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ATTACHMENT-4-8-3 COMPLETE BASELINE REPORT

Technical Report Prepared For

Amazon Data Services Ireland Limited

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EXECUTIVE SUMMARY

This soil and groundwater quality baseline report has been completed as part of the ADSIL IED licence review. This IE Licence review relates to the existing Installation (Licence P1186-01) that has been extended to c. 9.963 hectares (ha) in total under this review. The site is within an urban area situated in the Clonshaugh Business and Technology Park (IDA Park), Clonshaugh, Dublin 17. The report has been prepared in compliance with *European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions.*

The only relevant bulk hazardous substances (substances stored or used onsite and which are classified as hazardous by the EPA under the Groundwater Regulations and contained in bulk storage) is fuel. Diesel or hydrotreated vegetable oil (HVO) is used for emergency back-up generators. The fuel store is of sufficient volume to be identified as a hazard present at the site which has the potential to impact soil and groundwater if not adequately mitigated during storage and operation at the Installation site.

A review of containment and mitigation measures at the facility confirms that the risk of a contamination event resulting in soil or ground water contamination is low. These measures include hard standing, adequate bunding, tank level alarms, double lined transfer lines, spill management procedures and hydrocarbon interceptors on all stormwater lines draining areas where there is a risk of surface water interacting with hydrocarbon sources.

A review of the site history confirmed that the existing Installation site was formally comprised of a warehouse operated by Donnelly Documentation Services, Cahill Printers building previously used as a printing press and the former Acco/Rexel site which produced plastic extrusions. All three facilities included warehousing, offices and associated infrastructure. A review of the extended Installation site confirmed that the site was previously a brownfield site formally occupied by a children's toy factory.

The majority of the overall site is hard paved, reducing the potential for vertical migration to ground during operation. In the unlikely event of a leakage outside of the storage bunds, including the extended Installation, the primary pathway would be through the stormwater drainage system which discharges to the IDA park storm water drainage system via hydrocarbon interceptors.

For both the existing and extended Installation, there are stormwater flow control devices located downstream of the attenuation systems to reduce to the maximum permissible flow rate.

A conceptual site model (CSM) has been presented for the site based on the assessment of available information and site investigation data collected at the site and neighbouring sites. The source pathway qualitative risk assessment concludes that the risk of an impact to soil or water is low.

Receptors include the underlying aquifer and Santry River located immediately to the south of the site which discharges to the east to the North Bull Island transitional water body, and ultimately the Dublin Bay. There is no potential for a source -pathway-receptor linkage with the underlying aquifer based on the presence of thick deposits of low permeability glacial clays beneath the site. There is an indirect linkage to Dublin Bay through the stormwater drainage system discharging to the Santry River. The design measures on site ensure maintenance of stormwater quality discharging from the facility.

CONTENTS

1.0 INTRODUCTION

AWN Consulting Limited (AWN) was appointed by ADSIL to complete a baseline report to accompany this Industrial Emissions (IE) Licence review application that relates to the entire Installation that is approximately 9.963 hectares (ha) in total ('the Site'), which is an increase from the existing Installation (Licence P1186-01) (7.9 ha).

This report relates to the Site located within the Clonshaugh Business and Technology Park, Clonshaugh, Dublin 17, as described in the Operational Report Attachment 4-8-2.

It is necessary from the outset of a licence application that the operator of a facility has a record of the existing conditions of the site prior to development. This allows for a comparison of contamination at the beginning and end of a site's operational history.

1.1 DISCLAIMER

The conclusions presented in this report are professional opinions based solely on the tasks outlined herein and the information made available to AWN. They are intended for the purpose outlined herein and for the indicated site and project. Furthermore, this report is produced solely for the benefit of ADSIL to address the EPA requirement for a licence application.

This report may not be relied upon by any other party without explicit agreement from AWN. Opinions and recommendations presented herein apply to the site conditions existing at the time of the completed field work and subsequent assessment.

They cannot apply to changes at the site of which AWN is not aware and has not had the opportunity to evaluate. This report is intended for use in its entirety; no excerpt may be taken to be representative of this baseline assessment. All work carried out in preparing this report has utilised and is based on AWN professional knowledge and understanding of the current relevant Irish and European Community standards, codes, and legislation.

1.2 LEGISLATIVE CONTEXT AND GUIDANCE

Under the Industrial Emissions Directive[1] it necessary to prepare a Baseline Report in conjunction with an Industrial Emissions Licence Application, as stated in Article 22(2) Chapter 2 of the directive:

> *"Where the activity involves the use, production or release of relevant hazardous substances and having regard to the possibility of soil and groundwater contamination at the site of the installation, the operator shall prepare and submit to the competent authority a baseline report before starting operation of an installation…."*

Article 22(2) specifies that the Baseline Report should contain at least the following information:

a) Information on the present use and, where available on past uses of the site;

[1]European Union. Directive 2010/75/EE of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control). EU: November 2010.

b) Where available, existing information on soil and groundwater measurements that reflect the state at the time the report is drawn up or, alternatively, new soil and groundwater measurements having regard to the possibility of soil and groundwater contamination by those hazardous substances to be used, produced or released by the installation concerned.

The Industrial Emissions Directive was transposed into Irish law under the European Union (Industrial Emissions) Regulations 2013[2]. The Environmental Protection Agency Act 1992 was subsequently amended to include aspects of the conditions outlined in Article 22(2); this included the requirement for an applicant for a license to furnish to the Agency a baseline report. T*he applicant in preparing the baseline report shall include any information prescribed in regulations under section 89 which includes:*

a) The current use and, where available, the past use of the site,
b) Any available information.
   i. On soil or groundwater measurements that reflect the state of the site at the time that the baseline report is drawn up, or
   ii. On new soil and groundwater measurements, having regard to the possibility of soil and groundwater contamination by the hazardous substances proposed to be used, produced or released by the installation concerned.

This report has been prepared to address the requirements of legislation and in accordance with the EU Guidance[3] for baseline reports. The EU Guidance outlines a number of key tasks that should be undertaken to both determine whether a baseline report needs to be produced for a particular situation and in order to produce the baseline report itself. The EU Guidance sets out 8 individual Stages to be considered; this report addresses the elements in accordance with Stages 1 to 8.

- Stage 1: Identifying the potential hazardous substances that are currently used, produced, or released at the site
- Stage 2: Identifying the relevant hazardous substances i.e. those which have the potential to cause soil and groundwater contamination
- Stage 3: Assessment of the site-specific pollution risk
- Stage 4: Site History
- Stage 5: Environmental Setting
- Stage 6: Conceptual Site Model
- Stage 7: Site Investigation – Soil & Water Quality Assessment
- Stage 8: Production of the Baseline Report

1.3 SITE LOCATION AND CONTEXT

This soil and groundwater baseline report relates to the entire site subject to the IE licence review. 3 no. 2-storey data storage installation buildings with mezzanine floors at each level (Buildings W, X and Y) and ancillary elements. Building X and Y consists of a 2-storey building connected via link corridor and share a loading bay and offices. The ancillary elements of the development include; loading bay, maintenance and

2Ireland. European Union (Industrial Emissions) Regulations 2013 (S.I. No. 138 of 2013).

3European Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on Industrial Emissions. EU: 2014/C 136/03

storage spaces, associated water tanks, sprinkler tanks, pump house and electrical rooms, security and utility spaces, underground foul and storm water drainage networks, attenuation storm cells (referred to as Stormtech systems), internal road network, and site landscaping. The site includes the Newbury 110 kV Substation.

The extended Installation comprises the following additional elements: 2 no. 2-storey data storage installation buildings with mezzanine floors at each level (Buildings U and V) and ancillary elements. The ancillary elements of the development include; loading bays, maintenance and storage spaces, office administration areas, electrical and mechanical plant rooms with plant at roof level, sprinkler tank and pump house, security and utility spaces, underground foul and storm water drainage network, an attenuation Stormtech system, internal road network with car and cycle parking, and site landscaping. Building U has solar panels at roof level. The site includes a substation.

The existing Installation is located close to the main entrance to the established Clonshaugh Business and Technology Park ("the Business Park"), located off the Oscar Traynor Road. Developments within the IDA Park are similar 'individual lot' type developments.

The extended Installation is located opposite the existing Installation within the IDA Park, on the other side of the IDA Park entrance road.

The IDA Park lies approximately 6.5 km north of Dublin's city centre and 3 km south of Dublin Airport. To the south of the site is a sports grounds facility and to the east of the IDA Park are residential estates. The M1 motorway runs parallel to the IDA Park site boundary to the west of the Site. Access to and from the IDA Park at present is from Oscar Traynor Road.

The IDA Park accommodates a range of technology and industrial type uses and is bounded by the M50/M1 to the west, the Santry River to the south with Oscar Traynor Road beyond, residential areas to east and the R139 to the north.

The wider context of the site is defined primarily by commercial and industrial development. Large areas of the surrounding lands to the south and north within the Business Park have been developed in the past 10-15 years and are occupied by industrial campuses including commercial and retail uses, including manufacturing, data centres and food manufacturing uses.

With the extended Installation, the closest occupied residential properties are c. 28 m east of the site boundary along the Clonshaugh Road, in comparison to the existing licenced Installation, where the closest are c. 145 m from the site boundary.

The surrounding 3 km of the site includes IE and IPC Licensed sites including:

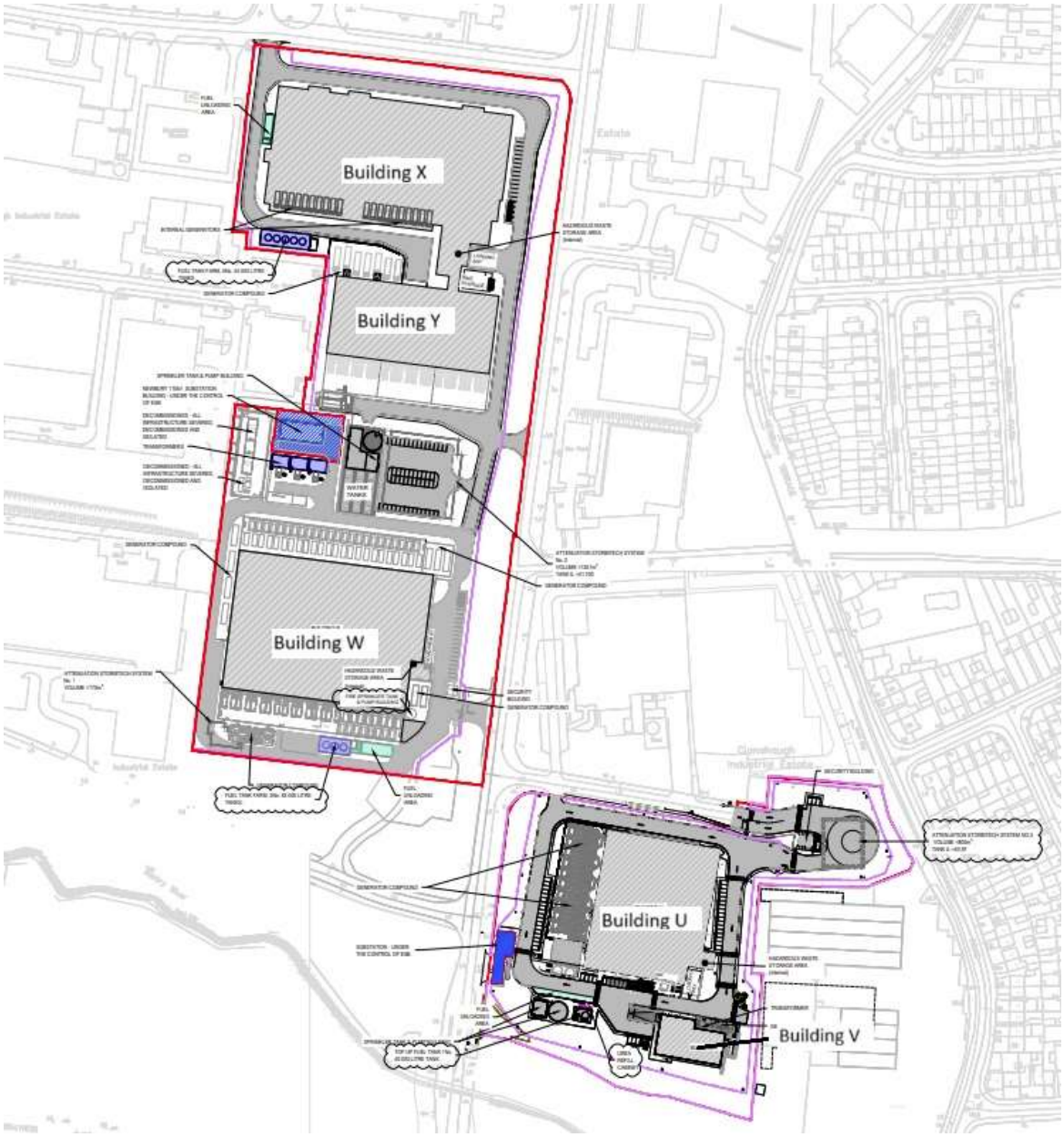
- Forest Laboratories Ireland Limited (P0306-04), located to the immediate west of the site;
- Global Switch Property Ltd (P0109-01), located to the north of the site within the Clonshaugh Business and Technology Park
- ADSIL (P1171-01), located to the north of the site within the Clonshaugh Business and Technology Park
- Wood-Printcraft Limited (P0143-01), located to the southeast in Coolock Industrial Estate
- Mondelez Ireland Production Limited (P0809-01), located to the southeast in Coolock Industrial Estate

- Crown Paints Ireland Ltd (P0248-01), located to the southeast in Coolock Industrial Estate
- Barclay Chemicals Manufacturing Ltd (P0317-01), located to the southwest in Lilmar Industrial Estate.

Located approximately 1km to the northeast of the site, immediately north of the Junction of the R139 and Clonshaugh Road, is a historic landfill containing; a mixture of commercial, municipal, industrial, and construction and demolition waste material; which was buried there in c. 1980s. Permission was granted by Fingal County Council (FCC) in 20 August 2019 (ref: F19A/0149) for the remediation by excavation and removal of circa 22,000 cubic metres of mixed waste material illegally deposited on lands at Belcamp. The project will involve site preparatory works, excavation and infill works, installation of a cut-off wall to the south and southwest and restoration with grass and treeline where applicable.

The IE Licence site boundary (including the extended Installation) is presented in Insert 1.1, and in Drawing 21_123F-CSE-00-XX-DR-C-0001 Site Layout Plan of the licence review application, an extract of which is presented in Insert 1.2, below.

Insert 1.1 Site Location (indicative red line site boundary)



Insert 1.2 Overall Installation Site Location (red line boundary illustrating site layout – extract from Drawing 21_123F-CSE-00-XX-DR-C-0001 Site Layout Plan

1.4 SOURCES OF INFORMATION

Reference is made in this report to information from a number of existing data sources and reports including the following:

- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information;
- Dublin City Council - illegal landfill information; and
- Environmental Protection Agency (EPA) – www.epa.ie on-line mapping and database information;
- Environmental Protection Agency (EPA) – www.epa.ie on-line licence information

- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database,
- Research papers referred to in the text.

