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**Portland Energy
Recovery Facility**



Powerfuel Portland Limited

Site Condition Report

Document approval

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1 Introduction

Powerfuel Portland Limited (Powerfuel) is proposing to build the Portland Energy Recovery Facility (the Facility) at a site within Portland Port on the Isle of Portland, Dorset. The Facility will incinerate refuse derived fuel (RDF) produced from domestic (municipal solid waste) and commercial & industrial (C&I) non-hazardous waste.

1.1 Project description

A detailed description of the Facility is presented in section 1.4 of the S2953-0320-0003NT1 Supporting Information.

1.2 The Site

For the purposes of this Site Condition Report, the 'Site' refers to the land within the EP Installation Boundary, as presented in Appendix A of the Supporting Information.

The Site is located on the north eastern coast of the Isle of Portland, approximately 600 m east of the village of Fortuneswell. The Site lies within the port and is not publicly accessible. Vehicular access is from the west, through the main Portland harbour complex, via Castletown, Castel Road, Lerret Road and A354.

The land is owned by Portland Port and is an existing industrial area, currently unused, within the port, allowing waste to be transported by road or delivered by ship. The site is bordered to the south west by Incline Road, which is a private road within the port that is actively used by port traffic, and a former railway embankment. Cliffs supporting grassland, scrub and woodland habitats lie to the south west of the embankment and rise steeply to approximately 125 m above ordnance datum (AOD). Her Majesty's Prison The Verne is approximately 430 m to the south west of the site at the top of the steep slope. The eastern site boundary is formed by the shingle shoreline and overland fuel pipes from Portland Bunkers, which are fuel bunkers in the nearby cliffs used for marine bunker fuel supply. Existing operational port development lies to the north and north west of the site. The Site is relatively flat with an elevation of approximately 7 m above Ordnance Datum (AOD). Portland and its harbour were designated as HM Naval Base Portland in 1923. From 1958, Portland was home to Flag Officer Sea Training. During this time, the site was dominated by a weapons research establishment building in the south east, with other buildings dedicated to mechanical repair facilities for military vehicles. The naval base and two major weapons research establishments were closed in 1995/96 and Portland Port Ltd began the transformation of the harbour into a commercial port. The buildings on site have been demolished to create cargo storage space when they were not used by tenants. In 2016/17, the main road leading to Incline Hill was realigned along the base of the hill / scree, creating the open development area on site. The land has since been cleared and is regarded as 'brownfield' land.

The Facility will be located at an approximate National Grid Reference of SY 69607 74248, with the nearest postcode listed as DT5 1PH.

1.3 Objective

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

1. consider the proposed activities to be carried out at the Facility;
2. identify any land contamination risk that may be linked to previous pollution events; and

3. provide a baseline for the existing ground conditions within the installation boundary.

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

- Environmental Statement Ground Conditions Technical Assessment – Portland Energy Recovery Facility. Ref: GEO-REP003 REV B, 14 July 2020 (Appendix A);
- Geo-environmental and Geotechnical Desk Study. Ref: GEO-REP001 Rev A, 23 June 2020 (Appendix B);
- Groundsure report Ref: GS-6721979 (Appendix C);
- Phase 2 Site Investigation Report- Port of Portland. Ref: JER4295 R 090429 AP Site Investigation, May 2009 (Appendix D); and
- Portland Energy Recovery Facility ES Chapter 8 DRAFT: Ground conditions and water quality (Appendix E).

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 are presented 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 capacity exceeding 3 tonnes per hour.
Directly Associated Activities		
Directly Associated Activities		The export of electricity to the National Grid and potential to export heat to local heat users.
Directly Associated Activities		Standby electrical generation to provide electrical power to the plant in the event of an interruption in the supply.
Directly Associated Activities		The receipt, storage and handling of non-hazardous waste prior to incineration.
Directly Associated Activities		The handling, storage and transfer of residues for transfer off-site.

