




Baseline Report
February 2023

**Unilin Insulation /
Ballytherm Trading Limited**

Ballyconnell, Co. Cavan

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Executive Summary:

AXIS environmental services were commissioned to carry out a baseline report for Unilin Insulation (Ballytherm Trading Limited), Ballyconnell, Co Cavan.

Baseline reports are required to meet the requirements of Article 22(2) of the Industrial Emissions Directive (2010/75/EU). The objective of the report is to obtain a current status of the site prior to issue or review of Industrial Emissions Licences. This information will be used to assess the future impact of the facility on the local soils and groundwater's since the baseline was established.

The Ballytherm Ltd. manufacturing facility is located in a factory situated in Annagh Industrial Park, Ballyconnell, Co. Cavan. Ballytherm Ltd. has been operating from this site since 2003. The company has been licensed by the EPA since 2003. The licence number of the facility is P0666-01 which is currently under review.

The national grid reference for the centre of the site is 227900E, 318450N. The Industrial Park is situated within the town boundary and has on its southern side the N87 national secondary route.

The Industrial Park is served by the Ballyconnell town sewer and by the town potable water supply. The area could be described as urban/rural with low density residential development predominating. To the North the site is bounded by agricultural land.

The facility manufactures PIR insulation boards. The plant operates 24 hours a day 7 days a week for 50 weeks of the year and employs 49 people.

Of the 3 samples taken there was no contamination determined. Materials deemed hazardous to groundwater and soil have been categorised in Regulation 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Most of the materials with hazardous components used in Ballytherm are purchased and stored in limited quantities. The materials are largely stored in bunded areas which have undergone integrity testing as per licence requirements. There are two main materials stored on site that would be deemed with significance for soil and water environment.

Three groundwater wells were installed and monitored within the boundary installation. AXIS environmental services were commissioned to perform the sampling, which was undertaken on the 26th January 2023. Analysis was subcontracted to an ISO 17025 accredited laboratory under controlled chain of custody.

The parameters analysed are compared with the EPA Guideline Values for the Protection of Groundwater in Ireland (IGV) and the Groundwater Threshold Values (GTV) as set out in the Report "*European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 366 of 2016)*".

All parameters were compliant with the thresholds outlined in Schedule 5 S.I. No. 9/2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 and Schedule 5 S.I. No. 366/2016 – European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016.

This report is certified as accurate, and representative of the sampling and associated analysis carried out.

1 Introduction

Ballytherm Trading Limited are required under Article 3(19) of the Industrial Emissions Directive to carry out an investigation into the installations requirement to complete a Baseline Report for the site.

A Baseline Report involves collation of detailed information on the current status of soil and groundwater contamination by relevant hazardous substances, if any.

The stages of a baseline report include completion of a screening model initially to determine if a full baseline report is required or to what extent the ground investigations should consider. If the screen indicates that there is or may be contamination on site by hazardous substances, then the investigation will be extended into a full intrusive survey of groundwater and soil.

This screen was carried out by KML Environmental Services which indicated that a baseline report was not required in December 2020. The EPA however, as part of their licence review process, requested that a baseline report be submitted in a Request for Further Information, May 2022:

“As required under regulation 9(2)(r) provide a baseline report having regard to European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EC on industrial emissions (2014/C 136/03) published on 6th May 2014.”

The activity under which Ballytherm is licensed is 5.12(h). There are no other associated licensable activities within the boundary of the installation. All raw materials, intermediates and final products from all processes were included in the initial screening assessment.

In order to evaluate the sites specific requirements a full installation survey and raw material review was completed on the 12th January 2023. The inventory of site materials (including raw materials, products, intermediaries, by-products, emissions and waste) were evaluated for potential classification as a hazardous substance.

The hazardous materials were then redefined as relevant hazardous substances capable of contaminating soil and groundwater. Storage, handling, delivery methods and uses on site were reviewed in line with typical volumes retained and consumed at the installation to assess the potential for accidents, spillages, discharges or losses to the environment.

2 Objectives

The objective of this Baseline Report was to complete an intrusive investigation into potential groundwater and soil contamination on site.

The objectives of this assessment were met by considering the following:

- Identification of the hazardous substances use, produced or released from site;
- Identify laboratory analysis for compounds that could be tested;
- Expand the parameter suite to cover activities prior to Ballytherm moving onto the site;
- Listing, assessing and restricting the hazardous substances to relevant hazardous substances;
- Discarding hazardous substances which are incapable of contaminating soil or groundwater;
- Justifying the decisions to exclude certain hazardous substances;
- Identifying the actual possibility for soil and groundwater contamination of the site;
- Inclusion probability of releases and the consequences of a release;
- Assessment of quantities of hazardous materials stored on site;
- Review the storage arrangements, use and transport procedures around site;
- Procedures, policies and measures adapted to minimise or eliminate possibility of groundwater and soil contamination;
- Installation of 3 groundwater wells;
- Sampling and analysis of 3 groundwaters and 3 soil samples from site for hazardous and also common polluting parameters;
- Issue of a baseline report which outlines the current position of the groundwater and soil on site.

3 Summary of Baseline Report Methodology

The installation was assessed in line with Table 1 to identify if activities and operations attributed significant risk to groundwater and soil contamination on site.

Table 3-1 Baseline Report Screening Assessment

Stage	Activity	Objective
1	Identify which hazardous substances are used, produced or released at the installation and produce a list of these hazardous substances	Determine whether or not hazardous substances are used, produced or released in view of deciding on the need to prepare and submit a baseline report.
2	Identify which of the hazardous substances from Stage 1 are relevant hazardous substances. Discard substances which are incapable of contaminating soil or groundwater. Justify and record the decisions taken to exclude certain hazardous substances	To restrict further consideration to only the relevant hazardous substances in view of deciding on the need to prepare a baseline report

If the facility is considered a threat or potentially impacting on the local soil and groundwater quality with substances considered as Hazardous under Article 3 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008, the Screening Assessment is extended to a detailed Baseline Report.

Table 3-2 Baseline Report

Stage	Activity	Objective
3	From each relevant hazardous substance brought forward from Stage 2, identify the actual possibility for soil or groundwater contamination at the site of the installation, including the probability of releases and their consequences, and taking particular account of: <ul style="list-style-type: none"> • The quantities of each hazardous substance or groups of similar hazardous substances concerned; • How and where hazardous substances are stored, used and to be transported around the installation; • Where they pose a risk to be released; • In the case of existing installations also the measures that have been adapted to ensure that it is impossible in practice that contamination of soil or groundwater takes place. 	To identify which of the relevant hazardous substances represent a potential pollution risk at the site based on the likelihood of releases of such substances occurring. For these substances, information must be included in the baseline report.
4	Provide a site history. Consider available data and information: <ul style="list-style-type: none"> — 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. Review of previous investigation reports may assist in compiling this data. 	Identify potential sources which may have resulted in the hazardous substances identified in Stage 3 being already present on the site of the installation.

