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Consulting Engineers Limited

Tees Valley Energy Recovery Facility

Viridor Tees Valley Limited

Site Condition Report

ENGINEERING CONSULTING

Document approval

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R0	22/10/2021	First draft for client	MJC	KLH
R1	02/03/2022	Updated following issue of site remediation report	MJC	SDR
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Contents

Introduction

Viridor Tees Valley Limited (Viridor) is developing the Tees Valley Energy Recovery Facility (the 'Facility') to incinerate non-hazardous residual waste. The Facility will be located at the site of the former British Steelworks in Grangetown, a large, industrial brownfield site in an area known as Grangetown Prairie within Redcar and Cleveland BC. A detailed description of the Facility is presented within section 2 of the Supporting Information.

Viridor is applying to the Environment Agency (EA) under the Environmental Permitting Regulations (EPR) for an Environmental Permit (EP) to operate the Facility. As part of the EP application, a Site Condition Report is required to be developed and submitted to the EA.

1.1 The objective

The purpose of the Site Condition Report is to summarise the existing ground conditions for the land within the Installation Boundary (the 'Site') and describe the setting for the Facility at the time of applying for the EP.

The report uses various sources of background information which are provided as Appendices:

- Arcadis, Remediation and Earthworks Verification Report; '10035117-AUK-XX-XX-RP-ZZ-0351-TVERF_Verification', December 2021 (Appendix A);
- Arcadis, Phase II ESA Report for STDC, November 2020 (Appendix B);
- Stantec, Geo-Environmental and Geotechnical Ground Investigation Report – Tees Valley ERF Site, November 2020 (Appendix C);
- Stantec, Phase 1 Geo-Environmental and Geotechnical Desktop Study – Tees Valley ERF, 2020 (Appendix D);
- JBA, The Town and Country Planning (Environmental Impact Assessment) Regulations, 2017, Volume 1: Environmental Statement, 2019 (Appendix E).

This report presents background information on the existing ground conditions in relation to the following:

1. Geology;
2. Hydrogeology;
3. Hydrology and flooding;
4. Historical and present land use; and
5. Existing ground conditions

The report:

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

Plans and drawings for the Facility can be found in Appendix A of the Application Pack. These include the following:

1. Site location plan;
2. Installation boundary;
3. Emission points drawing; and
4. Process schematic.

Site details

The proposed ERF site occupies a near rectangular 25 acre (10 hectare) plot situated at the southwestern corner of the South Tees Development Corporation (STDC) area, within the Grangetown Prairie Zone. The Site lies 1.2km south of the River Tees and approximately 6km to the northeast of Middlesbrough Town centre. The Facility will be located at an approximate national grid reference NZ 54436 21340.

The Facility is bounded to the north by the main Middlesbrough to Redcar railway line, to the east by the site of Lackenby steel works, to the south by industrial units and beyond them the A66 road and to the west by various industrial units. Access to the Site will be via a new site access on the corner of Eston Road that will serve a new internal highway network for the Grangetown Prairie plots. This access will be constructed as part of the enabling works for all development plots by STDC. The Site is brownfield land which has been cleared and was once dominated by industrial buildings at the heart of the steel making industry on Teesside. Some industrial buildings /plant still surround the Grangetown Prairie site on its the south, east and western boundaries.

2.1 Site address

Tees Valley Energy Recovery Facility,

Teesport,

Grangetown,

Middlesbrough,

TS6 6TR

Condition of land at permit issue

3.1 Geology, Hydrogeology & Hydrology

3.1.1 Geology

The geology associated with the land within the Site Boundary has been assessed in Appendix D and is summarised within Table 1.

Table 1: Site lithology and description

Lithology	Description
Made ground	Artificial deposits (legacy of prior iron and steel manufacturing)
Superficial deposits	Glaciolacustrine Deposits, Tidal Flat Deposits and Glacial Till – (silt, clay, sand and peat)
Bedrock	Mercia Mudstone Group & Redcar Mudstone Group Penarth Mudstone Group (immediately south of site boundary, possible encroachment onto site)

3.1.2 Hydrogeology

The EA has classified the different types of aquifer from which groundwater can be extracted (see Appendix C for definitions).

Table 2: Site hydrogeology

Lithology	Aquifer Classification
Glaciolacustrine Deposits	Unproductive Stratum (negligible significance for water supply or river base flow). Due to from the low permeability of the clay and silt.
Tidal Flat Deposits (120 m north)	Secondary (undifferentiated) Aquifer. Due to variable characteristics of the rock type rendering it impossible to attribute to either category A or B aquifer.
Redcar Mudstone Formation (240 m south	Secondary (undifferentiated) Aquifer. Due to variable characteristics of the rock type rendering it impossible to attribute to either category A or B aquifer.
Mercia Mudstone Group	Secondary B Aquifer. Due to largely lower permeability layers although still capable of storing limited groundwater in localised fissures/weathering and permeable horizons. Low vulnerability to pollution from surface sources.
Penarth Group – Mudstone	Secondary B Aquifer. Due to largely lower permeability layers although still capable of storing limited groundwater in localised fissures/weathering and permeable horizons. Low vulnerability to pollution from surface sources.

The Environment Agency has defined Source Protection Zones (SPZs) for over 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water and industrial water supply. Where these SPZs are present, there is an increased risk of contamination from any

activities on site that might cause pollution of groundwaters and water supply in the area. There are no SPZs recorded within 1 km of the Facility as reported in Appendix D.