2.2 On-site fuel and chemical storage facilities

As identified within the Supporting Information document, the activities undertaken at the Facility 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

Substance	Estimated Maximum Storage Capacity (tonnes)	Primary Containment	Secondary Containment	Tertiary Containment
Hydrated lime (Ca(OH) ₂)	80	Silo	Hardstanding	Contained drainage
Powdered Activated Carbon	10	Silo	Hardstanding	Contained drainage

Substance	Estimated Maximum Storage Capacity (tonnes)	Primary Containment	Secondary Containment	Tertiary Containment
25 % ammonia solution	90	Tank	Bunding	Hardstanding and contained drainage
Low sulphur fuel oil (diesel)	80	Tank	Bunding	Hardstanding and contained drainage
Residues				
IBA	510	Ash room	Hardstanding	Contained drainage
APCr	95	Silo(s)	Hardstanding	Contained drainage

2.3 Environmental Risk Assessment

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

The risk assessment considers all potential sources of ground and surface water pollution that could occur due to fugitive emissions or accidents occurring at the Facility. In addition, the risk assessment 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 at or released from 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 operation of the Facility.

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	Environmental fate / behaviour	Potential Pollution Risk?	Quantity Stored (tonnes)	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	80	Enclosed tank with bundling	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, overflow protection on tank.
Ammonium hydroxide solution, NH4OH	25% NH3, Liquid	1336- 21-6	215- 647-6	H314, H335, H400	Yes	Water soluble Potential for mobility in soil and water systems	Yes	90	Enclosed tank, double skinned, bundling	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 event, air emissions system is subject to advanced control measures

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Lime, Ca(OH) ₂	100%, Solid	1305- 62-0	215- 137-3	H315, H318, H335	Yes	High aqueous solubility	Yes	80	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 in these areas will be contained.
Powder Activated Carbon, C	100%, Solid	7440- 44-0	231- 153-3	H252	Yes	Insoluble	No	10	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.

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
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	<5	IBCs for liquids, with bunding where appropriate. Consumer package or bags for solids	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.
Residues											
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	95	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
Incinerator Bottom Ash (IBA)	Solid	91082-83-6	293-798-7	N/A	No	Limited solubility, potential for the presence of heavy metals	No	510	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.

4 Geology, hydrogeology and hydrology

4.1 Geology

Information on the geology at the Site was sourced from the Ground conditions and water quality chapter of the ES (Appendix A), Geo-environmental and Geotechnical Desk Study (Appendix B), the Groundsure report (Appendix C) and British Geological Survey (BGS). This is summarised in Table 4:

Table 4: Site geology

Lithology	Description	Estimated depth (m bgl)	Estimated thickness (m)
Made Ground	Grey brown gravels, gravelly sands, firm to stiff occasionally green gravelly clays and clays. Frequent gravels of limestone and other stone. Clays generally encountered below unconsolidated materials.	5.1 to 8	5.1 to 8
Superficial deposits (northeast of Site only)	Grey brown sand and gravels of subrounded to angular chert. Includes Landslide Deposits of unknown/unclassified rock type in the south west corner and Tidal Flat Deposits comprising silt and sand along the shoreline in the east and north east corner.	5 to 12	7
Bedrock	Weathered Kimmeridge Clay Formation. Firm to stiff grey clays.	5.1 to 9	1 to 2.7
	Kimmerage Clay. Mudstones and stiff clays.	>21	-

4.2 Hydrogeology

The Geo-environmental and Geotechnical Desk Study (Appendix B) states the following with regards the hydrogeology at the Site:

- The underlying Kimmeridge Clay bedrock is classified by the EA as an unproductive aquifer.
- The Site is not located within and EA designated groundwater source protection zone (SPZ). There are no groundwater abstractions reported within 1 km of the Site.
- The superficial deposits (tidal flat deposits) are classified as Secondary Undifferentiated aquifers.
- Due to the proximity to the coast the local groundwater regime is likely to have a tidal influence and likely elevated salinity. Groundwater beneath the Site is therefore of limited value as a potential resource.

