "Surfaces" is shown on the following page, and calculations in relation to the most relevant of these "Surfaces" are provided in Section 5.

3.7 The EASA and ICAO "Obstacle Limitation Surfaces" near the Huntstown Site

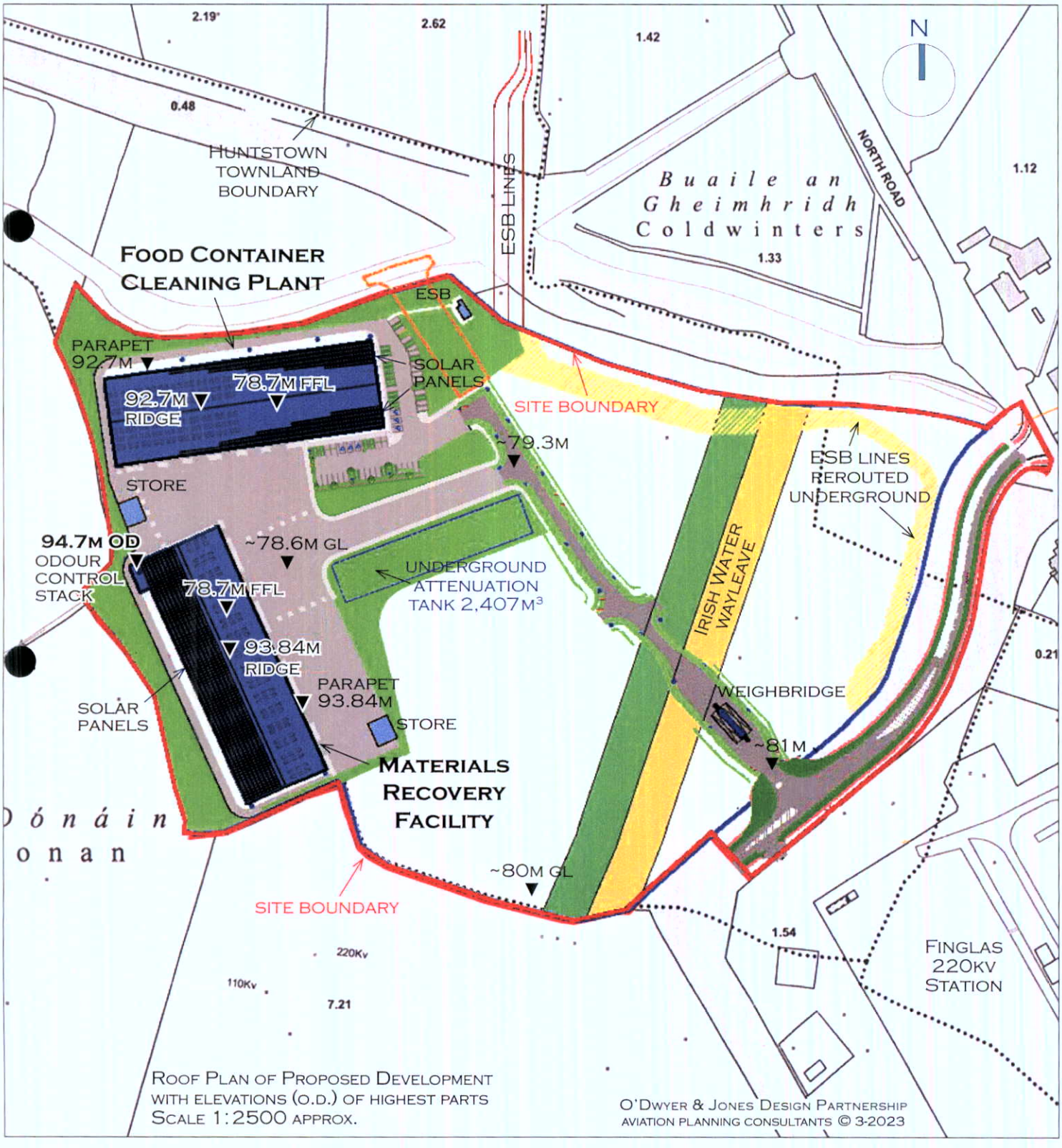
3.1 **The Obstacle Limitation Surfaces set out by EASA in its Aerodrome Specifications of December 2017** constitute the principal height restrictions which now apply in the vicinity of Dublin Airport. These Specifications differed in a few respects from the ICAO "Annex 14" Standards which previously applied at Dublin Airport. However subsequent updates to the ICAO Standards (in November 2018) have ensured that they now correspond fully with the new EASA Specifications.

3.2 The EASA Obstacle Limitation Surfaces for Dublin Airport, and the two ICAO Surfaces arising from Casement Aerodrome, which apply at (and in the vicinity of) the Huntstown site *(outlined in red)*, are shown in the following diagram:

3.3 This diagram shows that the Huntstown site – which is at ~1.7km from the centreline of east-west runway 10R/28L, and about 2.4km from Threshold 10R – lies under Dublin Airport's Inner Horizontal Surface, at ~1.3km from the Transitional Surface to the side of Runway 10R/28L.
It also shows that the site additionally lies under the the Approach Surface to Casement Aerodrome's Runway 22 (at 14km from its Threshold 22), and under Casement Aerodrome's Outer Horizontal Surface.

4. Layout and Heights (Elevations O.D.) of the Proposed Development

4.1 **Site and Roof Plan Drawing** of the Development to approximate scale 1:2500 — Phase 1: a Materials Recovery Facility of 15.14m height & 5,032m² floor area, and a Food Container Cleaning Plant of 14m height & 5,216m² floor area, plus two small storage units.



5. Calculations re Aviation "Obstacle Limitation Surfaces" near the Site

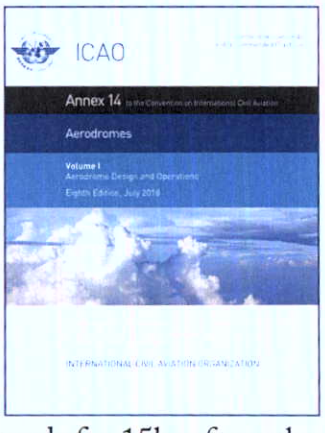
5.1 The Site in Relation to the Dublin Airport's "Inner Horizontal Surface":

As defined by EASA [>>], this is a flat Surface which extends to 4km from the centrelines of all runways at Dublin Airport, and which lies at 45m above the airport's datum (set at 67m OD), i.e. it is a flat Surface **at 112m OD**.

This Surface extends above all of the Huntstown site (the site is well within 4km of the runway centrelines).

However, the highest element of the proposed development – which is the odour control unit exhaust stack at the west corner of the Materials Recovery Facility – rises to just **94.7m OD. The proposed development is therefore very comfortably below Dublin Airport's "Inner Horizontal Surface" which lies at directly above the site (at 17.3m above the proposed highest element).**

5.2 The Site in Relation to the two Casement Aerodrome "Surfaces" lying above it:



As indicated in Section 3 above, two of Casement Aerodrome's "Obstacle Limitation Surfaces" also lie above the Huntstown site. These are — Casement Aerodrome's Outer Horizontal Surface; and the Approach Surface to Casement's Runway 22.

For Casement Aerodrome, these Surfaces are specified by ICAO >> (rather than by EASA).

Casement Aerodrome's "Outer Horizontal Surface" is now at 145m above the aerodrome's chosen datum (at 86.6m OD), i.e. it is a level surface at **231.6m OD**, and extends for 15km from the aerodrome's reference point.

The **Approach Surface to Casement's Runway 22** extends for 15.06km from the 22 Threshold, and the outer 8.4km of that distance is level at 150m above the elevation of Casement's Threshold 22 (at 306ft amsl /93.3m OD), i.e. the section of this Approach Surface which lies above the Huntstown site is level at **243.3m OD**.

These two Casement "Surfaces", at 231.6m OD and 243.3m OD, are therefore very substantially higher (by 136.9m and 148.6m) than the highest element of the proposed Huntstown development (which rises to 94.7m OD).

5.3 Other Aviation "Surfaces" in the vicinity of the Huntstown site:

These include:

(i) The Transitional Surface to the south of Dublin Airport's Runway 10R/28L, at 1.28km from the site;

(ii) The Approach Surface to Dublin Airport Runway 10R, at 1.31km from the site;

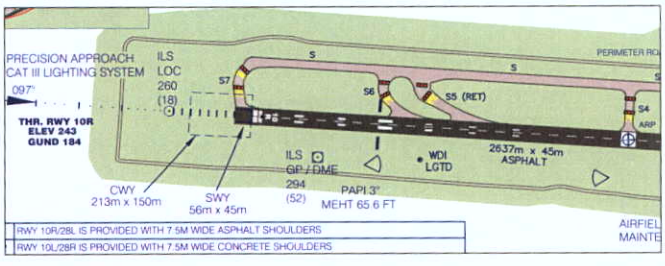
(iii) The Take-off Climb Surface from Dublin Airport Runway 28L, at 1.4km from the site;

(iv) The Inner Approach Surface to Dublin Airport's Runway 10R, at 1.75km from the site; and

(v) The Take-off Climb Surface from Casement Aerodrome's Runway 04, at 0.75km to south-east of the site.

While item (v) above – the Take-off Surface from Casement – is the closest of these nearby Surfaces to the site, it is very significantly higher (at around 370m OD).

Calculations is relation to the distances from the site of the nearest two Dublin Airport "Surfaces" *above* (which safeguard runway 10R/28L >) are as follows:



The site is at 2.4km from Threshold 10R *(above ↗)*, and at 1.7km from the extended centreline of Runway 10R/28L, and is therefore opposite at point along that extended centreline at 1.7km* from Threshold 10R. *[* confirmed as follows $1.7^2 + 1.7^2 = 2.4^2$]*

At 1.7km from THR10R, the **Approach Surface** will be 772m** wide overall, i.e. at **1,314m from the site**. *** (1700-60 × 15%)×2 + 280m = 772m*
& 1700 - (772÷2) = 1314m

At this point the Approach Surface will have risen 32.8m*** above THR10R (at 74m), i.e. to 106.8m OD. *** (1700-60)×2% = 32.8m & 32.8+74 = 106.8m*

From this point the **Transitional Surface** rises at 14.3% up to the IHS at 112m OD, – i.e. it will extend to 422.4m**** from the runway centreline, so that it will be at **1,278m from the site.** **** (112-106.8)÷14.3% + (772÷2)m = 422.4m*