There are no abstractions from groundwater recorded within 1 km of the Facility, and the Site is not located within a Drinking Water Safeguard Zone.

3.1.3 Hydrology and surface waters

Table 3: Site hydrology and description

Water Feature	Description
Holme Beck	Small watercourse tracking the western edge of the site. Intersects the site both as an open channel and culverted channel along a south to north path into the River Tees.
Knitting Wife Beck	Small watercourse tracking the eastern edge of the site. Intersects the site as a culverted channel along a south to north path into the River Tees.
River Tees – Estuary	Large estuary classified as being of poor status ecologically and chemically with the watercourse having high sensitivity reported in Appendix E.

Flood risk is deemed to be low with much of the site currently located within Flood Zone 1 (<0.1% annual probability of river or sea flooding). The most northern section of the site is currently located within Flood Zone 3 (0.5% annual probability of river or sea flooding) although, remediation works plan to raise this area to a Flood Zone 1 area to reduce the risk of fluvial flooding (Appendix E).

Elevated levels of sulphate and chloride were measured in all samples with a pH ranging from pH 7.4 to pH 9.2 denoting marginally basic groundwater. In addition, elevated barium was noted across Made Ground (Appendix B).

3.2 Pollution History

3.2.1 Historical land use within the Installation Boundary

A review of the historical use of the land within the installation boundary was undertaken by Wood in 2019 and CH2M in 2017 as detailed in Appendix C. These reviews considered land use dating back to 1857 when the Site was largely agricultural land. Eston Iron Works, a small iron works located to the northwest of the Site, was active although occupied a small area within the Site area. From 1893 onwards, the significantly larger Cleveland Steel Works was shown to occupy the majority of the western half of the Site. Further expansion through the early and mid-1900s into the east and south of the Site included Cleveland Coke Ovens and by-product plant, Colliery Arch Plant and Medium Section Mill (Appendix C). From 1970 onwards, the site saw widespread demolition until 2010 in which the Site began usage as a steel stocking yard.

3.2.2 Historical incidents

No significant pollution incidents with impacts to controlled land or waters have been recorded within 1km of the Site.

3.2.3 Historical pollution potential

Table 4 Summary of all historical pollution potential sources

Source	Description
Former Steel Works	Slag (silicates and metal oxides), arising scrap; dust and slurries; and refractory materials
Former Iron Works	Oxides of calcium, silicon, phosphorus, and sulphur as well as iron ore, coke, sinter/pellets and limestone

3.2.4 Permits & consents

Table 5 Environmental Permits within 1km of Site Boundary

Distance from the Site (m)	Direction from the Site	Site name	Details
300	S	Cleansing Service Group Limited	References: MP3434CN Operator: UK Resource Management Ltd Process type: Disposal or recovery of >50 t/d hazardous waste involving physico-chemical treatment Status: Effective
800	SE	Hartree Partners Power & Gas Company (UK) Limited	References: NP3331QY Operator: Hartree Partners Power & Gas Company (UK) Limited Process type: New Medium Combustion Plant Status: Effective

3.2.5 Groundwater abstractions

There are 12 groundwater abstracting wells across the site however, there are no abstractions from groundwater recorded within 1 km of the Site boundary (Appendix B).

3.2.6 Potable water abstractions

There are not any potable water abstractions within 2 km of the Site boundary (Appendix D).

3.2.7 Surface water abstractions and discharges

There are neither any surface water abstractions nor discharge consents within 1 km of the Site boundary (Appendix D).

3.2.8 Landfill sites

There are no recorded authorised or historical landfill sites within 250 m of the Site boundary.

There are three currently licenced waste management facilities within 250 m of the Site boundary. The details of these are summarised below:

Table 6 Licenced waste management facilities within 250 m of the site

Site	Location	Details
Cle 3/8 Landfill Site Epr/Rp3434hp	96 m Northwest	Sahaviriya Steel Industries UK Ltd; Waste Landfilling >10 T/D with capacity >25000 T excluding inert waste; Status – Transfer Effective; Issued – 24th March 2011.
B S Cleveland Works	144 m Northwest	Corus Construction & Industrial (British Steel PLC); Landfill sites taking special waste; Status – PPC; Issued – Not supplied.
ICI No 3 Teesport	155 m Northwest	North Tees Waste Management Limited; Site Category – Waste Landfilling >10 T/D with capacity >25000 T excluding inert waste; Status – Effective; Issued – Not supplied.

Permitted Activities

4.1 Activities

The permitted activities will consist of a combination of Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) and directly associated activities:

Table 7: Scheduled and Directly Associated Activities

Type of Activity	Schedule 1 Activity	Description of Activity
Installation	Section 5.1 Part A(1) (b)	Line 1 – The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more
Installation	Section 5.1 Part A(1) (b)	Line 2 – The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more
Directly Associated Activities		
Directly Associated Activities		Energy generation
Directly Associated Activities		A medium combustion plant comprising a diesel generator
Directly Associated Activities		Surface water management

4.2 On-site fuel and chemical storage facilities

As identified in the Supporting Information document, the activities undertaken at the Facility will utilise a number of fuels and chemicals. These materials will be stored in accordance with current guidance.

The primary, secondary and tertiary containment systems associated with the storage of these materials are presented in Table 8.