4.3 Hydrology and surface waters

The Geo-environmental and Geotechnical Desk Study (Appendix B) states the following with regards the hydrology at the Site:

- There are no surface water features on Site. However, historical maps show two outfalls on the Balaclava Bay shore northeast and southeast of the Site that suggests culverts may extent across the Site.
- The Site is defined as a European Union Water Framework Directive (WFD) coastal catchment. To the east of the Site, surface water is classified as Dorset/Hampshire coastal water, which is classified by the EA as a moderate water body, with a good chemical rating and a moderate ecological rating. 40 m north of the Site, surface water is defined as Portland Harbour coastal water, which is classified by the EA as a moderate water body with a good chemical rating and moderate ecological rating.
- There are no surface water abstractions within 1 km of the Site.

5 Pollution history

5.1 Historical land use

5.1.1 Within the installation boundary

The Geo-environmental and Geotechnical desk study (Appendix B) states detailed historical land use of the Site. This has been determined from historical maps and aerial photographs provided in the Groundsure report. A summary of the historical land use is provided below:

Table 5: *Historical land use within installation boundary*

Year	Change in land use
1864	Several railway lines run across the Site, servicing a number of buildings in the north and west of the Site and a gas works to the south. A shingle beach lies within the northeast corner of the Site.
1901	The gas works has been removed. 'Admiralty Slaughter House' occupies the south of the Site. The buildings in the northwest of the Site are occupied by the Royal Naval Hospital. There is a boat house in the east of the Site. The area of shingle beach in the northwest of the Site appears to have been infilled and now forms part of the side of the port.
1903	Timber yard occupies the northeast of the Site.
1927	The railway lines have been removed and several buildings demolished.
1938	Two new buildings in the south and north of the Site.
1963	Site is occupied by several large buildings which cover a significant proportion of the Site area. Labelled as a Dockyard.
1973	Canteen Road and Balaclava Road marked in east of the Site and Incline Road in the west of the Site.
1999	Building in northwest of Site has been demolished. Rubble remains stockpiled across building footprint area.
2001	Buildings in west of Site demolished.
2005	West of Site divided into four open storage areas. Some stockpiled materials within.
2009	Buildings in the south have been demolished. Rubble remains stockpiled in former building footprint. Stockpiled materials in the storage areas to the west no longer present, this area appears to now be occupied by vehicles and other mechanical equipment.
2014	Storage areas and equipment to the west cleared and buildings in northeast corner demolished.
2017	One building remains in the north of the Site. All other buildings demolished but some stockpiles on rubble remain.
2020	All buildings on Site demolished.

The review of Site history has identified over 150 years of port and industrial uses at the Site. Made ground has been placed across the Site in several phases. No particular sources of contamination such as fuel tanks have been identified. However, spills and contaminant releases may have occurred. Two drainage outfalls were present on the eastern Site boundary which discharged into Balaclava Bay. Demolition of twentieth century buildings may have resulted in the presence of asbestos within the fill material.

5.1.2 Wider environmental setting

The Geo-environmental and Geotechnical desk study (Appendix B) states detailed historical land use of the Site. This has been determined from historical maps and aerial photographs provided in the Groundsure report. A summary of the historical land use of the area surrounding the installation boundary is provided below:

Table 6: Historical land use in area surrounding the installation boundary

Year	Change in land use
1864	The main gasworks buildings are located outside the Site, adjacent to the southern Site boundary. Two gasometers are located approximately 15m to the south. The railway lines extend to the south and north of the Site. A Coal Depot is located on the harbour side 100m to the north. A reservoir and evidence of ground excavation is located 100m to the southeast and a reservoir is present on the top of the cliff approximately 100m to the southwest. Shingle beach is located to the east of the Site.
1901	A railway bounds the west of the Site. Portland Port to the north of the Site is more built up, including several buildings, jetties and cranes. The reservoirs southwest of the Site are shown as disused, a spring is marked at their location. A cemetery is located 250m southwest of the Site on the top of the cliff. The Balaclava Coastguard Station is present 100m to the south of the Site and the reservoir in this area appears to be no longer in use.
1903	The railway embankment along the western Site boundary has been constructed and includes two viaducts adjacent to the south of the Site.
1927	Rail lines within the port areas to the north and south no longer present.
1959-1960	Tanks present to the immediate west of the railway embankment.
1963	Increased development to the north and southeast of the Site along the port. HM Prison Training Centre built on the cliff top 500m to the southwest.
1973	Two outfalls are noted on the eastern boundary of the Site leading to Balaclava Bay. Old Depot Road labelled to the north. Buildings 100m to southeast labelled as HM Underwater Detection Establishment
1994	Railway to the west has been dismantled.
2003	An electricity substation is located adjacent to the northern Site boundary.
2005	Pipeline along the eastern Site boundary has been constructed. Some demolition/reconfiguration of buildings to the north.
2010	Two buildings <100m north of the Site have been demolished.

