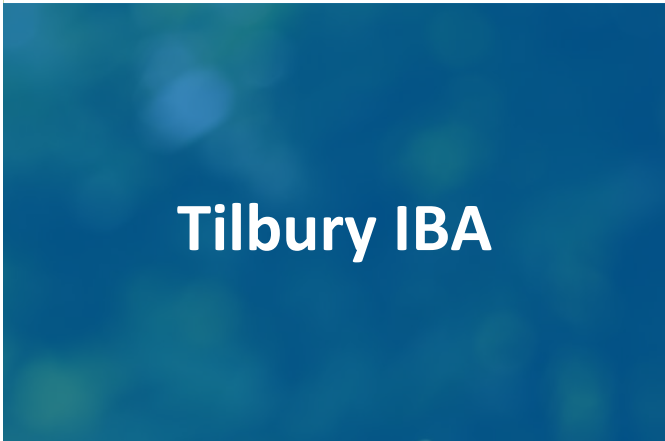


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Blue Phoenix Limited

Site Condition Report

Document approval

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1 Introduction

An Environmental Permit (EP) for the operation of the Tilbury IBA Facility (the Facility) was granted by the Environment Agency (EA) on 25 June 2012. Since it was granted, the EP has been subject to three variations. The most recent variation was granted on 6 February 2020, where the named operator was changed to Blue Phoenix.

Blue Phoenix is applying to the Environment Agency (EA) to vary the EP to increase the capacity of the Facility. The increase in capacity will require an additional area of land, adjacent to the Facility, to be incorporated into the installation boundary. This will require demolition of existing buildings and structures, construction of new access and loading ramps, and the construction of a surface water attenuation and process water storage lagoon.

A detailed description of the IBA processing activity is provided in section 2 of the supporting information.

1.1 The Objective

This Site Condition Report summarises the existing ground conditions for the land within the Installation Boundary (the 'Site') and describes the setting for the Facility at the time of applying for the EP. This report draws on the following sources of background information which are provided as Appendices:

- Site Condition Report submitted with the original application, 2008 (Appendix A);
- Groundsure Report, including Phase 1 Geo-Environmental Assessment Report, July 2023 (Appendix B);
- Phase 2 Geo-Environmental Assessment Report – Part 1 Environmental Assessment, November 2023 (Appendix C); and
- Report on Ground Investigation for New Shed, Western Peninsular Tilbury Free Port, 1994 (Appendix D).

The report:

- a. considers the existing and proposed IBA processing activities carried out at the Site;
- b. identifies any land contamination risk the activities pose that may be linked to previous pollution events; and
- c. provides a baseline for the existing ground conditions.

The report will present details on the following:

- a. geology;
- b. hydrogeology;
- c. hydrology and flooding;
- d. historical and present land use; and
- e. existing ground conditions.

Plans and drawings can be found in Appendix A of the Supporting Information, including but not limited to the following:

- site location plan;
- installation boundary drawing;
- emission points drawing;
- IBA processing schematics; and

- water flow schematic.

2 Site details

2.1 Applicant

The Blue Phoenix Group operates incinerator bottom ash (IBA) processing installations globally and helps the Energy-from-Waste sector with alternative sustainable solutions for ash residues.

The great majority of the incinerator bottom ash consists of inert brick, rubble, glass, ceramics, and stone. With over 20 years of experience processing and handling IBA aggregates (IBAA), the Blue Phoenix Group believes that IBAA deposits can be better used and offer an alternative manufactured aggregate suitable for many applications.

The processing of IBA provides a valuable supply of non-ferrous and ferrous metals for further recycling and an aggregate suitable for use in Construction. IBAA (Incinerator Bottom Ash Aggregate) is a true demonstration of Circular Economics and it is a product that is a sustainable alternative to natural aggregates.

In the UK, Blue Phoenix operates IBA recycling facilities throughout the country and specializes in the production of manufactured aggregates. Blue Phoenix UK assures the production of a constant quality aggregate from a daily changing and inhomogeneous IBA flow while assuring maximized metal recoveries.

2.2 Site address

The Site address is:

Tilbury IBA Facility
Port of Tilbury
Tilbury
Essex
RM18 7EH

2.3 National grid reference

NGR for the centre of the Facility is 563067, 175910.