Table 8: Chemical and Fuel Containment Facilities

Substance	Primary Containment	Secondary Containment	Tertiary Containment
Fuel oil	Tank	Bunding/Hardstanding	Hardstanding
Ammonia	Tank	Bunding	Hardstanding
Lime	Silo	Hardstanding	
Powdered Activated Carbon	Silo	Hardstanding	
Boiler treatment chemicals	Sealed containers	Bunding	Hardstanding

Various maintenance materials (oils, greases, insulants, antifreezes, welding and firefighting gases etc.) will be stored in an appropriate manner. Any gas bottles on-site will be kept secure in dedicated area(s).

4.3 Environmental Risk Assessment

An Environmental Risk Assessment has been carried out following the Environment Agency Horizontal Guidance Note H1. This is included within Appendix D of the Supporting Information. The assessment considers all potential sources of ground and surface water pollution that could occur due to fugitive emissions from the Facility or from accidents occurring at the Facility. The risk assessment also details any mitigation measures that will be employed to reduce the frequency or impact of these events.

The Environmental Risk Assessment identifies that the development will require the storage of various chemicals, which could 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. It is therefore regarded that there will be little risk of ground/groundwater contamination during normal operation of the Facility.

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

Previous Contamination & Site Investigations

5.1 Site investigations

As stated within Article 22 (2) of the EA Industrial Emissions Directive (IED):

"Where the activity involves the use, production or release of relevant hazardous substances and having regard to the possibility of soil and groundwater contamination at the site of the installation, the operator shall prepare and submit to the competent authority a baseline report before starting operation of an installation or before a permit for an installation is updated for the first time after 7 January 2013".

Furthermore, 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.

At the time of writing this report, data are available from 2021 remediation activities referred to in '10035117-AUK-XX-XX-RP-ZZ-0351-TVERF_Verification' within Appendix A and from the 2020 Ground Investigation Report (GIR) in Appendix B.

Remediation during 2021 included laboratory chemical analysis of the in-situ soil and Made Ground as well as the imported aggregates utilised for backfilling removed materials. This was to ensure materials used across the site meet human health criteria before Facility construction. A summary of post remediation soil chemical data is presented in Table 9 within Section 5.4 and supplants the data reported in Appendix B.

Groundwater chemical data were reported within the 2020 GIR in Appendix B from which a summary is presented in Table 10 of Section 5.4.

It is understood that a previous GI was undertaken in 2005, as reported by JBA in the Environmental Statement (2019) in Appendix E. However, the author of this previous GI is unknown and the report was not available for review.

Any additional data which is subsequently obtained to support the design process will be used to further inform on the ground conditions at the Site and the extent of any existing contamination. The Site Condition Report will be updated following completion of any additional site investigations throughout the lifetime of the Facility.

5.2 Arcadis Remediation and Earthworks Verification Report

Arcadis (UK) Limited were commissioned by STDC in March 2021 to verify the enabling earthworks and remediation activities conducted at the site. Remediation was undertaken predominantly to address presence of asbestos fibres (levels up to 0.134% by mass) in soils and also non-aqueous phase liquids (NAPL) excavated during enabling earthworks.

To facilitate redevelopment, a formation layer of 9.0 m AOD has been created by turning over Made Ground to a depth of 6.5 m AOD including removal of obstructions and replacement with bulk fill. Excavated soils were processed for reuse as bulk fill and where encountered, contaminate soils were removed. Total earthworks excavation volumes and backfill volumes were calculated by contractors to be 202,641 m^3 and 240,514 m^3 respectively (Appendix A).

To break the exposure pathway for PAHs, arsenic, benzofuran and asbestos, a temporary clean cover system (or cap) is to be implemented by STDC to prevent direct contact and inhalation of pollutants via dust generation. A permanent capping system will be implemented at the site dependent on final building layouts, hardstanding areas and green spaces.

5.3 Allied Exploration & Geotechnics Ltd, titled 'Prairie Site Ground Investigation Works 2020'

Allied Exploration and Geotechnics (AEG) was commissioned by STDC to undertake a ground investigation at the Site to ascertain soil and groundwater conditions. The investigation was carried out between 7th July 2020 and 7th August 2020 under the supervision of Stantec and consisted of the following:

1. Fifteen cable percussion boreholes with rotary follow-on were drilled to final depths of between 17.5 m bgl and 43.0 m bgl.
2. Fourteen dynamic windowless sampling boreholes were drilled to final depths of between 3.65 m bgl and 7.65 m bgl.
3. Forty-five trial pits were mechanically excavated to depths of between 0.3 m bgl and 4.5 m bgl.

Chemical testing of soil and groundwater samples was then undertaken for the following pollutant groups:

- Heavy Metals;
- Inorganics;
- Petroleum Hydrocarbons;
- Speciated Polycyclic Aromatic Hydrocarbons (PAHs);
- Polychlorinated Biphenyls (PCBs);
- Soil Organic Matter;
- Phenols (total monohydric); and
- Soil Aggressivity (pH, sulphate, chloride, etc).