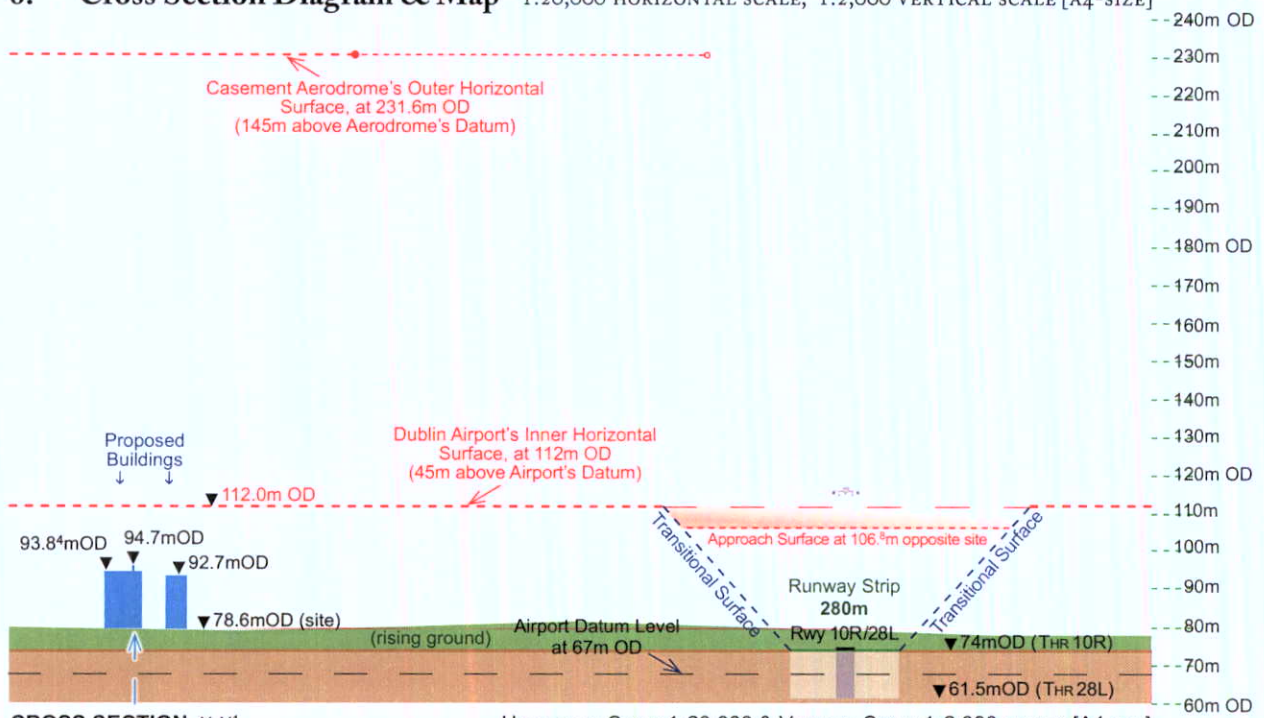
5.4 Conclusion in relation to all "Obstacle Limitation Surfaces" near the site:

Of the three Surfaces which lie above the Huntstown site, **Dublin Airport's Inner Horizontal Surface is the closest, at 112m OD. This is at 33.4m above ground level on the site, and 17.3m above the highest element of the development.** Consequently the development will not affect any aviation "Obstacle Limitation Surface", but care will need to be taken to ensure that crane operations are limited to ~33m above ground level *(see also para. 8.4 following)*.

A Cross-section and Plan of the above Surfaces are on the following page >.

6. Cross Section Diagram & Map

1:20,000 HORIZONTAL SCALE, 1:2,000 VERTICAL SCALE [A4-SIZE]



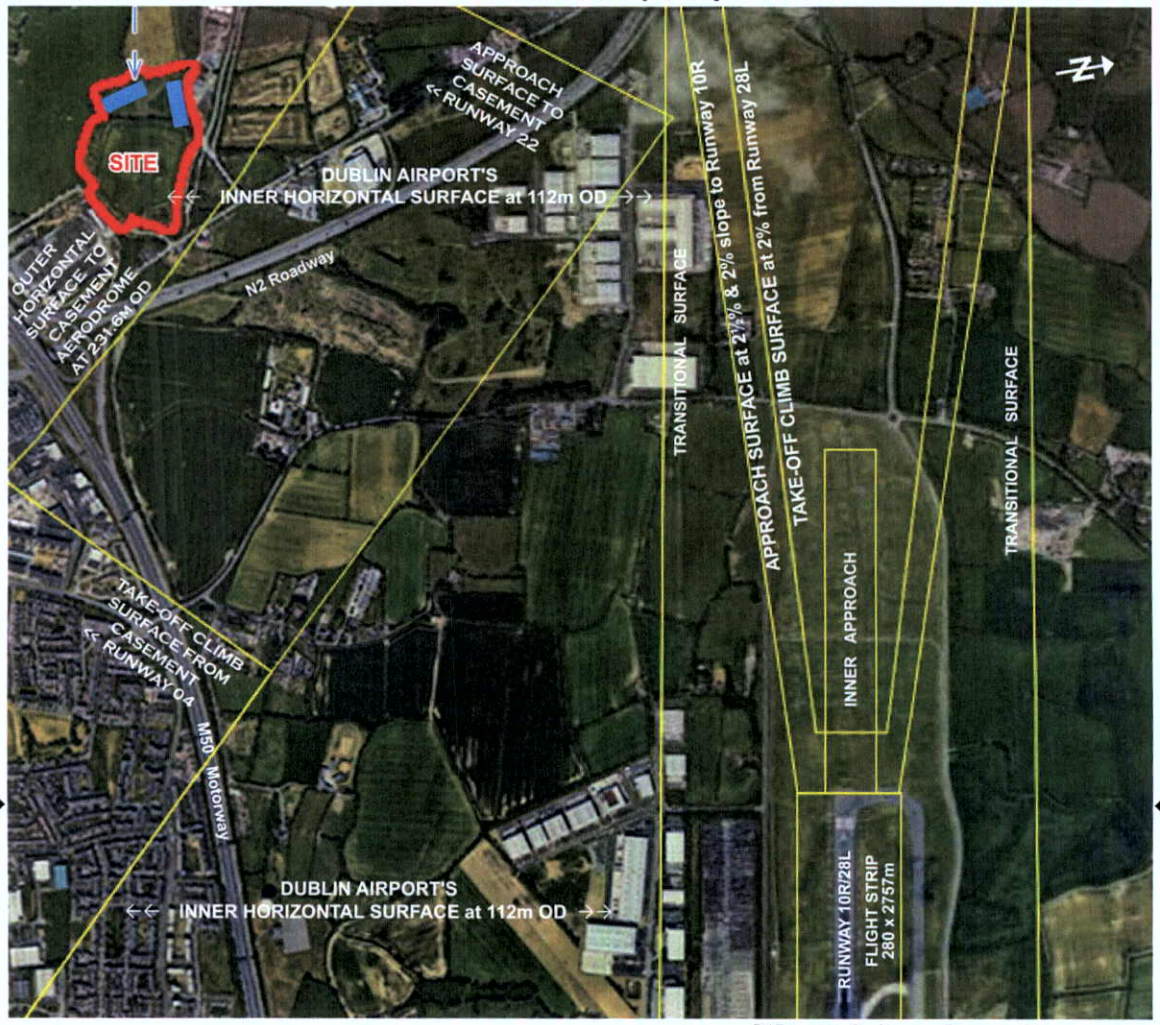
CROSS SECTION X-X¹
TAKEN PERPENDICULAR TO RUNWAY 10L/28R

HORIZONTAL SCALE 1:20,000 & VERTICAL SCALE 1:2,000 APPROX.[A4-SIZE]
(NOTE AERONAUTICAL SECTION: VERTICAL SCALE = 10X HORIZONTAL SCALE)

AERIAL PHOTO MAP

PLAN SCALE [A4-SIZE] 1:20,000 APPROX.

SITE OUTLINE: —



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7. Bird Strike Hazard Mitigation at the Huntstown Site

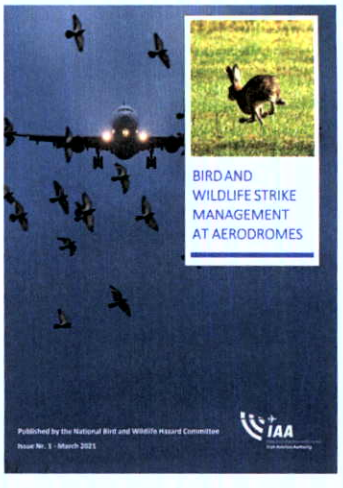
7.1 FCC Development Plan SuDS Considerations

Paragraph 4.5.2.8 on pages 170-171 of the Fingal Development Plan 2023-2029 (and other subsequent paragraphs in other chapters) outline a Sustainable Urban Drainage System strategy, and refer applicants to the FCC SuDS Guidance Document – "Green/Blue Infrastructure for Development" in Appendix 11 of the Plan. Paragraph 4.5.2.8 also includes the comment *"Underground tanked systems, whether concrete or plastic, are the least favoured means for surface water management and shall only be used when green solutions have proven not feasible"* – a comment which is discussed below in relation to aviation safety considerations.

SuDS also features in various Objectives in the FCC Development Plan 2023-29, including Objective IU011 "SuDS in New Developments", on page 397, which states:
"SuDS shall be incorporated into all parts of a development (open spaces, roads, footpaths, private areas), and have regard to the FCC SuDs Guidance Document – 'Green/ Blue Infrastructure for Development', as amended (Appendix 11), and shall ensure:
That the design of SuDS enhances the quality of open spaces and when included as part of any open space provision, it must contribute in a significant and positive way to the design and quality of the open space.
Open space areas shall not be dominated by SuDS features.
Underground tanked systems, whether concrete or plastic, are the least favoured means for surface water management and shall only be used when green solutions have proven not feasible.
See also Appendix 11 (SuDS Guidance Document), and Chapter 14 Development Management Standards (Section 14.20.3 SuDS)."

7.2 Overall Aviation Safety Considerations

Aviation Safety considerations require assessment of potential bird strike hazard in the landscaping (and in drainage provision) on any site in the vicinity of an airport or aerodrome, or under any flight path.



Guidance on this issue (and on wildlife considerations generally) are provided by various aviation authorities, including –

- The Irish Aviation Authority's recently published manual on "Bird and Wildlife Strike Management at Aerodromes (2021)"; >>
- The International Civil Aviation Organization's Airport Services Manual Part 3 – "Wildlife Control & Reduction"; and
- The Federal Aviation Administration's "Wildlife Hazard Management at Airports."

7.3 An additional aviation safety consideration involves the avoidance or restriction of items which might give rise to glint and glare that could adversely affect pilots on flight paths, or air traffic controllers, at an airport/aerodrome. This is principally analysed in respect of solar/PV panel arrays (using the FAA's "Solar Glare Hazard Analysis Tool"), but can also arise in relation to open bodies of standing water, which are recognised (by aviation analysts) as being potentially more reflective than standard solar/PV panels.

7.4 **Control Measures to Minimise Bird Strike (and Other) Aviation Hazard:**

(i) Control of any bird & wildlife attractants during construction.
(ii) Avoidance of landscape elements which might provide avian food.
(iii) Avoidance of unnecessary standing water features which might attract birds.
(iv) Management of any necessary standing water elements (e.g. flood-control swales) in locations where they will be less attractive to birds.
(v) Implementation of ongoing bird control and deterrence measures.

Landscape measures to minimise glint or glare hazards to aviation include:

(vi) Avoidance of unnecessary standing water in vicinity of flight paths & aerodromes.
(vii) Avoidance of all standing water in direct line of sight from an airport's Control Tower cab.

7.5 From the above list, it can be seen that – on aviation-sensitive sites – the general guidance in regard to SuDS provision might not apply. – In particular the general preference for overground ponds and swales rather than underground solutions (such as attenuation tanks) would be reversed, although permeable ground surfaces would be acceptable at all sites (whether near or far from aviation facilities).