The land use for the surrounding area has been Port uses similar to that within the boundary, with the exception of a gasworks to the south west of the Site which was present in the late 1800s.

5.2 Historical incidents

As reported in the Groundsure report (Appendix C) and the Substantiated Pollution Incident Register, there are four recorded pollution incidents within 500 m of the Site which are summarised in Table 7 below.

Table 7: Pollution incidents

Distance from Site (m)	Direction from Site	Details
88	S	Incident date: 2001 Water impact: Category 4 (no impact) Air impact: Category 3 (minor) Land impact: Category 4 (no impact) Pollutant: Atmospheric pollutants and effects (Smoke)
196	W	Incident date: 2001 Water impact: Category 4 (no impact) Air impact: Category 3 (minor) Land impact: Category 4 (no impact) Pollutant: Atmospheric pollutants and effects (Smoke)
266	NW	Incident date: 2014 Water impact: Category 2 (Significant) Air impact: Category 4 (no impact) Land impact: Category 3 (minor) Pollutant: Sewage materials (Crude Sewage)
424	NW	Incident date: 2001 Water impact: Category 3 (Minor) Air impact: Category 4 (no impact) Land impact: Category 4 (no impact) Pollutant: Oils and Fuel (Diesel)

5.3 Historical pollution potential

The Ground conditions and water quality chapter of the ES (Appendix A) and the Geo-environmental and Geotechnical desk study and its appendices (Appendix B), identified the following as the key potential onsite sources of contamination:

- Made ground deposits (roadways, hardstanding areas);
- Historical uses of the Site and surrounding area;

The review of the Site history has indicated that the surrounding land use has been primarily industrial since at least the construction of the harbour between 1837 and 1890. 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

main potential source of contamination within the Site is made ground, which contains a range of materials. There is the potential for the following contaminants to be present:

- Asbestos;
- Extremes of pH
- Heavy metals
- Petroleum hydrocarbons,
- Polycyclic aromatic hydrocarbons
- Volatile and semi-volatile organic compounds;
- Ground gases (methane and carbon dioxide).

According to the Groundsure report (Appendix C), there are three consents granted within 500 m for a site to hold hazardous substances, in accordance with the Planning (Hazardous Substances) Regulations 2015. They are summarised in Table 8 below.

Table 8: Hazardous substance storage/usage

Approximate distance from Site (m)	Direction from Site	Details
269	S	Application reference number: 03/00141/HAZ Application Status: Historical Content Details: Storage of fuels, diesel in underground storage tanks
413	S	Application reference number: No details Application Status: Approved Details: No Details
413	S	Application reference number: No details Application Status: Approved Details: No Details

5.4 Environmental Permits

As reported in the Groundsure report (Appendix C), there have been no recorded pollution incidents within 500 m of the Site.

5.5 Groundwater abstractions

As reported in the Groundsure report (Appendix C), the Site is not within an Environment Agency groundwater source protection zone or groundwater drinking water safeguard zone. There are no groundwater abstractions within 2 km of the Site.

5.6 Surface water abstractions and discharges

As reported in the Groundsure report (Appendix C), there are no known surface water abstraction licenses recorded within 2 km of the Site. Furthermore, there are 9 licenced discharges to controlled waters within 500 m, summarised in Table 9.