A plan showing the location of the boreholes and trial pits is presented in Figure 1:

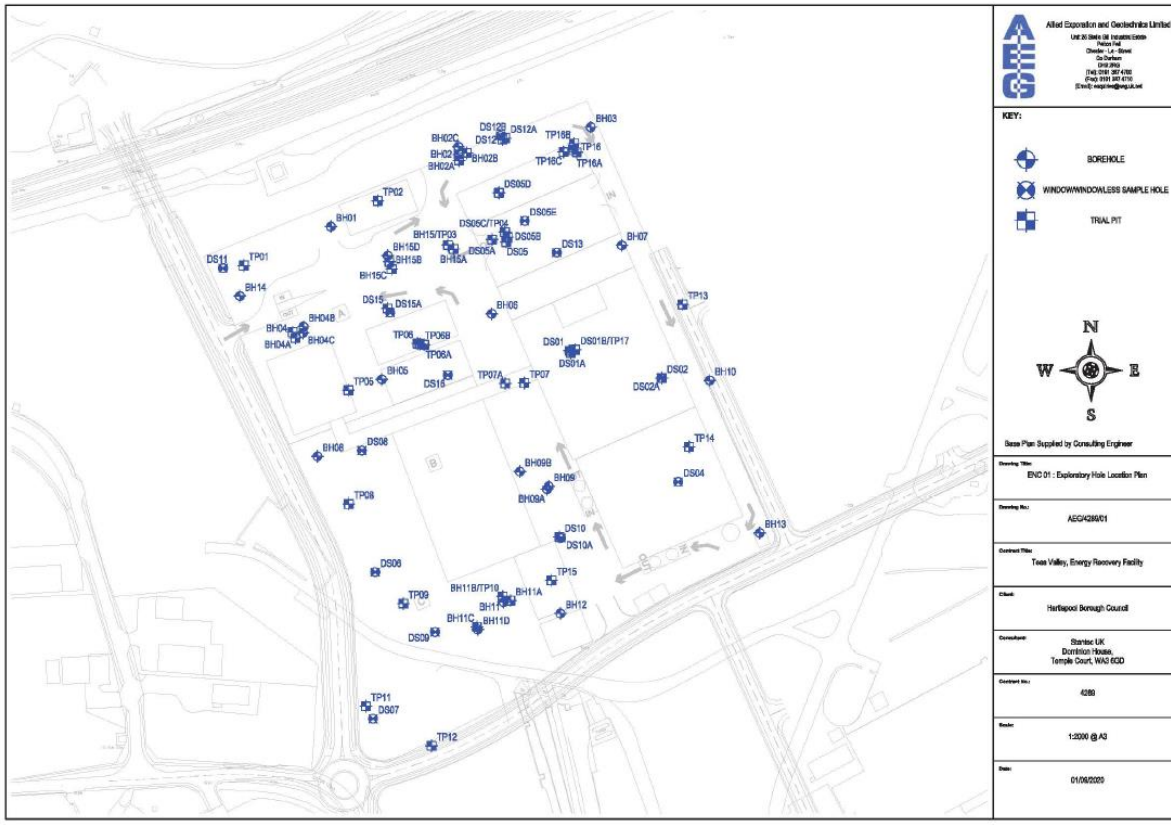

Figure 1: Borehole, sample hole and trial pit location plan (Source: AEG Prairie Site GIR 2020 in Appendix B)

Figure 2: Aerial imagery of groundwater sample locations, Site boundary and land-use (Source: Appendix C)

5.4 Baseline reference data

A summary of baseline reference pollutant data for the site is presented in Table 9 (soil) and Table 10 (groundwater). Currently there is no data available on the concentrations of pollutants within ground gases.

The chemical data for soil samples analysed as part of remediation activities were compared against EA's Generic Assessment Criteria (GAC) designed to protect human receptors. In this instance, specific reference to limit values for "Commercial Workers" are made. No exceedances of commercial GAC values were found within the site, including within areas occupied by Made Ground.

Maximum measured asbestos levels decreased from 0.134 % by mass to 0.00382 % by mass which falls close to the minimum detection limit (MDL) of 0.001 % by mass. Furthermore, decreases pollutant concentrations were observable between values listed in Table 9 and pre-remediation values listed in Appendix B.

The chemical data from groundwater sampling displayed exceedances of GAC across the Site; however, groundwater is deemed not to be a sensitive receptor in this location. The geology of the Site is largely low hydraulic conductivity mudstone and till and there are no potable water abstractions within the Site or nearby. Furthermore, there is no principal aquifer beneath the Site, the area is not within a groundwater SPZ, and the nearest surface water body is the River Tees located 1.3 km from the Site boundary.

Table 9: Summary of soil chemical data post site remediation

Analyte	Units	Maximum Concentration	Minimum Concentration
Metals			
Arsenic	mg/kg	72	29
Boron, Water Soluble	mg/kg	7.7	6
Cadmium	mg/kg	1.7	1
Chromium	mg/kg	290	200
Chromium, Hexavalent	mg/kg	<MDL	<MDL
Copper	mg/kg	993	180
Lead	mg/kg	370	300
Mercury	mg/kg	2.4	1
Nickel	mg/kg	221	55
Selenium	mg/kg	5	5
Vanadium	mg/kg	790	531
Zinc	mg/kg	702	650
Inorganics			
pH	pH	11.7	11
Cyanide, Total	mg/kg	180	16
Cyanide, Free	mg/kg	0.5	0.5
Thiocyanate	mg/kg	27	6
Organic matter	mg/l	5.1	5.1