This potential conflict between the standard SuDS guidelines, and considerations of aviation safety, is already recognised by Fingal, for example, in the Cherryhound Local Area Plan, which relates to an area just north of the Huntstown site. This Cherryhound LAP (of 2012) is listed on page 55 of the adopted Fingal Plan 2023-2029 as being one of the "Operational LAPs", and it includes the following statements in respect of Cherryhound:
"... The lands are located under the flight paths of aircraft using Dublin Airport. This may pose considerations on the nature and scale of uses and on provision of noise insulation. ..."
and
*"... **Care will be required to ensure that significant bird populations are not attracted to water bodies in view of its proximity to Dublin Airport and its flight paths.** ..."*

7.6 Specific Aviation Aspects Affecting the Huntstown Site

As noted above, the Huntstown site has the following aviation-related aspects:

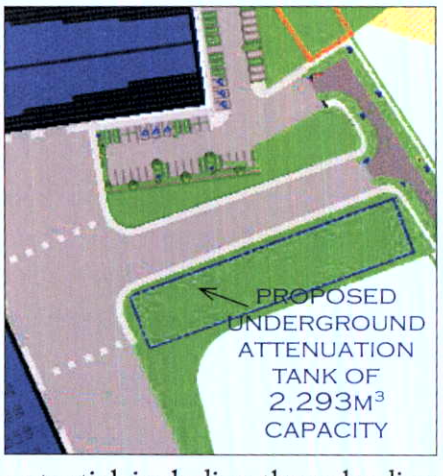
- It is at ~2.4km from a main runway threshold at Dublin Airport (Threshold 10R).
- It is on elevated ground directly under Dublin Airport's "Inner Horizontal Surface".
- Its ground surfaces are directly in view of Dublin Airport's new 90m-tall Control Tower, and in line with the control tower's view towards aircraft landing on Runway 10R.
- It is well within the 13km distance from Dublin Airport, identified as the area of potential bird hazard risk.
- It is directly under the end of the "Approach Surface" to Casement Aerodrome's runway 22; and it is directly under Casement Aerodrome's "Outer Horizontal Surface".

Because of all of the above aviation aspects, the arrangement of landscape and drainage features (and site management) on this site would require that all potential bird strike hazard elements be minimised or eliminated.

In addition, the nature of the intended operations on the site (which involve minimal pedestrian activity, and the transport of potential bird attractants) means that some commonly adopted bird hazard reduction features would be inappropriate. – These would include the locating of swales or ponds close beside well-trafficked pathway and roads – a feature sometimes adopted on sites near aerodromes (and suggested by the IAA) for the reason that birds are discouraged from roosting close to busy populated areas.

7.7 Recommended SuDS Provision, for Aviation Safety reasons, on the Huntstown Site

Any ponds or swales on this site could give rise to a bird strike hazard, and ponds or swales could also give rise to a glint & glare potential affecting visibility from Dublin Airport's Control Tower cab. Consequently, there should be no permanent ponds, and minimal swale provision (if any). In effect, this is a site on which the otherwise "green solutions" (referred to in paragraph 4.5.2.8. of the Fingal Plan, and quoted above) would be "not feasible".



Taking into account the various aviation safety aspects (including bird strike and glint & glare potential, and affecting both Dublin Airport and Casement Aerodrome), the appropriate SuDS provision on this particular site – for aviation safety reasons – would be underground attenuation tank provision (of large capacity, *as proposed* >>), and permeable pavings where possible.

The ongoing management of operations on the site would also require the avoidance of bird strike potential, including the unloading indoors of any potential bird attractant material.

8. The Development in relation to Public Safety Zones and Noise Contours

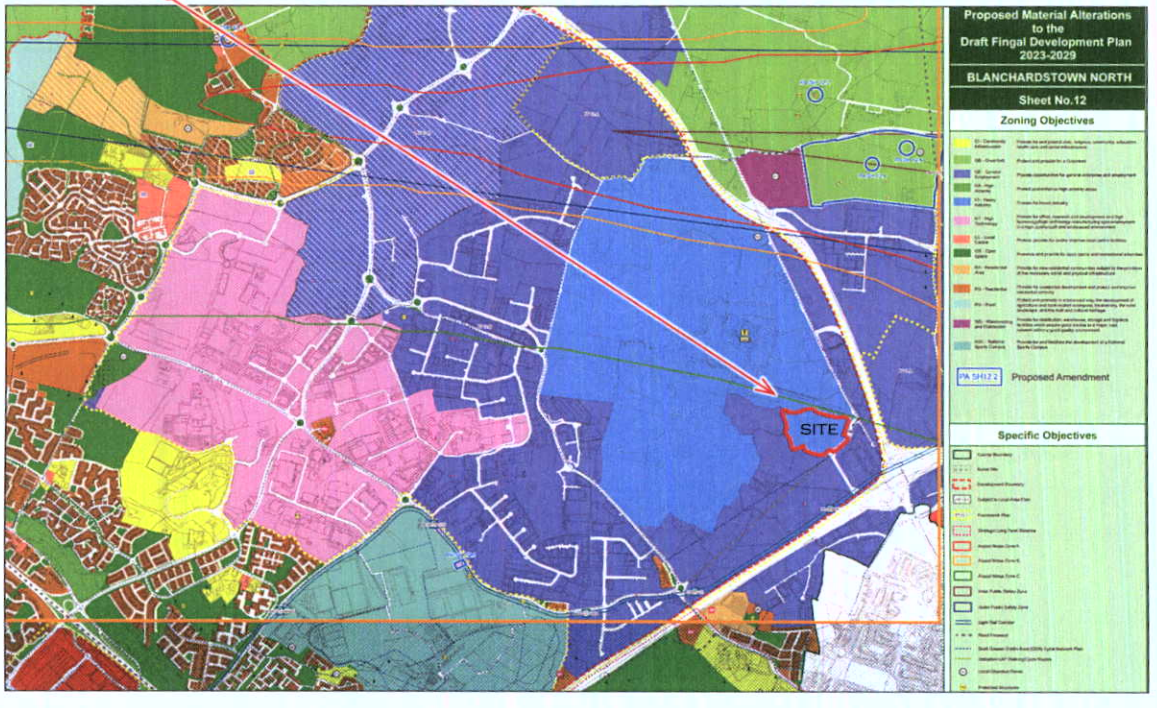
8.1 Aviation Items on the Fingal Development Plan Maps

Two aviation considerations appear on the Fingal Development Plan Maps 2023-29. These are the Public Safety Zones plotted around Dublin Airport within the ERM study of 2000-2005, and the recently updated Dublin Airport Noise Contours. [The previous "Airport Red Approach Areas" have been removed and replaced by written references to the EASA "Obstacle Limitation Surfaces" etc.]

8.2 Dublin Airport Public Safety Zones

Objective DAO19 on page 313 of the 2023-29 Fingal Plan supports "the review" of these Public Safety Zones. Such a review is desirable, as the UK criteria applied in setting out these Zones at Dublin is considered outdated in the UK (as of October 2021) – so that the PSZs at Dublin Airport have become out of step with other international practice, and are currently, for example, ten times the size of the PSZs at the much busier Heathrow and Gatwick Airports.

Below is an extract from the current Fingal Map #12, on which it can be seen that the site lies well outside all of Dublin Airport's Public Safety Zones.



8.3 Dublin Airport Noise Contours

It can also be seen that the site lies just outside the new "Airport Noise Zone C" (marked as a green line in the above Map #12 extract). This means that no special noise insulation is required (in relation to airport noise levels ≥ 54 dB LAeq). In any event, the Circular Economy Hub development is not noise-sensitive.

9. Other Aviation Considerations

9.1 Solar/PV Panels:

Solar/PV panels are to be provided on roofs of the two main buildings *(as indicated on the Roof Plan drawing on page 9).*

DUBLIN AIRPORT CONTROL TOWER

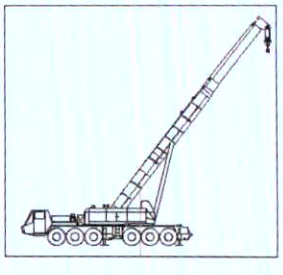
Because the new control tower at Dublin Airport is particularly tall > (extending to 526ft/160m OD, i.e. to more than double the height of the airport's Inner Horizontal Surface), care has been taken in the layout of the rooftop solar/PV panels to ensure that roof parapets (which extend to 1.66m above roof gutter level) will obscure all panels from any view from the new Control Tower cab.

These panels have also been the subject of a separate Glint+Glare Study by Macroworks Ltd. in relation to Dublin Airport's control tower and flight paths. The Macroworks analysis (dated April 2023) found that all proposed solar/PV panels would be satisfactory in relation to the SGHAT Glint & Glare criteria. The Overall Conclusion of the analysis by Macroworks Ltd. is stated as follows in paragraph 6.3 (on page 10) of their report:

> *"Overall Conclusion*
> *From the analysis and discussions contained herein, it is considered that there will not be any hazardous glint and glare effects upon the Dublin Airport aviation receptors identified as a result of the proposed roof mounted solar PV panels."*

9.2 Use of Cranes during Construction:

It is intended that a mobile crane will be used in construction of this development, and it is confirmed that the operating height of any cranes on site will be limited to no more that 33m above (finished) ground level, and 17m above the highest element of the development (i.e. to no higher than 112m OD).



In any event, it will be necessary [under S.I. 215 of 2005 – *'Irish Aviation Authority (Obstacles to Aircraft in Flight) Order'*] for prior notification of the use of any crane/s to be submitted, at least 30 days in advance, to the Irish Aviation Authority and to Dublin Airport Authority, who may need to issue any necessary notifications, and who may require cranes in this location to be fitted with aviation warning lights.

9.3 External Lighting:

As the development is near the flight path to/from Dublin Airport's Runway 10R/28L, it is recommended that external lighting on the site be of the cut-off type (i.e. not showing light above horizontal). However, the proposed development is not in a location, or of a height, where aviation obstruction lighting on it would be required.

10. SUMMARY

10.1 Dublin Airport's & Casement Aerodrome's "Obstacle Limitation Surfaces":

The Huntstown site, at ~2.4km from Runway Threshold 10R, lies well clear of all Approach and Take-off Climb Surfaces for Dublin Airport. It lies directly under Dublin Airport's Inner Horizontal Surface, and under two of Casement Aerodrome's Surfaces – Casement's Outer Horizontal Surface and the Approach to Casement Runway 22. Dublin's Inner Horizontal Surface (at 112m OD) is at 33.4m above the Huntstown site, and at 17.3m above the highest point of the proposed development.

It is confirmed that no aviation "Obstacle Limitation Surface" will be infringed by the proposed development.

10.2 Additional Aviation Considerations:

(a) The Huntstown site lies well outside all of Dublin Airport's **Public Safety Zones**, and outside the **Airport Noise Contours** shown on the Development Plan Maps.

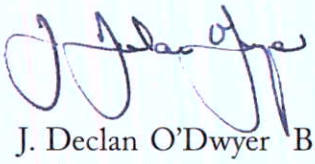
(b) The rooftop **Solar/PV panels** will not be visible from the new control tower, and are the subject of a separate Glint & Glare Study by Macroworks Ltd.

