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ENVIRONMENT AND SUSTAINABILITY
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WASTE RESOURCE MANAGEMENT



ENDLESS ENERGY LIMITED

ENDLESS ENERGY FACILITY

SITE CONDITION REPORT

SEPTEMBER 2018

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Appendix 3	Thwaites Works, Airedale Road, Keighley: Stage 5 Remediation Design Supplementary Specification Report. Celtic Technologies Ltd, Report Reference: R811/04/2433, April 2004.
Appendix 4	Thwaites Gas Works, Airedale Road, Keighley: Phase I Shallow Source Removal, Factual Remediation Validation Report, Celtic Technologies Ltd, Report Reference: R896/05/2644, January 2006.
Appendix 5	Thwaites Gas Works, Airedale Road, Keighley: Phase II Groundwater Remediation Factual Validation Report, Celtic Technologies Ltd, Report Reference: R910/06/2845, March 2006.
Appendix 6	City of Bradford Metropolitan District Council. Letter dated 16th January 2006.
Appendix 7	Environment Agency. Letter dated 8th March 2006.

- Appendix 8 City of Bradford Metropolitan District Council. Letter dated 20th March 2006.
- Appendix 9 Keighley Clean Energy Project, Phase II Geo-Environmental Site Investigation Report, Wardell Armstrong, September 2015, (ref: SH11087-RPT-003).

DRAWINGS

Drawing No	Title	Scale
SH11087-025	Environmental Permit Boundary	1;2000
D811/2368/A1	Site Location	NTS

1 INTRODUCTION

1.1.1 This Site Condition Report (SCR) has been prepared by Wardell Armstrong LLP on behalf of Endless Energy Ltd. It supports an application for an environmental permit for the Endless Energy Facility at Gas Works Road, Keighley, Yorkshire, BD21 4LY.

1.1.2 The report satisfies the Environment Agency's requirements for a SCR by identifying:

- the environmental setting and land pollution history of the site;
- activities that will be conducted at the site that may lead to land pollution; and
- assessing the preventative measures that will be in place to protect the environment.

1.1.3 A desk study has been undertaken reviewing information available via the Environment Agency's website.

1.1.4 This information is used to describe ground conditions at the site and in particular, to set baseline conditions by identifying any polluting substances that may be present in or on land. Polluting substances that may be used or generated on site and pollution prevention measures are identified and described.

1.1.5 The facility will be operated in accordance with an appropriate Environmental Permit, the proposed boundary of which is shown on Drawing SH11087-025.

2 PERMITTED ACTIVITIES

2.1.1 The facility will accept residual, commercial and industrial wastes of a similar nature to unsorted municipal solid waste.

2.1.2 Under the Environmental Permitting (England and Wales) Regulations 2016, burning of non-hazardous waste with a capacity of 3 tonnes or more per hour is a listed activity under Schedule 1, Section 5.1, Part A (1) (b) *the incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.*

2.1.3 The potential hazardous materials that may be used on site include diesel fuel and calcium oxide and ammonia used within the air abatement plant. These raw materials will be stored in appropriate containers with secondary containment.

Incoming waste will be stored on impermeable pavement within the waste bunker and is processed quickly. No leachate will be allowed to enter soils or surface water drains.

3 SUBSTANCES PRODUCED AT THE FACILITY

- 3.1.1 The Facility will accept 148,800 tonnes of non-hazardous waste per annum.
- 3.1.2 Waste will be tipped directly into the waste bunker which is accessed in the Tipping Hall. From there it will be transferred to the hopper by a crane mounted grab. The hopper guides the waste onto the grate. The waste is initially dried on the first section of the grate, gasified and oxidised on the next section and complete their burn out and are cooled on the final grate section.
- 3.1.3 Site operations will produce a number of end products at the facility, detailed below:
- 3.1.4 Bottom ash produced by the incineration process will be discharged using vibrating and belt conveyors to an ash storage area. The vibrating conveyor will remove oversize objects via a 300mm grid, and metals will be removed using a magnetic separator. Ferrous metal, bottom ash and oversize areas will be stored at separate places within the Bottom Ash Hall. Further information is provided in the Operating Techniques document.
- 3.1.5 Gases containing hazardous compounds are produced as a result of the incineration of waste within the facility. These gases (flue gasses) are cleaned using lime and activated carbon. Gases are fed into bag filters, where particulates and used reagents are captured. These air pollution control residues (APCR) are transferred by conveyors to a dedicated silo for storage. Further information is provided within the Operating Techniques document.
- 3.1.6 Water will be used to quench bottom ash within a water bath, situated beneath the grate. Quench water will be recirculated and will be made up using boiler blowdown and wash water generated on site. Water supplying the quench water bath will be stored within a central tank. Small quantities of spent boiler water will be released to foul sewer. Further information is provided within the Operating Techniques document.