Analyte	Units	Maximum Concentration	Minimum Concentration
Sulphur (free)	mg/kg	4468	210
Sulphate Aqueous Extract as SO4	mg/kg	3007	2700
Sulphate (total)	mg/kg	11351	11351
TOC	mg/kg	5	5
OMC	mg/kg	8	8
Petroleum Hydrocarbons			
Aliphatic C5-C6	mg/kg	0.17	0.17
Aliphatic C6-C8	mg/kg	<MDL	<MDL
Aliphatic C8-C10	mg/kg	0.34	0.34
Aliphatic C10-C12	mg/kg	153	22
Aliphatic C12-C16	mg/kg	203	140
Aliphatic C16-C21	mg/kg	380	380
Aliphatic C16-C35	mg/kg	1833	1833
Aliphatic C35-C44	mg/kg	325	325
Aliphatic C21-C35	mg/kg	2300	2300
Aliphatic C5-C35	mg/kg	2800	2800
Aromatic C5-C7	mg/kg	1	1
Aromatic C7-C8	mg/kg	<MDL	<MDL
Aromatic C8-C10	mg/kg	0.13	0.13
Aromatic C10-C12	mg/kg	99	4.3
Aromatic C12-C16	mg/kg	60	7
Aromatic C16-C21	mg/kg	290	99
Aromatic C21-C35	mg/kg	1700	42
Aromatic C5-C35	mg/kg	2100	2100
Aromatic C35-C44	mg/kg	5	5
TPH Ali/Aro Total	mg/kg	4900	4900
PAHs			
Naphthalene	mg/kg	98	21
Acenaphthylene	mg/kg	1	0.12
Acenaphthene	mg/kg	5	0.18
Fluorene	mg/kg	8	0.22
Phenanthrene	mg/kg	51	1.1
Anthracene	mg/kg	5	0.21
Fluoranthene	mg/kg	25	2.8
Pyrene	mg/kg	20	2.7
Benzo(a)anthracene	mg/kg	8	1.8
Chrysene	mg/kg	9	1.2

Analyte	Units	Maximum Concentration	Minimum Concentration
Benzo(b)fluoranthene	mg/kg	10	2.1
Benzo(k)fluoranthene	mg/kg	4	0.65
Benzo(a)pyrene	mg/kg	5	0.92
Indeno(1,2,3-c,d)pyrene	mg/kg	5	0.53
Dibenzo(a,h)anthracene	mg/kg	1	0.19
Benzo(g,h,i)perylene	mg/kg	4	0.71
PAH - USEPA 16, Total	mg/kg	234	22
VOCs			
1,1 Dichloroethylene	mg/kg	<MDL	<MDL
1,1,1,2-tetrachloroethane	mg/kg	<MDL	<MDL
1,1,1-trichloroethane	mg/kg	<MDL	<MDL
1,1,2,2-Tetrachloroethane	mg/kg	<MDL	<MDL
1,1,2-trichloroethane	mg/kg	<MDL	<MDL
1,1-Dichloro-1-propene	mg/kg	<MDL	<MDL
1,1-dichloroethane	mg/kg	<MDL	<MDL
1,1-Dichloroethene	mg/kg	<MDL	<MDL
1,1-dichloropropene	mg/kg	<MDL	<MDL
1,2,3-trichlorobenzene	mg/kg	<MDL	<MDL
1,2,3-trichloropropane	mg/kg	0.03	0.03
1,2,4-trichlorobenzene	mg/kg	<MDL	<MDL
1,2,4-trimethylbenzene	mg/kg	<MDL	<MDL
1,2-dibromo-3-chloropropane	mg/kg	<MDL	<MDL
1,2-dibromoethane	mg/kg	<MDL	<MDL
1,2-dichlorobenzene	mg/kg	<MDL	<MDL
1,2-dichloroethane	mg/kg	<MDL	<MDL
1,2-dichloropropane	mg/kg	<MDL	<MDL
1,3,5-trimethylbenzene	mg/kg	<MDL	<MDL
1,3-dichlorobenzene	mg/kg	<MDL	<MDL
1,3-dichloropropane	mg/kg	<MDL	<MDL
1,4-dichlorobenzene	mg/kg	<MDL	<MDL
2,2-dichloropropane	mg/kg	<MDL	<MDL
2-chlorotoluene	mg/kg	<MDL	<MDL
4-chlorotoluene	mg/kg	<MDL	<MDL
4-Isopropyltoluene	mg/kg	<MDL	<MDL
Benzene	mg/kg	0.8	0.01
Bromobenzene	mg/kg	0.03	0.03
Bromochloromethane	mg/kg	<MDL	<MDL