(c) Due to the site's proximity to Dublin Airport, and its location under three "Obstacle Limitation Surfaces" for Dublin Airport and for Casement Aerodrome, it is recommended – for **Bird Strike Hazard** reasons – that SuDS provision be made by means of a large underground attenuation tank.

(d) Arrangements will be made that **Mobile Cranes** use during construction will operate well below 112m OD – i.e. below the level of Dublin Airport's "Inner Horizontal Surface" (which is the nearest "Surface" above the site). And 30 days' advance notice of any crane use will be given to IAA and DAA.

10.3 Overall:

We consider that the proposed Circular Economy Hub development at Huntstown complies fully with all aviation and aeronautical requirements affecting its location.



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17th April 2023
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APPENDIX 6.1

LAND & SOIL

AGP19087_01

REPORT
ON THE
GEOPHYSICAL INVESTIGATION
AT
HUNTSTOWN NORTH
FOR
BEAUPARC LIMITED

17TH APRIL 2019

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PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGP19087		
AUTHOR	**CHECKED**	**REPORT STATUS**	**DATE**
KEVIN GALVIN B.A. (MOD)	TONY LOMBARD M.SC (GEOPHYSICS)	V.01	17TH APRIL 2019

CONTENTS

1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Beauparc Limited to carry out a geophysical survey at a site at Huntstown North, Co. Dublin to determine the depth to bedrock across the site.

The site is to be developed which is likely to involve earthworks to level the site including cutting into the small hill.

Historically there had been a gravel pit on the hill and part of it has been excavated and material removed.

The objectives of the survey were to provide information on the nature of the material in the raised part of the site and to determine the depth to rock.

The Geological Survey of Ireland (GSI) subsoils map shows the survey is within gravels derived from limestone surrounded by glacial till derived from limestone. The GSI 1:100,000 Bedrock Geology map indicates that the survey area is underlain by calcareous shale and limestone conglomerate of the Tober Collen Formation.

The survey was carried out on the 8th April 2019 and involved the collection of Electrical Resistivity Tomography profiles and Seismic Refraction profiles.

The interpreted soil thickness across the site ranges from c.1.0m in the western part of the site to greater than 25m.

While geophysical data indicates that the hill in the centre of the site is underlain by predominantly sandy gravelly clay and it is unlikely that bedrock will be encountered during any excavation of the hill. Shallow bedrock is interpreted in the western part of the site.

Bedrock has been interpreted as an upper layer of moderately weathered dark LIMESTONE (1.0m to 5.0m thick) which should be marginally rippable to requiring breaking/blasting; over a layer of slightly weathered to fresh dark limestone which will require breaking/blasting if encountered.

If excavations or ground works are to be carried out on the site then a detailed assessment of excavatability should be carried out combining the results of the geophysical survey, rotary core drilling, strength testing and trial excavation pits using a high powered excavator such as a CAT 336E or more powerful model.

The trial pits should be targeted in the interpreted shallow rock areas and the boreholes carried out in the area of interpreted thick soil.

The findings of the geophysical investigation should be reviewed following any direct investigation.

2. INTRODUCTION

APEX Geophysics Limited was requested by Beauparc Limited to carry out a geophysical survey at a site at Huntstown North, Co. Dublin to determine the depth to bedrock across the raised area in the centre of the site. The site is to be developed which is likely to involve earthworks to level the site including cutting into the small hill. The geophysical survey was carried out to determine the nature of the material beneath the hill.

2.1 Survey Objectives

The objectives of the investigation were to:

- determine the nature of the material in the raised part of the site.
- determine depth to bedrock;

2.2 Site Background

The site consists of c 5.3 ha of open fields located east of the Roadstone Huntstown Quarry. The survey area consists of a small raised hill (c.88mOD) in the centre of the site. The small hill is overgrown with tress and dense vegetation. Part of the hill has been excavated and material removed historically. The GSI 6" sheet indicates that there had been a gravel pit on the hill which would explain the excavated material.

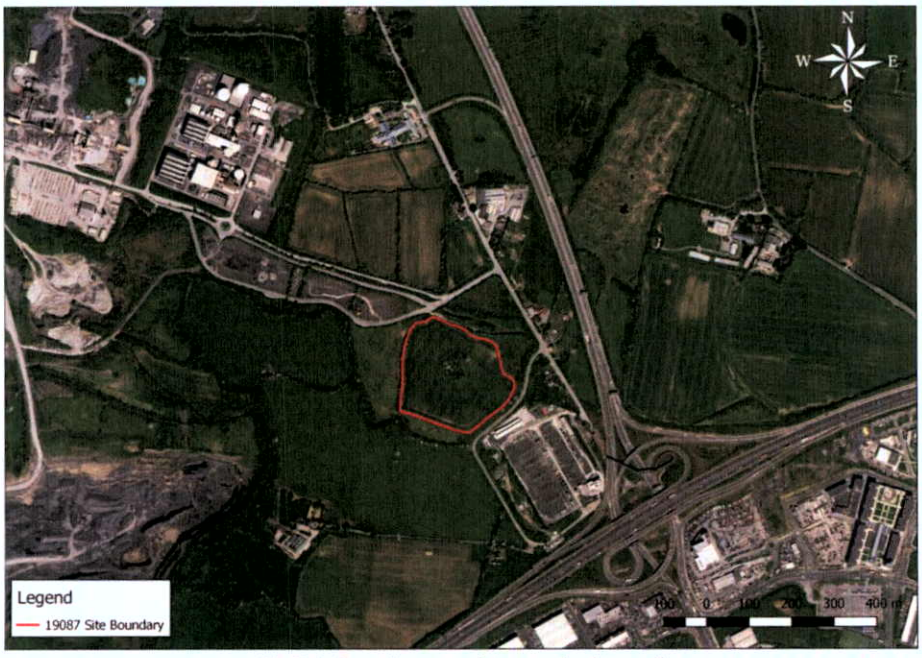


Fig 2.1: Location map (site marked in red).

2.2.1 Soils

The Geological Survey of Ireland (GSI) and Teagasc soils map for the area (Figure 2.2) indicates that the centre of the site consist of gravels derived from limestone surrounded by glacial till derived from limestone.

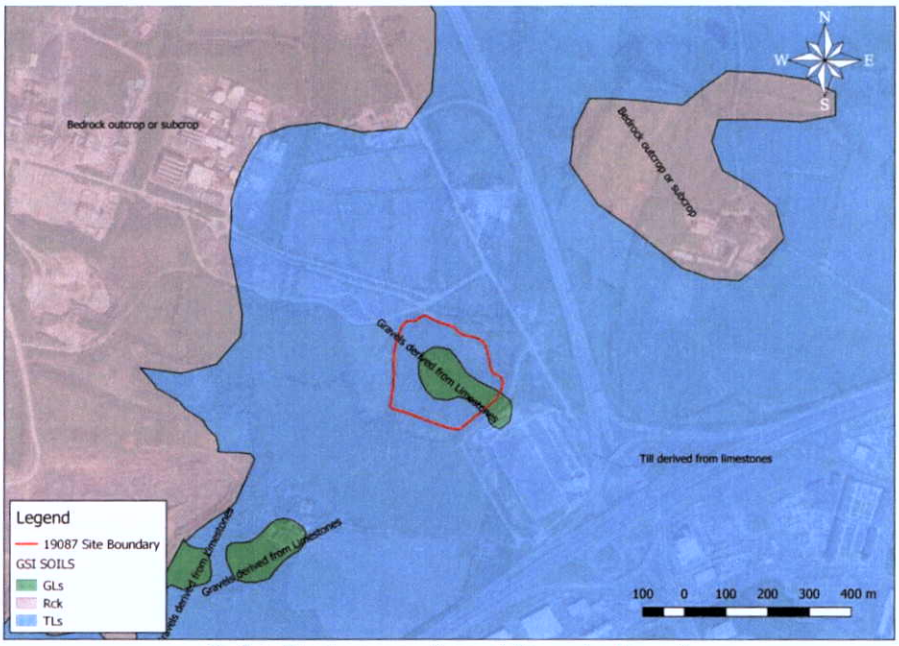


Fig 2.2: The Teagasc soil map (site marked in red).

2.2.2 Geology

The GSI 1:100k Bedrock Geology map (Figure 2.3) indicates that the site is underlain by calcareous shale and limestone conglomerate of the Tober Collen Formation. An anticlinal fold is mapped running though the centre of the site.

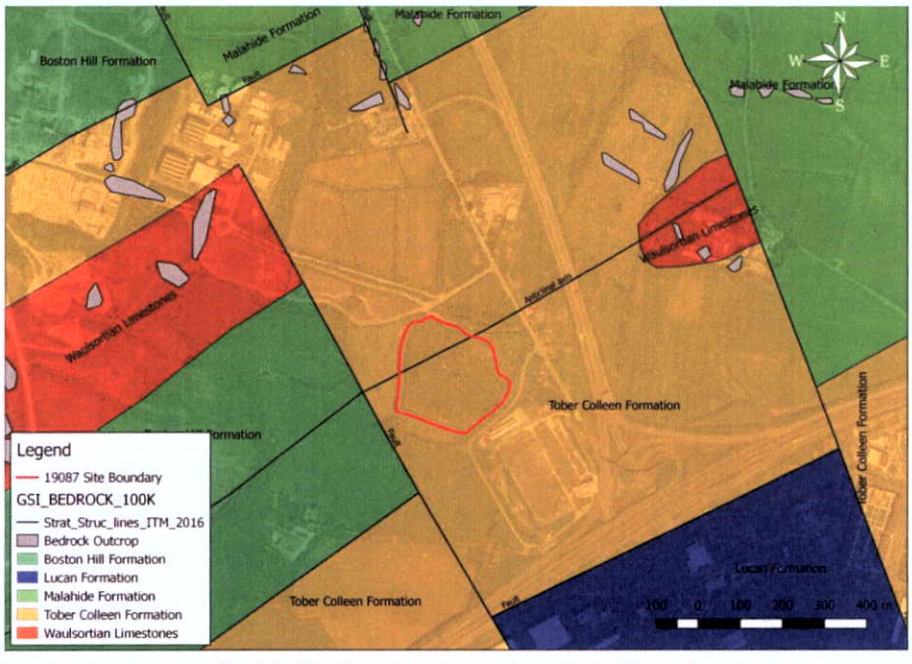


Fig 2.3: The GSI bedrock map (site marked in red).

2.2.3 Historical Data

The historical 6 inch sheet for the area indicates a gravel pit in the centre of the site.

Fig 2.4: The historical 6inch map (site marked in red).

2.2.4 Groundwater Vulnerability

The groundwater vulnerability rating for the site (Figure 2.5) is classified as high to moderate in the southern part of the site.