3.1.7 The facility will produce electricity but will be CHP ready and will produce a heat supply if and when a local user becomes available. Heat from the flue gasses generates steam within a boiler. This will be used by a steam turbine to produce electrical power via a generator. Electricity generated at the plant will be exported to the National Grid.

4 SITE LOCATION

4.1.1 The site location is shown on drawing D811/2368/A1. The land is designated as a brownfield site and covers an overall area of 3.5 hectares. The site is located on the edge of the town of Keighley, 12 kilometres to the north west of Bradford. The site is bounded by industrial developments to the west, the A650 dual carriageway to the north and east, and a railway line to the south. The land is generally flat, with pasture fields to the south of the site. Pasture and woodland lie to the north across the A650.

4.1.2 The site is located 15 metres south of the A650, which curves around the northern and eastern edges of the site. Access to the site is gained from Marley Road to the north. Across the road to the east lies a sewage works, along with woodland and pastoral fields. The River Aire is located 185 metres to the north, along with a large pastoral field and the Marley Activities and Coaching Centre. An industrial estate sits to the west of the site. Three gas holders from the previous gasworks border the site to the west, with a number of businesses also within the vicinity. 30 metres to the south lies the Airedale railway line, with the closest station at Keighley 1.3km to the west. A number of houses sit along "The Croft" road 70 metres to the south west.

5 SITE HISTORY

5.1.1 The site is a disused and partly demolished gasworks that was in operation for around 90 years. The site now is mainly empty and comprises areas of derelict hard standing, some disused buildings and areas of rough vegetation. The principle gasworks areas were within the western and north westerns areas of the site. Table 5:1 shows the history of the site, from 1851-present day.

Table 5:1 Site History		
Date	Site Land Use	Adjacent Land Use
1851	Site is shown as underdeveloped. Likely to be agricultural fields. A railway line is present along the southern boundary.	The area around the site is largely undeveloped and likely to be agricultural. Thwaites is seen 100m south west of the site. A number of sandstone quarries are noted to the south of the site. The River Aire is located to the north.
1890's	The site is developed as part of a gas works which is located to the west of the site. Two buildings, tanks and railway sidings are indicated in the west and central areas of the site. The eastern part of the site remains undeveloped. Marley Road is shown running along the northern boundary.	Keighley Corporation Gas Works is shown on and to the west of the site. Two gas holders are seen close to the western site boundary. The area to the west of the site is more developed.
1900's	A further building with connected sidings are shown along the southern boundary of the site	Pits and spoil heaps are shown to the north of the site alongside sidings which connect to the site. Keighley Corporation Sewage Works is seen 600m west.
1910's	No significant changes	Tanks and further sidings are shown to the immediate north of the site.
1930's	A small building is shown in the eastern area of the site	Allotment gardens are shown immediately east of the site and 30m north. An additional gas holder is seen to the west of the site. Significant development around Riddlesden to the north and around Keighley to the west. Significant expansion of the sewage works to the east of the site.
1960's	Some changes to layout on site are seen and the site is labelled as "Works." Chimneys and tanks are indicated	The area of land to the north of the site is shown as a sports ground and playing fields. A refuse tip is labelled in this area.
1970's	The site is cleared. Buildings, tanks and sidings are no longer seen. Three small buildings remain; two in the west and one in the eastern area.	No significant changes.
1980's	Site is largely vacant. Two small buildings and a substation are present in the west of the site. A cluster of small buildings is present in the east.	The Aire Valley road is constructed along the northern site boundary.
2000's	The buildings in the east are no longer shown.	No significant changes.
Present Day	Vacant Land	Gas works to the west, Aire Valley road to the north, open land to the east and a railway line to the south.

6 ENVIRONMENTAL SETTING AND CONDITION OF THE LAND AT PERMIT ISSUE

6.1 Geology, Hydrology and Hydrogeology

6.1.1 Geological, hydrological and hydrogeological information for the site was obtained from:

- BGS Geology of Britain Viewer; and
- "What's in my Backyard" (Environment Agency website www.environment-agency.gov.uk/wiyby).

