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**Doncaster Energy  
Recovery Facility**



**BH EnergyGap (Doncaster) Ltd**

Site Condition Report

## Document approval

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# Contents

1	Introduction.....	4
1.1	Project description.....	4
1.2	The Site.....	4
1.3	The objective.....	4
2	Permitted activities .....	6
2.1	Activities.....	6
2.2	On-site fuel and chemical storage facilities .....	6
2.3	Environmental Risk Assessment .....	7
3	EC Guidance: Stage 1 – 3 Assessment.....	8
4	Geology, hydrogeology and hydrology .....	15
4.1	Geology .....	15
4.2	Hydrogeology .....	15
4.3	Hydrology and surface waters .....	15
5	Pollution history .....	16
5.1	Historical land use.....	16
5.1.1	Within the Site boundary .....	16
5.1.2	Wider environmental setting.....	16
5.2	Historical incidents.....	18
5.3	Historical pollution potential .....	19
5.4	Environmental Permits .....	20
5.5	Groundwater abstractions.....	23
5.6	Surface water abstractions and discharges .....	24
5.7	Landfill and waste management sites.....	25
6	Previous contamination and site investigations .....	27
6.1	Site investigations .....	27
6.1.1	Historical site investigations.....	27
6.1.2	2013 Site Investigations.....	27
6.1.3	2014 Site Investigation .....	28
6.2	Baseline reference data .....	28
6.2.1	Soil monitoring and results.....	28
6.2.2	Groundwater monitoring and results.....	32
6.2.3	Gas monitoring and results.....	36
7	Conclusions.....	38
	Appendices .....	39
A	Geotechnical and Environmental Assessment Report (Goodson Associates, 2014) .....	40
B	Phase 3 Earthwork Suitability Supplemental Investigation (Goodson Associates, 2014).....	41
C	Installation Boundary and Borehole/Trial Pit Locations .....	42

# 1 Introduction

BH EnergyGap (Doncaster) Limited is developing the Doncaster Energy Recovery Facility (the 'Facility') to incinerate incoming residual waste fuel. The Facility will be located at Sandall Stones Road, Kirk Sandall, Doncaster.

## 1.1 Project description

A detailed description of the Facility is presented in section 1.4 the Supporting Information.

## 1.2 The Site

The Facility will be located at land off Sandall Stones Road in the Kirk Sandall industrial estate in Doncaster. The Facility will be located at an approximate National Grid Reference of SE 60707 07179, with the nearest postcode listed as DN2 4SF.

The EP Installation Boundary surrounding the Facility covers an area of approximately 1.5 hectares, with the site currently comprising tarmac hardstanding that is mostly unoccupied but has been utilised on occasion for the storage of finished plastic materials and HGV vehicle trailers. An Installation Boundary/Site Layout drawing is presented within Appendix A of the Supporting Information.

For the purposes of this Site Condition Report, the 'Site' refers to the land within the EP Installation Boundary.

The Installation Boundary is bounded by a railway line on the west side, Sandall Stones Road to the east and other business premises to the north and south. Access to the Facility will be via Sandall Stones Road, which links to the A630 via Barnby Dun Road.

The villages of Kirk Sandall and Edenthorpe lie to the northeast and southeast of the Installation Boundary respectively. The River Don and the River Dun Navigation run approximately 250 – 300 m to the west of the Installation Boundary. The centre of the Site lies at approximately 7.5m AOD.

## 1.3 The objective

The objective of this report is to provide details on the existing ground conditions for the land within the installation boundary. This report:

1. considers the proposed activities to be carried out at the Facility;
2. identifies any land contamination risk that may be linked to previous pollution events; and
3. provides a baseline for the existing ground conditions.

This report draws on various sources of background information (provided as appendices) to inform the baseline ground conditions within the installation boundary:

- Geotechnical & Environmental Assessment Report – Proposed New Eco Energy Hub, Sandall Stones Road, Long Sandall, Doncaster, South Yorkshire, Goodson Associates, Ref: 12080-TG-21022014-W 2, February 2014 (the 'Geotechnical Report') (Appendix A of this report); and
- Phase 3 Earthwork Suitability Supplemental Investigation – BHEG Doncaster, Sandall Stones Road, Doncaster, Goodson Associates, Ref: 12080-TG-10102014-W 8, October 2014 (the 'Phase 3 Report') (Appendix B of this report).

Utilising the information contained within the background information, this report will summarise the following conditions within the installation boundary:

1. geology;
2. hydrogeology;
3. hydrology and flooding;
4. historical and present land use; and
5. existing ground conditions.

The following drawings can be found in Appendix A of the Supporting Information for the Facility:

- site location plan;
- installation boundary drawing;
- emission points drawing; and
- process schematics.

## 2 Permitted activities

### 2.1 Activities

The permitted activities for the Facility will consist of a single Schedule 1 installation activity (as defined in the Environmental Permitting Regulations) and a number of directly associated activities:

Table 1: Permitted Activities

Type of Activity	Schedule 1 Activity	Description of Activity
Installation	Section 5.1 Part A(1) (b)	The incineration of non-hazardous waste in a waste incineration plant with a nominal design capacity of 37.6 tonnes per hour
<b>Directly Associated Activities</b>		
Directly Associated Activities		Waste reception, storage and handling facilities
Directly Associated Activities		Combustion and energy recovery processes including the export of electricity to the National Grid
Directly Associated Activities		Flue gas treatment
Directly Associated Activities		Residue storage and handling facilities
Directly Associated Activities		Standby electrical generation to provide electrical power to the plant in the event of an interruption in the supply.

### 2.2 On-site fuel and chemical storage facilities

As identified within the Supporting Information for the ERF, the activities undertaken at the ERF would utilise a number of fuels and chemicals. The primary, secondary and tertiary containment systems associated with the storage of these materials are presented in Table 2 below.

Table 2: Chemical and fuel containment facilities- ERF

Substance	Estimated Storage Capacity (m <sup>3</sup> )	Primary Containment	Secondary Containment	Tertiary Containment
Hydrated lime (Ca(OH) <sub>2</sub> )	281	Silo	Hardstanding	Contained drainage
Powdered Activated Carbon	65	Silo	Hardstanding	Contained drainage

Substance	Estimated Storage Capacity (m <sup>3</sup> )	Primary Containment	Secondary Containment	Tertiary Containment
Ammonium hydroxide solution (NH <sub>4</sub> OH)	30	Tank	Bunding	Hardstanding and contained drainage
Low sulphur fuel oil (diesel)	131	Tank	Bunding	Hardstanding and contained drainage
<b>Residues</b>				
IBA	815	Ash room	Hardstanding	Contained drainage
APCr	422	Silo(s)	Hardstanding	Contained drainage
Recovered ferrous metal	36.8	Container	Hardstanding	Contained drainage
Oversize IBA	36.8	Container	Hardstanding	Contained drainage

## 2.3 Environmental Risk Assessment

An Environmental Risk Assessment for the Facility has been carried out following the Environment Agency guidance 'Risk assessments for your environmental permit' and Horizontal Guidance Note H1. This is included within Appendix D of the Supporting Application.