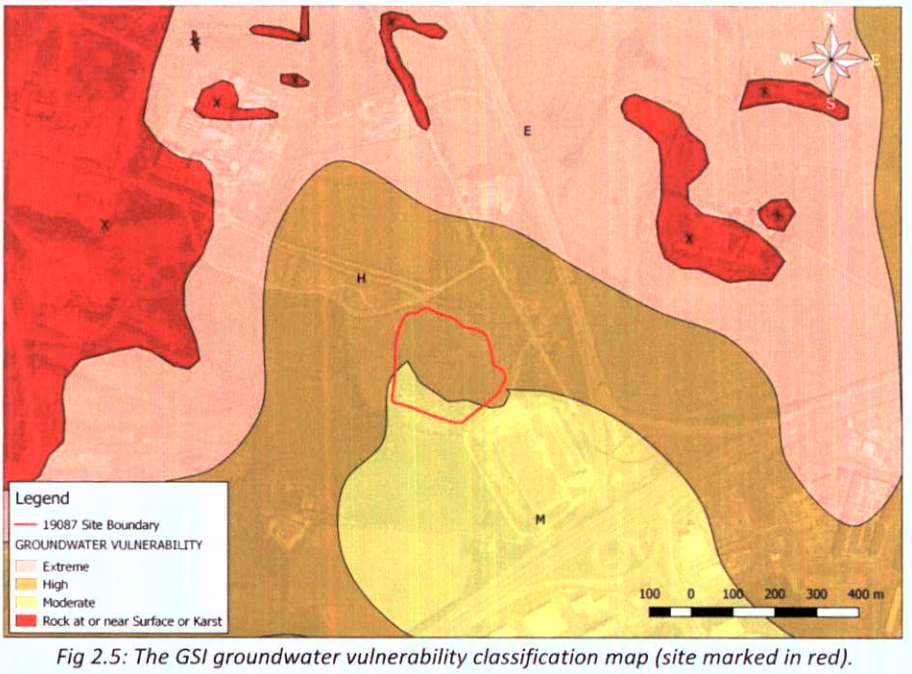


Fig 2.5: The GSI groundwater vulnerability classification map (site marked in red).

2.2.5 Direct Investigation Data

There was no direct investigation (boreholes or trial pits) available for the site.

2.3 Survey Rationale

The investigation consisted of 2D Electrical Resistivity Tomography (ERT) and Seismic Refraction profiling:

ERT images the resistivity of the materials in the subsurface along a profile to produce a cross-section showing the variation in resistivity with depth, depending on the length of the profile. Each cross-section is interpreted to determine the material type along the profile at increasing depth, based on the typical resistivities returned for Irish ground materials.

Seismic Refraction profiling measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. By combining a number of techniques it is possible to provide a higher quality interpretation and reduce any ambiguities which may otherwise exist. Further information on the detailed methodology of each geophysical method employed in this investigation is given in **APPENDIX A: DETAILED METHODOLOGY**.

3. RESULTS

The survey was carried out on the 8th April 2019 and involved the collection of 4 ERT profiles and 4 seismic refraction profiles. The geophysical survey locations are indicated on Drawing AGP19087_01 (Appendix D).

3.1 ERT

Four ERT Profiles (R1 to R4) have been acquired across the site. The resistivity values have been interpreted on the following basis:

Resistivity (Ohm-m)	Interpretation
<100	SILT/CLAY
100-375	Sandy gravelly CLAY (possible weathered rock towards the base)
375-500	Weathered Dark Limestone
>500	Dark Limestone

3.2 Seismic Refraction Profiling

Four seismic refraction spreads were recorded across the site (S1-S4). The seismic refraction data indicated 4 velocity layers which have been interpreted as follows:

Layer	Seismic Velocity (m/s)	Average Seismic Velocity (m/s)	Interpretation	Stiffness/ Rock Quality	Excavatability
1	354-587	444	Soil	Soft/Loose	Diggable
2	689-942	824	Soil	Firm/Medium Dense	Diggable
3	1535-1957*	1842	Soil	Stiff - Very stiff/ Dense – Very Dense	Diggable
			Highly-Moderately Weathered Bedrock	Poor-Fair	Marginally Rippable to Break / Blast
4	2547-3889	3347	Slightly Weathered – Fresh Bedrock	Good	Break/Blast

It should be noted that the cut-off velocity for excavatability will be lower if excavating in trenches.

3.3 Discussion

The ERT and Seismic Refraction datasets have been combined to produce the Interpreted Sections on Drawings AGP19087_R1 to AGP19087_R4 (Appendix D). The combined results are summarised on the following basis:

Layer	Seismic Velocity (m/s)	Average Seismic Velocity (m/s)	Resistivity (Ohm-m)	Interpretation	Stiffness/ Rock Quality	Excavatability
1	354-587	444	<100	SILT/ CLAY	Soft-Firm	Diggable
2	689-942	824				
3	1535-1957	1842	100-375	Sandy gravelly CLAY (possible w.rock towards the base)	Firm-Stiff	Diggable
			375-500	Moderately Weathered Dark LIMESTONE	Fair	Marginally Rippable to Break / Blast
4	2547-3889	3347	>500	Slightly Weathered to Fresh Dark LIMESTONE	Good	Break/Blast

3.3.1 Soils

The soils have been interpreted as topsoil over sandy gravelly clay with silt/clay lenses. Seismic velocities indicate that on average the upper 1.5m of soils will be soft to firm, becoming firm to stiff with depth. The interpreted soil thickness across the site ranges from c.1.0m in the western part of the site to greater than 25m.

3.3.2 Bedrock

Bedrock has been interpreted as dark limestone. Combined resistivity and seismic velocity values have been interpreted as indicating two rock layers: an upper layer of moderately weathered dark LIMESTONE (1.0m to 5.0m thick) which should be marginally rippable to requiring breaking/blasting; over a layer of slightly weathered to fresh dark limestone which will require breaking/blasting if encountered. It should be noted that the cut-off velocity for excavatability will be lower if excavating in trenches. The geophysical data indicates that the hill in the centre of the site is underlain by predominantly sandy gravelly clay and it is unlikely that bedrock will be encountered during any excavation of the hill. However, this should be confirmed by direct investigation.

4. RECOMENDATIONS

If excavations or ground works are to be carried out on the site then a detailed assessment of excavatability should be carried out combining the results of the geophysical survey, rotary core drilling, strength testing and trial excavation pits using a high powered excavator such as a CAT 336E or more powerful model. A detailed discussion on excavatability is contained in Appendix C. The trial pits should be targeted in the interpreted shallow rock areas and the boreholes carried out in the area of interpreted thick soil.

The findings of the geophysical investigation should be reviewed following any direct investigation.

REFERENCES

Bell F.G., 1993;
'Engineering Geology', Blackwell Scientific Press.

Geotomo Software, 2006;
'RES2DINV Users Manual', Malaysia.

GSI, 2017;
Bedrock Geology 1:100,000 Shapefile. http://www.gsi.ie/Mapping.htm

GSI, 2017;
GSI/Teagasc Subsoils Shapefile. http://www.gsi.ie/Mapping.htm

GSI, 2017;
Groundwater Vulnerability Shapefile. http://www.gsi.ie/Mapping.htm

Hagedoorn, J.G., 1959;
'The plus - minus method of interpreting seismic refraction sections', Geophysical Prospecting, 7, 158 - 182.

Palmer, D., 1980;
'The Generalized Reciprocal Method of seismic refraction interpretation', SEG.

Redpath, B.B., 1973;
'Seismic refraction exploration for engineering site investigations', NTIS, U.S. Dept. of Commerce

Sheriff, R.E., and Geldart, L.P., 1982;
Exploration seismology, volume 1: Cambridge University Press, 253 pp.

'The blind zone problem in engineering geophysics', Geophysics, 24, pp 359-365.

APPENDIX A: DETAILED METHODOLOGY

A combination of geophysical techniques was used to provide a high quality interpretation and reduce any ambiguities, which may otherwise exist.

Electrical Resistivity Tomography (ERT)

Electrical Resistivity Tomography was carried out to provide information on lateral variations in the overburden material as well as on the underlying overburden and bedrock.

Principles

This surveying technique makes use of the Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. This method involves the use of electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

Data Collection

Profiles were recorded using a Tigre resistivity meter, imaging software, two 32 takeout multicore cables and up to 64 stainless steel electrodes. Saline solution was used at the electrode/ground interface in order to gain a good electrical contact required for the technique to work effectively. The recorded data were processed and viewed immediately after surveying.

Data Processing

The field readings were stored in computer files and inverted using the RES2DINV package (Geotomo Software, 2006) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-depth model of the resistivities.

The inverted 2D resistivity models and corresponding interpreted geology are displayed on the accompanying drawings alongside the processed seismic sections. Profiles have been contoured using the same contour intervals and colour codes. Distance is indicated along the horizontal axis of the profiles.

Seismic Refraction Profiling

Principles

This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

Data Collection

A Geode high resolution 24 channel digital seismograph, 24 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable (2m spacing). Equipment was carried was operated by a two-person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution is about one third the length of the profile (e.g. 46m profile ~16m depth). Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors.

Data Processing

The recorded data was processed and interpreted using the ray-tracing and tomographic inversion methods, to acquire depths to boundaries and the P-wave velocities of these layers, using the SeisImager/2D programme from Geometrics.

SeisImager/2D interprets seismic refraction data as a laterally varying layered earth structure. The programme includes three methods for data analysis, time-term inversion, the reciprocal method and tomography.

The tomography method creates an initial velocity model, then traces rays through the model, comparing the calculated and measured traveltimes. The model is then modified and the process repeated to minimise the difference between the calculated and measured times. The data was processed using this method and was then converted to a layer model for display and interpretation.

Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

Spatial Relocation

All the geophysical investigation locations were acquired using Trimble Geo 7X high-accuracy GNSS handheld GPS system using the settings listed below. This system allows collecting GPS data with c.20mm accuracy.

Projection:	Irish Transverse Mercator
Datum:	Ordnance
Coordinate units:	Meters
Altitude units:	Meters
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

APPENDIX B: SEISMIC REFRACTION DATA

The tomographic inversions for the seismic refraction spreads S1 – S4 are shown below:

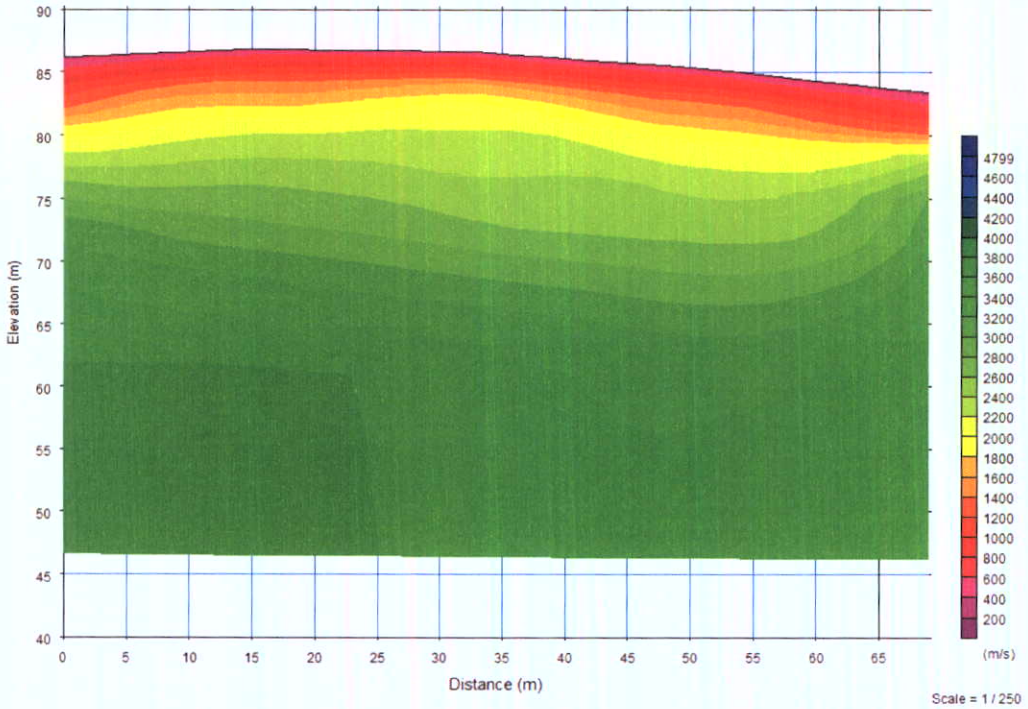


Fig.B.1.Seismic refraction spread S1 Tomographic Inversion.