2.4 Site location

The Site covers an area of approximately 5.6 hectares and is accessed through Tilbury Docks via St Andrew's Road (A1089) to the north-east of Site.

The Site boundaries are open to the adjacent docks to the north, east and south. To the west is the watercourse of the Docks. The boundaries of the installation to the north, east and south are formed by steel palisade fencing and is open to the west. In the north and east, the boundaries are predominantly formed by the walls of buildings on Site.

The Site is generally flat with no formal areas of vegetation or soft landscaping present. The western side of the Site, adjacent to the watercourse is flat, and the eastern boundary slopes gently toward the northeast.

The existing installation covers an area approximately 450m long by 70m wide parallel to the Quay known as Berths 36 and 38. The Berths are either side of a centrally located IBA sorting building and product skip area. Attenuation lagoons are located at either end of the Site to capture rainwater and/ or leachate runoff from the adjacent ash reception areas.

The increase in capacity will require an additional area of land, adjacent to the Facility, to be incorporated into the installation boundary. This will require demolition of existing buildings and structures, construction of new access and loading ramps, and the construction of a surface water attenuation and process water storage lagoon.

3 Condition of land at permit issue

3.1 Environmental setting

3.1.1 Geology

As shown within Phase 1 and Phase 2 Geo-Environmental reports in the appendices, the solid geology within the installation boundary is as summarised in Table 3-1:

Table 3-1: Site Geology

Lithology	Description
Artificial Ground	Asphalt and concrete over loose gravelly sands with varying amounts of clay and gravel of chert, concrete, brick and rare clinker.
	Very soft to soft organic clays with varying amounts of silts, peat and gravels of brick, coal, concrete and rare glass fragments.
Superficial Deposits	The superficial deposits underlying the Site are loose river estuarine sediments comprising Alluvium and Thames Valley Gravels.
	The Alluvium deposits comprise very loose slightly clayey gravelly Sand overlying very soft to firm, damp organic Clay with varying amounts of silt, gravels of chert, sand and fibrous peat.
	The Thames Valley Gravels are composed of medium dense to very dense sandy Gravel and gravelly Sand.
Bedrock	The bedrock beneath the Site is the Chalk Group Formation including: <ul style="list-style-type: none"> • Lewes Nodular Chalk Formation • Seaford Chalk Formation • Newhaven Chalk Formation

3.1.2 Hydrogeology

As shown within the Groundsure Report, the hydrogeology within the installation boundary is summarised in Table 3-2 below:

Table 3-2: Site Hydrogeology

Lithology	Description
Superficial Deposits	Underlying the Site is a Secondary Undifferentiated Aquifer within the superficial deposits. It is not possible to attribute category A or B to the aquifer.

Lithology	Description
Bedrock	A Principal Aquifer lies beneath the Site within the Chalk Group Formation. This geology has high intergranular and/ or fracture permeability, providing a high level of water storage and may support water supply/ river base flow on a strategic scale

3.1.3 Hydrology and Surface Waters

As shown in the Groundsure Report, the Site is adjacent to the man-made Tilbury Docks watercourse and is approximately 500m from the River Thames.

The EA's Risk of Flooding from Rivers and the Sea database indicate that the risk of flooding to be very low (less than 1 in 1000 chance of flooding in any given year).

As shown within the Groundsure Report, the Site is indicated to lie within both EA designated Zones 2 and 3 flood plains.

The British Geological Survey (BGS) indicates the potential for groundwater flooding at Site with a moderate to high-risk rating.

3.2 Pollution History

3.2.1 Site history

As shown within the historical mapping provided in the Groundsure Report, the site history (based on Ordnance Survey mapping data) is summarised in Table 3-3:

Table 3-3: Site History

Feature	Years	Description
Dockyard/ warehouses	1895 – 1966	The earliest development in the area sees the construction of the 'Tilbury Docks' between July 1882 and April 1886. Mapping was first completed in 1895. The docks remained substantially the same with the removal and construction of warehouses up until 1966 when a large expansion of the Tilbury Docks was initiated.
	1966 – early 1970s	The expansion was completed in the early 1970s with warehouses erected on the land within the installation boundary and on land immediately to the south.
	1993 - 2001	Further onsite warehouse expansion undertaken throughout Tilbury Docks.
	2000s – 2010s	Warehouses were constructed and demolished throughout the 2000s and 2010s with the existing site layout being retained.
Railway lines	1870 – 1895	A number of railway line were built, connecting the docks/ warehouses with the main 'London, Tilbury & Southend Railway' line which run in a north-west to south-east direction.