Analyte	Units	Maximum Concentration	Minimum Concentration
Bromodichloromethane	mg/kg	<MDL	<MDL
Bromoform	mg/kg	0.02	0.02
Bromomethane	mg/kg	<MDL	<MDL
Butylbenzene	mg/kg	<MDL	<MDL
Carbon tetrachloride	mg/kg	<MDL	<MDL
Chlorobenzene	mg/kg	<MDL	<MDL
Chloroethane	mg/kg	<MDL	<MDL
Chloroform	mg/kg	<MDL	<MDL
Chloromethane	mg/kg	<MDL	<MDL
Cis-1,2-Dichloroethene	mg/kg	<MDL	<MDL
Cis-1,2-dichloroethylene	mg/kg	<MDL	<MDL
cis-1,3-Dichloro-1-propene	mg/kg	<MDL	<MDL
cis-1,3-dichloropropene	mg/kg	<MDL	<MDL
Dibromochloromethane	mg/kg	0.03	0.03
Dibromomethane	mg/kg	0.02	0.02
Dichlorodifluoromethane	mg/kg	<MDL	<MDL
Ethylbenzene	mg/kg	<MDL	<MDL
Hexachloro-1,3-butadiene	mg/kg	<MDL	<MDL
Hexachlorobutadiene	mg/kg	<MDL	<MDL
Isopropylbenzene	mg/kg	<MDL	<MDL
m & p-Xylene	mg/kg	<MDL	<MDL
m+p-Xylene	mg/kg	0.03	0.03
MTBE	mg/kg	<MDL	<MDL
n-butylbenzene	mg/kg	<MDL	<MDL
n-propylbenzene	mg/kg	<MDL	<MDL
o-Xylene	mg/kg	<MDL	<MDL
p-isopropyltoluene	mg/kg	<MDL	<MDL
Propylbenzene	mg/kg	<MDL	<MDL
sec-butylbenzene	mg/kg	<MDL	<MDL
Styrene	mg/kg	<MDL	<MDL
Tert-butylbenzene	mg/kg	<MDL	<MDL
Tetrachloroethene	mg/kg	<MDL	<MDL
Tetrachloroethylene	mg/kg	0.04	0.04
Toluene	mg/kg	<MDL	<MDL
Trans-1,2-Dichloroethene	mg/kg	<MDL	<MDL
Trans-1,2-dichloroethylene	mg/kg	<MDL	<MDL
trans-1,3-Dichloro-1-propene	mg/kg	<MDL	<MDL

Analyte	Units	Maximum Concentration	Minimum Concentration
trans-1,3-dichloropropene	mg/kg	0.02	0.02
Tribromomethane	mg/kg	<MDL	<MDL
Trichloroethene	mg/kg	<MDL	<MDL
Trichloroethylene	mg/kg	<MDL	<MDL
Trichlorofluoromethane	mg/kg	<MDL	<MDL
Vinyl Chloride	mg/kg	<MDL	<MDL
SVOCs			
1,2-Dinitrobenzene	mg/kg	<MDL	<MDL
1,3-Dinitrobenzene	mg/kg	<MDL	<MDL
1,4-Dinitrobenzene	mg/kg	<MDL	<MDL
1-Methylnaphthalene	mg/kg	<MDL	<MDL
2,3,4,6-Tetrachlorophenol	mg/kg	<MDL	<MDL
2,3,5,6-Tetrachlorophenol	mg/kg	<MDL	<MDL
2,4,5-Trichlorophenol	mg/kg	<MDL	<MDL
2,4,6-Trichlorophenol	mg/kg	<MDL	<MDL
2,4-Dichlorophenol	mg/kg	<MDL	<MDL
2,4-Dimethylphenol	mg/kg	<MDL	<MDL
2,4-Dinitrophenol	mg/kg	<MDL	<MDL
2,4-Dinitrotoluene	mg/kg	<MDL	<MDL
2,6-Dinitrotoluene	mg/kg	<MDL	<MDL
2-Chloronaphthalene	mg/kg	<MDL	<MDL
2-Chlorophenol	mg/kg	<MDL	<MDL
2-Methyl-4,6-Dinitrophenol	mg/kg	<MDL	<MDL
2-Methylnaphthalene	mg/kg	<MDL	<MDL
2-Methylphenol	mg/kg	<MDL	<MDL
2-Nitroaniline	mg/kg	<MDL	<MDL
2-Nitrophenol	mg/kg	<MDL	<MDL
3&4-Methylphenol	mg/kg	<MDL	<MDL
3-Nitroaniline	mg/kg	<MDL	<MDL
4-Bromophenylphenyl ether	mg/kg	<MDL	<MDL
4-Bromophenylphenylether	mg/kg	<MDL	<MDL
4-Chloro-3-methylphenol	mg/kg	<MDL	<MDL
4-Chloroaniline	mg/kg	<MDL	<MDL
4-Chlorophenylphenyl ether	mg/kg	<MDL	<MDL
4-Chlorophenylphenylether	mg/kg	<MDL	<MDL
4-Nitroaniline	mg/kg	<MDL	<MDL
4-Nitrophenol	mg/kg	1.1	1.1

Analyte	Units	Maximum Concentration	Minimum Concentration
Aniline	mg/kg	<MDL	<MDL
Azobenzene	mg/kg	<MDL	<MDL
Benzyl Alcohol	mg/kg	<MDL	<MDL
Bis(2-chloroethoxy)methane	mg/kg	<MDL	<MDL
Bis(2-chloroethyl)ether	mg/kg	<MDL	<MDL
Bis(2-chloroisopropyl)ether	mg/kg	<MDL	<MDL
Bis(2-ethylhexyl)phthalate	mg/kg	<MDL	<MDL
Bis-(dichloroethoxy)methane	mg/kg	<MDL	<MDL
Butylbenzyl phthalate	mg/kg	<MDL	<MDL
Butylbenzylphthalate	mg/kg	<MDL	<MDL
Carbazole	mg/kg	<MDL	<MDL
Dibenzofuran	mg/kg	<MDL	<MDL
Diethyl phthalate	mg/kg	<MDL	<MDL
Diethylphthalate	mg/kg	<MDL	<MDL
Dimethyl phthalate	mg/kg	<MDL	<MDL
Dimethylphthalate	mg/kg	<MDL	<MDL
Di-n-butyl phthalate	mg/kg	<MDL	<MDL
Di-n-butylphthalate	mg/kg	<MDL	<MDL
Di-n-octyl phthalate	mg/kg	<MDL	<MDL
Di-n-octylphthalate	mg/kg	<MDL	<MDL
Diphenylamine	mg/kg	<MDL	<MDL
Hexachlorobenzene	mg/kg	<MDL	<MDL
Hexachlorocyclopentadiene	mg/kg	<MDL	<MDL
Hexachloroethane	mg/kg	<MDL	<MDL
Isophorone	mg/kg	<MDL	<MDL
Nitrobenzene	mg/kg	<MDL	<MDL
N-Nitrosodimethylamine	mg/kg	<MDL	<MDL
N-Nitrosodi-n-propylamine	mg/kg	<MDL	<MDL
PCBs			
PCB 28 + PCB 31	mg/kg	<MDL	<MDL
PCB 52	mg/kg	<MDL	<MDL
PCB 101	mg/kg	<MDL	<MDL
PCB 118	mg/kg	<MDL	<MDL
PCB 153	mg/kg	<MDL	<MDL
PCB 138	mg/kg	<MDL	<MDL
PCB 180	mg/kg	<MDL	<MDL
PCB Congener 28	mg/kg	<MDL	<MDL