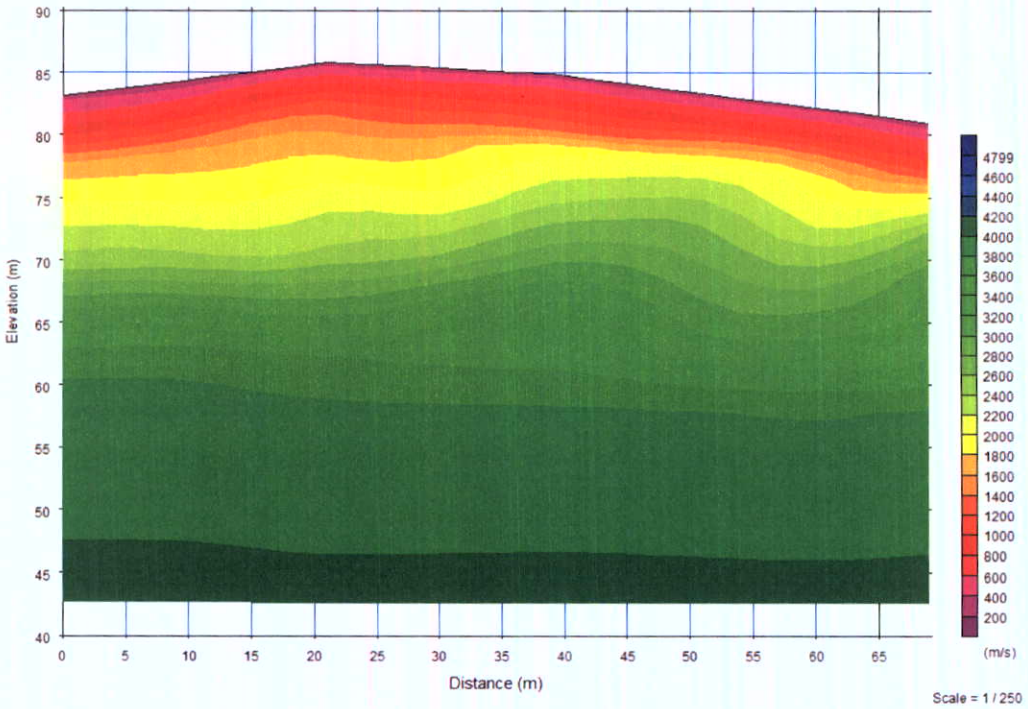


Fig.B.2.Seismic refraction spread S2 Tomographic Inversion.

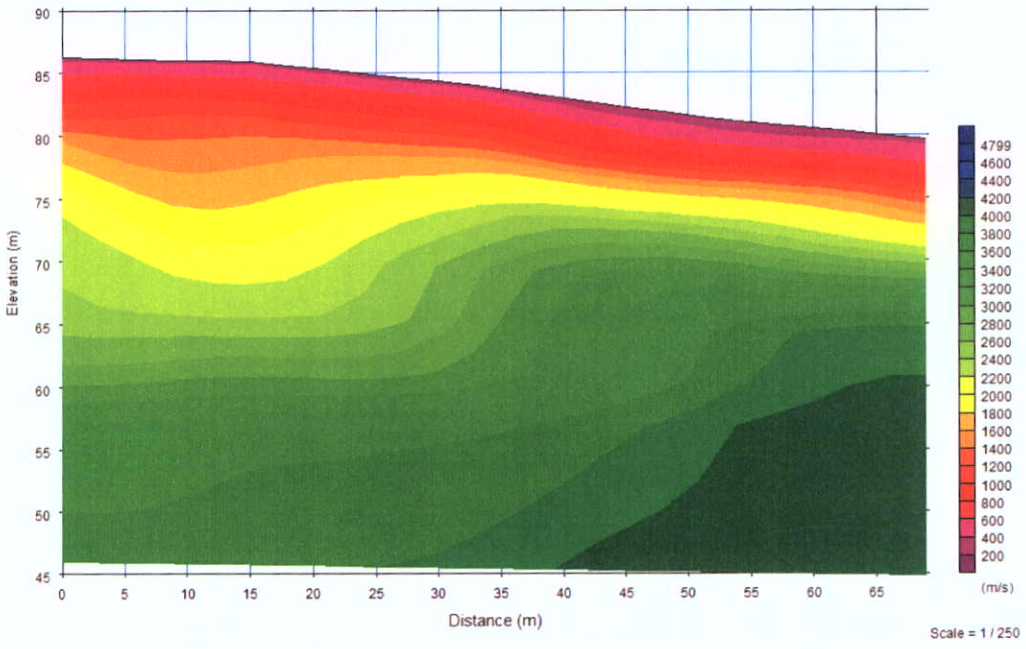


Fig.B.3.Seismic refraction spread S3 Tomographic Inversion.

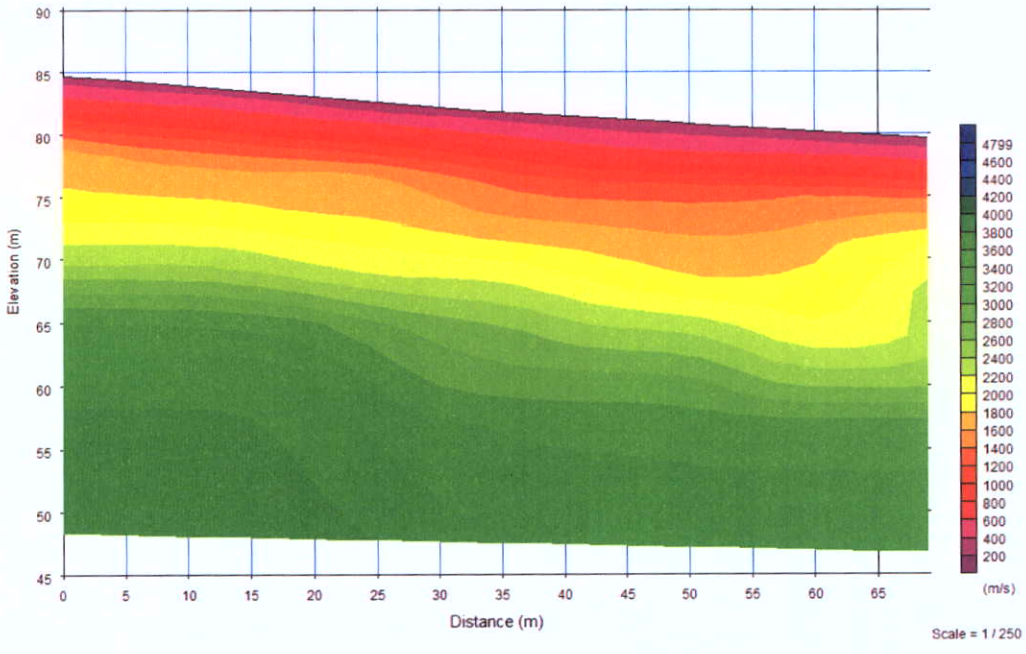


Fig.B.4.Seismic refraction spread S4 Tomographic Inversion.

APPENDIX C: EXCAVATABILITY

The seismic velocity of a rock formation is related to characteristics of the rock mass which include rock hardness and strength, degree of weathering and discontinuities. Usually the velocity is just one of several parameters used in the assessment of excavatability. The excavatability of a rock formation is favoured by the following factors:

- Open fractures, faults and other planes of weakness of any kind
- Weathering
- Brittleness and crystalline nature
- High degree of stratification or lamination
- Large grain size
- Low compressive strength

Weaver (1975) presented a comprehensive rippability rating chart (Fig.1) in which the p-wave velocity value and the relevant geological factors could be entered and assigned appropriate weightings. The total weighted index was found to correlate very well with actual rippability.

Fig.1 Rippability Rating Chart

Rock class	I	II	III	IV	V
Description	Very good rock	Good rock	Fair rock	Poor rock	Very poor rock
Seismic velocity (m/s)	>2150	2150-1850	1850-1500	1500-1200	1200-450
Rating	26	24	20	12	5
Rock hardness	Extremely hard rock	Very hard rock	Hard rock	Soft rock	Very soft rock
Rating	10	5	2	1	0
Rock weathering	Unweathered	Slightly weathered	Weathered	Highly weathered	Completely weathered
Rating	9	7	5	3	1
Joint spacing (mm)	>3000	3000-1000	1000-300	300-50	<50
Rating	30	25	20	10	5
Joint continuity	Non continuous	Slightly continuous	Continuous-no gouge	Continuous-some gouge	Continuous-with gouge
Rating	5	5	3	0	0
Joint gouge	No separation	Slight separation	Separation <1mm	Gouge <5mm	Gouge >5mm
Rating	5	5	4	3	1
Strike and dip orientation	Very unfavourable	Unfavourable	Slightly unfavourable	Favourable	Very favourable
Rating	15	13	10	5	3
Total rating	100-90	90-70*	70-50	50-25	<25
Rippability assessment	Blasting	Extremely hard ripping and blasting	Very hard ripping	Hard ripping	Easy ripping
Tractor horsepower		770/385	385/270	270/180	180
Tractor kilowatts		575/290	290/200	200/135	135