The assessment considers all potential sources of ground and surface water pollution that could occur due to fugitive emissions or accidents occurring at the Facility. The risk assessment also details any mitigation measures that would be employed to reduce the frequency and/or impact of these events and prevent pollution occurring.

The Environmental Risk Assessment identifies that the development would require the storage of various chemicals, which could potentially pose a risk to the ground and groundwater during normal operation. All process areas, loading/unloading areas, materials handling areas and roadways will be covered in concrete and/or tarmac hardstanding with contained drainage in process areas. Therefore, it is not considered that there will be any risk of ground/groundwater contamination during normal operation of the Facility.

The Environmental Risk Assessment has concluded that for land, groundwater and surface water, the residual impacts from the operation of the Facility would be insignificant provided the recommended mitigation measures are appropriately implemented.

It is concluded that the operation of the Facility would pose little risk of pollution. However, periodic soil and groundwater samples will be undertaken, in order to fulfil the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED.

### 3 EC Guidance: Stage 1 – 3 Assessment

In accordance with European Commission Guidance concerning baseline reports under Article 22(2) of the IED, a Stage 1 – 3 assessment has been undertaken to identify hazardous substances used at the Facility.

Stages 1 – 3 of the assessment are described as follows:

1. Identify which hazardous substances are used, produced or released at the installation.
2. Identify which of these substances are classed as ‘relevant hazardous substances’ (defined within Article 3 of EC Regulation 1272/2008). Justify any hazardous substances which have been excluded due to their incapability to contaminate soil or groundwater.
3. For each relevant hazardous substance, identify the actual possibility for soil or groundwater contamination at the site (including probability of release), taking into account quantities, storage and transport, risk of release.

Table 3 presents the full stage 1 – 3 assessment of the primary raw materials and residues handled at the Facility, in accordance with the EC guidance. The substances handled at the Facility are identified in the context of their hazards and theoretical pollution risk, with justification as to whether the substance is of concern or not in the context of the site.



Table 3: Stage 1 - 3 assessment of raw materials and residues

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
Fuel Oil (saturated and aromatic hydrocarbons)	Liquid	68334-30-5	269-822-7	H226, H304, H373, H315, H332, H351, H411, H350	Yes	Insoluble, high toxic effects, volatile	Yes	131 m <sup>3</sup>	Enclosed tank with bunding	Delivery in dedicated road tankers, unloaded into storage tank via flexible hose, direct feed into burners.	Periodic inspections of tank undertaken (preventative maintenance), refuelling undertaken on areas of hardstanding with contained drainage, overfill protection on tank.
Ammonium hydroxide solution, NH <sub>4</sub> OH	25% NH <sub>3</sub> , Liquid	1336-21-6	215-647-6	H314, H335, H400	Yes	Water soluble Potential for mobility in soil and water systems	Yes	30 m <sup>3</sup>	Enclosed tank, double skinned, bunding	Delivered by road tanker and pumped into storage tank via flexible hose, direct feed from tank into the process	Unloading operations on areas of hardstanding with contained drainage, storage in a bunded area, site drainage will be able to be isolated in a spill

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
											event, air emissions system is subject to advanced control measures
Lime, Ca(OH) <sub>2</sub>	100%, Solid	1305-62-0	215-137-3	H315, H318, H335	Yes	High aqueous solubility	Yes	281 m <sup>3</sup>	Enclosed silo(s)	Delivered in tankers, unloaded into storage silo by flexible hose, direct feed into flue gas treatment systems, collected on bag filters.	Any spillages easily swept up, site containment and handling procedures are good. Chemical dosing rates and flows within the FGT process are subject to control systems. Storage silos will be located above concrete hardstanding, and fitted with high-level alarms for unloading operations. Drainage

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
											in these areas will be contained.
Powder Activated Carbon, C	100%, Solid	7440-44-0	231-153-3	H252	Yes	Insoluble	No	65 m <sup>3</sup>	Enclosed silo	Delivered by road, unloaded into silo via flexible hose. Direct feed into flue gas treatment system.	Any spillages easily swept up, site containment and handling procedures are good. Silo located above an area of concrete hardstanding.
Boiler Treatment Chemicals (salts, oxygen scavenger, corrosion inhibitor)	Liquid and solids	Various	Various	Dependent on chemicals used (subject to detailed design)	Yes	Potential for mobility in soil and water systems, potential for toxicity	Yes	Various	IBCs for liquids, with bunding where appropriate. Consumer package	Boiler treatment chemicals will be stored in a designated area in/near the water treatment plant.	Spillages will be contained by hardstanding and contained drainage.

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
									or bags for solids		
<b>Residues</b>											
APCr (contains heavy metals, POPs)	Solid	90989-48-3	292-705-7	N/A	Yes	Presence of persistent organic pollutants (e.g. dioxins), volatiles.	Yes	422 m <sup>3</sup>	APCr silo	Collection on bag filters, direct feed from flue gas treatment system into residue silo, then loaded into tanker (all enclosed) for transfer off-site.	Any leaks during loading/ unloading operations will be contained by concrete hardstanding, with measures to prevent overflowing in place. APCr storage and unloading will be in areas with contained drainage to the process drainage network.

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
Incinerator Bottom Ash (IBA)	Solid	91082-83-6	293-798-7	N/A	No	Limited solubility, potential for the presence of heavy metals	No	815 m <sup>3</sup>	Dedicated ash room	Grate ash, collection in a dedicated storage area prior to transfer off-site to a suitable processing facility.	Inert and non-hazardous. Transfer to quench will be via an enclosed conveyor. IBA handling will be undertaken on areas of hardstanding with contained drainage. Transfer off-site will be in enclosed/covered vehicles.
Recovered ferrous metal	Solid	N/A	N/A	N/A	No	Limited solubility, may contain some	No	36.8 m <sup>3</sup>	Container in IBA storage area	Collected in a dedicated container prior to transfer off-site for recycling.	Mostly inert, non-hazardous.

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
						heavy metals					
Oversize IBA	Solid	N/A	N/A	N/A	No	Limited solubility, may contain some heavy metals	No	36.8 m <sup>3</sup>	Container in IBA storage area	Collected in a dedicated container prior to transfer off-site for disposal.	Mostly inert, non-hazardous.

## 4 Geology, hydrogeology and hydrology

### 4.1 Geology

Information on the geology at the Site was sourced from the Geotechnical Report (Appendix A of this Site Condition Report). This is summarised in Table 4:

Table 4: Site geology

Lithology	Description	Estimated depth (m bgl)	Estimated thickness (m)
Made Ground	Tarmac underlain by Type 1 aggregate subbase or (locally) broken brick, concrete and tar rubble fills	0	0.17 – 0.95
Subsoil	Grey/brown silty sand	0.17 – 0.60	0.15 – 0.40
Superficial deposits	River Alluvium	0.45 – 1.60	0.75 – 1.45
Bedrock	Sherwood Sandstone Formation	1.60 – 2.30	Not proven (borehole terminated at 9.9m bgl)

### 4.2 Hydrogeology

The Geotechnical Report states the following with regards the hydrogeology at the Site:

- Groundwater was encountered at depths of approximately 2.8 – 3m bgl. Water levels showed some fluctuation over the monitoring period, but it should be anticipated that excavations below 3m in depth should be inundated.
- The shallow water table is reflective of the Sherwood Sandstone Formation.
- The Sherwood Sandstone Formation is a major aquifer and the site is located within a Source Protection Zone.
- Recovered shallow groundwater is of a good ecological status, and contaminant concentrations were well below applicable screening criteria.
- Numerous groundwater abstractions are noted within 500 – 1km of the site. Although groundwater is abstracted, mostly for industrial and agricultural use, the aquifer is of good quality and can provide substantial potable water supplies.
- The site lies within a flood risk area, benefitting from flood defences.