- 6.1.2 The site is underlain by Quaternary alluvial fan deposits (with an age of 3 million years), with a thickness of 16-18m. Quaternary Boulder clay (with an age of 2 million years) lies beneath the alluvium. Underlying the clay is Upper Carboniferous age Millstone Grit, which is locally classified as a Major Aquifer. A fault is present to the north of the site.
- 6.1.3 The site sits upon made ground consisting of a heterogeneous mix of brick, concrete, spent oxide, wire, clinker, ash, tarmac and coke within a sand and gravel matrix. The average depth of the made ground is 1.5-2m below ground level.
- 6.1.4 A thick fine-grained alluvium aquifer underlies the site and surrounding area. This is classed as a Secondary A type aquifer. Although Secondary A types do not produce large amounts of water for abstraction, they are of importance for local supplies and may supply base flow to rivers.
- 6.1.5 There are 32 groundwater abstraction licences that are held within 2km of the site. The closest is operated by Celtic Technologies and is related to the site itself, although it is no longer used as remediation work for which it was utilised is complete. The nearest active abstraction is 661m to the west of the site and is for general use in textiles and leather. The abstraction is from Millstone Grit.
- 6.1.6 The site is not in an area that could be affected by coal mining. The site does not lie within a source protection zone.

Surface Water Features

- 6.1.7 The closest surface water feature to the site is the River Aire, which sits 185m to the north. A number of streams branch off from the river, and pose very minor, localised flooding hazards at the northern and eastern edges of the site. The main flood risks from the River affect the land on the opposite side of the A650, and the industrial estate 400m to the west.
- 6.1.8 There are 11 surface water abstraction licenses within 2km of the site. The closest is 718m to the west of the site and is operated by Leach and Thomson Ltd, which is licensed to abstract 3300m³ of surface water for other industrial/commercial/public services and general cooling purposes.

7 OTHER ACTIVITIES IN THE VICINITY OF THE SITE

7.1.1 The site lies near to a sewage works plant that is located 600m to the east. 450 metres to the north is a cricket club.

7.1.2 A number of historic landfills sit within 2km of the site, as shown in Table 7:1.

Table 7:1: Table Showing Former Landfills Within 2km of the Site			
Former Landfill	Distance from Site	Dates in Operation	Wastes Accepted
Royd Works	2km north west	1979-1988	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste. Industrial waste from a factory or industrial process. It excludes waste from mines, quarries and agricultural wastes.
Field off Royd Way	2km north west	1978-1980	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste.
Land Adjacent to Royd Way Trailer Park	2km north west	1988	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste.
Grange Middle School	1.4km north west	1983-1998	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste.
Land Fronting Harden Road	1.4km south west	1976-1977	inert wastes such as glass, concrete, brick, tiles, soils, stones
Low Fold Farm Sites A and B	1.4km south west	1978-1971	inert wastes such as glass, concrete, brick, tiles, soils, stones
Disused Quarry	2km south west	1987-1998	inert wastes such as glass, concrete, brick, tiles, soils, stones
Moorside Farm	2km south	1982-1987	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste.
Parkwood Boiler Works	800m south west	1977	Special waste, waste that has hazardous properties and is defined in the Special Waste Regulations 1996. Such properties may be flammable, irritant, toxic, harmful, carcinogenic or corrosive
The Former Parkwood Greyhound Racing Station	850m north west	1980-1987	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste.
Land off Ilkley Road	1.2km north	1990-1998	Inert wastes such as glass, concrete, brick, tiles, soils, stones.
North of Marley Road Sewage Treatment Works	200m north east	1986-1989	Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste. Liquids / sludge, Industrial wastewater, sewage sludge