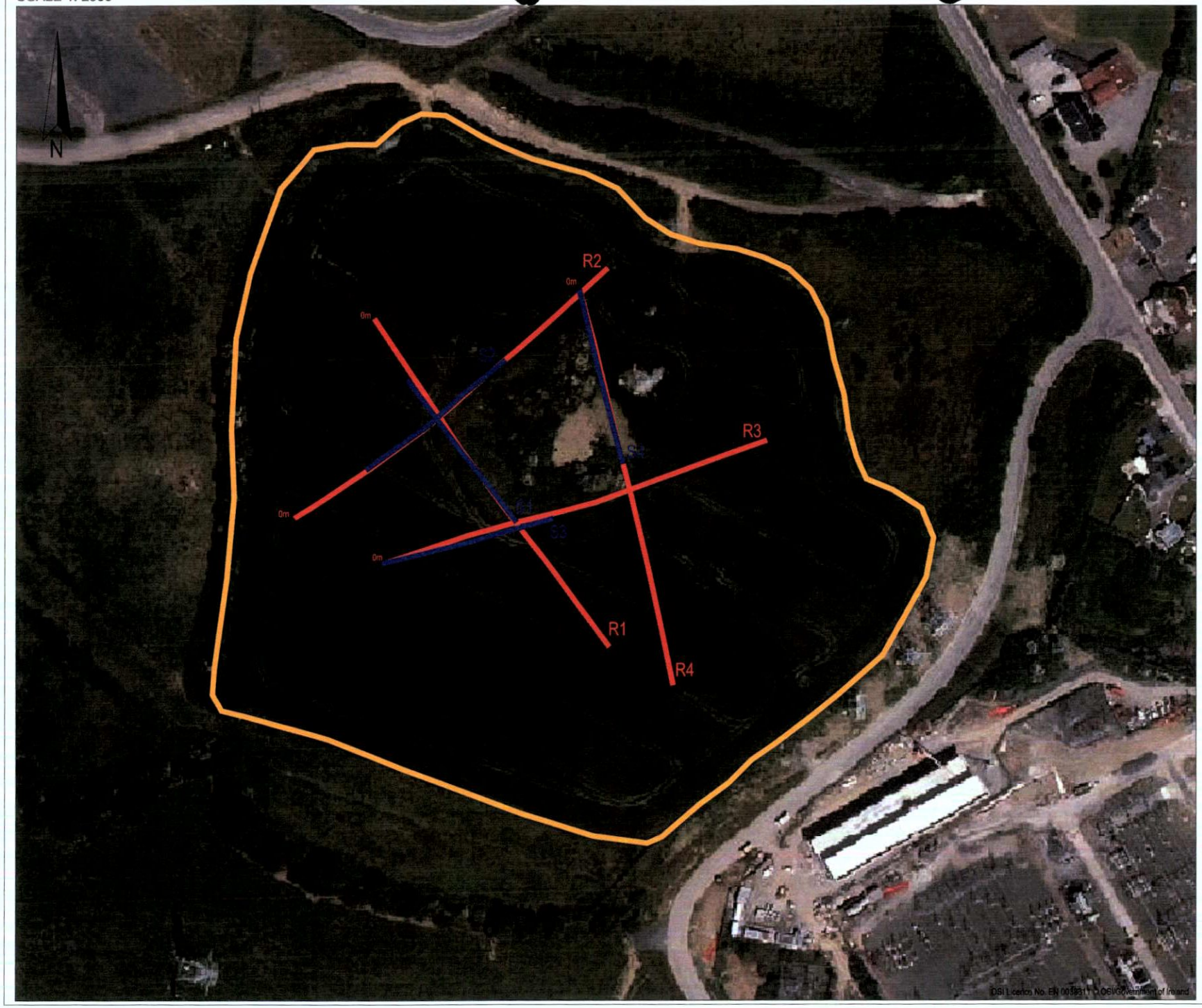
APPENDIX D: DRAWINGS

The information derived from the geophysical investigation as well as correlation with the available direct investigation is presented in the following drawings:

AGP19087_01	Geophysical Locations	1:2500 @ A3
AGP19087_R1	ERT R1 Results and Interpretation	1:1000 @ A4
AGP19087_R2	ERT R2 Results and Interpretation	1:1000 @ A4
AGP19087_R3	ERT R3 Results and Interpretation	1:1000 @ A4
AGP19087_R4	ERT R4 Results and Interpretation	1:1000 @ A4

FIGURE 1: GEOPHYSICAL LOCATIONS

SCALE 1: 2000



INDEX MAP:

LEGEND:

Site

R1 2D resistivity profile

S1 Seismic refraction profile

The information displayed here is to be used in conjunction with Report AGP19087_01 Report on the Geophysical Investigation at Huntstown North for Beauparc Ltd. APEX Geophysics Ltd. 17th April 2019

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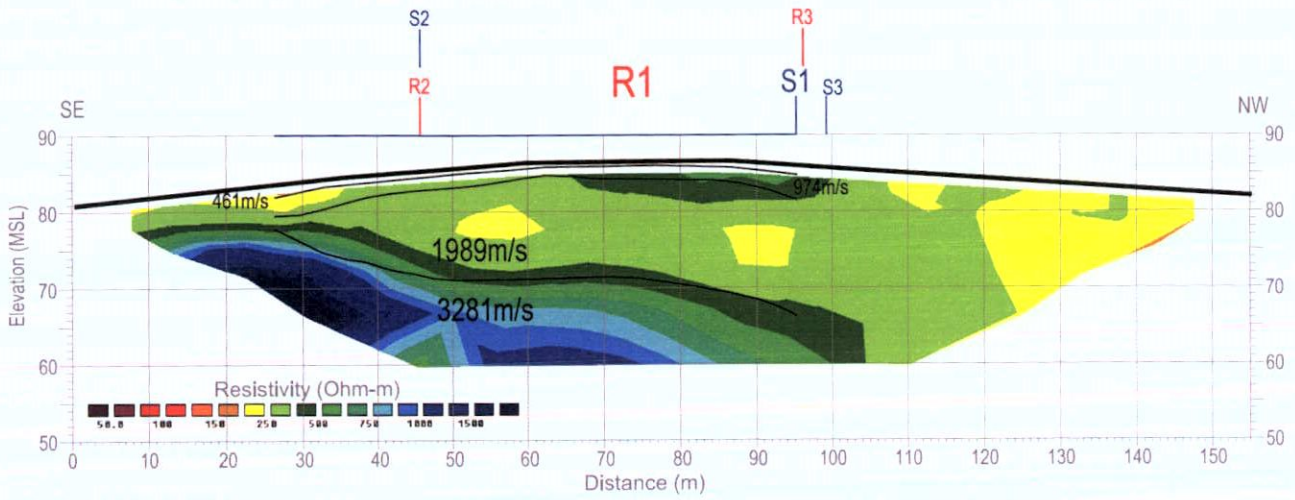
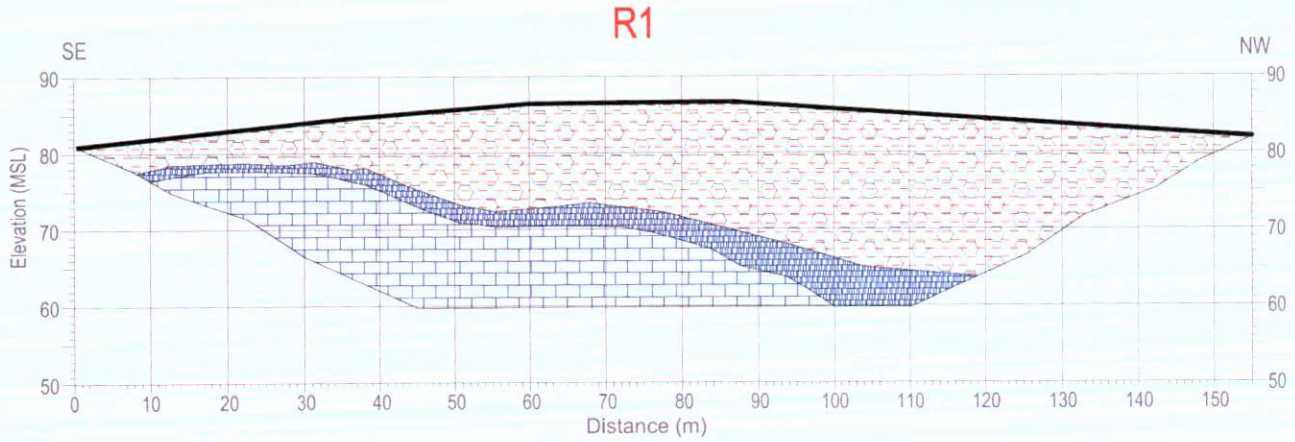
PROJECT	HUNTSTOWN NORTH GEOPHYSICAL SURVEY
CLIENT	BEAUPARC LIMITED
DRAWING NO	AGP19087_01
SCALE	AS INDICATED @ A4
DATE	17-04-2019

Version	Date	Drawn By	Checked
No.1	17-04-2019	KG	TL

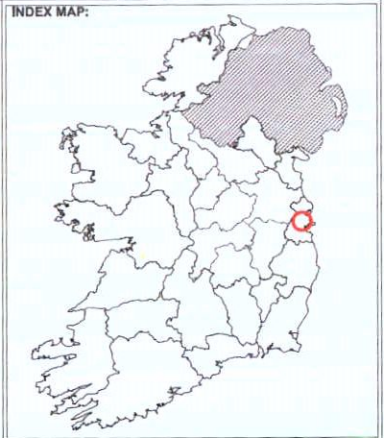
ERT R1 RESULTS AND INTERPRETATION

SCALE 1: 1000





INDEX MAP:



LEGEND:

- SILT/CLAY
- Sandy Gravelly CLAY (possible w.rock towards the base)
- Weathered Dark LIMESTONE
- Dark LIMESTONE
- 1254-1288 m/s — Seismic refraction layer with interpreted P-wave velocity

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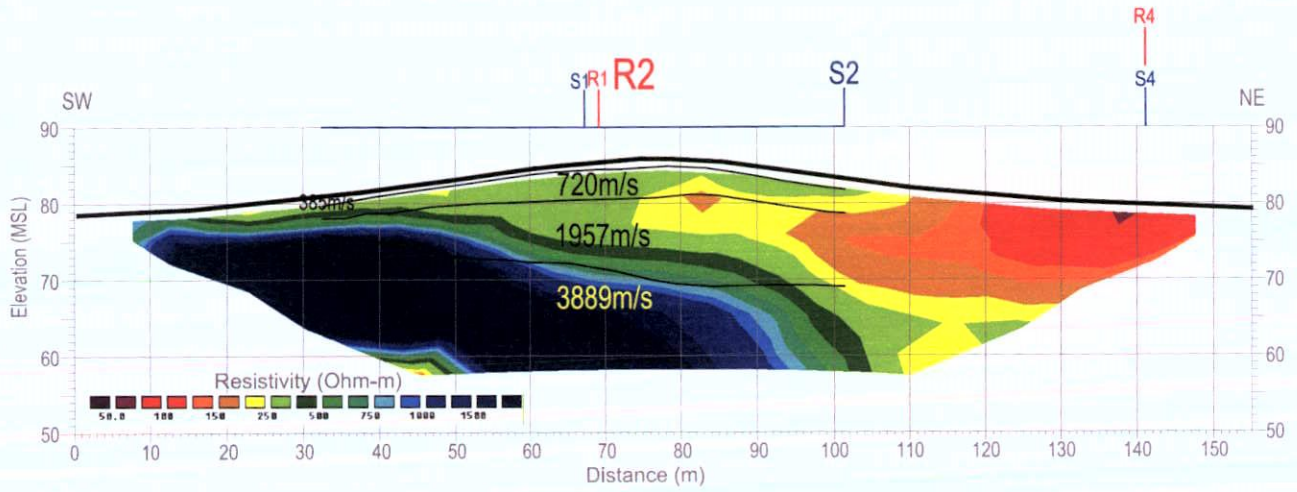
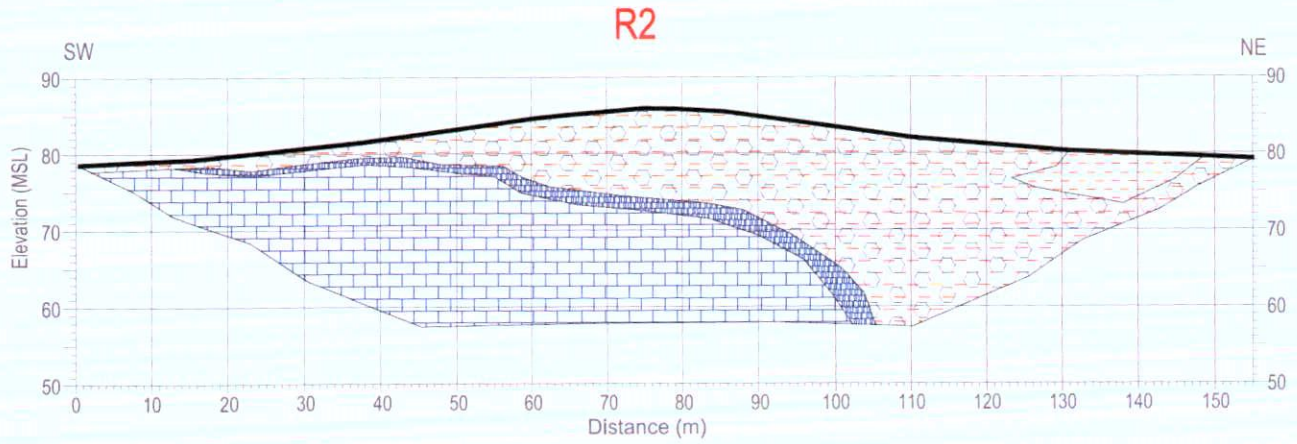
ERT R2 RESULTS AND INTERPRETATION