### 4.3 Hydrology and surface waters

The Geotechnical report states that the water environment is considered at low risk given the development proposal (as infiltration will be reduced) and that laboratory leachates indicated a low propensity for contaminants to enter the liquid phase.

The River Don and the River Dun Navigation run approximately 250 – 300 m to the west of the Facility, with numerous land drains and ponding lying further beyond to the west of the river.

## 5 Pollution history

### 5.1 Historical land use

#### 5.1.1 Within the Site boundary

The Poly Pipe factory is located immediately north of the Site. The Site is currently used for the storage of finished plastic materials and HGV vehicle trailers at the northern end, with the south of the site vacant and set as tarmac hardstanding with weed growth. The Geotechnical report states that, during the site reconnaissance prior to the site investigation works taking place, no visual or olfactory evidence of contamination was noted.

The Geotechnical Report and its appendices state the following with regards the historical land use at the Site:

- 1892 – The Site is undeveloped agricultural land. The Carr Drain runs northwards through the northeast corner of the Site.
- 1974 – An Electricity Transmission Line is shown to run southeast to northwest through the western portion of the Site. The surrounding area has undergone substantial industrial development.
- 1983 – The Carr Drain has been diverted into a culvert that dissects the extreme northeast corner of the Site.
- 1993 – The Site remains unoccupied although significant development to the north and south has occurred. Sandall Stones Road has been constructed immediately adjacent to the eastern boundary.
- 1993 – Present – No significant changes have occurred within the site boundary.

It is stated that previous intrusive investigations discovered no obvious visual or olfactory sources of contamination, with the exception of an ‘ashy discolouration’ in one sample of made ground.

The following were identified as the most likely sources for contamination:

- Made Ground deposits such as roadways and hardstanding/tarmac areas, often heterogeneous in nature.
- Point Source contaminants such as the storage of plastic products and HGV vehicle trailers (which may introduce the potential for fuel or oil spillages) as previously described.
- Diffuse contaminants relating to the adjacent railway line (and embankments) and nearby industrial premises.
- Potential for the generation (and migration) of ground gases, such as carbon dioxide and methane, attributable to in-situ Made Ground deposits.

It should be noted that the potential for the migration of contaminants onto the Site is reduced by the presence of impermeable hardstanding.

#### 5.1.2 Wider environmental setting

The Geotechnical Report and its appendices state the following with regards the historical land use of the surrounding area:



- 1854 – The Surrounding land is predominantly undeveloped and devoid of notable built-up areas. The Manchester, Sheffield, and Lincolnshire railway line runs parallel to the western boundary with the Don Navigation Canal and River Don approximately 200-250m beyond.
- 1893 – No significant industrial development has occurred; however, the River Don to the north of the Site has been diverted to facilitate the watering of the Don Navigation Canal.
- 1907 – The settlement of Long Sandall approximately 80 m to the southwest of the site has expanded.
- 1931 – Significant residential development has occurred to the east of the Site, with further development to the north (the Doncaster Glass Works) and west (smaller industries including a tar works and a sewage pumping station). The South Yorkshire Joint Railway runs parallel to the western boundary and to the south of the Site. The Doncaster Sewage Works has been established approximately 1 km to the south of the site.
- 1948 – Further residential expansion has occurred approximately 750m to the east and northeast of the site.
- 1956 – Further residential expansion has occurred towards the east and south of the Site. The tar works to the west of the Site is no longer shown.
- 1966 – Further residential expansion has occurred primarily to the east and northeast of the Site. The Doncaster Glass Works to the north of the Site has expanded in site. A depot building is shown where the former tar works were located.
- 1982 – Further industrial development has occurred relatively close to the Site boundary. A large works building is located approximately 260m to the south of the Site with new roadways (electrical substations) and related infrastructure to the north and east of the Site. A factory unit and unnamed structure are located approximately 200m and 50m to the east and north of the Site respectively. The large works building to the northwest has reduced in size and new light industrial depots are located around it. Further residential expansion has occurred approximately 200m to the east of the Site.
- 1992 – Further development of the Kirk Sandall Industrial Estate has occurred in addition to development of light industry to the east and south of the Site. The building to the north of the Site is denoted as a waste treatment plant.
- 2000 – Further development has occurred within the industrial estate to the east and north of the site (Guildhall Industrial Estate). The building to the north is no longer indicated as a waste treatment plant, and has expanded considerably and occupied by Poly Pipe Limited.
- 2006 – Further development has occurred within the industrial estate to the east and south of the Site, with further residential expansion to the north beyond Kirk Sandall Industrial Estate.

The Geotechnical Report states that there is low to moderate potential for contaminants to be present at and around the Site, due to the Site setting within an industrial estate and the nearby location of the adjacent railway line and embankments.

The Geotechnical Report states that previous intrusive investigations have confirmed the presence of slightly elevated total petroleum hydrocarbons (TPH) from soil arisings at one borehole located towards the southern boundary of the Site. However, contamination concentrations from recovered samples were well within applicable screening criteria in a commercial/industrial context.

## 5.2 Historical incidents

Data on records of pollution incidents within 500m of the site was obtained from the Geotechnical Report and its appendices (including an Envirocheck report). This is summarised in Table 5 below. A further 21 pollution incidents have been recorded between 500m – 1km from the Site.

Table 5: Pollution incidents

Distance from Site	Direction from Site	Grid Reference	Details
<b>Pollution Incidents to Controlled Waters</b>			
91	NE	461000, 407300	Property type: Industrial Premises Pollutant: Oils – unknown Incident date: 1990 Receiving water: Not given Severity: Category 2 (significant)
219	SE	460900, 406900	Property type: Surface water sewers Pollutant: Oils – unknown Incident date: 1990 Receiving water: Freshwater stream/river Severity: Category 2 (significant)
230	NE	461100, 407400	Property type: Industrial premises Pollutant: Unknown Incident date: 1990 Receiving water: Freshwater stream/river Severity: Category 2 (significant)
416	N	460600 407700	Property type: Not given Pollutant: Oils – diesel (including agricultural) Incident date: 1996 Receiving water: Freshwater stream/river Severity: Category 3 (minor)
434	SW	460300 406800	Property type: Miscellaneous Premises: Unknown Pollutant: Oils - Lubricating Incident date: 1994 Receiving water: Freshwater Stream/River Severity: Category 3 (minor)
495	SW	460305 406705	Property type: Other General Premises Pollutant: Oils - Unknown Incident date: 1990 Receiving water: Freshwater Stream/River Severity: Category 3 (minor)
499	SW	460305 406700	Property type: Miscellaneous Premises: Unknown Pollutant: Oils - Unknown