Other relevant documentation consulted as part of this assessment included the following:

- Project C-Unit AF1, Clonshaugh Business and Technology Park, Dublin 17. Due Diligence Report, ADSIL 24th November 2010
- Site 1 Cahill Printers Facility Due Diligence Report ADSIL, 22nd February 2013.
- Site 2 Acco Rexel Facility Due Diligence Report, ADSIL, 22nd February 2013.
- Environmental Audit (Phase 1 – Historical Review and Site Walkover) for Clifton Scannell Emerson Associates by AWN ref TH/12/6520 7th February 2013
- Complete Baseline Report 2020 IED Licence Application, ADSIL, AWN Consulting ref JG/20/11534WR01
- Site Investigation Report. DUB090 Data Centre & Ski Lodge Clonshaugh, Dublin 17. Site Investigations Ltd, September 2021;
- Due Diligence Report DUB090 - JCD Clonshaugh. ARUP, January 2021;
- Environmental Assessment Report. Clonshaugh Business Park. Ground Investigations Ireland, February 2020;
- Engineering Planning Report - Drainage & Water Services. Proposed Data Centre Development Clonshaugh Business and Technology Park. Clifton Scannell Emerson Associates, October 2021;
- Flood Risk Assessment. Data Centre Development Clonshaugh Business and Technology Park. Clifton Scannell Emerson Associates, September 2021.

1.5 SCOPE OF WORK UNDERTAKEN

The scope of the work undertaken for this assessment included the following:

- A desktop review of regional and site geology and hydrogeology.
- Review of available soil and groundwater quality data where available.
- Review of bulk liquid storage at the site and assessment in terms of likely impact to receiving waters.

2.0 STAGE 1: IDENTIFYING THE POTENTIAL HAZARDOUS SUBSTANCES

This section of the report identifies a list of all hazardous substances stored on site (refer to Table 2.1) or used in large quantities inside the Installation boundary (either as raw materials, products, intermediaries, by-products, emissions or wastes).

This includes all hazardous substances associated with both the IED Annex I activities and directly associated activities which have a technical connection to the activities carried out and which could have an effect on soil or groundwater pollution.

Where hazardous substances are listed under trade names the chemical constituents have also been identified. For mixtures or compounds the relative proportion of the largest constituent chemicals are identified.

Table 2.1 *Substances stored on site*

Substance	Area Served/Purpose	Expected Volume of storage
Fuel Oil (Diesel)	Emergency Generator Fuel source	579.15 tonnes*

Substance	Area Served/Purpose	Expected Volume of storage
Hydrotreated Vegetable Oil (HVO)	Emergency Generator Fuel source	569.72 tonnes*
R410A	Utilities - Refrigerant for cooling / HVAC systems	<1 tonne
R407c	Utilities - Refrigerant for cooling / HVAC systems	<0.2 tonne
R134a	Utilities - Refrigerant for cooling / HVAC systems	<1 tonne
R32	Utilities - Refrigerant for cooling / HVAC systems	<0.2 tonne
Urea Solution (AdBlue)	Abatement control for SCR system	10.14 tonnes (filled to 90% capacity)

*Maximum amount stored – either diesel or HVO or combination of both will be used.

For both the existing and extended Installation, the only chemical stored on site in bulk is fuel oil (diesel or HVO). In a worst-case scenario, the fuel tanks will contain only diesel (i.e. 579.15 tonnes) and no HVO (0 tonnes), in the best-case scenario, the fuel tanks will contain only HVO (i.e. 569.72 tonnes) and no diesel (0 tonnes). In reality, the ratio of diesel to HVO will vary and the amount of HVO and diesel will vary between these 2 scenarios.

There are no other materials held onsite other than domestic cleaning chemicals for cleaning of the staff facilities. These are managed by the cleaning company. All oils, paints, adhesives, maintenance products (including small amounts of hydrogen peroxide used for cooling unit Legionella management), or other materials required are brought onsite and removed from site by the relevant contractors. These substances are not stored on site. As they are only brought in as required for specific maintenance activities, and given the absence of on-site storage and the infrequent, small-scale use, the risk of pollution is considered to be very low.

Refrigerant is held within the VRF system for the offices, and Building V data storage rooms. No refrigerants are stored onsite. Refrigerants are held within this enclosed system on a continuous basis and would only be removed during decommissioning.

The small amounts of hazardous waste generated are stored in a designated storage areas The waste is covered, and a mobile retention bund is in place to contain any liquid waste that requires storage, where required. The waste is collected from this area by an authorised waste contractor for recovery and / or disposal off-site.

Waste oil and filters and waste batteries are not stored onsite and are removed by the maintenance contractors during maintenance operations and change outs. Waste sludge/oily water from hydrocarbon interceptors is removed directly from each interceptor by means of a vacuum tanker by relevant contractors. Once removed by the vacuum tanker, it is removed from the Installation. There is no storage of this waste on site and there is no discharge of oily water or waste sludge from the hydrocarbon interceptors to foul sewer /storm water network. No maintenance chemicals are held on site. There are no raw materials held onsite other than cleaning chemicals for cleaning of the staff facilities. These are managed by the cleaning company.

3.0 STAGE 2: IDENTIFYING THE RELEVANT HAZARDOUS SUBSTANCES

This section identifies which of the hazardous substances from Stage 1 are ‘relevant hazardous substances’ as defined by European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions.

'Relevant hazardous substances' are those substances or mixtures defined within Article 3 of Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation) which, as a result of their hazardousness, mobility, persistence and biodegradability (as well as other characteristics), are capable of contaminating soil or groundwater and are used, produced and/or released by the Installation.

Table 3.1 *Hazard statements for substances stored on site*

Substance	Hazard Statement(s)	Hazard Statement Description
Diesel	H226, H304, H332, H315, H351, H373, H411	H226 – Flammable liquid and vapour; H304 – May be fatal if swallowed and enters airways; H332 – Harmful if inhaled; H315 – Causes skin irritation; H351 – Suspected of causing cancer; H373 – May cause damage to organs through prolonged or repeated exposure; H411 – Toxic to aquatic life with long lasting effects.
Hydrotreated Vegetable Oil (HVO)	H304	H304 – May be fatal if swallowed and enters airways.
R410A	H280	H280 – Contains gas under pressure; may explode if heated.
R407c	H280	H280 – Contains gas under pressure; may explode if heated.
R134a	H280	H280 – Contains gas under pressure; may explode if heated.
R32	H280, H220	H280 – Contains gas under pressure; may explode if heated; H220 – Extremely flammable gas.
Urea Solution (AdBlue)	N/A	N/A

The table above summarise the Hazard Statement and description of the hazards for the identified chemicals identified, these statements identify the ability of these substances to contaminate soil or groundwater.

The only bulk liquids to be stored on site are diesel or HVO which are stored for emergency back-up operation of generators. Diesel fuel oil is the only substance, based on the hazard statements, that is considered to be capable of contaminating soil and/or groundwater. HVO fuel is used on site however, this fuel only includes the H-Statement H304 (may be fatal if swallowed and enters airways) — reflecting the risk of aspiration if ingested, but it does not pose a recognised risk of long-term aquatic toxicity.

4.0 STAGE 3 – ASSESSMENT OF SITE-SPECIFIC POLLUTION RISK

This section addresses the actual possibility in the context of the site for soil or groundwater contamination, including the probability of releases and their consequences. Taking particular account of:

- The quantity of each hazardous substance handled, produced or emitted in relation to its environmental effects.

- The location of each hazardous substance on the site e.g. where it is or will be delivered, stored, used, moved around the site, emitted etc., in particular in view of the characteristics of the soil and groundwater at that part of the site.
- The method of storage, handling and use of relevant hazardous substances and containment mechanisms to prevent emissions occurring; e.g. bunds, hard-standing, handling procedures.

As with every site there is the risk of accidents and incident due to tanker overturning on site roads; vessel rupturing; leaking tanks; seal breaking; accidental discharge; leaks from drain ruptures; or fire. As well as identified risks during routine operations such as spills during delivery or from pipe joints, small spills during decanting/transfer of product, leaks from blocked or broken drains, cracks in concrete hardstanding.

The only planned emissions from the site that hold a risk of including these relevant substances is the discharge to stormwater network. There are no planned discharges to land or ground water.

4.1 FUEL OIL STORAGE

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site operators are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil waste generated at the site

Fuel (diesel, HVO or HVO/diesel blend) for the emergency back-up generators or fire sprinkler pumps is stored in multiple locations across the Site; that includes bulk fuel tanks, belly tanks and/or day tanks.

There is a total fuel storage capacity on site of 748,250 litres (748.25 m^3). The tanks on site are filled to up to maximum 90% capacity; therefore, the expected maximum fuel storage on site is 673,425 litres (673.43 m^3), which is a maximum potential tonnage of approximately 579.15 tonnes of diesel fuel. A combination of both HVO or Diesel may be used.

In addition to onsite storage control and mitigation measures are in place and include the following;

- Double skinned day tanks, with high- and low-level alarms and leak detection;
- Bunded bulk fuel tanks with high- and low-level alarms;
- Bulk fuel tank bunds and unloading bays are equipped with hydrocarbon probes in the bund sump which detects hydrocarbons in the bund. This triggers closure of the sump discharge should hydrocarbon be detected in the sump and sends an alarm signal to the BMS to alert EOTs.
- Hydrocarbon interceptors with level alarms (high liquid and oil level); and
- Standard operating procedures for fuel delivery.

4.2 STORM WATER DRAINAGE

The storm water network has been designed to provide sufficient capacity to contain and convey all storm water runoff associated with the 1 in 100 year event to the attenuation cells without any overland flooding including an additional allowance of 10% in rainfall intensities due to climate change.

4.2.1 Existing Installation (Building W, Y and X)

Rainwater runoff from impermeable areas of the site (with the exception of rainwater runoff from the fuel tank farm and associated unloading bays and the transformer compound) is collected via the onsite storm water drainage network in accordance with DCC Planning Ref. 2979/13, 2688/13 and 3534/11. The residual evaporative cooling water also discharges to the stormwater network. The cooling water discharged from the evaporative cooling units is effectively clean water that has passed through the cooling equipment. Rainfall which passes through the back-up generator exhaust stacks discharges to the storm water drainage network via hydrocarbon interceptors. However, some of the back-up generator exhausts are horizontal, which prevents rainwater entering the generator flues.

The stormwater drainage network conveys the stormwater via hydrocarbon interceptors to discharge offsite at 2 no. Emission Points (SW1 and SW2).

There are 2 no. Attenuation stormtech systems located on the existing Installation site that are designed to attenuate storm waters (See Drawing 21_123F-CSE-00-XX-DR-C-1100).:

- Attenuation Stormtech system no. 1 (170 m^3 capacity) is located to the south of Building W and is an offline attenuation storm cell. Stormwater from Building W and the Newbury Substation is discharged at emission point SW1, which connects to the existing 450 mm IDA Park storm sewer located to the south of the existing Installation and subsequently to the Santry River.
- Attenuation Stormtech system no 2 (1,351 m^3 capacity) is located to the south of Building Y. From there, the stormwater is discharged at emission point SW2 which connects to the existing 900 mm IDA Park storm sewer located to the east of the existing Installation that flows north to south, and subsequently to the Santry River.

Prior to discharge, stormwater passes through hydrocarbon interceptors on site to ensure that the quality of the stormwater discharge is controlled. This network is shown on Drawing 21_123F-00-XX-DR-C-1100 Surface Water Layout Plan.

The IDA Park storm sewer outfalls into the Santry River that is located to the south of the Site; the Santry River flows c. 5.15 river km east, to the North Bull Island transitional water body, and ultimately into Dublin Bay.

4.2.2 Extended Installation (Buildings U and V)

For the extended Installation, rainwater runoff from impermeable areas is collected via the onsite storm water drainage network in accordance with DCC Planning Ref. 3461/21. Residual evaporative cooling water also discharges to the stormwater network. Rainfall which passes through the back-up generator exhaust stacks for Building U and Building V will discharge to the storm water drainage network via hydrocarbon interceptors prior to entering the attenuation tank. This network conveys the stormwater via hydrocarbon interceptors to Attenuation Stormtech No. 3 (See Drawing 21_123F-CSE-00-XX-DR-C-1100). The attenuated stormwater discharges offsite at Emission Point SW3.

There is 1 no. Attenuation Stormtech system for the extended Installation that is designed to attenuate storm waters discharge flows:

- Attenuation stormtech system no 3 (800 m^3 capacity) at the north east corner of the extended part of the site, close to Building U. From there, the stormwater is discharged at emission point SW3, which connects to the 900mm diameter storm sewer running north to south beneath the entrance road to the IDA Park and subsequently to the Santry River.

The stormwater passes through hydrocarbon interceptors on site to ensure that the quality of the stormwater discharge is controlled. This network is shown on Drawing 21_123F-00-XX-DR-C-1100 Surface Water Layout Plan.

As per the existing Installation, the IDA Park storm sewer(s) outfall into the Santry River that is located to the south of the Site; the Santry River flows c. 5.15 river km east, to the North Bull Island transitional water body, and ultimately to the Dublin Bay.

4.3 FOUL WATER (WASTEWATER) DRAINAGE

Domestic effluent arising from occupation of the existing and extended Installation is discharged to the public foul sewer (at Emission Points SE2 to SE5).

All internal foul drainage networks were designed in accordance with the relevant guidance including Irish Waters Code of Practice for Wastewater Infrastructure, National Building Regulations Technical Guidance Document H – Drainage & Waste Disposal.

The foul network ultimately coveys the wastewater for final treatment and disposal at Ringsend Wastewater Treatment Plant (WWTP) in Dublin.

4.3.1 Existing Installation

Domestic Effluent

For the existing Installation, a gravity piped foul drainage network comprising 225 mm uPVC pipes conveys effluent from internal sanitary locations and outfall into the external foul network. The outfall into the existing foul network is at four locations: SE1, SE2, SE3 and SE4. Refer to Drawing 21_123F-00-XX-DR-C-1200 for the foul drainage layout.

The foul water connection to the public foul sewer is in accordance with the DCC Planning Ref. 2979/13, 2688/13 and 3534/11.

Fuel Tank Farm(s)

Drainage of rainwater from the fuel tank farm and associated fuel unloading bays to the south of the Site (Building W) is directed to foul sewer and connects to the foul main at emission point SE1. The drainage from the fuel tank farm and associated fuel unloading bays to the north of the Site (Building X and Y) is directed to foul sewer and connects to the foul main at emission point SE3.

The drainage sumps at the fuel unloading bays and in the bulk tank concrete bunds contain hydrocarbon detectors which automatically shut off drainage from these sumps if fuel is detected, preventing any contaminated stormwater from exiting the bund. These probes are also connected to the BMS/EPMS critical alarm.

Drainage from the bulk tank farms is equipped with hydrocarbon interceptor(s). The location of these are illustrated on 21_123F-00-XX-DR-C-1200. The hydrocarbon

interceptors are equipped with an oil level and high liquid level detection system which is connected to the BMS/EPMS critical alarm.

Transformer Compound

There is one transformer compound onsite, located at the Newbury GIS Substation. The drainage from the transformer compound is directed to foul sewer, and connects to the foul main to discharge at emission point SE2.

Drainage from the GIS Substation transformer compound is directed to the storm water drainage system, which is equipped a hydrocarbon interceptor, the location of which is illustrated on Drawing 21_123F-00-XX-DR-C-1200. The hydrocarbon interceptors are equipped with an oil level and high liquid level detection system which is connected to the BMS/EPMS critical alarm.

4.3.2 Extended Installation

Domestic Effluent

Domestic effluent arising from the extended Installation, i.e. Buildings U and V is discharged to the public foul sewer (at Emission Point SE5). Refer to Drawing 21_123F-00-XX-DR-C-1200 for the foul drainage layout. The foul water connection to the public foul sewer is in accordance with the DCC Planning Ref. 3461/21.