SCALE 1: 1000





INDEX MAP:

LEGEND:

- SILT/CLAY
- Sandy Gravelly CLAY (possible w.rock towards the base)
- Weathered Dark LIMESTONE
- Dark LIMESTONE
- Seismic refraction layer with interpreted P-wave velocity (1254-1288 m/s)

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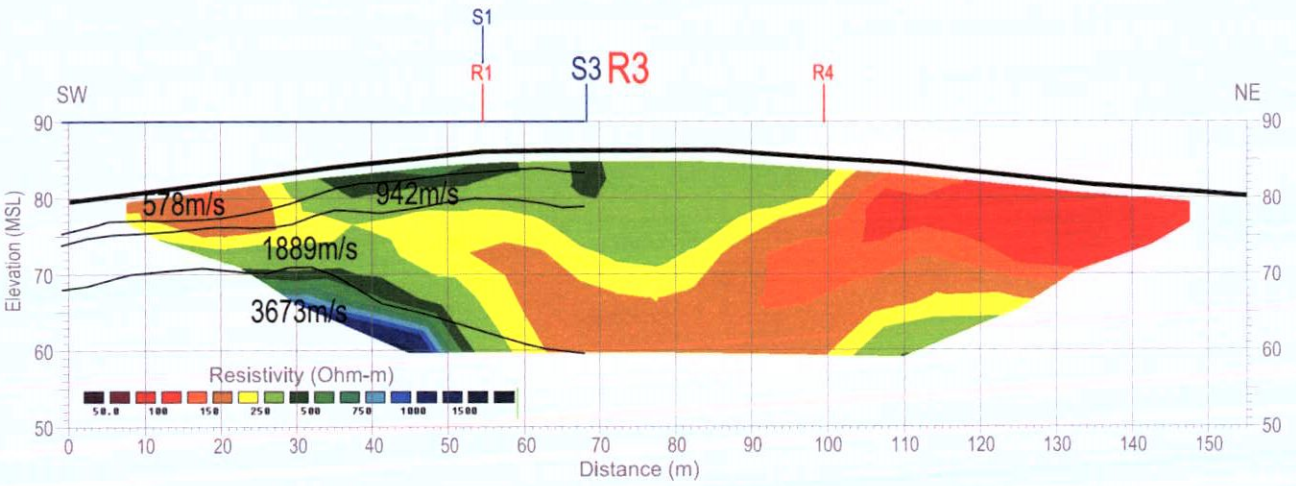
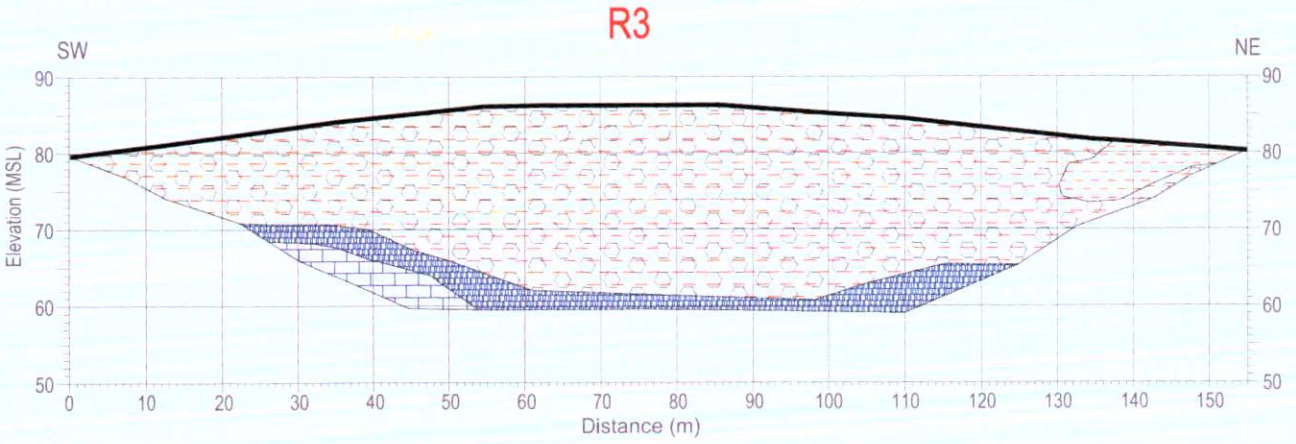
ERT R3 RESULTS AND INTERPRETATION

SCALE 1: 1000





LEGEND:

- SILT/CLAY
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- Weathered Dark LIMESTONE
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- 1254-1288 m/s — Seismic refraction layer with interpreted P-wave velocity

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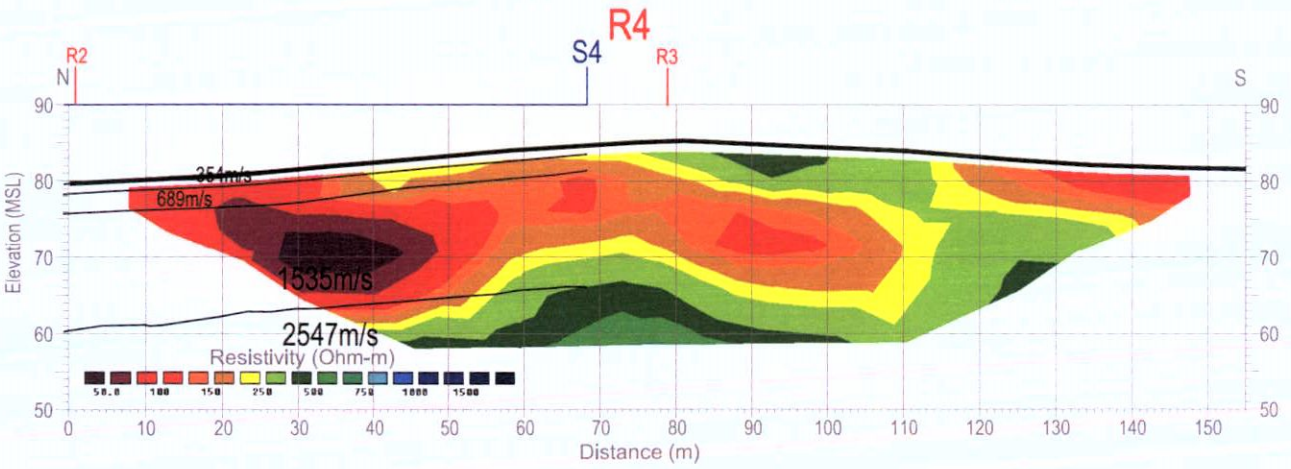
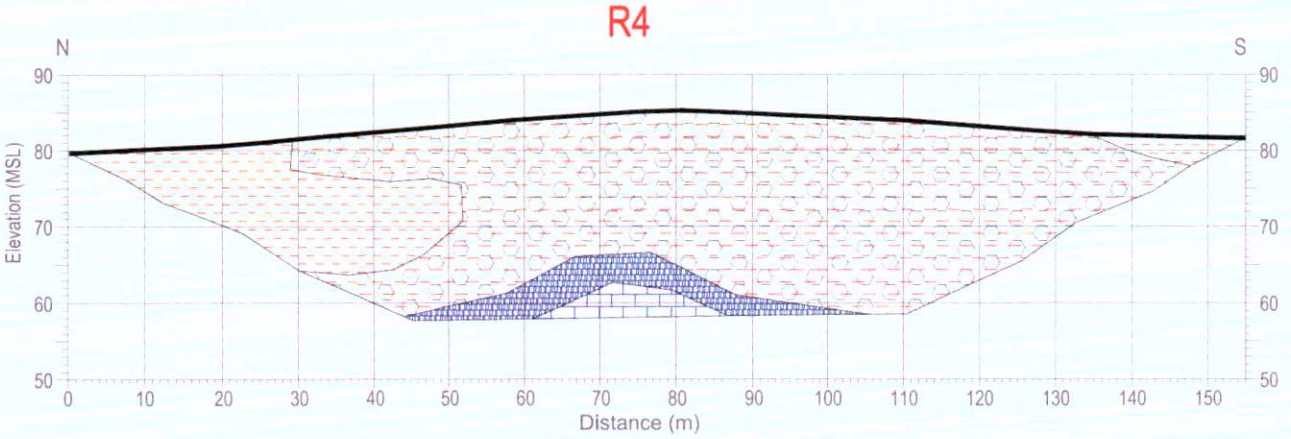
No.1	17-04-2019	KG	TL

ERT R4 RESULTS AND INTERPRETATION

SCALE 1: 1000





INDEX MAP:

LEGEND:

- SILT/CLAY
- Sandy Gravelly CLAY (possible w.rock towards the base)
- Weathered Dark LIMESTONE
- Dark LIMESTONE
- Seismic refraction layer with interpreted P-wave velocity (1254-1288 m/s)

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CLIENT:	BEAUPARC LIMITED
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SCALE:	AS INDICATED @ A4
DATE:	17-04-2019

Version	Date	Drawn By	Checked
No.1	17-04-2019	KG	TL

APPENDIX 6.2

LAND & SOIL

HANMAR
Site Investigation Services

PROPOSED INDUSTRIAL UNITS AT HUNTSTOWN Tc, Co. FINGAL

SITE INVESTIGATION REPORT

Client:	Rathdrinagh Land ULC, T/a Irish Recycling
Engineer:	Coyle Civil & Structural Design Ltd
Completed:	December 2022
Report No.:	22-125

Hanmar Site Investigation Services Ltd.
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