Distance from Site	Direction from Site	Grid Reference	Details
			Incident date: 1991 Receiving water: Freshwater Stream/River Severity: Category 3 (minor)
499	SW	460300 406705	Property type: Miscellaneous Premises: Unknown Pollutant: Unknown Incident date: 1990 Receiving water: Freshwater Stream/River Severity: Category 2 (significant)
<b>Substantiated Pollution Incident Register</b>			
54	N	460792, 407377	Incident date: 2004 Water impact: Category 3 (minor) Air impact: Category 2 (significant) Land impact: Category 2 (significant) Pollutant: Specific waste materials: contaminated construction and demolition material and waste
109	SW	460533, 407081	Incident date: 2006 Water impact: Category 4 (no impact) Air impact: Category 2 (significant) Land impact: Category 3 (minor) Pollutant: Atmospheric pollutants and effects (smoke, soot, steam)

### 5.3 Historical pollution potential

The Geotechnical report and its appendices identified the following as the key potential onsite sources of contamination:

- Made ground deposits (roadways, hardstanding areas);
- Point source contaminants (plastic products storage, HGV vehicle trailers and associated potential fuel or oil spillages/leaks);
- Diffuse contaminants relating to adjacent railway lines (embankment), railway land and industrial premises; and
- Potential generation and migration of ground gas carbon dioxide and methane attributable to the in-situ made ground deposits.

The review of the site history has indicated that the surrounding land use has been primarily industrial since the construction of the industrial estate during the early 1980's. A plastic manufacturer (formerly a waste treatment plant) is located immediately to the north of the site. Off-site sources cannot be discounted as contributing to contaminant levels at the site, although the migration of contaminants onto site is deemed unlikely due to the presence of impermeable hardstanding.

The suite of contaminants analysed for during the site investigation were considered reflective of the environmental setting, historic and present land use, and includes the following:

- Metals;
- Inorganic compounds;
- Total Petroleum Hydrocarbons;
- Phenols;
- Semi Volatile Organic Hydrocarbons (SVOC);
- Volatile Organic Hydrocarbons (VOC);
- BTEX;
- Fluoride, chloride, nitrate and nitrite;
- Total Organic Carbon (TOC); and
- Loss on Ignition (LOI), organic matter, FOC.

## 5.4 Environmental Permits

Table 6 below summarises information from the Geotechnical Report and its appendices (including an Envirocheck report) on licenses and consents that have previously been held within 500 m of the site. As can be seen, no permits, licenses or consents have been held at the site itself. A further 5 consents/permits are held/have been held between 500m – 1km of the Site.

Table 6: Environmental permits, authorisations and licenses

Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
173	N	460830, 407490	Type: IPPC Reference Number: Mp3030by Issuing Authority: EA Operator: Trackwork Group Ltd Description: Incineration of non hazardous waste greater than 1 t/hr Status: Superseded by variation
266	N	460698, 407578	Type: IPPC Reference Number: Kp3430lz Issuing Authority: EA Operator: Pilkington UK Ltd Description: Waste landfilling: greater than 10 t/day with capacity greater than 25,000 t excluding inert waste Status: Valid
11	E	460843, 407171	Type: LA PPC Reference Number: LAPPC41 Issuing Authority: Operator: Doncaster Metropolitan Borough Council

Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
			Description: Manufacture of timber and wood-based products Status: Permitted
11	E	460884, 407209	Type: LA PPC Reference Number: Not given Issuing Authority: Doncaster Metropolitan Borough Council Operator: Berg Profiles Ltd Description: Combustion of fuel manufactured from/or comprised of, solid waste in appliances between 0.4-3MW thermal input Status: Revoked
23	S	460750, 407034	Type: LA PPC Reference Number: 69 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Walon Ltd Description: Respraying of road vehicles Status: Authorised
176	NE	461052, 407374	Type: LA PPC Reference Number: Lappc41 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Berg Profiles Ltd Description: Manufacture of timber and wood-based products Status: Authorised
192	NW	460533, 407314	Type: LA PPC Reference Number: LAPPC 92 Issuing Authority: Doncaster Metropolitan Borough Council Operator: First Fleet Description: Respraying of road vehicles Status: Permitted
324	E	461175, 407058	Type: LA PPC Reference Number: EPR 39 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Descars Description: Waste oil burners, less than 0.4MW net rated thermal input

Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
			Status: Permitted
363	NE	461129, 407554	Type: LA PPC Reference Number: LAPPC 25 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Lafarge Redland Aggregates Ltd Description: Blending, packing, loading and use of bulk cement Status: Site Closed
413	E	461305, 407406	Type: LA PPC Reference Number: EPR 19 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Ba Components Ltd Description: Wood combustion processes between 0.4 and 3MW net rated thermal input Status: Permitted
435	NE	461102, 407655	Type: LA PPC Reference Number: LAPPC 114 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Jack Tighe Coatings Ltd Description: Coating of metal and plastic Status: Permitted
457	N	460758, 407781	Type: LA PPC Reference Number: EPR 31 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Express Asphalt (Doncaster) Ltd Description: Mineral drying and roadstone coating processes Status: Permitted
457	N	460758, 407781	Type: LA PPC Reference Number: LAPPC 35 Issuing Authority: Doncaster Metropolitan Borough Council Operator: Express Asphalt (Doncaster) Ltd Description: Mobile screening and crushing processes Status: Revoked

## 5.5 Groundwater abstractions

Data on recorded groundwater abstraction licenses within 500m of the site was obtained from the Geotechnical Report and its appendices (including an Envirocheck report). This is summarised in Table 7. A further 5 groundwater abstractions are recorded between 500m – 1km of the Site.

Table 7: Licensed groundwater abstractions

Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
417	N	460910, 407720	Operator: Trackwork Ltd Use: Other Industrial/Commercial/Public Services: Boiler Feed
417	N	460910, 407720	Operator: Trackwork Ltd Use: Other Industrial/Commercial/Public Services: Dust Suppression
417	N	460910, 407720	Operator: Trackwork Ltd Use: Other Industrial/Commercial/Public Services: Effluent/Slurry Dilution
417	N	460910, 407720	Operator: Trackwork Ltd Use: Food And Drink: General Use (Medium Loss)
417	N	460910, 407720	Operator: Frigoscandia Distributions Limited Use: Environment Agency, North East Region Other Industrial/Commercial/Public Services: General Use (Medium Loss)
417	N	460910, 407720	Operator: Frigoscandia Distributions Limited Use: Food And Drink: General Use (Medium Loss)
460	S	460700, 406600	Operator: Trackwork Ltd Use: Mineral Products: General Use (Medium Loss)
460	S	460700, 406600	Operator: Pilkington Brothers Ltd Use: Other Industrial/Commercial/Public Services: General Use (Medium Loss)
460	S	460700, 406600	Operator: Pilkington Brothers Ltd Use: Mineral Products: General Use (Medium Loss)
468	NW	460500, 407700	Operator: Canal And River Trust Use: Mineral Products: General Use (Medium Loss)
468	NW	460500, 407700	Operator: British Waterways Board Use: Other Industrial/Commercial/Public Services: General Use (Medium Loss)

Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
468	NW	460500, 407700	Operator: British Waterways Use: Mineral Products: General Use (Medium Loss)

## 5.6 Surface water abstractions and discharges

There are no known surface water abstraction licenses recorded within 1km of the site.