Stage	Activity	Objective
5	Identify the site's environmental setting including: <ul style="list-style-type: none"> — Topography; — Geology; — Direction of groundwater flow; — Other potential migration pathways such as drains and service channels; — Environmental aspects (e.g. particular habitats, species, protected areas etc.); and — Surrounding land use. 	Determine where hazardous substances may go if released and where to look for them. Also identify the environmental media and receptors that are potentially at risk and where there are other activities in the area which release the same hazardous substances and may cause them to migrate onto the site.
6	Use the results of Stages 3 to 5 to describe the site, in particular demonstrating the location, type, extent and quantity of historic pollution and potential future emissions sources noting the strata and groundwater likely to be affected by those emissions – making links between sources of emissions, the pathways by which pollution may move and the receptors likely to be affected.	Identify the location, nature and extent of existing pollution on the site and to determine which strata and groundwater might be affected by such pollution. Compare with potential future emissions to see if areas are coincident.
7	If there is sufficient information to quantify the state of soil and groundwater pollution by relevant hazardous substances on the basis of Stages (1) to (6) then go directly to Stage 8. If insufficient information exists then intrusive investigation of the site will be required in order to gather such information. The details of such investigation should be clarified with the competent authority.	Collect additional information as necessary to allow a quantified assessment of soil and groundwater pollution by relevant hazardous substances.
8	Produce a baseline report for the installation that quantifies the state of soil and groundwater pollution by relevant hazardous substances.	Provide a baseline report in line with the IED.

4 Summary Hazardous Substances – Stage 2

Table 4-1 List of Chemicals on Site

Material	CAS Number	R Phrase	Amount Stored	Relevant Hazard Risk Phrase
MDI, diphenylmethane-diisocyanate, isomers & homologues	9016-87-9	R20,R36/37/38, R42/43	84	-
Polyol blend Tris (1-chloroisopropyl) phosphate polyether based on aromatic amine, ethnaediol	01-2119486772-26, 67800-94-6 107-21-1	R23/24	73	-
Catalyst 1, diethylene glycol	111-46-6	R10,R22/R23/24, R35	10	-
Catalyst 2, N,N-dimethylcyclohexylamine, Bis (2-dimethylaminoethyl) (methyl) amine	98-94-2 3030-47-5	R22	10	-
Blowing agent, Cyclo/Iso Pentane 70:30	78-78-4 287-92-3	R11/12, R51/53, R65/66/67	27	Toxic to aquatic organisms May cause long term adverse effects in the aquatic environment
Iso PMDI 92730, isocyanic acid, polymethylenepolyphenylene ester	9016-87-9	R20,R36/37/38, R42/43	42	-
Fuel oil	68334305	Boiler fuel	15	May cause long term adverse effects in the aquatic environment

5 Site Specific Pollution Risk – Stage 3

This section includes a review of the containment measures in place for the hazardous substances identified in Stage 2 above.

The maximum quantity of cyclo/iso pentane 70:30 stored on site is 27 tonnes. It is stored in two bunded tanks, one of 13 tonne capacity and the second 14 tonne capacity. The pentane storage area is located in a bunded compound located outside the production area on the Ballytherm site.

The compound is roofed to avoid rainwater entering the bund, all refilling takes place within the bunded area. All areas on which activities take place are hardstand concreted. The likelihood of a spill contaminating ground water or soil is minimal.

The fuel oil tank has a capacity of 15tonnes. The fuel oil tank is located in a bund outside of the production area. There is a concrete apron in place which drains to the onsite interceptor.

As part of the ISO 14000 Environmental Management System in place at Ballytherm there is a documented unloading procedure for all chemicals and fuel.

There is also a documented emergency procedure in the event of spillage. All bunds and pipes are inspected and tested as per licence requirements.

6 Site History – Stage 4

6.1 Site History

The Ballytherm Ltd. manufacturing facility is located in a factory situated in Annagh Industrial Park, Ballyconnell, Co. Cavan. Ballytherm Ltd. has been operating from this site since 2003 and the company has been licensed by the EPA since that time. The current licence number of the facility is P0666-01.

Prior to Ballytherm this was an IDA factory which has planning applications in 1979 for its development. Planning permission for the facility was granted in 2002, due to expansion and extension of the factory buildings additional planning permission was sought and granted in 2013, 2015 and 2016. The facility became Ballytherm limited, which was purchased by Xtratherm and is now under the ownership of Unilin.

Details relating to the operations on site prior to the ownership by Ballytherm are limited, therefore the parameters chosen for analysis as part of this baseline survey have been extended.

The Industrial Park is served by the Ballyconnell town sewer and by the town potable water supply.

The other facility occupying the site is Boxmore Plastics Ltd.

The area could be described as urban/rural with low density residential development predominating. To the North the site is bounded by agricultural land.

There are no recorded spillages or incidents at the installation that could have caused groundwater or soil pollution since the EPA licence was issued to the company in September 2003. From conversation with employees of the factory, there were no known incidents at the installation either.

7 Site Environmental Setting – Stage 5

The Ballytherm Trading Ltd. manufacturing facility is located in a factory situated in Annagh Industrial Park, Ballyconnell, Co. Cavan. The national grid reference for the centre of the site is 227900E, 318450N. The Industrial Park is situated within the town boundary and is bounded on its southern side by the N87 national secondary route.

The Industrial Park is served by the Ballyconnell town sewer and by the town potable water supply. The area could be described as urban/rural with low density residential development predominating. To the North the site is bounded by agricultural land.

Fig 7-1: Site location Map



7.1 Topography, Water Supply and Drainage

The site is mainly hardstanding with a gravel area and marsh area to the northern boundary of the installation. All operational, storage, transport and pipeline systems on which hazardous substances are present are hardstanding areas. There is no direct access route to groundwater or soil. All hazardous substances stored on site are within integrity tested bunded areas or double skinned storage tanks. Most chemicals in use at the installation area stored within the manufacturing building itself.

The facility is located within the Erne River network. There are no surface streams or open drainage ditches on the site itself. All surface water run-off from roofs and hardstanding areas is captured by the storm water drainage system and discharges via petrol/oil interceptor into a small tributary of the Woodford River.

The facility is serviced by the public mains water supply. The facility does not use water in the manufacturing process, it is used for canteen, drinking and toilets.