Table 7.1: Table Showing Former Landfills Within 2km of the Site

Former Landfill	Distance from Site	Dates in Operation	Wastes Accepted
			and chemical wastes mixed with municipal solid waste. Industrial waste from a factory or industrial process. It excludes waste from mines, quarries and agricultural wastes. Special waste, waste that has hazardous properties and is defined in the Special Waste Regulations 1996. Such properties may be flammable, irritant, toxic, harmful, carcinogenic or corrosive
Land at Bradford Road	1km east	1985-1990	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste. WASTE CONTROL MEASURE – Gas control
Marley Hill	1.3km south east	1986-1998	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste. WASTE CONTROL MEASURE – Gas control
Hutler Hill	1.4km south east	(dates unknown)	Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste. Liquids / sludge, Industrial wastewater, sewage sludge and chemical wastes mixed with municipal solid waste
Crossflats Link Road	1.5km east	1987-1998	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Commercial wastes, waste from premises used wholly or mainly for trade, business, sport, recreation or entertainment. Excludes household and industrial waste. Liquids / sludge, Industrial wastewater, sewage sludge and chemical wastes mixed with municipal solid waste.
Land to the South West of Phoenix Foundry	1.6km east	1980-1988	Inert wastes such as glass, concrete, brick, tiles, soils, stones.
Repton Foundry	1.6km east	1933-1973	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Industrial waste from a factory or industrial process. It excludes waste from mines, quarries and agricultural wastes.
Castlefields Industrial Estate	1.9km south east	1991-1998	Inert wastes such as glass, concrete, brick, tiles, soils, stones.
Carrick and Fosters	2km south east	1933-1974	Inert wastes such as glass, concrete, brick, tiles, soils, stones. Industrial waste from a factory or industrial process. It excludes waste from mines, quarries and agricultural wastes.

7.1.3 The closest landfill site that is currently active is “Bingley Brickworks,” which is located 3.2km east of the Keighley site. The site is operated by Autospares (Bingley) Ltd, and the Licence type is A6: Landfill taking other wastes.

8 POLLUTION

8.1.1 NAPL (Non-aqueous phase liquids) was present on site as a result of the previous gasworks. Due to the presence of such compounds remediation was undertaken. Overall 60,000 litres of NAPL was removed from the ground surface and recycled. All

above ground structures associated with the site's former use as a gasworks have been removed as part of remediation and clean-up efforts. One brick building structure remains on site.

8.1.2 No major pollution incidents have occurred on site specifically.

8.1.3 Within 2km of the site a number of pollution incidents have occurred (not related to the site):

- In 2003 a "Major" incident occurred 1.8km south west of the site. The cause of the pollution was a sewage release, which affected water at the locality;
- In 2002 a "Significant" incident occurred at the same locality as previous. The cause was a release of "specific waste materials" that caused significant impacts upon land;
- In 2003 a "Significant" incident occurred 1.2km west of the site. The cause of the event was a release of "specific waste materials" that impacted significantly upon land;
- In 2003 1.9km south west of the site a "Significant" pollution incident occurred. This caused minor impacts to land, and significant impacts to water. The cause of the incident was "General Biodegradable Materials and Waste"; and
- In 2001 1.9km north west of the site a "Significant" pollution incident occurred. This had significant impacts upon to land and was caused by Organic Chemicals / Products.

8.1.4 Air pollution has occurred within the vicinity of the site (but was not caused by activities at the site).

8.1.5 From 2006-2012, the Marley sewage works (located 750m to the east of the site) operated by Yorkshire Water Services Limited produced <10,000 tonnes of Carbon Dioxide. From 2006-2012 the sewage works also produced Nitrogen Oxides, with releases <100 tonnes and Methane releases of <10,000 tonnes. Emission limits to air have not been exceeded at the site.

8.1.6 Since 2001 the sewage plant has released a variety of chemicals into the river. Numerous chemicals and metals have been flagged as being released between 2001-2012, including arsenic, lead, phosphorous, copper, nickel and mercury. Releases of harmful compounds are in small amounts that can be diluted by the river, and thus

do not cause harm to the river. Emission limits to water have not been exceeded at the site.

9 IDENTIFICATION OF HAZARDOUS SUBSTANCES

9.1.1 A number of potentially polluting substances will be used or produced at the site, as detailed in Table 9:1. Control measures to protect the environment, use of materials within site processes and quantities of materials used are also included within the table.

9.1.2 Substances that are highlighted are considered to be Relevant Hazardous Substances, as defined under Article 3 of Regulation (EC) No 1272/2008 on the classification, labelling and pack aging of substances and mixtures (CLP Regulation) which as a result of their hazardousness, mobility, persistence and biodegradability (as well as other characteristics), are capable of contaminating soil or groundwater and are used, produced and/or released by the installation.