Data on recorded surface water discharge licenses within 500m of the site was obtained from the Geotechnical Report and its appendices (including an Envirocheck report). This is summarised in Table 8 below. One further discharge consent is recorded between 500m – 1km of the site.

Table 8: Licensed discharge consents

Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
109	N	460700, 407400	Operator: Trackwork Ltd Discharge type: Trade discharge – process water Receiving water: River Don Status: Transferred from COPA 1974
109	N	460700, 407400	Operator: Pilkington UK Ltd Discharge type: Trade discharge – process water Receiving water: River Don Status: Transferred from Rivers Act 1951 -1961 (Revoked 1986)
166	NW	460660, 407440	Operator: Yorkshire Water Services Ltd Discharge type: Sewage Discharges - Pumping Station Receiving water: Cow Pasture Drain (Culverted) Status: New Consent
333	NW	460450, 407450	Operator: Yorkshire Water Services Ltd Discharge type: Storm sewage overflow discharge Receiving water: Cow pasture drain Status: Not supplied
432	SW	460350, 406750	Operator: Yorkshire Water Services Ltd Discharge type: Sewage Discharges - Stw Storm Overflow/Storm Tank Receiving water: River Don



Approximate distance from Site (m)	Direction from Site	Grid Reference	Details
			Status: New consent
432	SW	460350, 406750	Operator: Yorkshire Water Services Ltd Discharge type: Surface Water Effluent Receiving water: River Don Status: Not supplied
720	SW	460200, 406500	Operator: Rockware Glass Ltd Discharge type: Trade Effluent Receiving water: Not supplied Status: Post National Rivers Authority Legislation where issue date > 31/08/1989 (revoked 1991)

## 5.7 Landfill and waste management sites

Data on landfill and waste management sites within 500m of the Site was obtained from the Geotechnical Report and its appendices (including an Envirocheck report). This is summarised in Table 9 below. 15 further records of landfills, waste management sites and waste treatment/disposal sites are recorded between 500m – 1km of the Site.

Table 9: Recorded landfill sites

Distance from Site (m)	Direction from Site	Grid Reference	Details
<b>Landfill Sites</b>			
196	SW	460460, 406994	License Holder: British Waterways Board Waste types: Not supplied Status: Historical
199	SW	460458 406993	License holder: Not supplied Waste types: Not supplied Status: Unknown
499	NW	460282 407493	License holder: Not supplied Waste types: Not supplied Status: Unknown
<b>Waste Management Sites</b>			
61	W	460600, 407150	License Holder: Shaw, Dave Site Category: Household, Commercial and Industrial Transfer Stations Status: Issued
157	SW	460500, 407000	License Holder: Morris, Steve and Carol

Distance from Site (m)	Direction from Site	Grid Reference	Details
			Site Category: Household, Commercial and Industrial Transfer Stations Status: Issued
237	SW	460550, 406850	License Holder: Trackwork Holdings Ltd Site Category: Metal Recycling Sites (Mixed) Status: Surrendered
361	SW	460400, 406800	License Holder: Reuse Glass UK Ltd Site Category: Physical treatment facilities Status: Issued
433	NE	461006, 407697	License Holder: Trackwork Group Ltd Site Category: Household, Commercial and Industrial Transfer Station Status: Modified
220	SW	460600, 406853	License Holder: Trackwork Group Ltd Site Category: Transfer Status: Operational
<b>Waste Treatment or Disposal Sites</b>			
61	W	460600, 407150	License Holder: D Shaw of Riverside Metals Inc Quick Skip Site Category: Scrapyard - with Transfer Station Status: Operational
61	W	460600, 407150	License Holder: D Shaw of Riverside Metals Inc Quick Skip Site Category: Scrapyard - with Transfer Station Status: Superseded
230	NE	461100, 407400	License Holder: Leigh Environmental Ltd Site Category: Treatment Status: Lapsed/cancelled
266	SW	460580, 406810	License Holder: Rockware Glass Ltd Site Category: Storage Status: Exempt

## 6 Previous contamination and site investigations

### 6.1 Site investigations

The EA guidance note *'H5: Site Condition Report – Guidance and Templates'* states that “*where a facility involves the use, production or release of RHS*” a baseline report must be submitted as part of the application.

#### 6.1.1 Historical site investigations

The ‘Geotechnical Report’ (Appendix A of this Site Condition Report) describes how a previous site investigation was undertaken in November 2007. However, when producing the Site Condition Report, this report associated with the site investigation was not available. Therefore, the most recent site investigations (refer to section 6.1.2) inform the baseline results for the Facility as this is considered to represent the most accurate and up-to-date ground conditions at the installation.

#### 6.1.2 2013 Site Investigations

The ‘Geotechnical Report’ (Appendix A of this Site Condition Report) presents the findings of a previously compiled Preliminary Environmental Assessment (desk study), a generic Quantitative Risk Assessment based on an Archaeological Investigation undertaken in June 2013, a subsequent intrusive Phase 2 Site Investigation undertaken in July 2013, and a revised generic Quantitative Risk Assessment (February 2014).

The Phase 2 Site Investigation (July 2013) was undertaken between 01 July 13 and 03 July 13 by DAM Geotechnical Services Limited, and comprised eight (BH1-BH8) windowless percussive boreholes and five (R1-R5) rotary cored boreholes at locations across the site. Combined gas and groundwater monitoring locations were installed at R1-R2 and R4-R5. Soil samples were analysed from all boreholes for contamination – thirty one soil samples were obtained at depths between 0.25 – 8m. Groundwater samples were also analysed for contamination.

The archaeological trenching exercise undertaken in June 2013 involved the collection of soil samples for chemical testing. The accompanying generic quantitative risk assessment undertaken in 2013 was revised in February 2014 following completion of the Phase 2 Site Investigation to incorporate the results from both the original generic Quantitative Risk Assessment and the Phase 2 Site Investigation. The February 2014 generic quantitative risk assessment therefore presents a comprehensive overview of the contaminative status of soils and groundwater at the site based on both the Phase 2 Site Investigation and Archaeological trenching exercise.

Analysis has been undertaken to determine the minimum and maximum recorded concentrations of contaminants in soil, soil leachate, groundwater and gas, with data obtained from the July 2013 Phase 2 full Site Investigation and the revised February 2014 generic Quantitative Risk Assessment (which includes the results from the 2013 Archaeological trenching exercise). The results are presented in section 6.2 below. A drawing is presented within Appendix A of this Site Condition Report which shows the location of exploratory holes in relation to the Installation Boundary for the Facility.