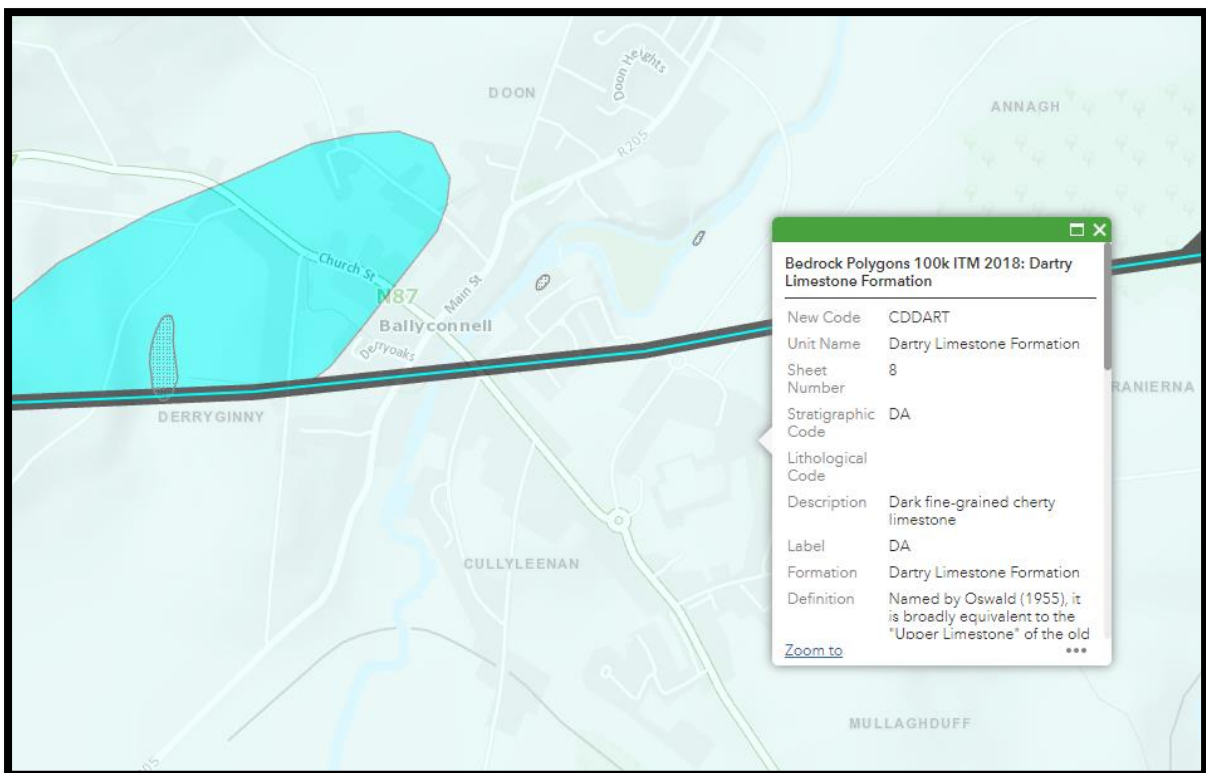
All surface water run-off from roofs and hardstanding areas is captured by the storm water drainage system and discharges via petrol/oil interceptor into a small tributary of the Woodford River. Wastewater is discharged to the Ballyconnell waste water treatment plant.

Overall lands surrounding the facility to the north and east are mostly in agricultural use. There is residential development to the south and south east of the site that is within 50m of the site boundary. There is further residential development to the west of the facility in the main town of Ballyconnell. There are neighbouring manufacturing facilities within the Annagh Industrial Estate and retail development in the town centre.

7.2 Bedrock Geology

The Ballytherm site is underlain by the Dartry Limestone Formation. The dominant facies is massive to thick-bedded, mostly very fine grained and dark wackestone, locally rich in sponge spicules. Bedding is picked out by chert nodules. There is pervasive dolomitisation and silicification. Grey medium-bedded crinoidal calcarenites (packstones and wackestones) also occur in the formation.

Fig 7-2: Site Bedrock



7.3 Soil and Subsoil

Till subsoils are found beneath the Ballytherm site. The till is derived from silicified limestone and chert (TLSch). Fen peat (FenPt) deposits are mapped along the margins of Annagh Lough and Killywilly loughs to the east and south of the site. Alluvial deposits are mapped along the Woodford River, and in places along the Rag River.

The TLSch tills in the study area are of low permeability. The FenPt deposits are also assumed to have low permeability. The subsoil permeability observations correlate with the mapped soil types and are supported by field observations of poorly drained lands across the study area. According to the Teagasc soil map the soil association beneath the site is Kilrush (700h), fine loamy drift with siliceous stones.

Fig 7-3: Site Bedrock

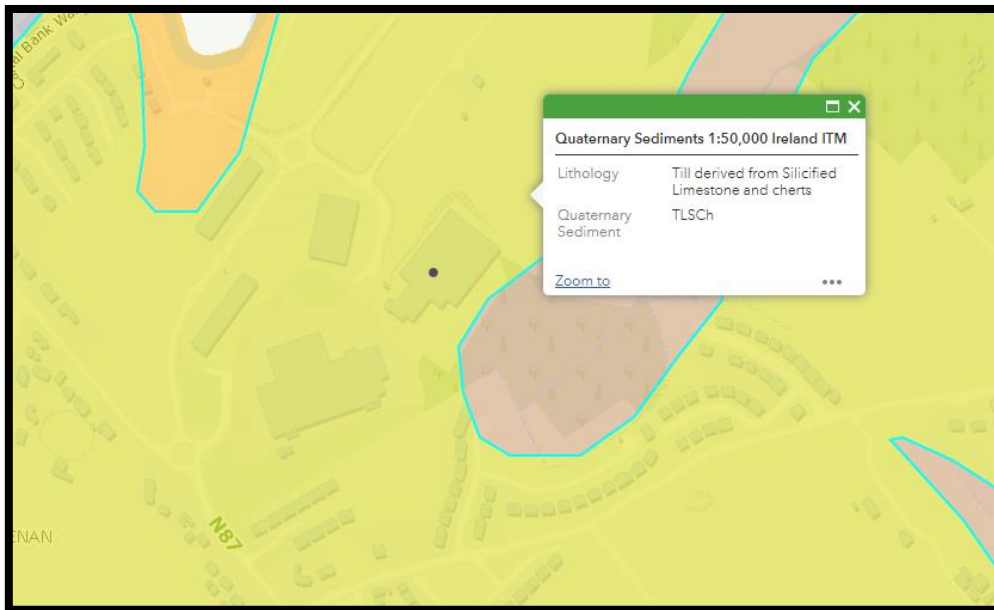
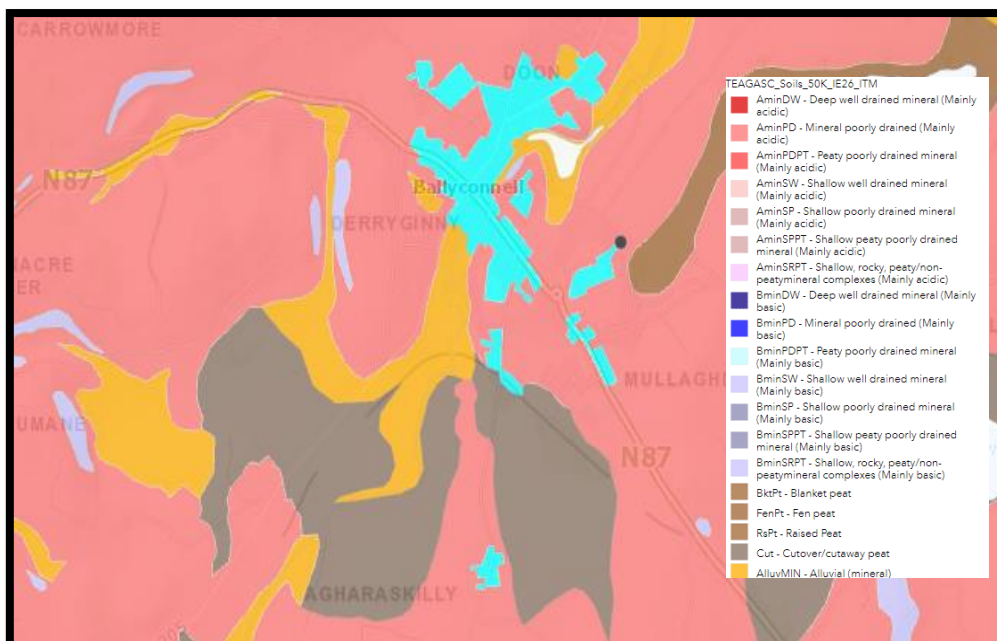