Analyte	Units	Maximum Concentration	Minimum Concentration
PCB Congener 52	mg/kg	<MDL	<MDL
PCB Congener 101	mg/kg	<MDL	<MDL
PCB Congener 118	mg/kg	<MDL	<MDL
PCB Congener 138	mg/kg	<MDL	<MDL
PCB Congener 153	mg/kg	<MDL	<MDL
PCB Congener 180	mg/kg	<MDL	<MDL
PCB (total of ICES 7)	mg/kg	<MDL	<MDL
Phenols			
Phenol	mg/kg	<MDL	<MDL
Phenol - Monohydric	mg/kg	1	1
Pentachlorophenol	mg/kg	<MDL	<MDL
Asbestos			
Detected	-	<MDL	<MDL
Asbestos (quantitative)	%	0.00382	0.00382

Table 10: Summary of pollutant concentrations in water

Analyte	Unit	Maximum Concentration	Minimum Concentration
Metals			
Aluminium, Dissolved	µg/L	710	-
Antimony, Dissolved	µg/L	2.4	-
Arsenic, Dissolved	µg/L	6.7	-
Barium, Dissolved	µg/L	1,000	-
Beryllium, Dissolved	µg/L	<0,1	-
Boron, Dissolved	µg/L	520	-
Cadmium, Dissolved	µg/L	0.1	-
Calcium, Dissolved	mg/L	980	-
Chromium, Total	µg/L	110	-
Chromium, Hexavalent	µg/L	<7	-
Copper, Dissolved	µg/L	11	-
Iron, Dissolved	µg/L	780	-
Lead, Dissolved	µg/L	20	-
Magnesium, Dissolved	mg/L	93	-
Manganese, Dissolved	µg/L	810	-
Mercury, Dissolved	µg/L	0.3	-
Molybdenum, Dissolved	µg/L	51	-
Nickel, Dissolved	µg/L	7.1	-

Analyte	Unit	Maximum Concentration	Minimum Concentration
Sodium, Dissolved	mg/L	320	-
Vanadium, Dissolved	µg/L	17	-
Zinc, Dissolved	µg/L	86	-
Inorganics			
pH	pH Units	13	-
Cyanide, Total	µg/L	410	-
Cyanide, Free	µg/L	86	-
Thiocyanate	µg/L	150	-
DOC	mg/L	24	-
Ammoniacal Nitrogen as N	mg/L	1.0	-
Chloride	mg/L	240	-
Nitrate as N	mg/L	1.1	-
Nitrite as N	mg/L	0.0	-
Salinity (Calculated)	%	3.3	-
Silicate as SiO2	mg/L	16	-
Sulphate as SO4	mg/L	1,500	-
Sulphur (free)	µg/L	460	-
Petroleum Hydrocarbons			
Aliphatic C5-C6	µg/L	20	-
Aliphatic C6-C8	µg/L	160	-
Aliphatic C8-C10	µg/L	210	-
Aliphatic C10-C12	µg/L	13	-
Aliphatic C12-C16	µg/L	330	-
Aliphatic C16-C21	µg/L	1,200	-
Aliphatic C21-C35	µg/L	230	-
Aliphatic C5-C35	µg/L	2,200	-
Aromatic C5-C7	µg/L	130	-
Aromatic C7-C8	µg/L	41	-
Aromatic C8-C10	µg/L	<0.1	-
Aromatic C10-C12	µg/L	1,200	-
Aromatic C12-C16	µg/L	4,600	-
Aromatic C16-C21	µg/L	1,100	-
Aromatic C21-C35	µg/L	140	-
Aromatic C5-C35	µg/L	7,200	-
TPH Ali/Aro Total	µg/L	9,400	-
PAHs			
Naphthalene	µg/L	4,900	