### 6.1.3 2014 Site Investigation

The 'Phase 3 Report' (Appendix B of this Site Condition Report) describes how borehole returns from the Phase 2 Site Investigation (July 2013) identified reasonably consistent ground conditions throughout the site. Accordingly, five exploratory trial pits were sunk at locations across the site to provide a representative sample of the underlying ground. Materials testing was carried out on soil samples to determine particle size distribution, moisture content, density etc however no chemical testing for contamination was undertaken.

## 6.2 Baseline reference data

### 6.2.1 Soil monitoring and results

A summary of the soil pollutant concentrations for measurements taken during the 2013 site investigations is presented in Table 10 below, with a summary of leachate measurements presented in Table 11:

Table 10: Summary of pollutant concentrations in soil

Determinant	Units	Min Value	Max Value
<b>Metals</b>			
Arsenic	mg/kg	4.9	44.2
Cadmium	mg/kg	-	<1
Total Chromium	mg/kg	2.8	136.6
Lead	mg/kg	22.8	189
Mercury	mg/kg	-	<1
Selenium	mg/kg	-	<1
Copper	mg/kg	29.2	88.5
Nickel	mg/kg	24.5	77.3
Zinc	mg/kg	8.7	109.9
<b>TPH</b>			
nC5-6	mg/kg	-	<0.5
nC6-nC8	mg/kg	-	<0.50
nC8-nC10	mg/kg	-	<0.50
nC10-nC12	mg/kg	-	<0.50
nC12-nC16	mg/kg	-	<1.00
nC16-nC21	mg/kg	<1.00	12.2
nC21-nC35	mg/kg	<3.00	23.1
Total TPH (C5-C35)	mg/kg	<7.00	33.55
<b>Miscellaneous</b>			
pH	pH units	6.84	8.37
Free Cyanide	mg/kg	-	<2.50
Soluble Sulphate	g/l	0.004	0.085

Determinant	Units	Min Value	Max Value
Total Phenol	ppm	<0.10	2.24
Organic Matter	%	0.2	0.93
Total Organic Carbon	%	0.12	0.56
Loss on Ignition @440°C	wt%	0.38	1.86
<b>SVOC</b>			
Phenol	mg/kg	-	<0.1
Bis(2-chloroethyl)ether	mg/kg	-	<0.1
1,3-Dichlorobenzene (SVOC)	mg/kg	-	<0.1
2-Chlorophenol	mg/kg	-	<0.1
1,4-Dichlorobenzene (SVOC)	mg/kg	-	<0.1
1,2-Dichlorobenzene (SVOC)	mg/kg	-	<0.1
Bis(2-chloroisopropyl)ether	mg/kg	-	<0.1
2-Methylphenol	mg/kg	-	<0.1
N-nitrosodi-n-propylamine	mg/kg	-	<0.1
Hexachloroethane	mg/kg	-	<0.1
4-Methylphenol	mg/kg	-	<0.1
Nitrobenzene	mg/kg	-	<0.1
2-Nitrophenol	mg/kg	-	<0.1
2,4-Dimethylphenol	mg/kg	-	<0.1
Bis(2-chloroethoxy)methane	mg/kg	-	<0.1
2,4-Dichlorophenol	mg/kg	-	<0.1
1,2,4-Trichlorobenzene (SVOC)	mg/kg	-	<0.1
Naphthalene (SVOC)	mg/kg	<0.1	0.3
4-Chloro-3-Methylphenol	mg/kg	-	<0.1
2,4,5/2,4,6-Trichlorophenol	mg/kg	-	<0.1
2-chloronaphthalene	mg/kg	-	<0.1
Acenaphthylene (SVOC)	mg/kg	-	<0.1
Dimethyl phthalate	mg/kg	-	<0.1
2,6-dinitrotoluene	mg/kg	-	<0.1
Acenaphthene (SVOC)	mg/kg	-	<0.1
2,4-dinitrotoluene	mg/kg	-	<0.1
4-Nitrophenol	mg/kg	-	<2
Fluorene (SVOC)	mg/kg	<0.1	0.5
Diethylphthalate	mg/kg	-	<0.1
4-chlorophenyl-phenylether	mg/kg	-	<0.1
N-nitrosodiphenylamine	mg/kg	-	<0.1
4-Bromophenyl-phenyl ether	mg/kg	-	<0.1

Determinant	Units	Min Value	Max Value
Hexachlorobenzene	mg/kg	-	<0.1
Pentachlorophenol	mg/kg	-	<0.5
Phenanthrene (SVOC)	mg/kg	<0.1	0.4
Anthracene (SVOC)	mg/kg	-	<0.1
Di-n-butylphthalate	mg/kg	-	<0.1
Fluoranthene (SVOC)	mg/kg	-	<0.1
Pyrene (SVOC)	mg/kg	<0.1	0.5
Chrysene (SVOC)	mg/kg	-	<0.1
Bis(2-ethylhexyl) phthalate	mg/kg	-	<0.1
Di-n-octyl phthalate	mg/kg	-	<0.1
Benzo(a)pyrene (SVOC)	mg/kg	-	<0.1
Indeno(1,2,3-cd)pyrene (SVOC)	mg/kg	<0.1	0.3
1,2 Benzanthracene	mg/kg	<0.1	0.3
1,2:5,6 - Dibenanthracene (SVOC)	mg/kg	-	<0.1
2,3,4,6-Tetrachlorophenol	mg/kg	-	<0.1
2,6-Dichlorophenol	mg/kg	-	<0.1
Azobenzene	mg/kg	-	<0.1
Benzo(b/k)fluoranthene (SVOC)	mg/kg	0.2	<0.1
Benzo(g,h,i)perylene (SVOC)	mg/kg	-	<0.1
Butyl benzyl phthalate	mg/kg	-	<0.1
Hexachloro-1,3-butadiene	mg/kg	-	<0.1
Hexachlorocyclopentadiene	mg/kg	-	<0.1
<b>VOC</b>			
Vinyl chloride	µg/kg	-	<10
Bromomethane	µg/kg	-	<10
Trichlorofluoromethane	µg/kg	-	<10
1,1-Dichloroethane	µg/kg	-	<10
2,2-Dichloropropane	µg/kg	-	<10
Bromochloromethane	µg/kg	-	<10
Chloroform	µg/kg	-	<10
1,1,1-Trichloroethane	µg/kg	-	<10
Carbon tetrachloride	µg/kg	-	<10
1,1-Dichloropropene	µg/kg	-	<10
Benzene	µg/kg	-	<10
1,2-Dichloroethane	µg/kg	-	<10
Trichloroethylene	µg/kg	-	<10
1,2-Dichloropropane	µg/kg	-	<10