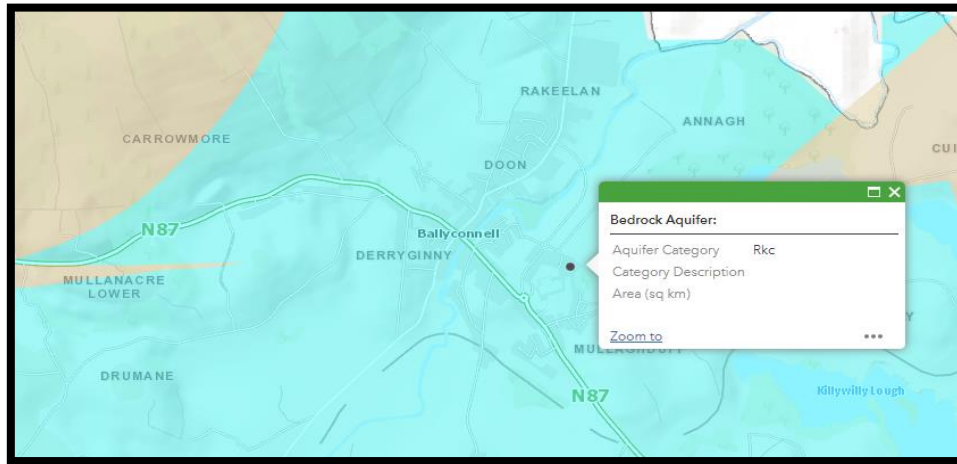
Fig 7-4: Teagasc Soils



7.4 Hydrogeology

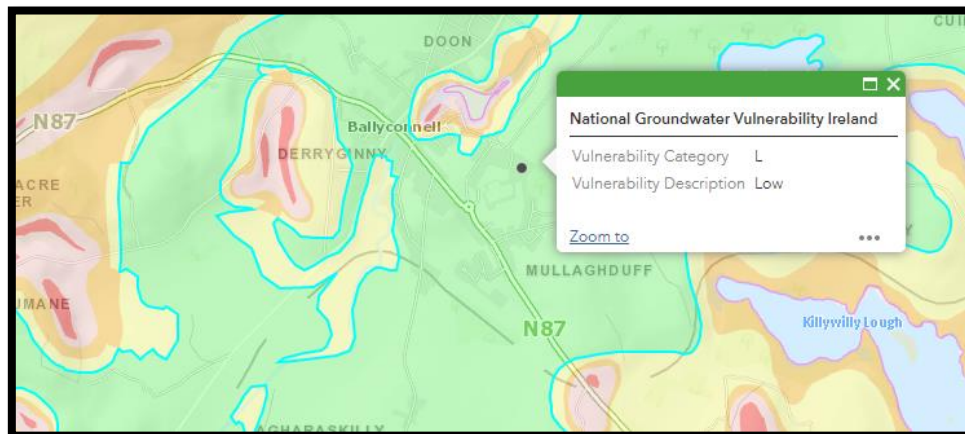
The bedrock aquifer beneath the Ballytherm site is classed (GSI classification system) as Rkc which is a Regionally Important Aquifer – Karstified. Rkc are those aquifers in which the degree of karstification limits the potential to develop groundwater. They have a high ‘flashy’ groundwater throughput, but a large proportion of flow is concentrated in conduits, numerical modelling using conventional programs is not usually applicable, well yields are variable with a high proportion having low or minimal yields, large springs are present, storage is low, locating areas of high permeability is difficult and therefore groundwater development using bored wells can be problematic.

Fig 7-5: Bedrock Aquifer



The aquifer vulnerability is classed as L – low vulnerability. Groundwater vulnerability is a term used to represent the natural ground characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability embodies the characteristics of the intrinsic geological and hydrogeological features at a site that determine the ease of contamination of groundwater. The vulnerability category assigned to a site or area is based on the relative ease with which infiltrating water and potential contaminants may reach groundwater in a vertical or sub-vertical direction. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants), more slowly, and consequently in lower quantities. Also, the slower the movement and the longer the pathway, the greater is the potential for attenuation of many contaminants.