A gravity piped foul drainage network, comprising 100 mm diameter pipes connecting to 150 mm diameter pipes, conveys effluent from internal sanitary locations and outfall into the external foul network.

Fire Sprinkler Pumphouse

A foul drainage line (as can be seen on Drawing 21_123F-00-XX-DR-C-1200-Foul Water Layout Plan) serves the fire sprinkler pumphouse to the south of Building U. This is connected to the internal floor gully. There is a Class 2 full retention hydrocarbon interceptor on this line (FR4). The foul line and interceptor act as a tertiary containment measure for unplanned emergency events, such as spillages associated with the pump and fuel tank. Under normal operating conditions, there is no discharge to the foul sewer.

5.0 CONCLUSION - STAGES 1 TO 3

Stages 1 to 3 of the Baseline Assessment concluded that there are relevant hazardous substances stored that are capable of contaminating soil or groundwater.

The potential pollution risk is low based on the likelihood of releases of such substances occurring. Due to the volume of the diesel fuel oil, which is a relevant hazardous substance, ‘used, stored and transported’ to the site it is considered that a Complete Baseline Assessment is required.

6.0 STAGE 4 – SITE HISTORY

The purpose of this section is to determine which of the relevant hazardous substances identified by Stage 3 have the potential to be present on site in the soil and groundwater already as a result of activities to date and to determine whether they are coincident with potential future emission points.

The EU Commission guidance requires the following activity to be undertaken for Stage 4:

- Provide a site history. Consider available data and information;
- In relation to the present use of the site, and on emissions of hazardous substances which have occurred and which may give rise to pollution. In particular, consider accidents or incidents, drips or spills from routine operations, changes in operational practice, site surfacing, changes in the hazardous substances used;
- Previous uses of the site that may have resulted in the release of hazardous substances, be they the same as those used, produced or released by the existing installation, or different ones; and
- Review of previous investigation reports may assist in compiling this data.

6.1 SUMMARY OF PRIOR USE

This section includes an evaluation of the likelihood of the presence of any historic contamination of soil or groundwater at the site and an overview of the site history.

The historic mapping below indicates the prior use of the site from the earliest mapping available 1837-1842 through to present day.

The existing and extended Installation site was historically agricultural lands of various plot sizes, a typical of the rural setting prior to the 1980's. By 1995, the Clonshaugh Business and Technology Park area was developed and surrounded by residential areas and the M50 motorway was under construction.

A review of the site history confirmed that the existing Installation site was formally comprised of a warehouse operated by Donnelly Documentation Services, Cahill Printers building previously used as a printing press and the former Acco/Rexel site which produced plastic extrusions. All three facilities included warehousing, offices and associated infrastructure. All sections of the site were originally developed in the 1980's. The existing Installation comprises of three areas, the southern section (Building W) the mid-section (Building Y) and the northern section (Building X) of the site.

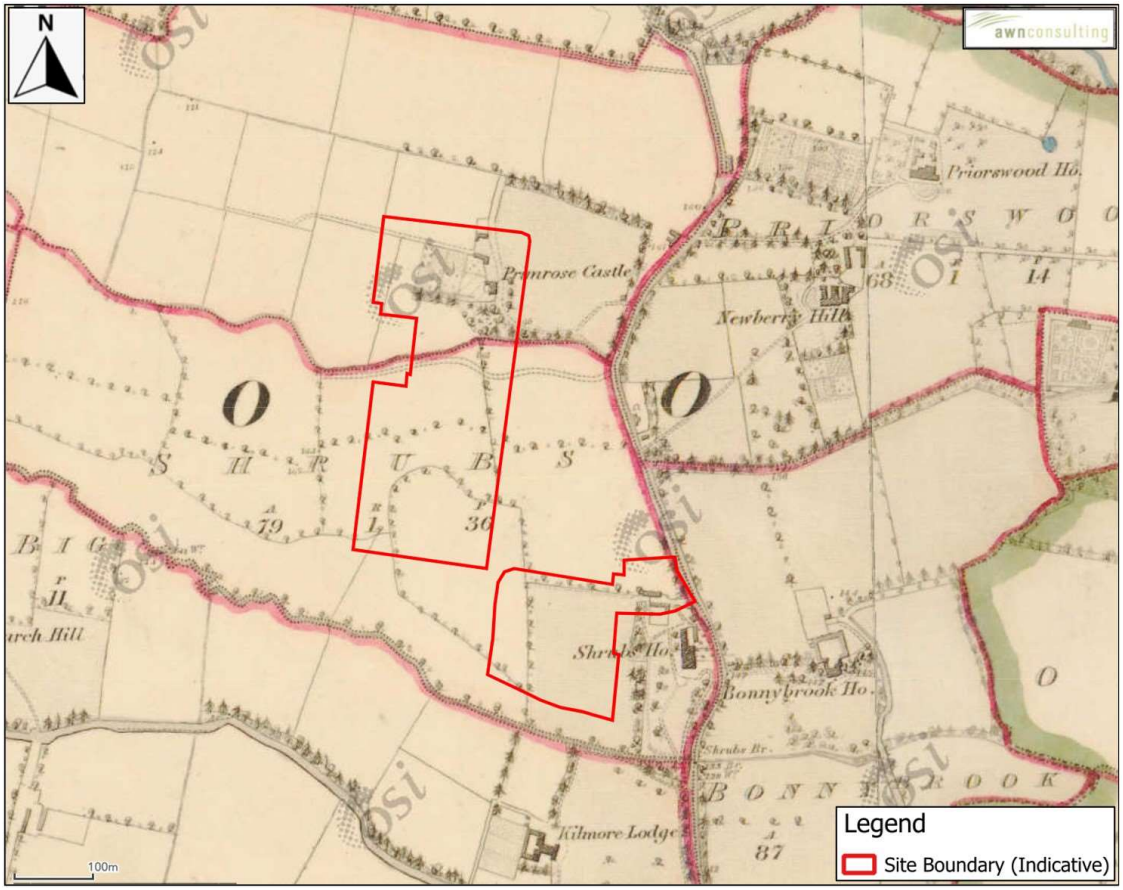
The site where the extended Installation is located previously comprised of two large industrial units which had previously been in use as a toy production factory. There was an office section located to the south of the western unit. To the north of the two large units and adjoining them were two above ground circular tanks which appeared to have been water tanks. There was a boiler unit located to the north of the large industrial units. The site was sold in 2000.

There are no records on any environmental enforcement action against the extended Installation site and based on the EPA license database the site was never the subject of an EPA license or permit. The site was the subject of Dublin City Council Waste Permit (WP98042) which ran from October 2001 to October 2004. The permit allowed

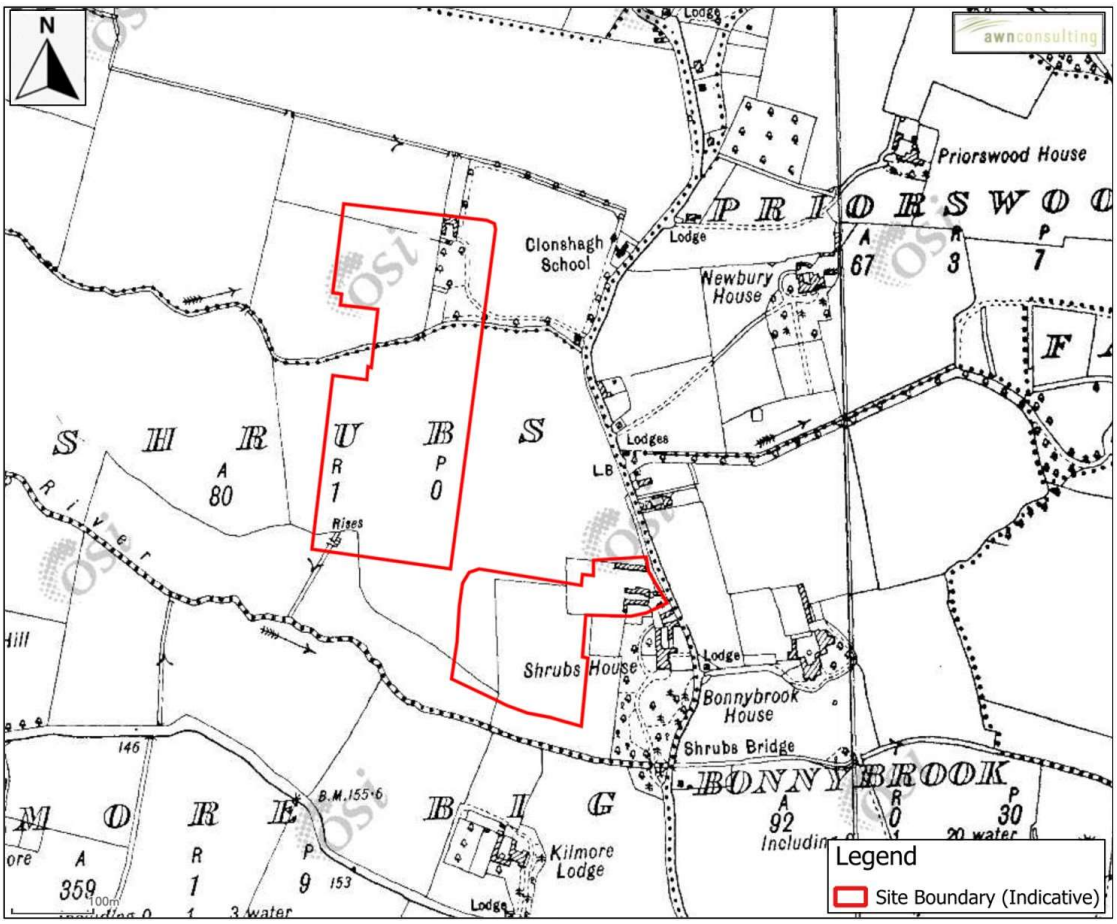
the site to operate as a dry recyclable recovery facility. The site was operated by JVC Limited in conjunction with Oxygen waste. There is no available record of enforcement action by Dublin City Council under the permit.

6.2 HISTORIC MAPPING

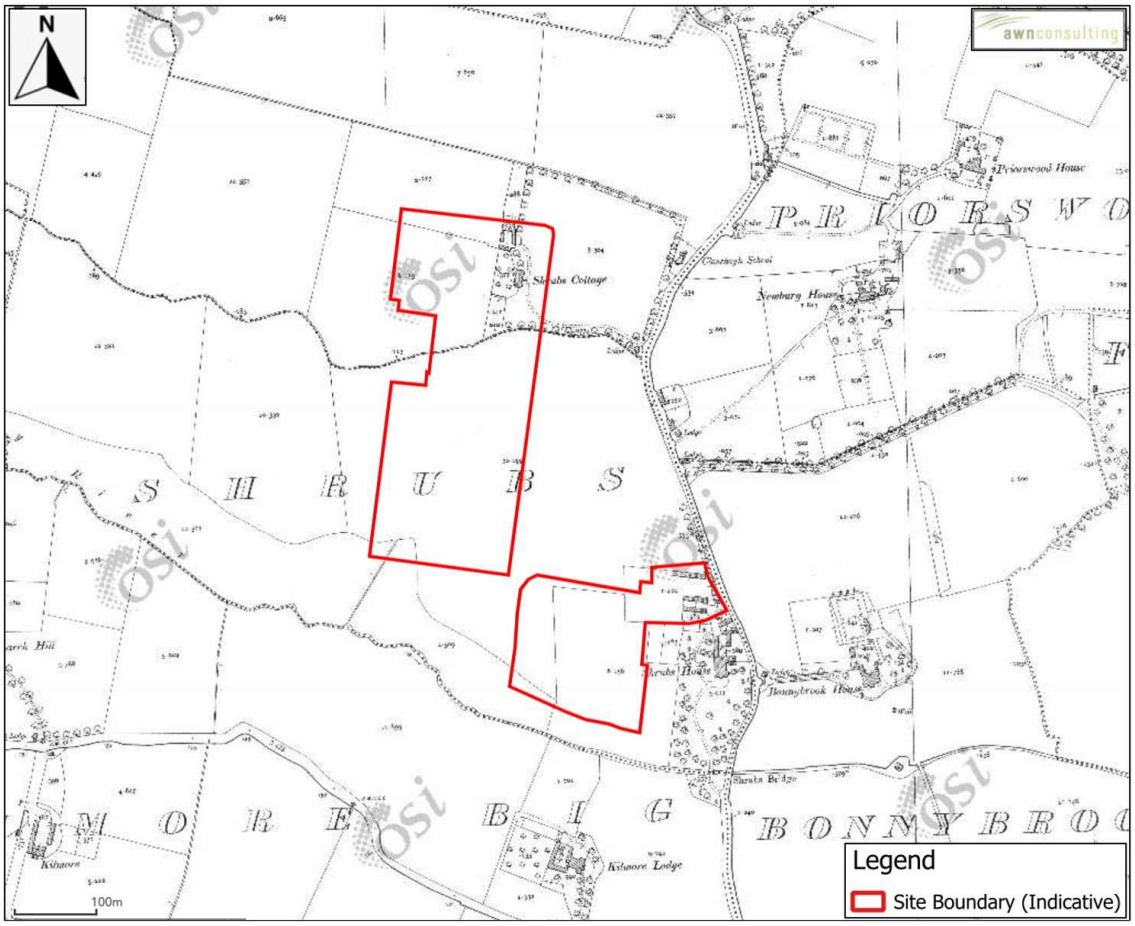
Historical Ordnance Survey maps were examined for the purpose of this report to identify any historical sources of contamination. The available OSI mapping from the 1830s through to the 1913 (Insert 6.1 – 6.3) shows historic land use of agricultural nature. Insert 6.1 (1837-1842) shows two dwellings Willsborough House to the northwest of the site and Woodlands House to the north of the site.



Insert 6.1 Historic Map 6 inch Colour (c. 1837-1842) (source www.osi.ie): showing the approximate site location highlighted in red.



Insert 6.2 Historic Map 6 inch (c. 1837-1842) (source www.osi.ie): showing the approximate site location highlighted in red.