Table 9: Licensed discharges to controlled waters

Approximate distance from Site (m)	Direction from Site	Details
25	S	Effluent type: Sewage discharges – pumping station – not water company Receiving water: English Channel Permit number: 043062 Status: New consent, by application (WRA 91, section 113 & sched 12)
51	N	Effluent type: Agriculture – fish farming – not water company Receiving water: Portland Harbour Permit number: EPRWP3928XN Status: New issued under EPR 2010
51	N	Effluent type: Agriculture – fish farming – not water company Receiving water: Portland Harbour Permit number: EPRWP3928XN Status: New issued under EPR 2010
327	E	Effluent type: Trade discharges – process effluent – water company (WTW) Receiving water: Chesil Beach Permit number: 043086 Status: Revoked (WRA 91, S88 & sched 10 as amended by env act 1995)
339	SE	Effluent type: Sewage discharges – sewer storm overflow – not water company Receiving water: Balaclava Bay Permit number: 042843 Status: New consent, by application (WRA 91, section 113 & sched 12)
357	W	Effluent type: Sewage discharges – pumping station – not water company Receiving water: Portland Harbour Permit number:043081 Status: New consent, by application (WRA 91, section 113 & sched 12)
361	W	Effluent type: Sewage discharges – final/treated effluent – not water company Receiving water: Portland Harbour Permit number: 043071 Status: New consent, by application (WRA 91, section 113 & sched 12)

Approximate distance from Site (m)	Direction from Site	Details
367	W	Effluent type: Trade discharges – site drainage Receiving water: Coastal water Permit number: 043070 Status: New consent, by application (WRA 91, section 113 & sched 12)
409	N	Effluent type: sewage discharges – final/treated effluent – not water company Receiving water: Portland Harbour Permit number: 043075 Status: New consent, by application (WRA 91, section 113 & sched 12)

5.7 Landfill and waste management sites

As reported in the Groundsure report(Appendix C), there are no active, recent, or historical landfill sites within 500 m of the Site. There is one licenced waste site, under EA regulation, within 500 m of the Site. There are also three activities involving the storage, treatment or disposal of waste that are exempt from needing a permit. All licensed waste sites are listed in Table 10.

Table 10: Licensed waste sites within 500 m

Approximate distance from Site (m)	Direction from Site	Details
228	S	Site Name: Paisley Plant Hire Ltd Type of Site: 75kte HCl Waste TS + asbestos Size: 25000 tonnes EP regulations (waste) licence number: PAI009 EPR reference: EA/EPR/GP3591LR/A001
492	W	Site reference: WEX078668 Site Category: Storing waste exemption (not on a farm) Description: Storage of waste in a secure place
492	W	Site reference: WEX005945 Site Category: Storing waste exemption (not on a farm) Description: Storage of waste in a secure place
498	W	Site reference: EPR/CE5587CY /A001 Site Category: Storing waste exemption (non-agricultural waste only) Description: Storage of waste in a secure place

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 2009 Site Investigations

The Geoenvironmental and geotechnical desk report and Phase 2 Site Investigation Report details a previous Phase 2 intrusive ground investigation, carried out by RPS Planning and Development Chepstow (RPS) in 2009. The objectives of the investigation were to provide an assessment of the ground conditions and determine the extent of any contamination in soil and groundwater beneath the Site and provide a baseline geotechnical assessment.

The investigation was undertaken between the 6th and 17th April 2009. It comprised four rotary drilled boreholes (RT1 – RT4), to a maximum depth ranging from 13 mbgl to 21 mbgl, and 11 window sample boreholes, to a maximum of 7 mbgl. Gas and/or groundwater monitoring installations were installed in boreholes RT1- RT4 and six of the window sample boreholes. Representative soil samples were collected from all boreholes. A drawing is presented within Appendix F which shows the location of exploratory holes in relation to the Installation Boundary for the Facility.

Representative soil samples were dispatched for analysis to Alcontrol Geochem Analytical Services in Chester. A photo-ionisation detector PID was used during the drilling works to determine the concentration of Volatile organic compound vapours (VOCs). Bulk soil, U70 and core samples of intact core over 10 cm in length were collected from the rotary holes for geotechnical analysis at Geolabs.

Two rounds of gas monitoring and groundwater level monitoring were undertaken on 23rd April and 7th May 2009. Groundwater sampling was undertaken on 23rd April 2009. The results are presented in section 6.2 below.