Table 9:1 Potentially Polluting Substances Stored or Generated at the Site

Chemical Handled	Characteristics and Toxicity				Site Specific Characteristics		
	Substance	State	CAS Number	Risk Phrases	Environmental Fate and Behaviour	Quantity	Storage Arrangements
Gas Oil	Liquid	64741-57-7	R45	Potential for toxic effects if released to the aquatic environment. May contaminate ground and soils.	80m ³	Stored in suitable tanks with a bund capable of holding 110% of the tank contents, to provide secondary containment. Tertiary containment provided by impermeable site surfacing and sealed drainage system.	Use as fuel for [supplementing the incineration process] the black start diesel generator. Inspection and maintenance schedule to ensure that tank and bund are kept in working order. Checks on fuel level in tank prior to delivery of diesel. Valves/pipes contained in bund. Deliveries supervised. Spill kit provided on site.
Lubricating Oils and Grease	Liquid / Solid	93572-43-1		Potential for toxic effects if released to the aquatic environment. Potential for contamination of soils on land.	2000 litres Stored: suitable can	Quantity stored in appropriate containers with secondary containment for liquids. Site provided with impermeable pavement.	Used for plant maintenance. Spill kits available in case of spillage.
Hydraulic Oils	Liquid			Potential for toxic effects if released to the aquatic environment. Potential for contamination of soils on land.	2000 litres Stored: suitable can	Quantity stored in appropriate containers with secondary containment for liquids. Site provided with impermeable pavement.	Used for plant maintenance. Spill kits available in case of spillage.
Powdered Activated Carbon	Powder			Potential for dust nuisance if released to air.	70m ³ Stored: Silo 80 m ³ gross total	Stored in sealed silo.	Used for pollution abatement in flue gas treatment. Level monitoring in silo to prevent overfilling.
Process Water	Liquid			Potential for toxic effects if released to water due to heavy		Process water will be collected in a central tank for use in the bottom ash	Generated by site processes. Small amounts may be discharged to foul

Table 9:1 Potentially Polluting Substances Stored or Generated at the Site

Chemical Handled	Characteristics and Toxicity				Site Specific Characteristics			
	Substance	State	CAS Number	Risk Phrases	Environmental Fate and Behaviour	Quantity	Storage Arrangements	Delivery Storage and Use Details
					metals. Suspended solids may also be present.		quench. Process water used within the bottom ash quench will be recirculated.	sewer.
Chemicals for Boiler Water Treatment	Liquid				Potential irritants. Possibly toxic to aquatic life.	250 kg bag 200l can	Stored within suitable bags or cans.	Essential to proper operation of plant, preventing a build-up of salts within the boiler. No alternative available.
APCR	Powder			Potential for R35, R36, R37, R54 or R55 depending upon residential lime and heavy metals	May contain heavy metals and other leachate contaminants. Risk of dust nuisance.	250m ³	Stored within a dedicated silo.	Generated by flue gas treatment. Collected in sealed tankers and taken to a permitted facility for disposal. Levels in the silo will be monitored to prevent overfilling.
Bottom Ash	Solid				Potential to contain leachable metals.	4 days	Stored in the bottom ash hall on an impermeable pavement with sealed drainage.	Bottom ash will remain within the bottom ash hall prior to removal from the site.
Quicklime (Calcium Oxide)	Powder	1305-78-8			Potential for dust nuisance and impacts on human health if released to air.	70m ³ Stored: Silo 80 m ³ gross total	Stored within a dedicated silo.	Used for pollution abatement in flue gas treatment. Level monitoring in silo to prevent overfilling.

Site Investigation

9.1.3 The following site investigations have been undertaken at the site:

- Thwaites Works, Airedale Road, Keighley: Factual Site Investigation Report.
- Celtic Technologies Ltd, Report Reference: R811/03/2368, November 2003.
- Thwaites Works, Keighley: Risk Assessment and Outline Remediation Strategy.
- (Draft). Celtic Technologies Ltd, Report Reference R811/03/2269, January 2004.
- Thwaites Works, Airedale Road, Keighley: Stage 5 Remediation Design Supplementary Specification Report. Celtic Technologies Ltd, Report Reference: R811/04/2433, April 2004.
- Thwaites Gas Works, Airedale Road, Keighley: Phase I Shallow Source Removal, Factual Remediation Validation Report, Celtic Technologies Ltd, Report Reference: R896/05/2644, January 2006.
- Thwaites Gas Works, Airedale Road, Keighley: Phase II Groundwater
- Remediation Factual Validation Report, Celtic Technologies Ltd, Report Reference: R910/06/2845, March 2006.
- City of Bradford Metropolitan District Council. Letter dated 16th January 2006.
- Environment Agency. Letter dated 8th March 2006.
- City of Bradford Metropolitan District Council. Letter dated 20th March 2006.
- Keighley Clean Energy Project, Phase II Geo-Environmental Site Investigation Report, Wardell Armstrong, September 2015, (ref: SH11087-RPT-003).