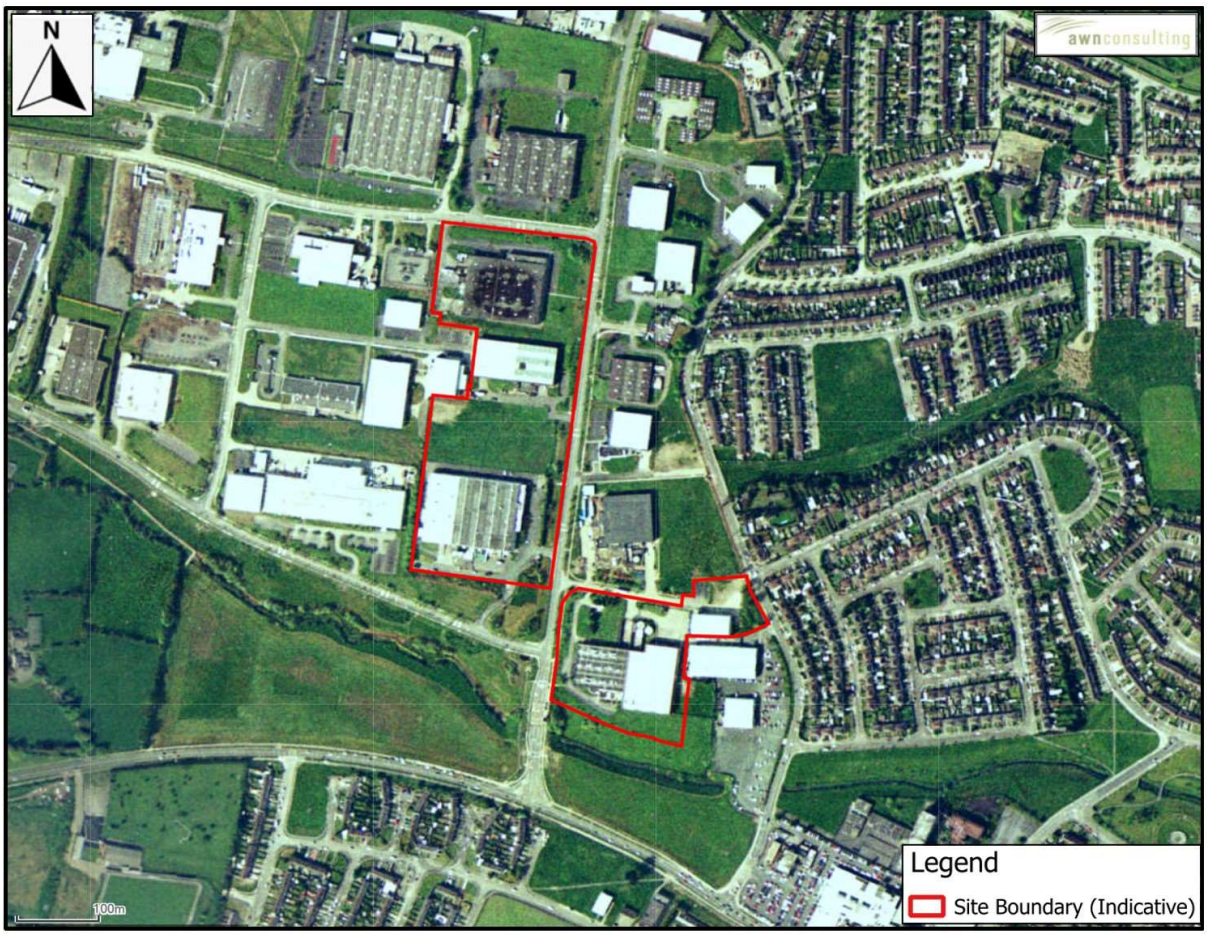


Insert 6.3 Historic Map 25 inch (c. 1888-1913) (source www.osi.ie): showing the approximate site location highlighted in red.

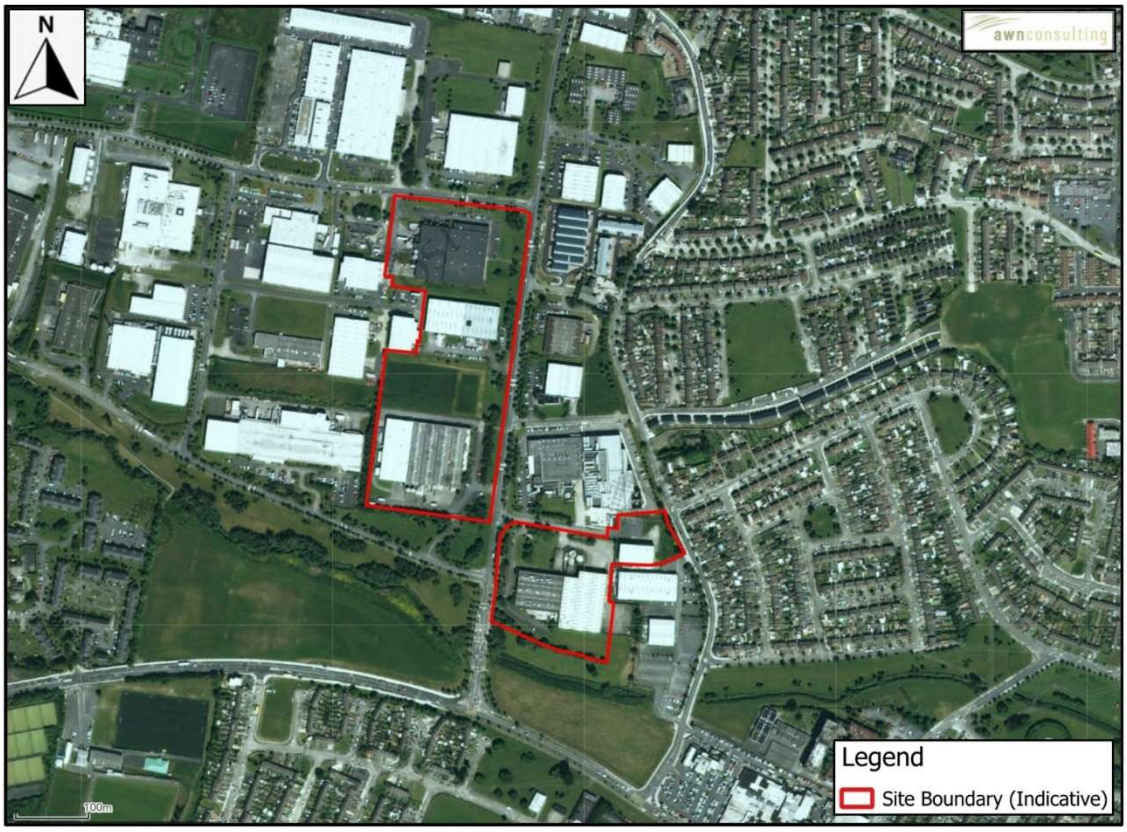
The most notable changes occur on the 1995 aerial imagery (Insert 6.4) with the construction of the M1 and M50 interchange motorway underway, along with the establishment of the Clonshaugh Business and Technology Park. One of the historic dwellings, Woodlands House is still located north of the site. In addition the 1995 aerial imagery illustrates extensive residential developments to the west, south and east of the Clonshaugh Business and Technology Park.

Insert 6.4 *Aerial Image (1995) (source www.osi.ie):* showing the approximate site location highlighted in red.

There is very little change in the immediate vicinity of the site and on the site between the 1995 image above and the 2000 (Insert 6.5) 2005-2012 image (Insert 6.6) below.



Insert 6.5 *OSi Aerial Map (1995-2000) (source www.osi.ie):* showing the approximate site location highlighted in red.



Insert 6.6 *OSi Aerial Map (2005-2012) (source www.osi.ie):* showing the approximate site location highlighted in red.

Insert 6.7 *OSi Aerial Map (2011-2013) (source www.osi.ie):* showing the approximate site location highlighted in red.

The imagery dated 2011–2013 (Insert 6.7) shows the surrounding area remains similar and ADSIL

. Based on a review of the Dublin City Council Planning files and national newspapers the extended site was occupied by the Little Tikes toy manufacturing company until it closed operations in 1995. The site was sold in 2000.

The 2013-2018 (Insert 6.8) shows surrounding area and the extended Installation remaining similar. ADSIL Buildings X and Y have been completed in the northern and middle part of the existing site at the former Acco Rexel and Cahill Printers sites respectively.

Insert 6.8 *OSi Aerial Map (2013-2018) (source www.osi.ie):* showing the approximate site location highlighted in red.

6.2.1 Planning History

The DCC Planning Department website was consulted in respect of planning applications and granted planning permissions for the site. Listed below are the main planning permissions relating to each of the buildings and phases of development at the site. In addition, Table 6.1 below presents a list granted permissions relating the site development that fall outside the main activity at the site.

The existing Installation received Final Grant of planning permission from Dublin County Council (DCC) under the separate applications listed below:

- Building X and Y; final grant of permission on 24th October 2013 (DCC Reg. Ref.: 2979/13).
- Building W; final grant of permission on 02 April 2012 (SDCC Reg. Ref.: 3534/11).

For the extended Installation, Final Grant of planning permission was obtained from DCC under the following applications:

- Buildings U and V: DCC Reg. Ref.: 3641/21, final grant of permission on 24 August 2022
- DCC Reg. Ref.: 3200/20, final grant of permission on 18 November 2020 (Grant retention)
- DCC Reg. Ref.: 2229/19, final grant of permission on 05 July 2019

All planning permissions for the data storage facilities that are relevant to this Licence review application under Class 2.1 of the EPA Act 1992 (as amended) have been granted on site (refer to Section 6 of this licence review application). Any further information relating to the environmental assessment of the activity is made available and contained within Section 7 of this licence review application.

In addition to the relevant planning permissions for the Data Storage buildings and combustion of fuels (that relate to the IE application being made) the following additional permissions below relate to the history of the overall site.

Application Details	Description of Development
Applicant: Clonmont Developments Ltd. Reg. Ref.: 2229/19 Final Grant Date: 08 Oct 2020 subject to no. 4 conditions	Planning permission for development at a site of c.3.1 ha comprising Units 15/16, Clonshaugh Business & Technology Park, Clonshaugh, Dublin 17. The development will comprise the following: Demolition of existing former industrial buildings (c.7,400 sq.m total GFA), associated plant and hard-standing. Construction of a 2 storey data centre including data halls, offices/admin, staff areas, storage/loading areas, circulation, UPS rooms, and roof plant (total floor area c.9,250 sq.m). Provision of a generator yard with 3 no. buildings (total floor area c.275 sq.m) housing 5 no. back-up generators. Provision of a substation building (floor area c.34.5sq.m), waste compound building (floor area c.16sq.m), 14 no. car parking spaces, 10 no. bicycle parking spaces, internal roads, docking/service yard, site lighting, new entrance gate, new security fencing to replace existing fencing. All associated site development works, landscape works and services provision. Total floor area of the proposed development is c.9,520.5m.
Applicant: Unknown Reg. Ref.: 3200/20 Final Grant Date: 14 August 2020	Permission is being sought for retention of development at Units 15/16 Business & Technology Park, Clonshaugh, Dublin 17 comprising a modification to Permission DCC Ref. 2229/19 (currently under construction) granted for a 2 storey data centre, (with generator yard and all associated works). The development now provides a larger, single storey substation (increased in size from c.34.5 sq.m (as permitted) to c.68.4 sq.m) and located to the south-west of the data centre building as per the parent permission DCC Ref. 2229/19.
Applicant: Amazon Data Services Ireland Ltd Reg. Ref.: 3400/19 Final Grant Date: 07 Oct 2019	Planning permission for development on a site of c. 0.025 hectares at Clonshaugh Business and Technology Park, Dublin 17. The site is located to the south of an existing data storage facility at the former Cahill Printers building (Building B). The proposed development comprises of a container compound for the purposes of providing ancillary modular plant, electronic equipment and machinery space.

	The development comprises 4 no. prefabricated metal containers (stacked to form 2 no. storeys), associated access arrangements and staircases, a boundary fence enclosure around the proposed development with 3no. access points, and all ancillary works.
Applicant: Reg. Ref.: 5950/07 (ABP PL29N.229202) Final Grant Date: The 10 year permission was not commenced and expired May 2019.	A 10 year permission was granted by An Bord Pleanála for a mixed use retail, office, residential, restaurant, bar, crèche, community and recreational development over two phases on a 30.28 hectare site. The application site included the Northside Shopping Centre, Coolock Health Centre, Cromcastle Court, Santry River Park and various retail warehousing and industrial units at Clonshaugh Road and Clonshaugh Industrial Estate, including the subject site.
Applicant: Amazon Data Services Ireland Limited Reg. Ref.: 2244/17 Final Grant Date: 22 May 2017	The development will consist of the upgrade of existing boundary railings and palisade fence by increasing the height of the existing fencing and railings by 0.7 meters to the overall site boundary
Applicant: ADSIL Reg. Ref.: 2979/13 Final Grant Date: 24 Oct 2013	On a site at Clonshaugh Business and Technology Park, Clonshaugh, Dublin 17, specifically the former Cahill Printer and Acco Rexel Buildings and the site between the existing ADSIL building and the Cahill Printers building. The development will comprise (1) demolition of the former Acco Rexel Building (2) construction of a new two/three-storey building with a double vehicle loading bay, and including within the building, office and staff welfare facilities (3) alterations and additions to the former Cahill Printer building, consisting of demolition of the existing first floor offices and installation of ground level external air handling units with associated visual screening at south of the building; (4) construction of a new link building joining the two above buildings; (5) provision of a temporary accommodation comprising portacabins for staff offices, welfare and security for use during the phased construction of the development, (6) ancillary works comprise of the construction of a sprinkler tank, pump and water houses and adjoining water storage tanks and pumphouse: the construction of new site roadways and car parking for 69 cars as well as the upgrade of the existing boundary structures comprising new railings to the east and north of the enlarged site and fencing to the other boundaries and associated structures and landscaping works over the enlarged site. The facility is to house electrical rooms for electronic operations mechanical plant rooms, a loading bay workshops and a two-storey office and staff welfare facility. The works will include external roof top air handling units with associated visual screening. Total plan area of new building c. 21,750sq.m.
Applicant: ADSIL Reg. Ref.: 2688/13 Final Grant Date: 19 Aug 2013	The development will comprise of alterations and additions to the two existing buildings and the provision of temporary accommodation. The alterations and additions at the former Acco Rexel building will comprise of (1) the partial demolition of the two-storey offices on its eastern facade (2) the demolition of an associated sprinkler tank, a pump house, fuel tanks, bunds and existing sheds on its western side; additions to the west and north side. At the former Cahill Printers building the works comprise (3) demolition of the existing first floor offices, (4) screening to external plant at south of the building; (5) a new double loading bay and link building joining the two above existing buildings; Ancillary works comprise (6) the construction of an auxiliary sprinkler tank, pump and water houses, and adjoining water storage tanks; (7) the construction of new site roadways and (8) car parking for 57 cars (9) the upgrade of the existing boundary structures comprising new railings to the east and north of the enlarged site and fencing to the other boundaries and (10) associated structures and landscaping works over the enlarged site. The temporary buildings comprise portacabins for staff offices, welfare and security for use during the

	phased construction of the development. The facility is to house electrical rooms for electronic operations, mechanical plant rooms, a loading bay, a workshop and a two storey office and staff welfare facility. The works will include external roof top air handling units with associated visual/acoustic screening and ground level external air handling units with associated visual acoustic screening.
Applicant: ADSIL Reg. Ref.: 2273/12 Final Grant Date: 21 Aug 2012	Permission to construct a new GIS (Gas Insulated Switchgear) 110kv electricity substation and to carry out ancillary site works. The proposed works will consist of the following: 1. All necessary site works for construction of a concrete compound area to the north of the existing ADSIL facility. 2. Construction of an ESB GIS substation control building within the compound area. 3. Construction of a client control building and a transformer bay to contain three number transformers within the compound area. 4. Construction of a 6m wide concrete access road within the perimeter of the site area. 5. Installation of all substation apparatus within the compound area and buildings.
Applicant: ADSIL Reg. Ref.: 3676/11 Final Grant Date: 23 Mar 2012	Upgrade of existing boundary fencing/railings, upgrade of existing site entrance, new security hut and upgrading of the site security system to include red-wall system, CCTV, public lighting poles and associated underground services to the site.
Applicant: ADSIL Reg. Ref.: 3534/11 Final Grant Date: 02 Apr 2012	RETENTION - Phase 1 refurbishment of the existing warehouse facility, to construct screening of mechanical plant, to carry out ancillary site works and construct ancillary site facilities to the site of DUB 10, Clonshaugh Business & Technology Park, Dublin 17. The works under Planning Retention will consist of the following: 1. The demolition of existing metal sheet roof and replacement with new roof cladding. 2. The demolition of lean-to buildings to the South & West elevations of the existing building to allow for a new internal access road and mechanical air handling equipment. 3. The demolition of a portion of the existing 2-storey office block for construction of a new loading bay to the east face of the building. 4. Demolition of existing sprinkler pumphouse & associated tanks, ESB substation and customer switchroom buildings to the south of the existing building. 5. Phase 1 internal works to the existing facility consist of 6 No. rooms for electrical and electronic operations, Loading Bay, Workshop, Offices and Staff Welfare area. 6. Construction of containerised electrical plant equipment to the North West corner of the site. 7. Phase 1 construction of new external wall cladding to a proportion of the north, east & south elevations of the building. 8. Screening to external mechanical air handling equipment and stand-by generator units to north, south and east elevations. PERMISSION- ADSIL is applying for Planning Permission for Phase 2 refurbishment of the existing warehouse facility, to construct screening of mechanical plant, to carry out ancillary site works and construct ancillary site facilities to the site of DUB 10, Clonshaugh Business & Technology Park, Dublin 17. The proposed works under Planning Permission will consist of the following: 1.Phase 2 construction to complete new cladding to remainder of the north, south and west elevations of the building. 2. Phase 2 construction of the palladine plant fencing to external Mechanical Air Handling Units. The fence line is to be constructed on the North and South elevations of the facility. 3. Phase 2 internal works to the existing facility will consist of 8No. rooms for electrical and electronic operations. 4. Auxiliary sprinkler and storage water tanks, pump house and provision for new oil storage tanks and associated bund.
Applicant: Bellpark Developments Ltd Reg. Ref.: 3679/08	Development on a site of c0.325 hectares within Unit AF1, Clonshaugh Industrial Estate, Dublin 17. The application site will be located to the east of permitted Block no. 3 (per reg ref 1883/07) and will be located generally by the internal road network permitted under reg ref 1883/07.