Feature	Years	Description
	1916 – 1938	The layout of the railway lines are adjusted as warehouses are built and demolished
	1955 – 1966	Two lines are constructed running through the Site from the north-western to the south-eastern end.
	1971	All railway lines are demolished.

3.2.2 Historical Incidents

The Groundsure Report identifies no records of historical pollution incidents associated with the land within the installation boundary.

There are 2 recorded pollution incidents within 250m of Site in 2001 and 2003 where Category 3 (Minor) impacts to water and air, and water and land were caused respectively.

3.2.3 Historical Pollution Potential

The Groundsure Report contains no records of 'contaminated land' within 250m of the land within the installation boundary except for the two incidents outline in 3.2.2.

However, given the industrial history of the Site, there is potential for historical pollution to be present in the ground underlying the installation boundary.

3.2.4 Licenses and authorisations

As shown within the Groundsure Report, there is Part A Environmental Permit held by Blue Phoenix on land within the installation boundary, this was originally issued in 2016 and has been updated/ revised twice. The permits enable the recovery or a mix of recovery and disposal of non-hazardous waste, including treatment of slags and ashes. The license was originally issued in 2016 and is still recorded as effective.

3.2.5 Groundwater Abstractions

As shown in the Groundsure Report, there are not any groundwater water abstractions for potable water purposes within 2000m of the installation boundary.

3.2.6 Surface Water Abstractions and Discharges

As shown in the Groundsure Report, there are not any surface water abstractions associated with the land within the installation boundary.

The closest surface water abstraction point is over 1,300 m from installation boundary in a Southwest direction at a mineral washing plant. There are no known potable water abstraction points with 2000m of Site, and no known active licensed discharge points within 500m of Site.

3.2.7 Other

As shown within the Groundsure Report, the UXO risk is considered as 'moderate' with a recorded discovery in August 2020 which required the attendance of the bomb disposal squad. The Groundsure Report recommends the completion of a Stage 2 Detailed Risk Assessment in order to

further assess the risk to proposed works. In lieu of a Detailed UXO Assessment, on-site support for any planned ground works is recommended.

4 Permitted activities

4.1 Activities

The permitted activities will consist of the Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) and directly associated activities listed in Site Geology Table 4-1:

Table 4-1: Scheduled and Directly Associated Activities

Type of Activity	Schedule 1 Activity	Description of Activity
IBA Facility	Section 5.4 Part A(1) (b) (iii) – Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day involving the treatment of slags and ashes.	R5: Recycling/reclamation of other inorganic materials R4: Recycling/reclamation of metals and metal compounds
Directly Associated Activities		
Directly Associated Activities	Storage of waste	R13: Storage of wastes pending any of the operations numbered R1, R4 and R5 (excluding temporary storage, pending collection, on the site where it is produced).
Directly Associated Activities	Raw material storage – storage of raw materials	From the receipt of raw materials to despatch for use within the facility.
Directly Associated Activities	Surface water collection and storage – Collection and storage of contaminated surface water	From the collection of uncontaminated roof and site surface water from non-operational areas to re-use within the facility.

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 delivery and transfer details, and secondary and tertiary containment systems associated with the storage of these materials are presented in the table below.

Table 4-2: Raw material containment facilities – Primary raw materials

Material	Delivery details	Transfer for storage details	Storage containment details
Fuel oil	Delivered using tanker.	Unloading from delivery vehicle tanker into storage tank using sealed pipework.	Primary: Tank Secondary: Bunding (110%)

Material	Delivery details	Transfer for storage details	Storage containment details
		Storage tanks located with a dedicated concrete sump or other bunding. Hardstanding in this area will also have links to process drainage system.	Tertiary: Hardstanding and contained drainage.

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).

4.2 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 air, land and water pollution that could occur due to 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 fugitive emissions or accidents.