Fig 7-6: Groundwater Vulnerability



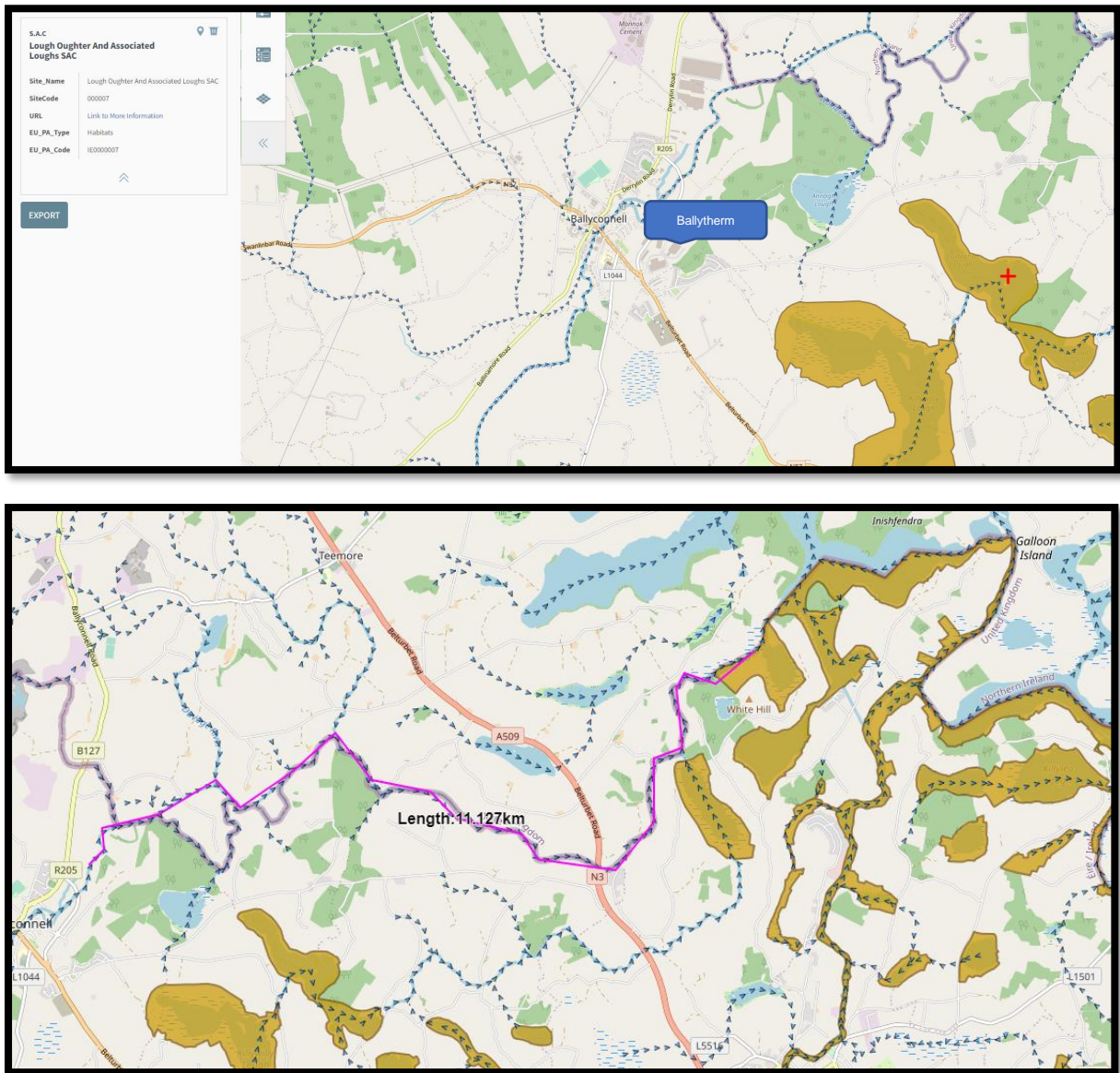
The Ballytherm site is located in the Newton-Ballyconnell groundwater body (IEGBNI-NW-G-031). This Groundwater Body GWD) is located between the Upper Lough Erne to the north-east and Carrick-on-Shannon to the south-west. The available groundwater levels range from 0-40m below ground level, with 75% greater than 5m below the surface. The overall flow directions are generally to the east and northeast, with groundwater discharging into the Lower Lough Erne. The Newtown-Ballyconnell groundwater body has been classified as being of Good Status. (GSI, Newtown-Ballyconnell GWB Description October 2004))

The Ballyconnell Water Supply scheme sources its supply from two boreholes in the townland of Killywilly, Ballyconnell. Each borehole is considered to have a sustainable yield of 1,500m³/day. The scheme supplies a population of 1000 people and also supplies the Ballytherm facility. These wells are approximately 3.5Km from the Ballytherm site. The water abstracted from the wells comes from the same groundwater body that is beneath the Ballytherm site. Groundwater source protection zones (SPZ) have been delineated for the **Ballyconnell Public Water Supply Scheme** according to the principles and methodologies set out in 'Groundwater Protection Schemes (DELG/EPA/GSI, 1999) and in the GSI/EPA/IGI training course on Groundwater SPZ Delineation. The protection zones are intended to provide a guide in the planning and regulation of development and human activities to ensure groundwater quality is protected. (GSI Ballyconnell-Lough Cuillaghan Boreholes SPZ).

7.5 Special Area of Conservation / Special Protected Areas

The only special area of conservation in the area is Lough Oughter and its associated Loughs. Storm water from this installation and contaminated groundwater does have the potential to enter this special area of conservation given the direction of groundwater and river water flow. There are no special protected areas within 15km of the installation.

Fig 7-7: Special Area of Conservation and River Direction of Flow



8 Site Characterisation – Stage 6

8.1 Environmental Incidents / Pollution

There have not been any environmental incidents, losses or spillages on record at the installation since the EPA licence was initiated in 2003. The operations on site have ensured that all activities have minimal impact on the surrounding area, including soil and groundwater.

8.2 Operations Carried out on site

The main activity on site includes the manufacture of PIR insulation boards. Polyisocyanurate is formed from the chemical blending of diphenylmethane-4, 4'-diisocyanate (MDI) with polyester/polyether polyols. In this production facility the raw materials MDI and Polyol blend is mixed to the specific requirements of the plant process. The polyol blend which is comprised of polyol (Tris-(B-chlorisopropyl)-phosphate/ Halogenated polyetherpolyol), Diethylene Glycol and surfactant (Polysiloxane) is purchased pre-mixed as a single compound.

8.3 Main Air Emissions

The main air emission from the facility is from the chemical laydown extraction. There are minor emissions from the dust filter extraction system and the process heat exchange boiler. There are potential emissions from the laminator vent and the pentane metering/pumping system.

The main emission to the atmosphere occurs in the chemical laydown area. Working losses of MDI or volatile organic compounds (VOCs), especially pentane occur as the liquid is dispensed onto the bottom flexible facing material. The chemical laydown extract and fresh air supply (along with correct mixing of chemicals) will dilute any pentane vapours. In this area there is a gas detection system which will activate alarms (audible and visual) and controlling measures at detected levels for pentane of 15- 30% Lower Explosive Limit (LEL). At 15% of pentane LEL and alarm is activated. At 30% the plant will automatically shut down and the extraction systems starts.

8.4 Main Fugitive Emissions

The main area where fugitive emissions can occur is the outside off-loading area where tankers offload chemicals. An off-loading procedure is in place. Relevant personnel are trained to implement this procedure. All vessels are enclosed and personnel are prevented from opening them except in the case of emergency (e.g. blockage, pump failure). It is considered that impacts from fugitive emissions is minimal to negligible on the receiving environment.

8.5 Main Storm / Surface Water Emissions

Surface water from the facility is restricted to surface storm water run-off from the roof of the buildings and hard standing areas following rainfall. The on-site surface water drainage network consists of an underground drainage system which diverts storm water from the roof of all buildings directly into a drain, which eventually leads into the River Woodford.

In order to prevent potential contamination of the receiving watercourse with water that may be contaminated with oil/chemicals during off-loading the loading bay aprons are gravitated to an interceptor channel.

Procedures are in place for the off-loading of materials and in the event of accidental spillage/emergency.

As water is not used in the process there are no aqueous process emissions or wastewater discharges other than foul water directed to sewer from canteen and toilets.

8.6 Groundwater Emissions

There are no emissions to ground on site. The integrity of the groundwater beneath the site protected by adherence to the following measures:

All individual chemical storage areas are bunded according to standard bunding specifications in order to contain potential accidental discharges.