Final Grant Date: 09 Sep 2008	The development will consist of: A) 2 no. blocks as follows: - i) Block 1 (3 storey overall height 9.8m; GFA 2,343sqm) to comprise of 24no. own door office units (ranging in size from 72.0sqm to 138.5sqm). ii) Block 2 (single storey; overall height 8.1m; total GFA 1,146.1sqm) to comprise of 5 no. light industrial / workshop / enterprise units (ranging in size from 194.3sqm to 281.6sqm). The total GFA of the proposed blocks is 3,489.1sqm. B) 4 no. block indicator signs (each being 3m high with advertising space of c.2.8sqm each). C) All associated car parking, cycle parking, landscaping and site development works. D) Vehicular access and the internal road network to serve the proposed development will be per that permitted under reg ref 1883/07.
Applicant: Bellpark Developments Ltd Reg. Ref.: 5594/07 Final Grant Date: 08 Jan 2008	Permission for development of light industrial/warehouse/enterprise units, area 6,857.6sqm, consisting of: Block 1 (area 3,363.6sqm) containing 14 no. units for use as light industrial/warehouse/enterprise units ranging from 132.5 to 323.6sqm on ground and part first floors; Block 2 (area 1,771.3sqm) containing 7 no. units for use as light industrial/ warehouse/ enterprise units ranging from 142.7 to 355.1sqm, on ground and part first floors; Block 3 (area 1,697.4sqm) containing 10 no. units for use as light industrial/ warehouse/ enterprise units ranging from 142.7 to 210.3sqm, on ground and first floors: ESB substation and switchroom (area 25.3sqm); new vehicular access; car parking & associated site works.
Applicant: Unknown Reg. Ref.: 2524/96 Final Grant Date: May 1997	Retain and complete, compressor building at the rear of premises
Applicant: Acco Ireland Limited Reg. Ref.: 1248/96 Grant Date: 11th September 1996	Elevation modifications, provision of internal factory toilets, lunch rooms, offices, external signs, palisade fencing to yard, lighting standards and extra parking
Applicant: Acco Ireland Limited Reg. Ref.: 2230/96 Grant Date: 8th January 1997	Twenty car park spaces, landscaping and pedestrian access on the east side of the building
Applicant: Donnelley Documentation Services Reg. Ref.: 2382/92 Grant Date: Feb 1993	Application for Planning Permission for a 'Two-Bay' Extension, New Entrance and Associated Site Works to the Donnelley Documentation Services Building at Clonshaugh Industrial Estate, Dublin 17.
Applicant: Mountcoal Investments Limited Reg. Ref.: 2512/90 Grant Date: 1st March 1991	Construction of additional 2-storey offices, ESB substation and ancillary buildings to previously approved industrial unit and offices.
Applicant: Mountcoal Property Investments Limited Reg. Ref.: 1172/90 Grant Date: 24th September 1990	Erect extension to existing general industrial unit.
Applicant: Acco Ireland Limited Reg. Ref.: 1036/90 Grant Date: 24th September 1990	Extension to Existing Factory

Applicant: Irish Printers Limited Reg. Ref.: 736/90 Grant Date: June 1990	Modification to existing Entrances and Boundary Fence, Build new entrance and Car Park.
Applicant: Mountcoal Investments Limited Reg. Ref.: 2772/89 Grant Date: 20th April 1990	Erection of an Industrial Unit and Offices.
Applicant: Mountcoal Investments Limited Reg. Ref.: 2772/89 Grant Date: Feb 1990	Erection of an Industrial Unit and Offices
Applicant: Mountcoal Investments Limited Reg. Ref.: 1477/89 Grant Date: 11th October 1989	Change of use of Light Industrial Unit including Offices to General Industrial Unit and erection of ESB Substation
Applicant: Chisima (Ireland) limited Reg. Ref.: 2146/89 Grant Date: 23rd September 1989	Erection of Company Sign
Applicant: Unknown Reg. Ref.: 2321/88 Grant Date: Unknown	Original Planning Application cannot be found by DCC
Applicant: Acco Ireland Limited Reg. Ref.: 2219/852 Grant Date: 26th March 1985	Plant Room Extension to Factory

Table 6.1: Outlining the granted permissions relating development at the site that fall outside the main activity.

7.0 STAGE 5 - ENVIRONMENTAL SETTING

This section includes an assessment of the likely fate of any spill/leak event based on the topography, soil, and groundwater characteristics at the location. Based on the findings of Stages 1 to 4 above, the locations of hazardous substances storge have also been assessed with regard to confirming source-pathway-receptor linkages i.e. in the unlikely event of a leakage/spillage.

7.1 TOPOGRAPHY

The existing Installation site topography is described as flat, with an elevation to ordinance datum (AOD Malin) ranging between 48m AOD and 44 m AOD across the site north to south and 46m AOD (west) to 44m AOD (east) indicating a shallow gradient to the southeast of the site. The regional topography gradient across the Clonshaugh Business Park falls from 56m AOD to 42m AOD in a south-easterly direction across a c. 1.5 km distance.

The extended Installation site levels vary from +43.50m AOD at the northern end of the site where the site entrance is, to +44.00m AOD at the south eastern end of existing hardstanding. The northern and central sections of the site are relatively flat. The southern section sloped to the south towards the Santry River.

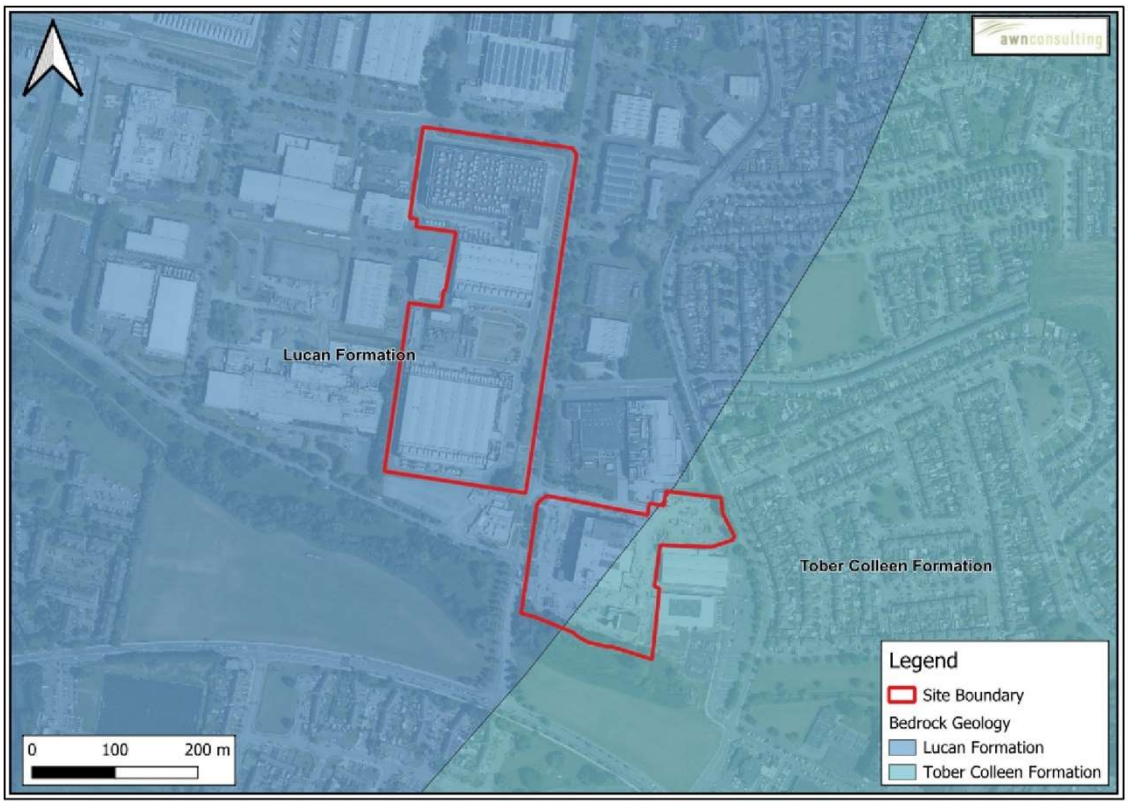
7.2 GEOLOGY AND HYDROGEOLOGY

7.2.1 Regional Geology

The bedrock of the greater Dublin region consists of Dinantian Upper Impure Limestone which is part of the Lucan Formation. See Insert 7.1 below. The limestone is colloquially known as Calp and is estimated to be up to 800m thick. The homogeneous sequence consists of dark grey massive limestones, shaley limestones and massive mudstones. The average bed thickness is less than 1m, but these normally thin-bedded lithologies can reach thicknesses of 2m or more. While the existing Installation site belongs to Lucan formation, inspection of the available GSI maps show that the bedrock geology underlying the extended Installation site belongs to Lucan Formation (western section of the site) and Tober Colleen Formation (to the eastern half of the site). The Lucan Formation comprises dark-grey to black, fine-grained, occasionally cherty and micritic limestones whilst the Tober Colleen consists of dark-grey, calcareous, commonly bioturbated mudstones. The GSI categorises the bedrock aquifer underlying the site as having a ‘Low’ vulnerability which is consistent with the site investigation results.

The Calp is almost completely obscured across central Dublin under the Dublin Boulder Clay. The depth to bedrock is mapped as >10m on the GSI GeoUrban viewer however local site-specific information available from sites within the Clonshaugh Business Park indicates bedrock is likely to be >20m below ground level.

No bedrock outcrop was identified on the sites. In terms of the structural relationship of the area, the GSI database (refer also to Insert 7.1) does not show any faults on the site or within the immediate vicinity of the sites. A synclinal axis line feature does run from south west to north east beneath the Clonshaugh Roundabout to the northwest of the site.



Insert 7.1 Bedrock Geology Map (Source www.gsi.ie) showing indicative red line boundary

7.2.2 Regional Hydrogeology

7.2.2.1 Aquifer Classification

Aquifers are generally classified as rocks or other matrices that contain sufficient void spaces and which are permeable enough to allow water to flow through them in significant quantities. The GSI (2018) classifies the principal aquifer types in Ireland as:

Bedrock Aquifer

- Rkc – Regionally Important Aquifer – Karstified (conduit)
- Rkd – Regionally Important Aquifer – Karstified (diffuse)
- RK – Regionally Important Aquifer – Karstified
- Rf – Regionally Important Aquifer – Fissured bedrock
- Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive
- Lk – Locally Important Aquifer – Karstified
- Ll – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones
- Pl – Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones
- PU – Poor Aquifer – Bedrock which is Generally Unproductive

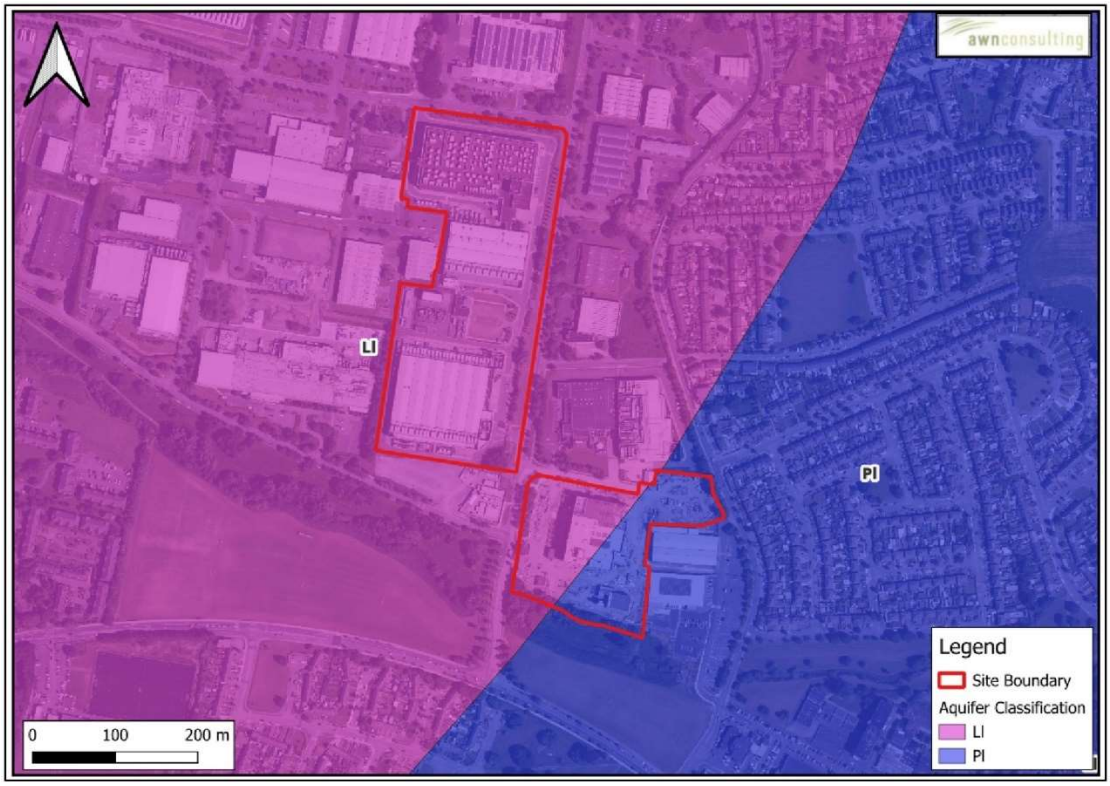
Gravel Aquifer

- Lg - Locally Important Aquifer - Sand & Gravel

- Rg - Regionally Important Aquifer - Sand & Gravel

The bedrock aquifer underlying the existing Installation site according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map is classified as a Locally Important Aquifer (Ll) which is described as Bedrock which is Moderately Productive only in Local Zones. Insert 7.2 presents the current bedrock aquifer map for the area surrounding the site. According to the GSI, the aquifer is not considered to have any primary porosity and flow will be primarily fracture controlled.