The Environmental Risk Assessment identifies that the operation of the Facility will require the storage of various chemicals, which could pose a risk to the land, groundwater and/or surface water during operations. All process areas, loading/unloading areas, materials handling areas and roadways will be covered in concrete and/or tarmac hardstanding. As such, it is regarded that there will be little risk of ground/groundwater contamination during normal operation of the Facility.

Therefore, it is concluded that the Facility will pose little risk of pollution. However, periodic soil and groundwater samples at the Site will be undertaken to fulfil the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the Industrial Emissions Directive (IED).

5 EC Guidance: Stage 1 – 3 Assessment

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

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

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

The full stage 1 – 3 assessment of the primary raw materials and residues handled at the Facility is presented in Table 5-1: The substances handled at the Facility are identified in the context of their hazards and theoretical pollution risk, with justification as to whether the substance is of concern or not in the context of the Site.

Table 5-1: Stage 1 - 3 assessment of materials at the Facility

Stage 1: Chemicals handled	Stage 2: Chemical characteristics and toxicity							Stage 3: Site specific characteristics			Stage 4: Site specific risk
Substance	Concentration / State	CAS No.	EC/List No.	Hazard statements (CLP)	Hazard substance under Stage 2?	Environmental fate / behaviour	Potential Pollution Risk?	Approx. Quantity Stored	Storage Arrangements/ Containment	Delivery, Storage and use details	Comments/ Chemical of concern?
Unburnt, oversized or unsuitable materials	Solid	N/A	N/A	N/A	No	Limited solubility, potential for the presence of heavy metals	No	50,000 tonnes	For unacceptable wastes which cannot be re-combusted in the ERF there will be a quarantine area prior to the waste being removed to a suitably licensed facility within 7 days.	Stored in quarantine area and removed from Site in a timely manner.	Impermeable hardstanding with contained drainage.
Processed IBAA	Solid	N/A	N/A	N/A	No	Limited solubility, potential for the presence of heavy metals	No	Fines - 100,000 tonnes Coarse – 40,000 tonnes	External stockpiles in storage yard. Runoff from washdown and process areas to be collected in sealed drainage system and reused onsite in ash processing. Any excess water would be directed to the ERF wastewater pit.	Processed IBA moved from process building to stockpiles via front-end bucket, for maturation storage period. IBAA leaving the Site to be removed from the Facility via enclosed/sheeted vehicles.	IBA handling will be undertaken on areas of hardstanding with contained drainage. Transfer off-site will be in enclosed/covered vehicles.
Extracted metals	Solid	N/A	N/A	N/A	No	Limited solubility, potential for the presence of heavy metals	No	1,000 tonnes	Containers in storage yard.	Removal via vehicles for recycling.	Storage in metal containers and prompt removal from Site. Site process areas fitted with hardstanding and contained drainage.
Diesel	Liquid	68334-30-5	269-822-7	H226, H304, H373, H315, H332, H351, H411, H350	Yes	Insoluble, high toxic effects, volatile	Yes	10,000 litres	Double skinned tank with built in bunding to 110%	Delivery in dedicated road tankers, unloaded into storage tank via flexible hose, direct feed into burners.	Periodic inspections of tank undertaken (preventative maintenance), refuelling undertaken on areas of hardstanding with contained drainage, overfill protection on tank.

6 Previous Contamination and Site Investigations

6.1 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 [RHS] 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.

Blue Phoenix has procured a Phase 2 Geo-environmental investigation which consists of contamination testing of both soil and groundwater samples. Refer to in Appendix D. This report identifies a slight hydrocarbon odour in one borehole; however, no visual evidence was observed and a slight putrid odour in another borehole thought to be attributed to decaying organic matter. Groundwater samples from two boreholes displayed slight olfactory signs of potential hydrocarbon contamination however no visual contamination was observed.

Phase 2 Geo-Environmental Assessment Report, November 2023A Phase 2 Geo-Environmental Assessment Report – Part 1 Environmental Assessment, November 2023, document number LN/C5441/12644, has been undertaken to inform the existing ground conditions prior to the re-development of the Facility.

The site works were completed on 6 - 7 November 2023 and comprised of eight window samples taken to a maximum depth of 5.00m bgl, and a single cable percussive borehole to a depth of 21.8m bgl. Samples were taken at regular intervals to facilitate a range of laboratory tests to be undertaken.