Any accidental spillage is contained within the bund and collected for off-site treatment/disposal by licensed contractor.

The construction and operation of the manufacturing facility is according to the BAT principle, therefore ensuring that inputs to/contamination of groundwater and surface water environments does not occur during normal and/or emergency situations (material spillage or fire event).

A fire water retention study had been completed for the facility. Emergency procedures are in place.

The integrity of all bunds is assessed as per licence requirements.

An environmental liability risk assessment has been documented for the site.

These combined measures ensure the integrity of the groundwater and surface water resources. The site is in compliance with relevant environmental standards (Council Directive 80/68/EEC and 2006/118/EC in relation to the protection of groundwater) and Local Government (Water Pollution Acts 1977 to 1990).

8.7 Soil Contamination

The main potential impacts to soil arise from the accidental spillage of oil or chemicals. It is considered that the impact is minimal when the remedial measures in place are considered.

Storm water from chemical/fuel off-loading areas is diverted to the interceptor where potential contaminants are dealt with.

All fuel and chemical storage areas are bunded to a least 110% of the capacity of the largest tank/drum within the bunded area. Bund integrity testing is carried out as per licence requirements.

All activities which have greatest potential of environmental significance are carried out on hardstanding areas which minimises the potential for contamination of soil below.

8.8 Waste Management

The majority of waste produced is from the primary manufacturing process. General waste from day-to-day operations is also produced. Where possible the production of waste is avoided in accordance with Council directive 98/2008/EC on waste and section 21A of the Waste Management Act 1996 as amended: where waste is generated, it is prepared for re-use, recycled or recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment.

- Chemical waste is collected and disposed of by a licensed waste disposal contractor.
- Trimming and cross cutting the finished board produces foam waste. These cut-offs are stored in a covered skip before removal to landfill.
- Rejected product is sold as second quality or shredded, compacted and disposed of to landfill via licensed waste disposal contractor.
- Excess foam formed around the side restraint units of the laminator are brushed off to prevent build-up of dried foam. This foam is removed to the dust extraction unit from where it is discharged into a covered skip before disposal by licensed contractor.
- Packaging waste consisting of paper, cardboard (both sheet and reel cores from facings) and polyethylene wrapping. This waste is stored in a skip before removal by licensed contractor for recycling.
- Canteen waste is stored in a skip before removal to landfill.

8.9 Incident Management

Emergency response procedures have been documented that define appropriate procedures in response to potential emergency situations occurring at the site including environmental accidents and or/emergencies. These procedures are designed to:

- Ensure maximum protection for on-site personnel;
- Ensure that a significant hazard to the general public is prevented;
- Minimise impact on the receiving environment;
- Reduce impact on site operations.

9 Site Investigation – Stage 7

Full details of the 2023 sampling results are attached in Appendix I of this report. The assessment was carried out to determine the concentration of common pollutants associated with the installation in operation and also specific hazardous substances that are used on site.

9.1.1 Groundwater Sampling & Monitoring

Samples were collected using SOP 2013. This is summarised as follows:

- Water levels within the wells were obtained to determine the volume of purge water to remove.
- Wells were purged using submersible groundwater pumps.
- Three times the volume of water in the well was removed.
- After purging the wells were allowed to regenerate and settle prior to samples been collected for analysis.
- 1000 ml plastic bottles were used for inorganic fractions
- VOCs were collected in 40ml glass vials
- 1000 ml glass bottles were used for Semi-Volatile Organic Compounds
- Samples were uniquely labelled, refrigerated by use of cool boxes with frozen ice packs, logged onto chain of custody form and delivered to laboratory for analysis.

9.1.2 Laboratory Analyses

Element were used for the analysis. The scope of accreditation is available on the UKAS website

[Accreditation Certificate](#)

9.1.3 Parameters

The following parameters were assessed on each sample:

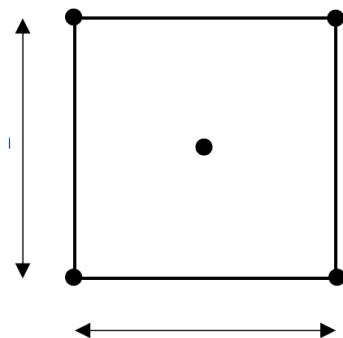
Table 9-1

Dissolved Arsenic	Nitrite as NO ₂
Dissolved Cadmium	Monoethylene glycol
Dissolved Calcium	Propylene glycol
Total Dissolved Chromium	Diethylene glycol
Dissolved Copper	Triethylene glycol
Dissolved Lead	Thiodiglycol
Dissolved Magnesium	Ammoniacal Nitrogen as NH ₄
Dissolved Mercury	2,4-TDI
Dissolved Nickel	2,6-TDI
Dissolved Potassium	HDI
Dissolved Sodium	IPDI
Dissolved Zinc	MDI
Total Phosphorus	Electrical Conductivity @ 25°C
EPH (C8-C40) (Diesel Range Organics)	pH
Sulphate as SO ₄	Total Petroleum Hydrocarbons
Chloride	Pesticides
Nitrate as NO ₃	PAH

9.1.4 Soil Sampling & Monitoring

Samples were collected using SOP 2109. This is summarised as follows:

- All contaminants were avoided, hands were kept clean, no hand lotions, jewellery, medical dressings worn whilst sampling. Clean set of gloves used for each sample / sample location;
- At each sample site, a composite soil sample was collected at two separate depth intervals;
- Primary sample bags used were Kraft® paper soil sample bags (125 mm by 250 mm size) and a secondary outer polybag used to transport samples to prevent cross-contamination in transit;
- Samples were collected from auger holes at the centre and 4 corners of a sample square;



Diagrammatic plan of a 1 m by 1 m square, from which a composite soil sample is taken from auger holes at the centre and the four corners of the square.

- Prior to collecting the sample, soil sample bags were labelled with the site number, the sample type and the initials of the persons sampling;
- Prior to sampling, one auger flight was collected and discarded at the sample site, in order to 'clean' the auger of material from the previous sample site;
- The samples were collected using a hand auger.
- The soil collected in each auger flight was examined when removing from the auger flight, and observations made and recorded on the field card;
- The composite soil sample was collected at a nominal depth of at 5–20cm. The maximum depth of sample collection was 50cm;
- Samples were uniquely labelled, logged onto chain of custody form and delivered to laboratory for analysis.