According to the GSI National Draft Bedrock Aquifer Map, the bedrock aquifer underlying south-eastern part of the extended Installation, is classified as a 'Poor Aquifer' (Pl) which is described as Bedrock which is Generally Unproductive except for Local Zones. The north-western part of the site is, however, classified as a Locally Important Aquifer (Ll, Bedrock which is Moderately Productive only in Local Zones).



Insert 7.2 Aquifer Classification map (Source: www.gsi.ie) showing indicative red line boundary

7.2.2.2 Aquifer vulnerability

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

The GSI currently classifies the bedrock aquifer in the region of the existing Installation and extended Installation site as having (L) - Low Vulnerability status across the site and the immediate area of the site (indicating >10 m of low permeability soil).

Insert 7.3 Aquifer vulnerability (Source: www.gsi.ie) showing indicative red line boundary

7.2.2.3 Groundwater Wells and Flow Direction

There are no source protection areas relating to group water schemes or public water supplies within 3km of the site, i.e. zones surrounding a groundwater abstraction area.

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland. This current index, however, shows a number of groundwater monitoring and abstraction wells within a 3 km radius of the site; the abstraction wells are used primarily for industrial use. The maximum borehole depth was 122m below ground level (bgl). Bedrock was encountered from between 10 – 23m bgl and water yields were recorded between 87 and 300 m^3/day.

Local information confirmed a historical well on the former DIIO site and on the Butlers Chocolate Site to the north. The well on the DIIO site has since been decommissioned as part of the closure of the site. The well at the Butlers site was installed in the overburden and there is no abstraction undertaken. As the area is served by public mains, it is unlikely that there are any boreholes in the area used for potable water supply.

There are no groundwater wells located hydraulically downgradient between the site and the Santry River.

Insert 7.4 below presents the GSI well search for the area surrounding the site (Note this source does not include all wells) and Table 7.1 below summarises the details of some of the wells present within this search area.

Insert 7.4 GSI Well Search (GSI, 2024) showing indicative red line boundary

Groundwater flow locally is anticipated to flow is in a south-easterly direction towards the Santry River and regionally to the east towards the Dublin Bay.

Table 7.1 GSI Well Index Table from well search (GSI, 2023)

GSI Name	Type	Depth (m)	Depth to Bedrock	Townland	County	Use	Yield Class	Yield m3/d
2923NEW042	Spring			TOBERBUNNY	Dublin			
3223NWW011	Spring			SAINTDOOLAGHS	Dublin			
3223NWW012	Spring			SAINTDOOLAGHS	Dublin			
3223SWW004	Spring			KILBARRACK UPPER	Dublin			
3223SWW005	Spring			BROOKVILLE	Dublin			
2923NEW015	Borehole	48.8		SANTRY	Dublin	Industrial use	Good	130
2923NEW016	Borehole	35.4		BALLYMUN	Dublin	Domestic use only	Good	109
2923NEW034	Borehole	13.7	11.6	CORBALLIS	Dublin	Industrial use	Good	300
2923NEW036	Borehole	91.4	20	BALLYMUN	Dublin	Industrial use	Moderate	87
2923NEW037	Borehole	122	22	BALLYMUN	Dublin	Industrial use		
2923SEW032	Borehole	15		COOLOCK	Dublin	Industrial use		
2923SEW033	Borehole	16.5		COOLOCK	Dublin	Industrial use		
2923NEW061	Borehole	91.4	20	BALLYMUN	Dublin	Industrial use	Moderate	87
2923NEW062	Borehole	122	23	BALLYMUN	Dublin	Industrial use	Good	200
3223SWW001	Borehole	52.7	10	BALGRIFFIN	Dublin	Industrial use	Good	196

7.2.2.4 Groundwater Quality

The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy (commonly known as the Water Framework Directive [WFD]). The WFD required '*Good Water Status'* for all European water by 2015, or at the latest, by 2027, to be achieved through a system of river basin

management planning and extensive monitoring. 'Good status' means both *'Good Ecological Status'* and *'Good Chemical Status'*.

The Groundwater Body (GWB) underlying the site is the Dublin GWB (EU Groundwater Body Code: IE_EA_G_008). The previous EPA data (2013-2018) classified the Dublin GWB as having 'Good Status', with a WFD risk status 'under review'. The current EPA data (2016-2021) also classifies the Dublin GWB as having 'Good Status', with a WFD risk status 'under review'.

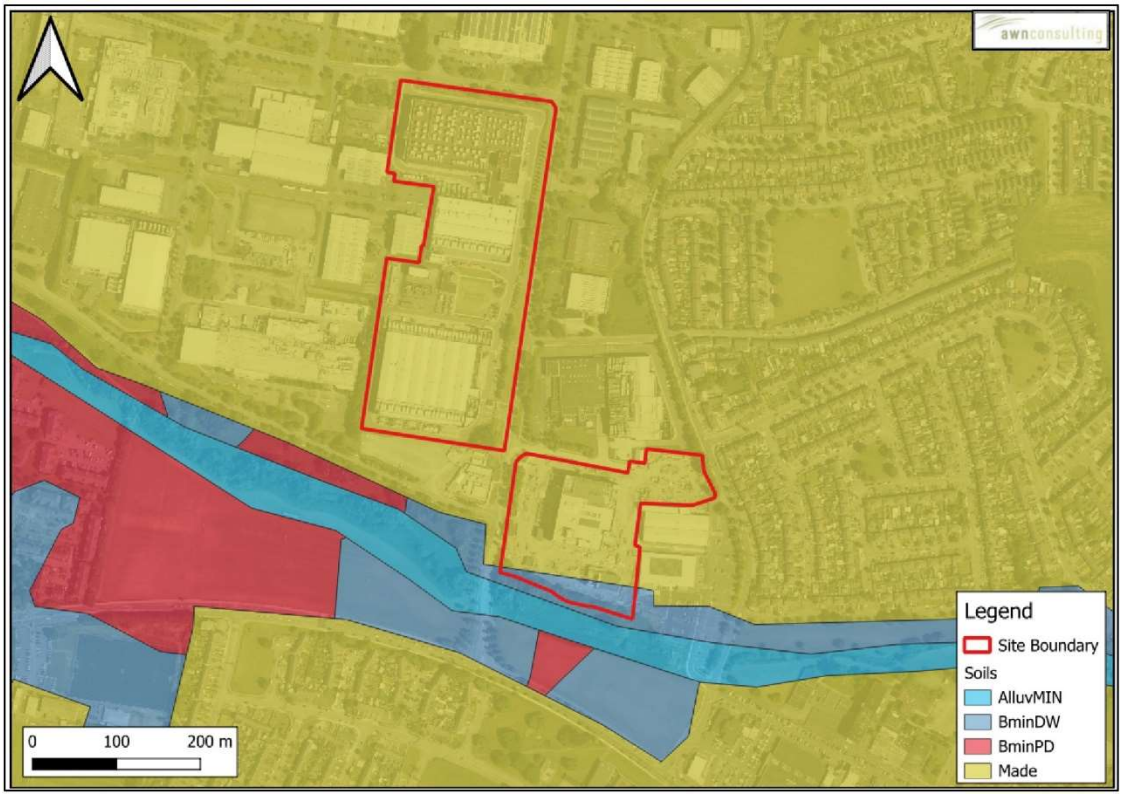
7.2.3 Regional Soils

The GSI geological web viewer shows the site is primarily underlain by made ground.

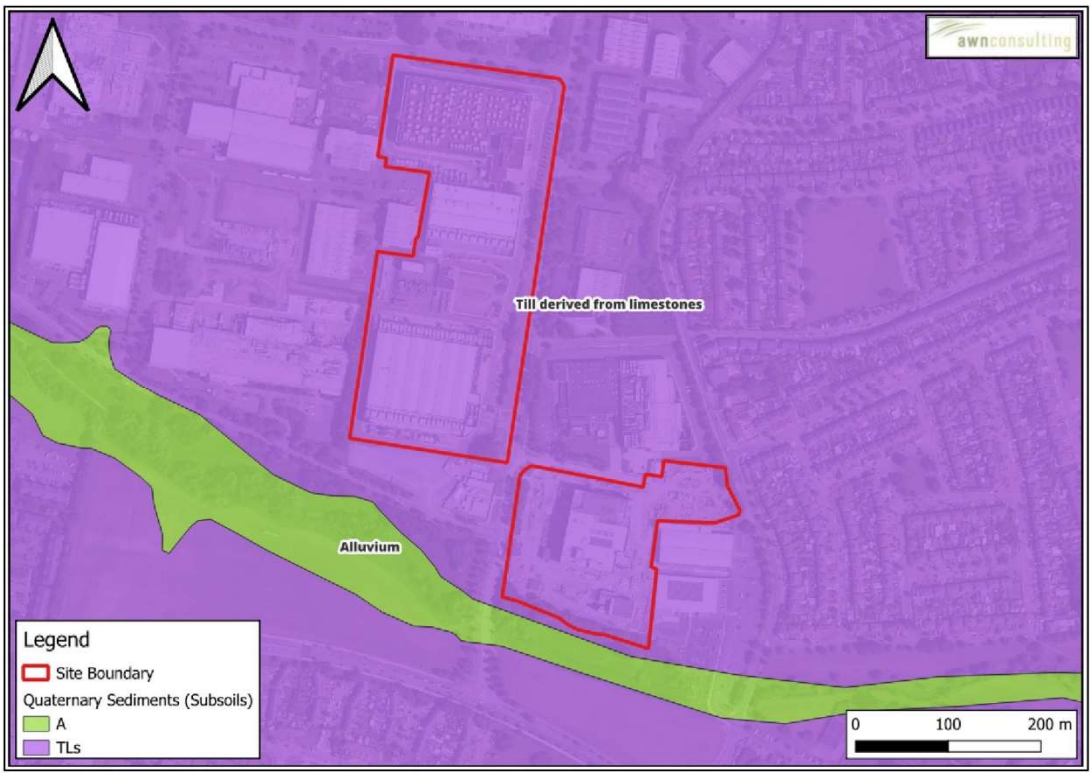
It is likely that the made ground designation relates to the hardstanding and buildings associated with the industrial estate as opposed to any historic made ground or infilling. Therefore, the made ground is underlain by the till which has been confirmed by AWN at neighbouring sites within the immediate vicinity of the Clonshaugh Business and Technology Park.

The subsoil has been classified as limestone till (Carboniferous). This is the dominant subsoil type in the region and is a glacial deposit which is known as Dublin Boulder Clay. There is alluvial deposits immediately south of the extended Installation site at the River Santry. The soils and subsoils map for the site is illustrated in Insert 7.5 and 7.6.

The boulder clays generally exhibit very low permeability in the order of $1x10^{-7}$ to $1x10^{9}$ m/s or lower. The glacial boulder clay will tend to act as an aquitard or aquiclude (a confining layer with low permeability) between the other more permeable formations including the limestone bedrock (fracture dominated flow).



Insert 7.5 Soils map (Source: www.gsi.ie) showing indicative red line boundary

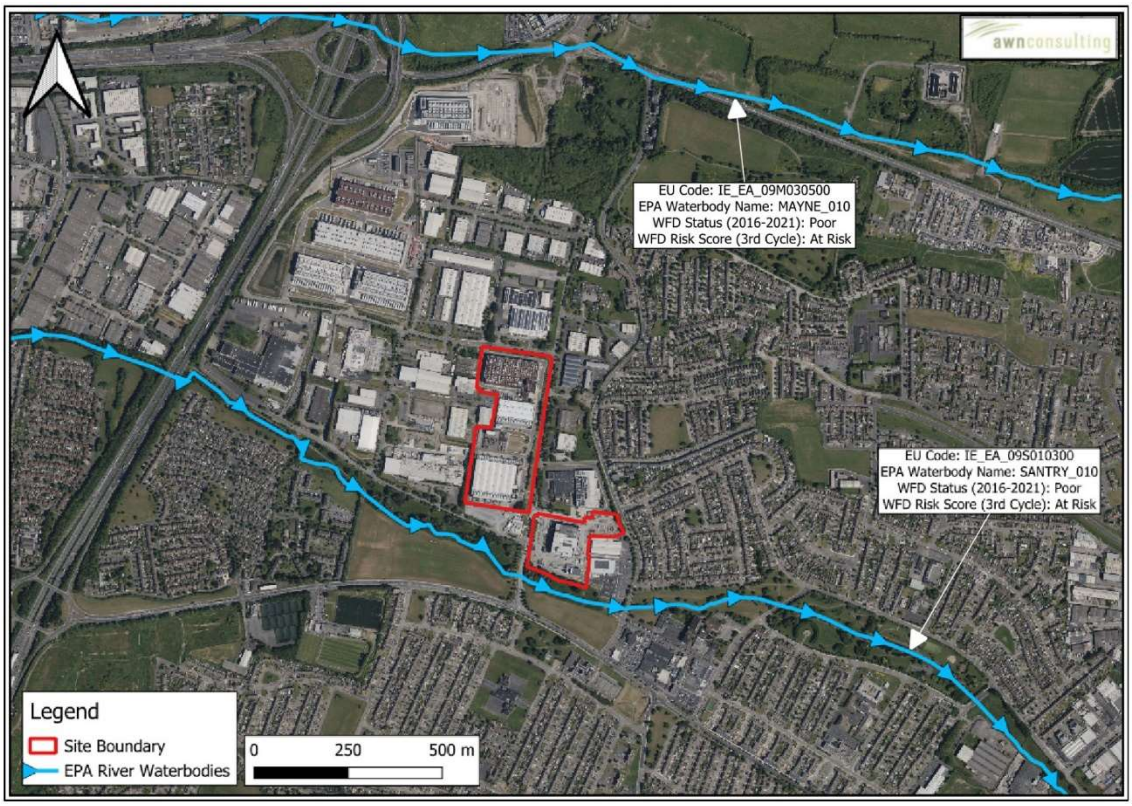


Insert 7.6 Sub-Soils map (Source: www.gsi.ie) showing indicative red line boundary

7.3 HYDROLOGY

The Eastern River Basin District (ERBD) Management Plan identifies that the site lies within the Santry River Surface Water Body (SWB) catchment area (IE_EA_09_1507). The Grounds Investigation Report confirmed that there are no surface water features directly connected to the site and that the stormwater drains via the Irish Water municipal waste storm water system is eventually discharged into the Santry River.

The Santry River flows in a south-easterly direction from the existing and extended Installation site for c. 5.15 river km before it outfalls into North Bull Island SPA and North Dublin Bay SAC.