6.2 Baseline reference data

6.2.1 Soil monitoring and results

A summary of the soil pollutant concentrations for measurements taken during the 2009 Site investigations is presented in Table 11 below.

Table 11: Summary of soil monitoring results (where above the laboratory limit of detection (LLOD))

Determinant	Units	Total Number of samples	Number of samples >LLOD	Max Value
Sulphate	mg/kg	17	17	2,800
Arsenic	mg/kg	17	7	12

Determinant	Units	Total Number of samples	Number of samples >LLOD	Max Value
Cadmium	mg/kg	17	4	0.8
Chromium	mg/kg	17	12	23
Copper	mg/kg	17	15	130
Lead	mg/kg	17	17	360
Nickel	mg/kg	17	16	32
Zinc	mg/kg	17	17	530
Hexavalent Chromium	mg/kg	17	1	3
Total Sulphur	mg/kg	17	17	0.24
pH	mg/kg	17	17	11.96
TPH C6 – C8	mg/kg	31	0	20
TPH >C8 – C10	mg/kg	31	0	20
TPH >C10 – C12	mg/kg	31	2	52
TPH >C12 – C16	mg/kg	31	9	470
TPH >C16 – C21	mg/kg	31	18	2,100
TPH >C21 – C40	mg/kg	31	22	6,900
TPH C6 – C40	mg/kg	31	23	9,500
Aliphatic >C8 – C10	mg/kg	3	2	0.03
Aliphatic >C10 – C12	mg/kg	3	1	0.16
Aliphatic >C12 – C16	mg/kg	3	3	310
Aliphatic >C16 – C21	mg/kg	3	3	360
Aliphatic >C21 – C35	mg/kg	3	3	160
Total Aliphatic C5 – C35	mg/kg	3	3	760
Aromatic >C8 – C10	mg/kg	3	2	0.047
Aromatic >C10 – C12	mg/kg	3	1	0.23
Aromatic >C12 – C16	mg/kg	3	3	200
Aromatic >C16 – C21	mg/kg	3	3	290
Aromatic >C21 – C35	mg/kg	3	3	230
Total Aromatic C6 – C35	mg/kg	3	3	720
Total TPH C6 – C35	mg/kg	3	3	1,500
Naphthalene	mg/kg	31	20	13
Acenaphthylene	mg/kg	31	18	14
Acenaphthene	mg/kg	31	19	41
Fluorene	mg/kg	31	20	40
Phenanthrene	mg/kg	31	25	130
Anthracene	mg/kg	31	20	44
Fluoranthene	mg/kg	31	24	210

Determinant	Units	Total Number of samples	Number of samples >LLOD	Max Value
Pyrene	mg/kg	31	25	180
Benzo(a)anthracene	mg/kg	31	23	110
Chrysene	mg/kg	31	25	80
Benzo(b)fluoranthene	mg/kg	31	23	90
Benzo(k)fluoranthene	mg/kg	31	21	51
Benzo(a)pyrene	mg/kg	31	21	110
Indendo(123cd)pyrene	mg/kg	31	21	57
Dibenzo(a,h)anthracene	mg/kg	31	18	17
Benzo(ghi)perylene	mg/kg	31	21	63
PAH 16 Total	mg/kg	31	23	1,200
SVOCs				
Bis(2-ethylhexyl)phthalate	mg/kg	6	1	0.13
4-methylphenol	mg/kg	6	1	1.1
2-methylnaphthalene	mg/kg	6	2	5.6
Carbazole	mg/kg	6	3	5.8
Dibenzofuran	mg/kg	6	3	12.0
VOCs				
Toluene	mg/kg	6	1	0.01
Ethylbenzene	mg/kg	6	1	0.015
Isopropylbenzene	mg/kg	6	1	0.01
1,2,4-Trimethylbenzene	mg/kg	6	1	0.11
4-Isopropyltoluene	mg/kg	6	1	0.016
Naphthalene	mg/kg	6	2	0.79

6.2.2 Groundwater monitoring and results

A summary of the groundwater pollutant concentrations for measurements taken during the 2009 Site investigations is presented in Table 12:

Table 12: Groundwater Chemical Analytical Results where above LLOD

Determinant	Units	Number of samples > LLOD	Max Value
Sulphate	mg/l	6	2,100
Arsenic	mg/l	6	0.56
Boron	mg/l	6	3.3
Cadmium	mg/l	3	0.0015
Chromium	mg/l	6	0.021
Copper	mg/l	6	0.035

Determinant	Units	Number of samples > LLOD	Max Value
Lead	mg/l	5	0.03
Nickel	mg/l	6	0.097
Selenium	mg/l	6	0.24
Zinc	mg/l	6	0.075
Sulphide	mg/l	1	37
Hexavalent Chromium	mg/l	1	0.04
Free Sulphur	mg/l	1	2.8
Aliphatic >C12 – C16	mg/l	1	0.042
Aliphatic >C16 – C21	mg/l	1	0.049
Aliphatic >C21 – C35	mg/l	1	0.023
Total Aliphatic C5 – C35	mg/l	1	0.11
Aromatic >C12 – C16	mg/l	1	0.011
Aromatic >C16 – C21	mg/l	1	0.04
Aromatic >C21 – C35	mg/l	1	0.076
Total Aromatic C6 – C35	mg/l	1	0.13
Total TPH C6 – C35	mg/l	1	0.24
Naphthalene (µg/l)	mg/l	1	0.33
Acenaphthylene (µg/l)	mg/l	3	0.022
Acenaphthene (µg/l)	mg/l	4	0.17
Fluorene (µg/l)	mg/l	3	0.079
Phenanthrene (µg/l)	mg/l	5	0.47
Anthracene (µg/l)	mg/l	4	0.2
Fluoranthene (µg/l)	mg/l	6	0.38
Pyrene (µg/l)	mg/l	6	0.66
Benzo(a)anthracene	mg/l	5	0.16
Chrysene (µg/l)	mg/l	6	0.24
Benzo(b)fluoranthene (µg/l)	mg/l	5	0.4
Benzo(k)fluoranthene (µg/l)	mg/l	5	0.22
Benzo(a)pyrene (µg/l)	mg/l	6	0.24
Indeno(123cd)pyrene (µg/l)	mg/l	5	0.16
Dibenzo(a,h)anthracene (µg/l)	mg/l	2	0.05
Benzo(ghi)perylene (µg/l)	mg/l	5	0.21
PAH 16 Total (µg/l)	mg/l	6	2.7
VOCs			
Carbon Disulphide	µg/l	1	2
Tetrachloroethene	µg/l	2	8

6.2.3 Gas monitoring and results

A summary of the gas monitoring undertaken during the 2009 Site investigations is presented in Table 13:

Table 13: Summary of gas monitoring results

Determinant	Units	Max Value
CH4	% Vol	0
LEL	% Vol	0
CO2	% Vol	1.1
O2	% Vol	21.3
H2S	ppm	0
CO	ppm	0
DP	Pa	2-6
AP	mB	1023
PID (peak)	ppm	6.4
Flow (Max)	l/hr	1.9

7 Conclusions

The potential constraints to the proposed development, as identified in the Geo-environmental and geotechnical desk study (Appendix B), are:

- Presence of contamination that requires remediation or mitigation;
- Moderate UXO risk;
- Former building substructure;
- Thickness of made ground;
- Localised hydrocarbon contamination;
- Lack of asbestos testing;
- 2009 intrusive Site investigation testing is widely spaced and has limited coverage beneath former building sites

During the operational phase of the Facility any records which demonstrate how the land and groundwater have been protected will be retained. This information will 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 Environmental Statement Ground Conditions Technical Assessment – Portland Energy Recovery Facility (Arup, July 2020)

B Geoenvironmental and Geotechnical Desk Study (Arup, June 2020)

C Groundsure report (March 2020)

D Phase 2 Site Investigation Report- Port of Portland (RPS, May 2009)

E Portland Energy Recovery Facility ES Chapter 8: Ground conditions and water quality (Arup, July 2020)

F Installation Boundary and Borehole/Trial Pit Locations

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