9.1.5 Laboratory Analyses

Element were used for the analysis. The scope of accreditation is available on the UKAS website

[Accreditation Certificate](#)

9.1.6 Parameters

The following parameters were assessed on each sample:

Table 9-2

Arsenic	PCB 28
Cadmium	PCB 52
Chromium	PCB 101
Copper	PCB 118
Lead	PCB 138
Mercury	PCB 153
Nickel	PCB 180
Zinc	Monoethylene glycol
Arsenic	Propylene glycol
PAH MS	Diethylene glycol
TPH CWG	Triethylene glycol
MTBE	Thiodiglycol
Benzene	Sulphate as SO ₄
Toluene	m/p-Xylene
Ethylbenzene	o-Xylene

9.1.7 Summary of Water Results

Table 9-3

Parameter	Units	Well Number	Well Number	Well Number	Limits under Groundwater Regulations 2016 as amended	Dutch Intervention Values
		GW-1	GW-2	GW-3		
Field Measurements						
Visual Inspection	-	Brown muddy water	Brown muddy water	Brown Muddy water	-	-
Solids / Silt	-	Present	Present	Present	-	-
Odour	-	None	None	None	-	-
Well Depth	metres	9.6	4.5	6.4	-	-
Water Level	metres	2.2	2.1	1.7	-	-
Recharge Rate	sec/cm	3	2	2	-	-
Chemical Analysis						
Dissolved Arsenic	ug/l	<2.5	<2.5	<2.5	7.5	60
Dissolved Cadmium	ug/l	<0.5	<0.5	<0.5	-	6
Dissolved Calcium	mg/l	67.9	67.3	92.2	-	-
Dissolved Chromium	ug/l	<1.5	<1.5	<1.5	37.5	30
Dissolved Copper	ug/l	<7	<7	<7	-	75
Dissolved Lead	ug/l	<5	<5	<5	7.5	75
Dissolved Magnesium	mg/l	11.0	11.0	8.2	-	-
Dissolved Mercury	ug/l	<1	<1	<1	0.75	0.3
Dissolved Nickel	ug/l	<2	<2	8	-	75
Dissolved Potassium	mg/l	2.5	2.5	1.2	-	-
Dissolved Sodium	mg/l	19.6	19.5	13.5	-	-
Dissolved Zinc	ug/l	<3	<3	7	75	800
EPH (C8-C40)	ug/l	<10	<10	<10	-	-
Sulphate as SO ₄	mg/l	35.4	1.9	6.1	187.5	-
Chloride	mg/l	17.2	14.1	14.8	187.5	-
Nitrate as NO ₃	mg/l	<0.2	<0.2	<0.2	37.5	-
Nitrite as NO ₂	mg/l	<0.02	<0.02	<0.02	375	-

Note 1: Guide Values refers to EPA Guideline Values for the Protection of Groundwater in Ireland, IGV = Interim Guideline Value. Note these standards are presented for guideline purposes only, therefore, due care should be exercised in cross-referencing these standards with the groundwater results obtained.

Note 2: Where parameters were detected the sum of the concentration of those parameters was quoted. Otherwise, the highest LOD for the group was listed if they were all less than that limit.

Parameter	Units	Well Number	Well Number	Well Number	Limits under Groundwater Regulations 2016 as amended	Dutch Intervention Values
		GW-1	GW-2	GW-3		
Chemical Analysis						
Monoethylene glycol	ug/l	<10	<10	<10	-	-
Propylene glycol	ug/l	<10	<10	<10	-	-
Diethylene glycol	ug/l	<10	<10	93	-	-
Triethylene glycol	ug/l	<10	<10	<10	-	-
Thiodiglycol	ug/l	<10	<10	<10	-	-
Ammoniacal Nitrogen as NH ₄	mg/l	0.13	2.72	0.38	175	-
Isocyanates	ug/l	<1.0	<1.0	<1.0	-	-
Conductivity	uS/cm	541	797	586	1,875	-
pH	pH units	7.53	7.30	7.20	-	-
Total Petroleum Hydrocarbons						
Aliphatics						
>C5-C6	ug/l	<10	<10	<10	-	-
>C6-C8	ug/l	<10	<10	<10	-	-
>C8-C10	ug/l	<10	<10	<10	-	-
>C10-C12	ug/l	<5	<5	<5	-	-
>C12-C16	ug/l	<10	<10	<10	-	-
>C16-C21	ug/l	<10	<10	<10	-	-
>C21-C35	ug/l	<10	<10	<10	-	-
Total aliphatics C5-35	ug/l	<10	<10	<10	-	-
Aromatics						
>C5-EC7	ug/l	<10	<10	<10	-	-
>EC7-EC8	ug/l	<10	<10	<10	-	-
>EC8-EC10	ug/l	<10	<10	<10	-	-
>EC10-EC12	ug/l	<5	<5	<5	-	-
>EC12-EC16	ug/l	<10	<10	<10	-	-
>EC16-EC21	ug/l	<10	<10	<10	-	-
>EC21-EC35	ug/l	<10	<10	<10	-	-
Total aromatics C5-35	ug/l	<10	<10	<10	-	-
Total aliphatics and aromatics(C5-35)	ug/l	<10	<10	<10	-	-

Note 1: Guide Values refers to EPA Guideline Values for the Protection of Groundwater in Ireland, IGV = Interim Guideline Value. Note these standards are presented for guideline purposes only, therefore, due care should be exercised in cross-referencing these standards with the groundwater results obtained.

Note 2: Where parameters were detected the sum of the concentration of those parameters was quoted. Otherwise the highest LOD for the group was listed if they were all less than that limit.

Parameter	Units	Well Number	Well Number	Well Number	Limits under Groundwater Regulations 2016 as amended	Dutch Intervention Values
		GW-1	GW-2	GW-3		
PCBs						
PCB 28	ug/l	<0.01	<0.01	<0.01	-	-
PCB 52	ug/l	<0.01	<0.01	<0.01	-	-
PCB 101	ug/l	<0.01	<0.01	<0.01	-	-
PCB 118	ug/l	<0.01	<0.01	<0.01	-	-
PCB 138	ug/l	<0.01	<0.01	<0.01	-	-
PCB 153	mg/l	<0.01	<0.01	<0.01	-	-
PCB 180	ug/l	<0.01	<0.01	<0.01	-	-
Total 7 PCBs	ug/l	<0.07	<0.07	<0.07	-	0.01
Pesticides						
Organochlorine	ug/l	<0.01	<0.01	<0.01	-	-
PAH						
Naphthalene	ug/l	<0.1	<0.1	<0.1	-	70
Acenaphthylene	ug/l	<0.005	<0.005	<0.005	-	-
Acenaphthene	ug/l	<0.005	<0.005	<0.005	-	-
Fluorene	ug/l	<0.005	<0.005	<0.005	-	-
Phenanthrene	ug/l	<0.005	<0.005	<0.005	-	5
Anthracene	ug/l	<0.005	<0.005	<0.005	-	5
Fluoranthene	ug/l	<0.005	<0.005	<0.005	-	1
Pyrene	ug/l	<0.005	<0.005	<0.005	-	-
Benzo(a)anthracene	ug/l	<0.005	<0.005	<0.005	-	0.5
Chrysene	ug/l	<0.005	<0.005	<0.005	-	0.2
Benzo(bk)fluoranthene	ug/l	<0.008	<0.008	<0.008	-	-
Benzo(a)pyrene	ug/l	<0.005	<0.005	<0.005	-	0.05
Indeno(123cd)pyrene	ug/l	<0.005	<0.005	<0.005	-	0.05
Dibenzo(ah)anthracene	ug/l	<0.005	<0.005	<0.005	-	-
Benzo(ghi)perylene	ug/l	<0.005	<0.005	<0.005	-	0.05
PAH 16 Total	ug/l	<0.173	<0.173	<0.173	-	-
Benzo(b)fluoranthene	ug/l	<0.008	<0.008	<0.008	-	-
Benzo(k)fluoranthene	ug/l	<0.008	<0.008	<0.008	-	0.05
Organics						
MTBE	ug/l	<0.1	<0.1	<0.1	-	-
Benzene	ug/l	<0.5	<0.5	<0.5	0.75	30
Toluene	ug/l	<5	<5	<5	525	1,000
Ethylbenzene	ug/l	<1	<1	<1	-	150
m/p-Xylene	ug/l	<2	<2	<2	-	70
o-Xylene	ug/l	<1	<1	<1	-	70