Determinant	Units	Min Value	Max Value
Dibromomethane	µg/kg	-	<10
Bromodichloromethane	µg/kg	-	<10
cis-1,3-Dichloropropene	µg/kg	-	<10
Toluene	µg/kg	-	<10
trans-1,3-Dichloropropene	µg/kg	-	<10
1,1,2-Trichloroethane	µg/kg	-	<10
Tetrachloroethylene	µg/kg	-	<10
1,3-Dichloropropane	µg/kg	-	<10
1,2-Dibromoethane	µg/kg	-	<10
Chlorobenzene	µg/kg	-	<10
Ethylbenzene	µg/kg	-	<10
m,p-xylene	µg/kg	-	<10
o-Xylene	µg/kg	-	<10
Styrene	µg/kg	-	<10
Bromoform	µg/kg	-	<10
iso-Propylbenzene	µg/kg	-	<10
Bromobenzene	µg/kg	-	<10
1,2,3-Trichloropropane	µg/kg	-	<10
n-Propylbenzene	µg/kg	-	<10
2-Chlorotoluene	µg/kg	-	<10
1,3,5-Trimethylbenzene	µg/kg	-	<10
4-Chlorotoluene	µg/kg	-	<10
tert-Butylbenzene	µg/kg	-	<10
1,2,4-Trimethylbenzene	µg/kg	-	<10
sec-Butylbenzene	µg/kg	-	<10
1,3-Dichlorobenzene (VOC)	µg/kg	-	<10
1,4-Dichlorobenzene (VOC)	µg/kg	-	<10
n-Butylbenzene	µg/kg	-	<10
1,2-Dichlorobenzene (VOC)	µg/kg	-	<10
1,2-Dibromo-3-chloro-propane	µg/kg	-	<10
1,2,4-Trichlorobenzene (VOC)	µg/kg	-	<10
Hexachlorobutadiene	µg/kg	-	<10
1,2,3-Trichlorobenzene	µg/kg	-	<10
1,1,2,2 -Tetrachloroethane	µg/kg	-	<10
1,1-Dichloroethylene	µg/kg	-	<10
4-isopropyltoluene	µg/kg	-	<10
Chlorodibromomethane	µg/kg	-	<10

Determinant	Units	Min Value	Max Value
Cis - 1,2 -dichloroethylene	µg/kg	-	<10
Naphthalene (VOC)	µg/kg	-	<10
trans-1,2-Dichloroethylene	µg/kg	-	<10

Table 11: Summary of pollutant concentrations in leachate

Determinant	Units	Min Value	Max Value
<b>Metals</b>			
Nickel	µg/l	-	24
Zinc	µg/l	-	55
<b>Ions</b>			
Sulphate	µg/l	-	19
Nitrate (NO <sub>3</sub> )	µg/l	-	36

## 6.2.2 Groundwater monitoring and results

A summary of the groundwater pollutant concentrations for measurements taken during the 2013 site investigations is presented in Table 12:

Table 12: Summary of pollutant concentrations in groundwater

Determinant	Units	Min Value	Max Value
<b>Dissolved metals</b>			
Arsenic	µg/l	0.22	2.66
Barium	µg/l	92.84	218
Beryllium	µg/l	-	<0.10
Cadmium	µg/l	0.22	0.84
Chromium	µg/l	0.17	0.89
Copper	µg/l	0.23	11.71
Lead	µg/l	<0.05	0.14
Mercury	µg/l	-	<0.10
Nickel	µg/l	7.81	146.58
Selenium	µg/l	<1.00	6.93
Vanadium	µg/l	-	<1.00
Zinc	µg/l	2.4	55
<b>Miscellaneous</b>			
Sulphate	µg/l	-	19
Nitrate (NO <sub>3</sub> )	µg/l	-	36
pH	N/A	6.64	8.01
Ammoniacal Nitrogen	mg/l-N	0.4	2.5
Hardness	mg/l CaCO <sub>3</sub>	278	545



Determinant	Units	Min Value	Max Value
Conductivity	µS/cm	487	1060
Dissolved Oxygen	mg/l	7	8
BOD	mg/l	3	7
COD	mg/l	<10	161
<b>TPH</b>			
>C6-C8 Aliphatic (w)	mg/l	-	<0.01
>C7-C8 Aromatic (w)	mg/l	-	<0.01
C5-C6 Aliphatic (w)	mg/l	-	<0.01
C5-C7 Aromatic (w)	mg/l	-	<0.01
>C10-C12 Aliphatic (w)	mg/l	-	<0.01
>C10-C12 Aromatic (w)	mg/l	-	<0.01
>C12-C16 Aliphatic (w)	mg/l	-	<0.01
>C12-C16 Aromatic (w)	mg/l	-	<0.01
>C16-C21 Aliphatic (w)	mg/l	-	<0.01
>C16-C21 Aromatic (w)	mg/l	-	<0.01
>C21-C36 Aliphatic (w)	mg/l	-	<0.01
>C21-C36 Aromatic (w)	mg/l	-	<0.01
>C8-C10 Aliphatic (w)	mg/l	-	<0.01
>C8-C10 Aromatic (w)	mg/l	-	<0.01
<b>SVOC</b>			
Phenol (w)	µg/l	-	<0.1
Bis(2-chloroethyl)ether (w)	µg/l	-	<0.1
2-Chlorophenol (w)	µg/l	-	<0.1
1,2-Dichlorobenzene (SVOC) (w)	µg/l	-	<0.1
Bis(2-chloroisopropyl)ether (w)	µg/l	-	<0.1
2-Methylphenol (w)	µg/l	-	<0.1
N-nitrosodi-n-propylamine (w)	µg/l	-	<0.1
Hexachloroethane (w)	µg/l	-	<0.1
4-Methylphenol (w)	µg/l	-	<0.1
Nitrobenzene (w)	µg/l	-	<0.1
2-Nitrophenol (w)	µg/l	-	<0.1
2,4-Dimethylphenol (w)	µg/l	-	<0.1
Bis(2-chloroethoxy)methane (w)	µg/l	-	<0.1
2,4-Dichlorophenol (w)	µg/l	-	<0.1
1,2,4-Trichlorobenzene (SVOC) (w)	µg/l	-	<0.1
naphthalene (SVOC) (w)	µg/l	-	<0.1
4-Chloro-3-Methylphenol (w)	µg/l	-	<0.1