Analyte	Unit	Maximum Concentration	Minimum Concentration
Acenaphthylene	µg/L	69	-
Acenaphthene	µg/L	1,600	-
Fluorene	µg/L	540	-
Phenanthrene	µg/L	630	-
Anthracene	µg/L	55	-
Fluoranthene	µg/L	35	-
Pyrene	µg/L	21	-
Benzo(a)anthracene	µg/L	6.4	-
Chrysene	µg/L	5.9	-
Benzo(b)fluoranthene	µg/L	5.8	-
Benzo(k)fluoranthene	µg/L	2.6	-
Benzo(a)pyrene	µg/L	2.8	-
Indeno(1,2,3-c,d)pyrene	µg/L	2.6	-
Dibenzo(a, h)anthracene	µg/L	0.1	-
Benzo(g,h,i)perylene	µg/L	2.6	-
PAH Total	µg/L	7,800	-
Phenols			
Phenol	µg/L	3,400	-
VOCs			
Dichloro-difluoromethane	µg/L	<1	-
Chloromethane	µg/L	<1	-
Vinyl Chloride	µg/L	<1	-
Bromomethane	µg/L	<1	-
Chloroethane	µg/L	<1	-
Trichlorofluoromethane	µg/L	<1	-
1,1-dichloroethylene	µg/L	<1	-
Methylene Chloride	µg/L	<1	-
Trans-1,2-dichloroethylene	µg/L	<1	-
1,1-dichloroethane	µg/L	<1	-
Cis-1,2-dichloroethylene	µg/L	<1	-
2,2-dichloropropane	µg/L	<1	-
Bromochloromethane	µg/L	<1	-
Chloroform	µg/L	<1	-
1,1,1-trichloroethane	µg/L	<1	-
1,1-dichloropropene	µg/L	<1	-
Carbon tetrachloride	µg/L	<1	-
Benzene	µg/L	<1	-

Analyte	Unit	Maximum Concentration	Minimum Concentration
1,2-dichloroethane	µg/L	0	-
Trichloroethylene	µg/L	<1	-
1,2-dichloropropane	µg/L	<1	-
Dibromomethane	µg/L	<1	-
Bromodichloromethane	µg/L	<1	-
cis-1,3-dichloropropene	µg/L	<1	-
Toluene	µg/L	48	-
trans-1,3-dichloropropene	µg/L	<1	-
1,1,2-trichloroethane	µg/L	<1	-
Tetrachloroethylene	µg/L	<1	-
1,3-dichloropropane	µg/L	<1	-
Dibromochloromethane	µg/L	<1	-
1,2-dibromoethane	µg/L	<1	-
Chlorobenzene	µg/L	<1	-
1,1,1,2-tetrachloroethane	µg/L	<1	-
Ethylbenzene	µg/L	11	-
m+p-Xylene	µg/L	77	-
o-Xylene	µg/L	30	-
Styrene	µg/L	0	-
Bromoform	µg/L	<1	-
Isopropylbenzene	µg/L	0	-
1,1,2,2-tetrachloroethane	µg/L	<1	-
Bromobenzene	µg/L	<1	-
1,2,3-trichloropropane	µg/L	<1	-
n-propylbenzene	µg/L	<1	-
2-chlorotoluene	µg/L	0	-
1,3,5-trimethylbenzene	µg/L	14	-
4-chlorotoluene	µg/L	<1	-
Tert-butylbenzene	µg/L	<1	-
1,2,4-trimethylbenzene	µg/L	34	-
sec-butylbenzene	µg/L	<1	-
p-isopropyltoluene	µg/L	<1	-
1,3-dichlorobenzene	µg/L	<1	-
1,4-dichlorobenzene	µg/L	<1	-
n-butylbenzene	µg/L	<1	-
1,2-dichlorobenzene	µg/L	<1	-
1,2-dibromo-3-chloropropane	µg/L	64	-

Analyte	Unit	Maximum Concentration	Minimum Concentration
1,2,4-trichlorobenzene	µg/L	<1	-
Hexachlorobutadiene	µg/L	<1	-
1,2,3-trichlorobenzene	µg/L	<1	-
MTBE	µg/L	<1	-

Ongoing Management

During the lifetime of the permit, the Site Condition Report will be updated to take into account the following:

- any changes to the permitted activities or the Installation Boundary;
- any measures taken to protect the underlying land and groundwater;
- any pollution incidents that may have had an impact on land and associated remediation; and
- any soil, gas or groundwater monitoring (where undertaken).

At the end of the operational life of the Facility, the Site Condition Report will be updated to include for decommissioning and site closure. It will be demonstrated that all sources of pollution risk have been removed and whether decommissioning has had any impact on the land. Any required remedial works will be documented and incorporated into the report. A statement of site condition will be made to confirm that:

- the permitted activities have stopped;
- decommissioning is complete, and the pollution risk has been removed; and
- the land is in a satisfactory condition.

Conclusions

For the reasons stated within this report, it anticipated that there will be little risk of pollution associated with the Facility and its directly associated activities.

It is concluded that the remediation works conducted by STDC have suitably prepared the site for construction of the Facility.

During the Operational phase of the Facility, as required by the EP, any records which demonstrate how the land and groundwater have been protected will be maintained. This information will include inspection records of site infrastructure, pollution/incident reports, records of any ground investigations undertaken, and any monitoring records of soil, gas and/or water during the life of the permit. Where it is identified that pollution has occurred records will be maintained to demonstrate any pollution incidents that may have affected the land or groundwater. These records will be retained to be used at Permit Surrender.

Appendices

A Arcadis Remediation and Earthworks Verification Report – TV ERF Plot – Dorman Point, Teesworks – December 2021

B Arcadis Phase II ESA Report for STDC, November 2020

C Stantec Geo-Environmental and Geotechnical Ground Investigation Report – Tees Valley ERF Site, November 2020

D Stantec Phase 1 Geo-Environmental and Geotechnical Desktop Study – Tees Valley ERF, 2020

E JBA Environmental Statement Energy Recovery Facility, Grangetown Prairie, Redcar, December 2019

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