9.1.8 Summary of Soil Results

Table 9-4

Parameter	Soil 1	Soil 2	Soil 3	Dutch Intervention Values (mg/kg DM Soil)
Coordinates (UTM)	593181.53 5997193.3	593270.91 5997107.88	593339.44 5997212.99	
Aluminium	3.5	4.5	6.0	-
Cadmium	0.2	0.2	0.2	12
Chromium	42.0	63.8	44.0	380
Copper	11	12	18	190
Lead	9	10	14	530
Mercury	<0.1	<0.1	<0.1	10
Nickel	15.6	22.0	34.4	210
Zinc	34	35	51	720
pH	8.38	8.32	8.38	-
PAH				
Naphthalene	<0.04	<0.04	<0.04	-
Acenaphthylene	<0.03	<0.03	<0.03	-
Acenaphthene	<0.05	<0.05	<0.05	-
Fluorene	<0.04	<0.04	<0.04	-
Phenanthrene	<0.03	<0.03	<0.03	-
Anthracene	<0.04	<0.04	<0.04	-
Fluoranthene	<0.03	<0.03	<0.03	-
Pyrene	<0.03	<0.03	<0.03	-
Benzo(a)anthracene	<0.06	<0.06	<0.06	-
Chrysene	<0.02	<0.02	<0.02	-
Benzo(bk)fluoranthene	<0.07	<0.07	<0.07	-
Benzo(a)pyrene	<0.04	<0.04	<0.04	-
Indeno(123cd)pyrene	<0.04	<0.04	<0.04	-
Dibenzo(ah)anthracene	<0.04	<0.04	<0.04	-
Benzo(ghi)perylene	<0.04	<0.04	<0.04	-
PAH 16 Total	<0.6	<0.6	<0.6	40
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	-
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	-
Petroleum Hydrocarbons				
Aliphatic				
>C5-C6	<0.1	<0.1	<0.1	-
>C6-C8	<0.1	<0.1	<0.1	-
>C8-C10	<0.1	<0.1	<0.1	-
>C10-C12	<0.2	<0.2	<0.2	-
>C12-C16	<4	<4	<4	-
>C16-C21	<7	<7	<7	-
>C21-C35	<7	<7	<7	-
Total aliphatic C5-35	<19	<19	<19	-
Aromatics				
>C5-EC7	<0.1	<0.1	<0.1	-
>EC7-EC8	<0.1	<0.1	<0.1	-
>EC8-EC10	<0.1	<0.1	<0.1	-
>EC10-EC12	<0.2	<0.2	<0.2	-
>EC12-EC16	<4	<4	<4	-
>EC16-EC21	<7	<7	<7	-
>EC21-EC35	<7	<7	<7	-
Total aromatics C5-35	<19	<19	<19	-
TPH (C5 – C35)	<38	<38	<38	-
Volatile Organics				
MTBE	<0.005	<0.005	<0.005	-
Benzene	<0.005	<0.005	<0.005	1.1
Toluene	<0.005	<0.005	<0.005	320
Ethylbenzene	<0.005	<0.005	<0.005	110
m/p-Xylene	<0.005	<0.005	<0.005	17
o-Xylene	<0.005	<0.005	<0.005	17
Isocyanates				
2,4 TDI	<1.0	<1.0	<1.0	
2,6-TDI	<1.0	<1.0	<1.0	
HDI	<1.0	<1.0	<1.0	
IPDI	<1.0	<1.0	<1.0	
MDI	<1.0	<1.0	<1.0	

Parameter	Soil 1	Soil 2	Soil 3	Dutch Intervention Values (mg/kg DM Soil)
Coordinates (UTM)	593181.53 5997193.3	593270.91 5997107.88	593339.44 5997212.99	
PCBs				
PCB 28	<0.005	<0.005	<0.005	-
PCB 52	<0.005	<0.005	<0.005	-
PCB 101	<0.005	<0.005	<0.005	-
PCB 118	<0.005	<0.005	<0.005	-
PCB 138	<0.005	<0.005	<0.005	-
PCB 153	<0.005	<0.005	<0.005	-
PCB 180	<0.005	<0.005	<0.005	-
Total 7 PCBs	<0.035	<0.035	<0.035	1
Glycols				
Monoethylene glycol	<0.05	<0.05	<0.05	-
Propylene glycol	<0.05	<0.05	<0.05	-
Diethylene glycol	<0.05	<0.05	<0.05	-
Triethylene glycol	<0.05	<0.05	<0.05	-
Thiodiglycol	<0.05	<0.05	<0.05	-
Asbestos				
Asbestos Fibres	None	None	None	100
Asbestos ACM	None	None	None	100
Asbestos Type	None	None	None	100

10 Baseline Assessment – Stage 8

10.1.1 Site Investigation

As part of this baseline report a site investigation was carried out. There were three borehole wells installed at the installation to obtain groundwater from below site. There were three soil samples obtained on site which were also analysed as part of this investigation.

10.1.2 Overview of Groundwater and Soil Results

A review of the results from samples collected in January 2023 have indicated that the groundwater below site is of good quality and unpolluted. This report would conclude that:

- The existing groundwater and soil were determined from samples obtained at this installation to be unpolluted;
- From review of the raw materials at this installation and given there are high concentrations both on the upstream and downstream samples, the source of phosphorus in the groundwater would not be attributed to activities at this installation;
- Groundwater quality from wells on site show no evidence of physical, chemical, organic or inorganic contamination;
- There were no petroleum hydrocarbons, PAHs, organic pesticides or isocyanates detected in any of the water samples taken at the installation;
- All parameters tested for in soil were consistent with unpolluted soil quality. All parameters with associated limits under the Dutch Intervention Guidelines were complied with.

11 Conclusions

The groundwater parameters tested were within the threshold values outlined in the S.I. No 9 of 2010, its amendment S.I. No. 366 of 2016 and EPA Guidance values. Similarly, the soil samples tested on site were compliant with Dutch Intervention Guideline values.