Determinant	Units	Min Value	Max Value
2,4,5-Trichlorophenol (w)	µg/l	-	<0.1
2-chloronaphthalene (w)	µg/l	-	<0.1
Acenaphthylene (SVOC) (w)	µg/l	-	<0.1
Dimethyl phthalate (w)	µg/l	-	<0.1
2,6-dinitrotoluene (w)	µg/l	-	<0.1
Acenaphthene (SVOC) (w)	µg/l	-	<0.1
2,4-dinitrotoluene (w)	µg/l	-	<0.1
4-Nitrophenol (w)	µg/l	-	<2
Fluorene (SVOC) (w)	µg/l	-	<0.1
Diethylphthalate (w)	µg/l	-	0.2
4-chlorophenyl-phenylether (w)	µg/l	-	<0.1
N-nitrosodiphenylamine (w)	µg/l	-	<0.1
4-Bromophenyl-phenyl ether (w)	µg/l	-	<0.1
Hexachlorobenzene (w)	µg/l	-	<0.1
Pentachlorophenol (w)	µg/l	-	<0.5
Phenanthrene (SVOC) (w)	µg/l	-	<0.1
Anthracene (SVOC) (w)	µg/l	-	<0.1
Di-n-butylphthalate (w)	µg/l	0.1	0.5
Fluoranthene (SVOC) (w)	µg/l	-	<0.1
Pyrene (SVOC) (w)	µg/l	-	<0.1
Benzyl butyl phthalate (w)	µg/l	-	<0.1
Benzo(a)anthracene (SVOC) (w)	µg/l	-	<0.1
Chrysene (SVOC) (w)	µg/l	-	<0.1
bis(2-ethylhexyl) phthalate (w)	µg/l	-	<0.1
Di-n-octyl phthalate (w)	µg/l	-	<0.1
Benzo(b)fluoranthene (SVOC) (w)	µg/l	-	<0.1
Benzo(k)fluoranthene (SVOC) (w)	µg/l	-	<0.1
Benzo(a)pyrene (SVOC) (w)	µg/l	-	<0.1
Indeno(1,2,3-cd)pyrene (SVOC) (w)	µg/l	-	<0.1
Dibenzo(a,h)anthracene (SVOC) (w)	µg/l	-	<0.1
1,3-Dichlorobenzene (SVOC) (w)	µg/l	-	<0.1
1,4-Dichlorobenzene (SVOC) (w)	µg/l	-	<0.1
2,3,4,6-Tetrachlorophenol (w)	µg/l	-	<0.1
2,4,6-Trichlorophenol (w)	µg/l	-	<0.1
2,6-Dichlorophenol (w)	µg/l	-	<0.1
Azobenzene (w)	µg/l	-	<0.1

Determinant	Units	Min Value	Max Value
Benzo(g,h,i)perylene (SVOC) (w)	µg/l	-	<0.1
Hexachloro-1,3-butadiene (w)	µg/l	-	<0.1
Hexachlorocyclopentadiene (w)	µg/l	-	<0.1
<b>VOC</b>			
Vinyl Chloride (w)	µg/l	-	<10
Bromomethane (w)	µg/l	-	<10
Trichlorofluoromethane (w)	µg/l	-	<10
1,1-Dichloroethane (w)	µg/l	-	<10
2,2-Dichloropropane (w)	µg/l	-	<10
Bromochloromethane (w)	µg/l	-	<10
Chloroform (w)	µg/l	-	<10
1,1,1-Trichloroethane (w)	µg/l	-	<10
Carbon tetrachloride (w)	µg/l	-	<10
1,1-Dichloropropene (w)	µg/l	-	<10
Benzene (w)	µg/l	-	<10
1,2-Dichloroethane (w)	µg/l	-	<10
Trichloroethylene (w)	µg/l	-	<10
1,2-Dichloropropane (w)	µg/l	-	<10
Dibromomethane (w)	µg/l	-	<10
Bromodichloromethane (w)	µg/l	-	<10
cis-1,3-Dichloropropene (w)	µg/l	-	<10
Toluene (w)	µg/l	-	<10
trans-1,3-Dichloropropene (w)	µg/l	-	<10
1,1,2-Trichloroethane (w)	µg/l	-	<10
Tetrachloroethylene (w)	µg/l	-	<10
1,3-Dichloropropane (w)	µg/l	-	<10
1,2-Dibromoethane (w)	µg/l	-	<10
Chlorobenzene (w)	µg/l	-	<10
1,1,1,2-Tetrachloroethane (w)	µg/l	-	<10
Ethylbenzene (w)	µg/l	-	<10
m,p-Xylene (w)	µg/l	-	<10
o-Xylene (w)	µg/l	-	<10
Styrene (w)	µg/l	-	<10
Bromoform (w)	µg/l	-	<10
iso-Propylbenzene (w)	µg/l	-	<10
Bromobenzene (w)	µg/l	-	<10
1,2,3-Trichloropropane (w)	µg/l	-	<10

Determinant	Units	Min Value	Max Value
n-Propylbenzene (w)	µg/l	-	<10
2-Chlorotoluene (w)	µg/l	-	<10
1,3,5-Trimethylbenzene (w)	µg/l	-	<10
4-Chlorotoluene (w)	µg/l	-	<10
tert-Butylbenzene (w)	µg/l	-	<10
1,2,4-Trimethylbenzene (w)	µg/l	-	<10
sec-Butylbenzene (w)	µg/l	-	<10
1,3-Dichlorobenzene (VOC) (w)	µg/l	-	<10
1,4-Dichlorobenzene (VOC) (w)	µg/l	-	<10
n-Butylbenzene (w)	µg/l	-	<10
1,2-Dichlorobenzene (VOC) (w)	µg/l	-	<10
1,2-Dibromo-3-chloro-propane (w)	µg/l	-	<10
1,2,4-Trichlorobenzene (VOC) (w)	µg/l	-	<10
Hexachlorobutadiene (w)	µg/l	-	<10
1,2,3-Trichlorobenzene (w)	µg/l	-	<10
1,1,2,2-Tetrachloroethane (w)	µg/l	-	<10
1,1-Dichloroethylene (w)	µg/l	-	<10
4-isopropyltoluene (w)	µg/l	-	<10
Chlorodibromomethane (w)	µg/l	-	<10
cis-1,2-Dichloroethylene (w)	µg/l	-	<10
Naphthalene (VOC) (w)	µg/l	-	<10
trans-1,2-Dichloroethylene (w)	µg/l	-	<10

### 6.2.3 Gas monitoring and results

A summary of the gas monitoring undertaken during the 2013 site investigations is presented in Table 13:

Table 13: Summary of gas monitoring results

Determinant	Units	Min Value	Max Value
H <sub>2</sub> S	ppm	0	-
O <sub>2</sub>	% Vol	18.3	19.4
CO <sub>2</sub> (peak)	% Vol	0.7	4.2
CO <sub>2</sub> (steady)	% Vol	0.3	0.9
CH <sub>4</sub> (peak)	% LEL	0	-
CH <sub>4</sub> (steady)	% LEL	0	-
CH <sub>4</sub> (peak)	% Vol	0	-
CH <sub>4</sub> (steady)	% Vol	0	-

Determinant	Units	Min Value	Max Value
CO	ppm	0	-
VOC	ppm	0	-

## 7 Conclusions

As explained within this report and the Environmental Risk Assessment (refer to Appendix D of the Supporting Information), it is anticipated that there will be little risk of pollution associated with the operation of the Facility.

During the operational phase of the Facility, as required by each EP, any records which demonstrate how the land and groundwater have been protected will be maintained. This information would include inspection records of pollution prevention infrastructure, pollution/incident reports, records of any further ground investigations undertaken, and any monitoring records of soil, gas and/or water during the life of the EP. Where it is identified that pollution has occurred, records would be maintained of any pollution incidents that may have affected the land or groundwater. These records will be retained to be used to inform whether operations or incidents associated with the operation of the Facility has impacted upon the ground conditions when applying to surrender the EP.

# Appendices

# A Geotechnical and Environmental Assessment Report (Goodson Associates, 2014)



## B Phase 3 Earthwork Suitability Supplemental Investigation (Goodson Associates, 2014)

## C Installation Boundary and Borehole/Trial Pit Locations

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