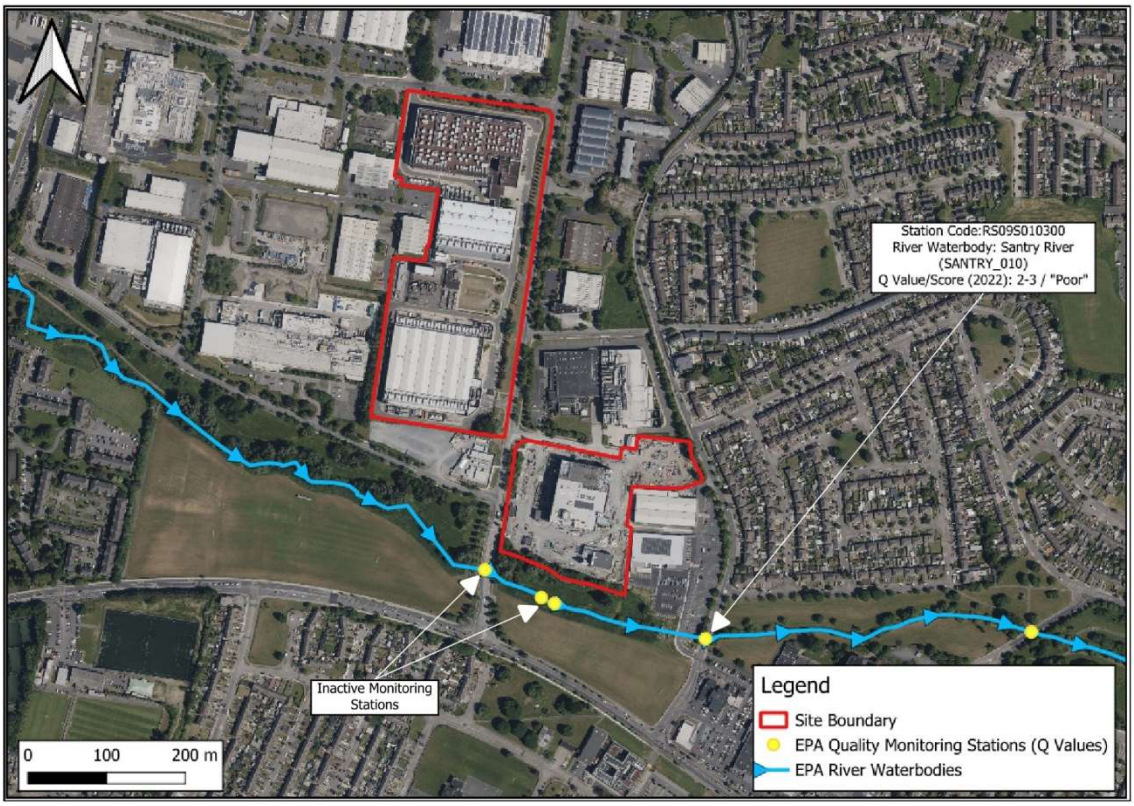


Insert 7.7 Hydrological Environment, illustrating the River Mayne and the Santry River flowing in an easterly direction and showing indicative red line boundary

7.3.1 Surface Water Quality

The existing and extending Installation site is located within the Ireland River Basin District (formally the Eastern River Basin District (ERBD)), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD).

Surface water quality is monitored continuously by the EPA at various regional locations along principal and other smaller watercourses. Insert 7.8 below presents the EPA quality monitoring points in the context of the site and other regional drainage setting, together with hydrometric gauges along the respective stage of each river body shown.



Insert 7.8 Surface Water Quality Monitoring Point (source: www.epa.envision) (Site location indicated with star with monitoring point locations shown with orange circles)

With reference to the site setting, the nearest downstream EPA monitoring station is situated along the Santry River to the south of the site.

The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

There was one water quality monitoring station located on the Santry River downstream of the site which has quality ratings available within the last ten years. This monitoring location (Clonshaugh Road Bridge RS09S010300) obtained a Q rating of 2-3 - Poor Status (in 2022). There is also a station downstream on the River Mayne at the Hole-in-the-Wall Bridge (RS09M030500). This also obtained a Q rating of 2-3 (in 2022) which also denotes a "poor" rating for the same period.

In accordance with the WFD, each river catchment within the former ERBD was assessed by the EPA and a water management plan detailing the programme of measures was put in place for each. Currently, the EPA classifies the WFD Ecological Status for the Mayne and Santry waterbodies as having '*Poor Status'* (Cycle Status 2016-2021) and as being 'At risk' of not achieving good status. Due to this, there is a possible threat to the ecological status resulting in harm to the river ecosystems. This 'Poor' status in the Santry River is due to its Invertebrate Status or Potential (EPA, 2023). An active EPA water quality station is located next to the subject site (Clonshaugh Road Bridge); this station is classified with a Biological Q Rating of 'Q2-

3' according to its 2022 records, which means a 'Moderately Polluted' status in the river. This is consistent with historical ecological conditions recorded in the Santry River during previous years. Insert 7.9 presents the river waterbody risk EPA map.

Insert 7.9 River Waterbody Risk - 'At risk of not achieving good status, WFD Ecological Status: Poor. and showing indicative site red line boundary

7.3.2 Flood Risk

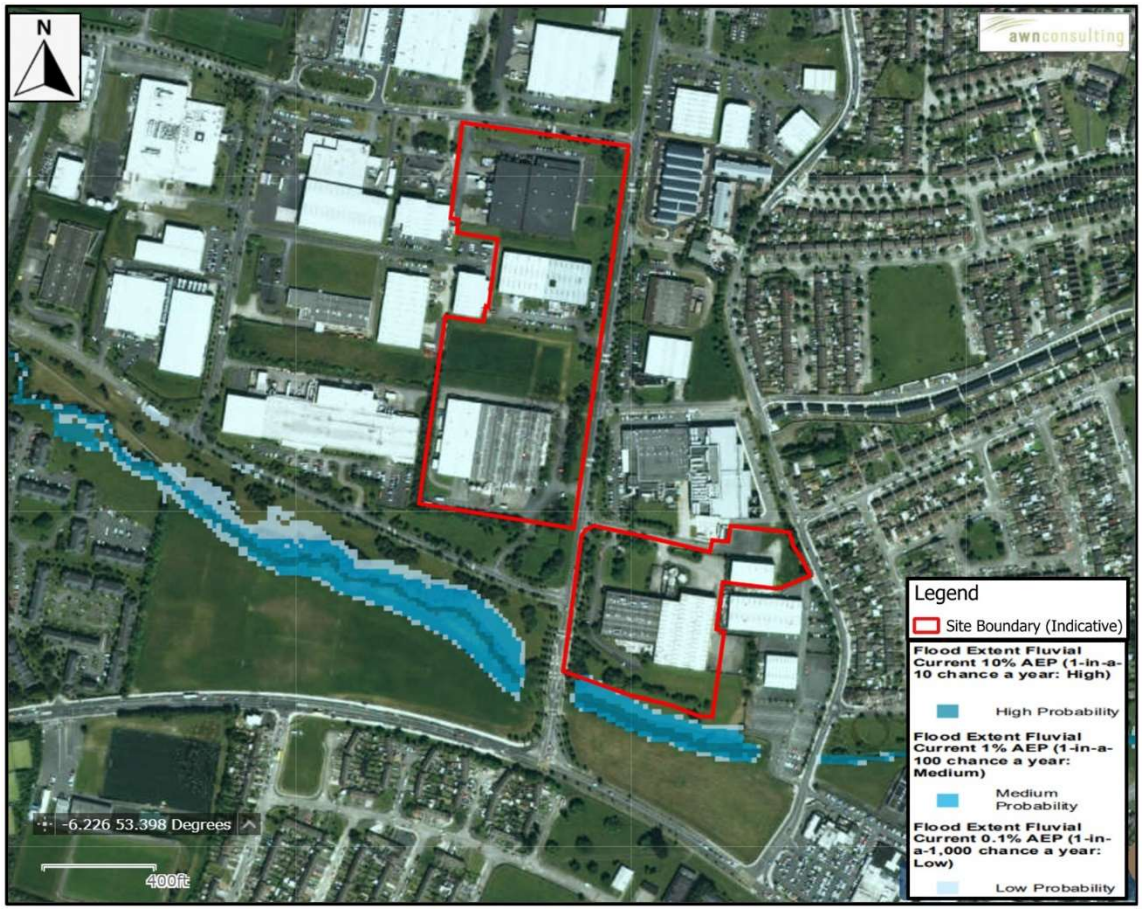
The potential risk of flooding on the subject site was also assessed through a review of the OPW CFRAM mapping for the area; shown in Insert 7.10 below. The section of the extended Installation site that is located adjacent to the Santry River is at risk to 0.1% flood event. The remainder of the is not in an area at risk of flooding based on the OPW map.

Insert 7.10 highlights the areas that have;

- A high probability flood events have approximately a 1-in-a-10 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 10%.
- A medium probability flood events have approximately a 1-in-a-100 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 1%.

- A low probability flood events have an indicative 1-in-a-1000 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 0.1%.

There are no historical flood events in the immediate vicinity of the site.



Insert 7.10 Floodinfo.ie extract: The Site Location is Highlighted in Red (indicative red line boundary)

7.4 MAN-MADE PATHWAYS

As identified in Stages 1-4, bulk storage for fuel oil only is present at the facility. Due to the volumes stored and the hazard classifications of these substances they could pose a risk to receiving waters if a source-pathway-receptor linkage existed.

There are no historic mines on the site. Much of the site will be hard paved reducing the potential for vertical migration to ground during operation. In the unlikely event of a leakage outside of the storage bunds, the primary pathway would be through the stormwater drainage system. The only man-made pathway of concern is the site stormwater network, the stormwater network is described in Section 4.2 above.

As noted in Section 4.1 the fuel tanks are located on hardstanding, appropriately bunded, with leak detection alarm systems, furthermore, prior to discharge stormwater is passed through Class 1 hydrocarbon interceptors to ensure that the quality of the stormwater discharge is controlled. In the event of a fire, run-off would be to the site attenuation systems where water would be held until tested and removed off site if required.

7.5 SURROUNDING LAND USE AND INTERDEPENDENCIES

The surrounding context of the site has been described in Section 1.3 above.

Located approximately 1 km upgradient of the site is an historic illegal landfill that is located on c.1.5 ha of lands to the north of Clonshaugh and R139 junction on Lands owned by the IDA. Permission has been granted by FCC (ref: F19A/0149) to remove and remediate part of the landfill site and this remedial work was undertaken in 2020/21. The application for planning permission was accompanied by an Environmental Impact Assessment report (EIAR). The exploratory site investigation undertaken to inform the EIAR in September/October 2018 included the installation of 23 No. Trial pits, 5 overburden leachate wells and 1 dual installation overburden/bedrock wells. (AWN 2018). The site investigation works noted that the waste body is dry, with no significant leaching or gaseous emissions, there was hydrocarbon staining and odours observed, Waste Acceptance Criteria testing confirmed that the waste body is primarily non-hazardous, with some localised areas considered to be hazardous due to the presence of hydrocarbon contaminated waste (AWN, 2018).

The waste is underlain by 14m of low permeability Dublin boulder clay, and monitoring confirmed that this protects the underlying aquifer should any leachate be generated within the waste body. Due to the low permeability of the subsoil of Dublin boulder clay, and the lack of gaseous emissions, and dry - leachate free waste. As such there is no source pathway linkage between the landfill and the subject site.

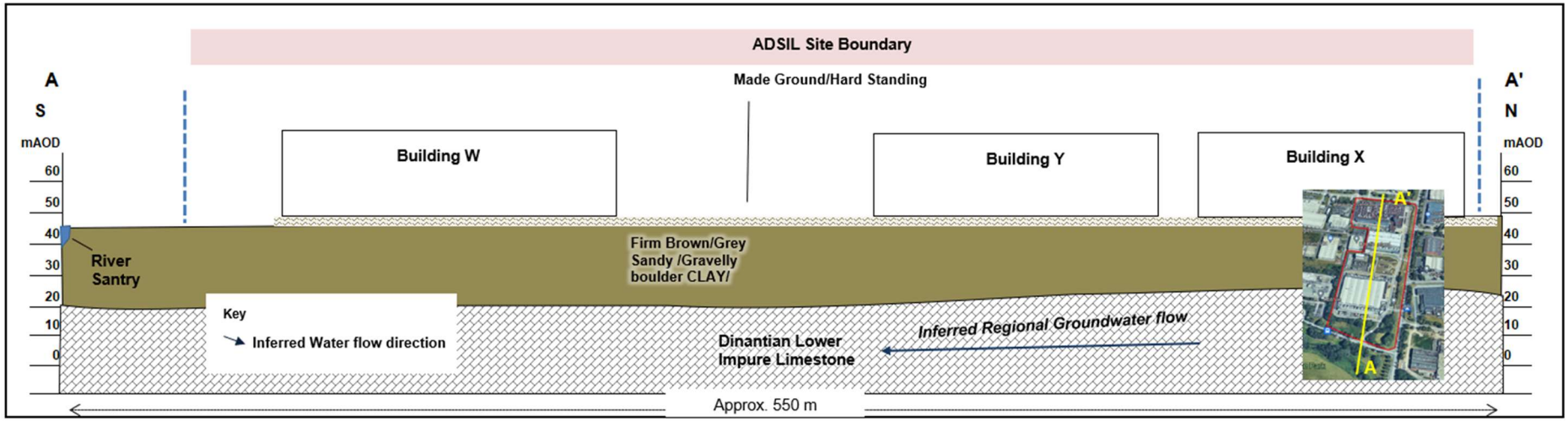
The only other site of interest in the surrounding area is the Forest Laboratories Ireland Limited site, this is located to the west of the site and cross gradient. Thus, the potential for any contamination from this site (if present) is unlikely to migrate onto the subject lands.

8.0 STAGE 6 – CONCEPTUAL SITE MODEL

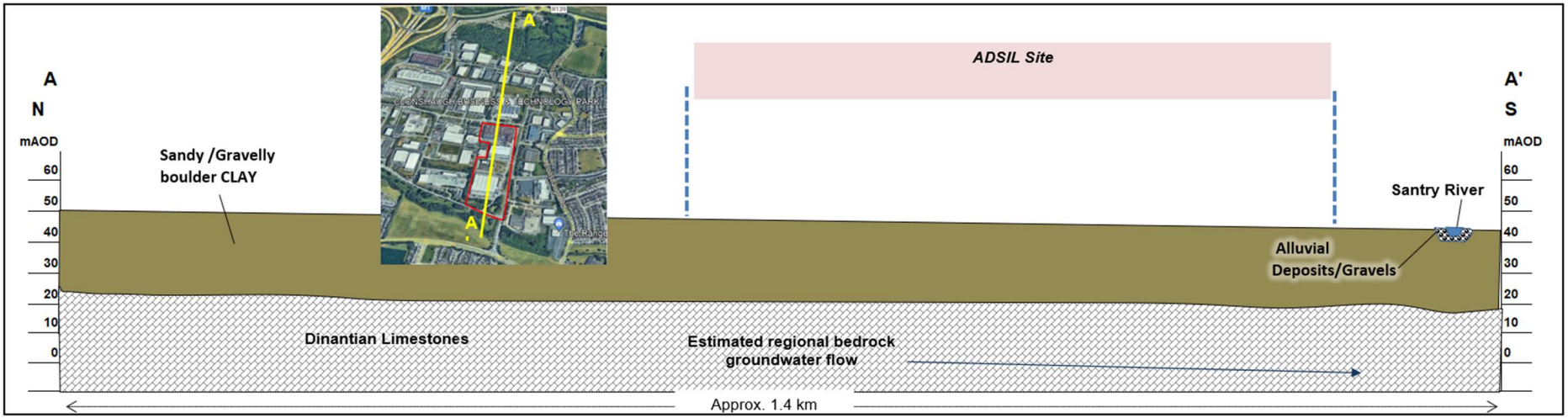
Based on the available information and intrusive site-specific data from the sites, the site is characterised as follows:

- The existing Installation site topography is described as flat, with an elevation to ordinance datum (AOD Malin) ranging between 48m AOD and 44m AOD across the site north to south and 46m AOD (west) to 44m AOD (east) indicating a shallow gradient to the southeast of the site. The extended Installation site levels vary from +43.50m AOD at the northern end of the site where the site entrance is, to +44.00m AOD at the south eastern end of existing hardstanding.
- The existing Installation site is underlain by Dinantian Upper Impure Limestone which is part of the Lucan Formation, comprising dark shaley limestone known as Calp. The extended Installation site is underlain by the Lucan Formation and the Tober Colleen Formation, comprising a calcareous shale, limestone conglomerate.
- The Lucan Formation has been classified by the GSI as a Locally Important Bedrock Aquifer which is moderately productive only in local zones (Ll). The Tober Colleen has been classified by the GSI as a Poor Bedrock Aquifer which is generally unproductive except for local zones (Pl).
- The GSI vulnerability map indicates that the vulnerability at the site is low. A subsoil type of TILL (which is of low permeability) and a high vulnerability indicate a subsoil thickness of greater than 10m

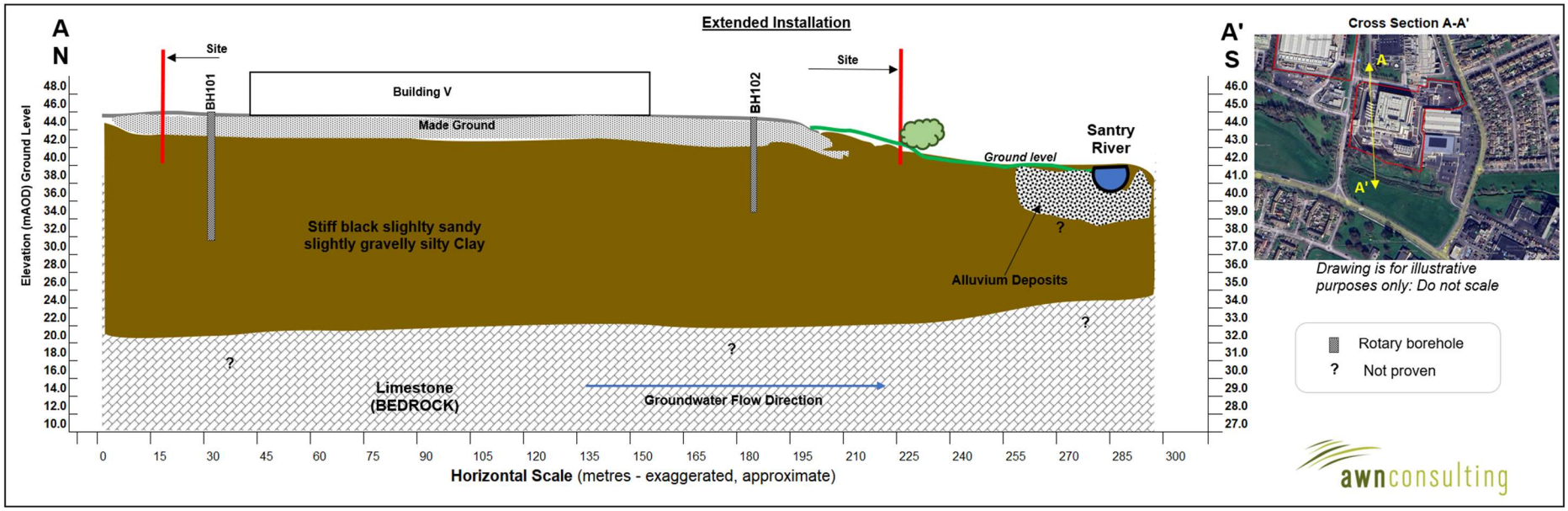
- The Eastern River Basin District (ERBD) Management Plan identifies that the groundwater body (GWB) beneath the site is part of the “Dublin Urban” GWB (IE_EA_G_005). The GWB Report indicated that the status of the water body is good.
- Groundwater flows are in a south easterly direction towards Dublin Bay; however, the permeability of soils within the region are generally low as characterised by the Dublin GWB.
- Based on assessments within the Clonshaugh Business and Technology Park, bedrock is greater than 20.0mbgl in the immediate vicinity of the site. As such there is a negligible pathway to the bedrock aquifer.
- The site is located within an extent of shallow Made Ground which reflects the industrial and business mix in terms of land use in the immediate area.
- Review of the geology and hydrogeology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, significant public water supplies/ Group Water Schemes or geological heritage sites within the immediate vicinity which could be impacted by the Installation;
- Based on the Institute of Geologists of Ireland (IGI) the criteria for rating the importance of hydrogeological features, the importance of the hydrogeological features at this site is rated as ***medium Importance***. This is based on the assessment that the attribute has a good quality significance or value on a local scale. The Lucan formation aquifer is a *moderately productive* bedrock aquifer, productive only in local zones and it is unlikely to be used for public water supply or widely used for potable use. The Tober Colleen has been classified by the GSI as a Poor Bedrock Aquifer which is generally unproductive except for local zones (Pl).
- In addition, the aquifer does not host any groundwater dependent ecosystems (SACs/NHAs).
- The storm water from site discharges in the IDA Park storm sewer(s) drainage system which discharges into the Santry River south of the site, flows c. 5.15 river km east to the North Bull Island transitional water body, and ultimately to the Dublin Bay. The nearest relevant SAC is c.5.15 river km to the southeast of the site.



Insert 8.1 A-A' Schematic local cross section showing the ADSIL Existing Installation site



Insert 8.2 A-A' Schematic regional cross section showing the ADSIL Existing Installation site



Insert 8.2 A-A' Schematic cross section showing the ADSIL Extended Installation site

8.1 POLLUTANT LINKAGES

The pollutant linkages based on the primary sources of possible contaminants on site are summarised in Table 8.1.

Table 8.1 Pollutant Linkages

Source	Pathways	Receptor	Impact Assessment
Diesel Fuel Spill (not contained)	No source -pathway - receptor linkage based on thickness (>20 m) and low permeability nature of underlying soil.	Locally Important Bedrock Aquifer with low vulnerability and Poor Bedrock Aquifer which is Generally Unproductive except for Local Zones	Low – Tanks are bunded and double skinned and on hard stand areas with drainage to interceptors No source -pathway - receptor linkage based on thickness (>20 m) and low permeability nature of underlying soil.
	Lateral migration via drainage system	Stormwater system discharging to River Santry	Low – Tanks contained (as above), gradient low and drainage to interceptors prior to discharge to storm sewer.

9.0 STAGE 7 – SITE INVESTIGATION

9.1.1 Existing Installation

The due diligence reports completed by CSEA for all three sections of the existing Installation site, this information has been used and summarised accordingly for this section. There were no intrusive investigations completed at the existing Installation site however the due diligence reports present details regarding the conditions of the building and the associated infrastructure at the facilities.

The southern section of the existing Installation site where Building W is located was formerly occupied by Donnelly Documentation services. The warehouse and offices had two above ground storage tanks and outbuildings that housed boilers and other mechanical infrastructure. The due diligence reports indicate the surfaces at the site were in good condition and does not report and known environmental incidents at the site.

The middle section of the site where Building Y is located was previously used as a printing press which is likely to have used a range of chemicals such as petroleum constituents, organic sulphur and organ nitrogen compounds, solvents and metals. The visual site assessment completed at the time of the due diligence did not identify any evidence of storage of chemicals. The AWN Phase 1 walkover of the site completed in 2013 recorded a boiler/generator room located to the rear of the building, the internal floor surface was in good condition and the external hardstanding was noted to be in moderate condition.

The northern section of the site where Building X is located is the former Acco/Rexel site. It is understood that plastic extrusions were carried out on the site until 1996 when manufacturing ceased. From 1996 to c. 2010 the warehouse was primarily used as a warehouse for finishing products. It is likely that there was organic solvents, inorganic pigments, organic pigment and dyes and organic binders in use at the facility. An above ground bunded heating oil tank and disused un-bunded above ground storage tanks (used for firewater retention and storage of dry granules) were identified during the AWN Phase 1 walkover of the site completed in 2013. The external hardstanding areas were in poor condition.

Based on the AWN Phase 1 walkover of the former Cahill Printers and Acco/Rexel sites there was no underground storage tanks identified, there were above ground storage tank and infrastructure such as boilers and generators indicating the bulk storage and use of hydrocarbons on site. Based on the former uses it is likely there was chemicals stored at the site, however there was no evidence of large bulk storage with the exception of two tanks which were reportedly used for storage dry polyethylene granules.

9.1.2 Extended Installation

A site investigation was carried out in June 2019 for the extended Installation site and involved the excavation of ten (10 No.) trial pits across the site. Samples were collected from a selection of trial pit locations at various depths from both made ground and natural subsoils. These trial pits were excavated to facilitate the description of the made ground and natural subsoils across the site incusing observations in relation to potential contention.

The ground conditions encountered during the investigation are summarised below as follows;

- Topsoil was encountered in all but one of the exploratory holes and was present to a maximum depth of 0.3m BGL. Tarmac surfacing was present typically to a depth of 0.1m BGL.
- Made Ground deposits were encountered beneath the Topsoil/Surfacing and was present to a relatively consistent depth of between 0.8m and 1.3m BGL. These deposits were described generally as brown slightly sandy slightly gravelly clay with rare fragments of charcoal, wood, red brick; ceramics, metal, plastic and concrete.
- Cohesive deposits were encountered beneath the Made Ground and were described typically as slightly sandy gravelly CLAY with rare sub-angular to sub-rounded cobbles. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.
- The granular deposits were encountered within/below/at the base of the cohesive deposits and were typically described as grey very sandy sub-angular to sub-rounded fine to coarse GRAVEL. The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs. Clayey gravelly fine to coarse SAND was encountered in TP-10 between 1.4m and 2.1 m BGL.

There was no evidence of buried municipal wastes or hydrocarbon impacted materials noted during the excavation of the trial pits. There was no evidence of buried asbestos containing materials noted during the excavations.

9.1.2.1 Soil Quality Assessment

There are no legislated threshold values for soils in Ireland. As such, the soil quality data was compared to a Generic Assessment Criteria (GAC) derived to be protective of human health and also ecology for a residential and commercial/industrial end use.

Generic Assessment Criteria (GAC) in the UK has been derived using the Contaminated Land Exposure Assessment (CLEA) model to be protective of human health for a number of different land uses. Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) developed a document in July 2009 detailing their own research and derivation of their own 'LQM GACs'. A total of 82 substances including many organic substances had LQM GACs derived, for the standard land uses of residential, commercial/industrial and allotments. This was updated in 2015 following further research and the derived results are now called LQM/CIEH Suitable 4 Use Level (S4UL). The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and as transparently derived and cautious "trigger values" above which further assessment of the risks or remedial action may be needed. For each contaminant S4ULs have been derived for six land use scenarios based on assessing exposure pathways in each planning scenario. In this instance the commercial scenario has been considered. Soil type and soil organic matter (SOM) has an influence on the behaviour of contaminants. S4ULs have been derived for three SOM contents (1%, 2.5% and 6%) to cover the likely range in soils.

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

assessment. The main basis of the assessment remains the conceptual site model and consideration of the pollutant linkages: Source - Pathway – Receptor.

GII assessed the soils data collected from the trial pits against the LQM/CIEH 'Suitable 4 Use Levels' (S4ULs). All parameters where detected were present at levels below their respective commercial and residential (with homegrown produce) S4ULs.

9.1.2.2 Waste Acceptance Criteria

Soil samples to facilitate waste classification were completed as part of the site investigation works. The scope of the work undertaken to facilitate the waste classification exercise included the following:

- Collection of subsoil and groundwater samples for chemical analysis;
- Environmental laboratory testing; and
- Waste classification.

Samples were analysed and compared against Waste Acceptance Criteria (WAC) set out by the adopted EU Council Decision 2003/33/EC which established criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002).

The made ground underlying the site has been shown to meet inert waste acceptance criteria and suitable for retention on site following development. The naturally occurring clay directly underlying the made ground has also been shown to meet inert waste acceptance criteria.

Elevated levels of selenium were detected in the naturally occurring black clay underlying the site in the locations TP-01 and TP-08 exceeded the inert waste acceptance criteria. These elevated levels are not due to any impact from the site or site activities. The black boulder clay underlying much of the greater Dublin urban area is known to have naturally high level of soluble heavy metals including selenium, antimony and molybdenum which exceed the inert waste acceptance criteria, as is the case here.

All samples were subjected to asbestos screening and trace asbestos fibres were detected in the sample of the made ground at TP-04. The asbestos type detected was chrysotile. The laboratory did not identify asbestos containing materials (ACMs) in the sample. The level detected was less than the laboratory detection limits of 0.1%. This material as detected does not pose an environmental risk if retained on site at this level of detection.

9.1.2.3 Water Quality Analysis

Three (3 No.) groundwater monitoring wells were installed on site during the week of the 29th July 2019. The borehole BH-01 was located in the upgradient sector of the site, BH-02 was located in the central section of the site and BH-03 was located in the downgradient section of the site. Samples were collected by a GII Geo-Environmental Engineer on the 8th August 2019.

There were no parameters which are indicative of contamination of the groundwater by hydrocarbon related products detected in the groundwater samples analysed (TPH, BTEX and PAH). Ammonia was detected at levels greater than the GTV in BH-02 wells. Manganese was detected in all wells above the IGV. Potassium was detected in BH-01 and BH-02 above the IGV. The levels of manganese and potassium were greatest

in BH-01 which is upgradient section of the site. The source of these elevated parameters is considered to be off site. The detections of elevated parameters are not considered to be of environmental significance. This chemical testing of the groundwater has confirmed that the historical site activities have not had an impact on the underlying groundwater.

10.0 CONCLUSIONS

On the basis of the soil and groundwater investigations undertaken and an assessment of the source-pathways-receptors, the following conclusions have been made:

- Bedrock is greater than 20.0 mbgl and is overlain by shallow fill and low permeability boulder clay greater than 20.0 meters. As such there is no source-pathway-receptor linkage to the underlying aquifer.
- Based on the low-level detection of constituents of concern below the available soil and groundwater standards and guideline values, the site is of low environmental risk.
- The historic site uses have utilised chemicals as part of their manufacturing and printing processes these chemicals were likely to be stored in smaller containers and within the footprint of the building reducing the risk of potential historic contamination occurrences. The only bulk chemical likely to be present was fuel oil. There is no record of any spills at the site prior to redevelopment. However, based on the natural conditions present if any localised leaks or spills occurred, these would be contained within the clays on site and naturally degrade over time.
- There is bulk diesel storage proposed for the facility (diesel, HVO or a blend of both may be used). However, the risk prevention measures present at the facility significantly reduce the potential for an environmental impact to soil or water to occur. These measures include bunded or double contained vessels, dual-contained fuel pipe system (when underground), spill management procedures and incorporation of interceptors on stormwater lines.
- Source-pathway-receptor linkages were assessed for the bulk storage areas. It was concluded that there are no direct pathways to either the soil and groundwater environment. Interceptors are installed on the storm water drainage network. A leakage from a bulk tank would be fully contained in the designated bund or the double skin lining of the tank, with leaks during delivery fully contained within the continuous hardstand delivery area. Any leakage outside of the delivery area would be contained in hydrocarbon interceptors within the drainage system.
- There is an indirect connection through the storm water drainage network to the Santry river and ultimately Dublin Bay. Based on the assessment of the source-pathway-receptor linkages, there no potential for impact of any downgradient Natura site (>5.5 km from the facility).

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