9.1.4 Copies of the investigation reports and letters are attached as appendices 1-9 to this document.

9.1.5 A summary of the findings of the reports is provided in the Remedial Strategy document.

9.1.6 Site investigations were carried out over 4 stages between September 1997 and October 2003. A total of 120 trial pits (to a maximum depth of 4.0m bgl), 29 boreholes (to a maximum depth of 21.75m bgl) and 4 hand dug pits were excavated over the site area during these investigations.

9.1.7 The site investigations identified significant contamination within historical structures and in the soil (made ground and natural) beneath these structures.

Below ground tanks were found to contain free phase tar and significant volumes of spent oxide was identified within backfilled foundations in the southern central part of the site. TPH, benzene, phenols and naphthalene was also encountered.

9.1.8 Groundwater encountered within structures and beneath the site was also contaminated.

9.1.9 A Risk Assessment and Outline Remediation Strategy report was prepared by Celtic Technologies Ltd in January 2004. The results of this assessment indicated that with protective measures in place, the risk to human health from the contaminants on site is low. Target concentrations for groundwater modelled contaminants were decided, in addition to a remediation strategy.

9.1.10 Remediation works were undertaken by Celtic Technologies in 2004, as described in Section 8. The remedial strategy demonstrated a reduction in NAPL mass. A High Vacuum Extraction system was installed incorporating 88 recovery wells, ATEX rated plant, off gas treatment by Catalytic Oxidizers (CATOX) and a water treatment system.

9.1.11 Remediation of soils at the site commenced during April 2004. A total of 44,256m³ of material (including made ground, tar tanks, spent oxide and process pipes) was excavated from the site during remediation works. Generally the remediation targeted the shallow soils from <1-3m bgl although deeper structures were removed in places. A methodology for dealing with asbestos contaminated material was agreed with the regulators, and a screening value for Benzo(a)pyrene (BaP) was also raised.

9.1.12 Groundwater was encountered at approximately 5m bgl within alluvium. Remediation of groundwater was carried out by High Vacuum Extraction (HVE) across the gas works process plant area. The HVE was designed to recover groundwater, soil vapour and NAPL from the alluvium and was targeted at the groundwater smear zone.

9.1.13 The aim of the groundwater remediation was to remove contaminant mass from the alluvium. A total of 87 treatment wells were drilled and connected to two HVE systems on site. The system was operated for a period of approximately 8 months

from March 2005 to November 2005. During the remedial works 5,333m³ of groundwater was processed through the water treatment plant. 67.254m³ of NAPL was recovered. An estimated 8,773kg of hydrocarbon mass was recovered in vapour phase and removed by catalytic oxidation, and an estimated 592kg of hydrocarbons was recovered through this process. The remediation of the groundwater on site achieved its aims of mass removal and betterment, with a significant proportion of the contaminant mass removed.

9.1.14 A 2015 Site Investigation undertaken by Wardell Armstrong indicates that the site is unlikely to pose a significant risk to long term human health in a future industrial land use scenario. Low concentrations of asbestos fibres were identified within made ground across the site, although there is no significant risk to human health if not exposed or near the surface.

9.1.15 Details of future remediation strategies for land at the site are provided in the Remedial Strategy document.

10 CONCLUSIONS

10.1.1 The proposed activities to be undertaken do not present a significant risk of pollution or harm to land or controlled waters if well controlled. Activities will be housed within buildings, which will limit emissions of dust and ash that could potentially cause pollution. Flue gases and ash will be cleaned in order to remove harmful compounds such as acids and heavy metals. An impermeable base with sealed drainage will aid in protecting groundwater and soils.

10.1.2 Despite these preventative measures, regular monitoring of the site should be maintained. Infrastructure such as fuel tanks should be checked regularly. Dust and odour should also be monitored at regular intervals.

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