Gas and groundwater monitoring standpipes were installed into 4 of the boreholes with varying response zones.

6.2 Baseline reference data

6.2.1 Soil Contamination Monitoring & Results

A summary of the soil pollutant concentrations reported in the Site Investigation is presented in Table 6-1.

Table 6-1: Summary of pollutant concentrations in soil

Analyte	Min Value (mg/kg unless stated)	Max Value (mg/kg unless stated)
Moisture Content	8.10	41.00
Soil Organic Matter	1.80	9.30
pH	7.60	11.20

Analyte	Min Value (mg/kg unless stated)	Max Value (mg/kg unless stated)
Water Soluble Sulphate (2:1 Leachate Equivalent)	159.00 mg/l	2540.00 mg/l
Arsenic	13.00	35.00
Cadmium	< LOD	0.50
Chromium (III)	15.00	38.00
Hexavalent Chromium (VI)	< LOD	<LOD
Copper	15.00	200.00
Lead	32.00	600.00
Mercury	< LOD	3.90
Nickel	14.00	35.00
Selenium	< LOD	<LOD
Zinc	69.00	420.00
Cyanide (free)	0.00	<LOD
Phenol (total)	0.00	<LOD
Naphthalene	< LOD	0.34
Acenaphthylene	< LOD	0.11
Acenaphthene	< LOD	0.13
Fluorene	< LOD	0.12
Phenanthrene	< LOD	1.40
Anthracene	< LOD	0.29
Fluoranthene	< LOD	2.20
Pyrene	< LOD	2.00
Benzo(a)anthracene	< LOD	1.50
Chrysene	< LOD	1.40
Benzo(b)fluoranthene	< LOD	2.20
Benzo(k)fluoranthene	< LOD	0.82
Benzo(a)pyrene	< LOD	1.90
Indeno(1,2,3-cd)pyrene	< LOD	1.10
Dibenz(a,h)anthracene	< LOD	0.29
Benzo(ghi)perylene	< LOD	1.30
Asbestos Detected (Detected or Not-Detected)	0.00	0.00
Asbestos Quantification (% w/w)	0.00	<LOD
Petroleum Hydrocarbons Aliphatic >EC5-EC6	< LOD	<LOD
Petroleum Hydrocarbons Aliphatic >EC6-EC8	< LOD	<LOD

Analyte	Min Value (mg/kg unless stated)	Max Value (mg/kg unless stated)
Petroleum Hydrocarbons Aliphatic >EC8-EC10	< LOD	<LOD
Petroleum Hydrocarbons Aliphatic >EC10-EC12	< LOD	<LOD
Petroleum Hydrocarbons Aliphatic >EC12-EC16	< LOD	10.00
Petroleum Hydrocarbons Aliphatic >EC16-EC35	< LOD	50.00
Petroleum Hydrocarbons Aliphatic >EC35-EC40	0.00	<LOD
Petroleum Hydrocarbons Aromatic >EC5-EC7	< LOD	<LOD
Petroleum Hydrocarbons Aromatic >EC7-EC8	< LOD	<LOD
Petroleum Hydrocarbons Aromatic >EC8-EC10	< LOD	<LOD
Petroleum Hydrocarbons Aromatic >EC10-EC12	< LOD	<LOD
Petroleum Hydrocarbons Aromatic >EC12-EC16	< LOD	7.50
Petroleum Hydrocarbons Aromatic >EC16-EC21	< LOD	15.00
Petroleum Hydrocarbons Aromatic >EC21-EC35	< LOD	26.00
Petroleum Hydrocarbons Aromatic >EC35-EC40	0.00	<LOD
Benzene	< LOD	<LOD
Toluene	< LOD	<LOD
Ethyl benzene	< LOD	<LOD
o-Xylene	< LOD	<LOD
m- & p-Xylene	< LOD	<LOD
MTBE	< LOD	<LOD

6.2.2 Groundwater Monitoring & Results

The results from the ground water monitoring will be included when this data is available.

6.2.3 Gas Monitoring & Results

A summary of the gas monitoring results reported in the Site Investigation is presented in Table 6-2 below. The results include those included within the Phase 2 Geo-Environmental Assessment Report in addition to subsequent monitoring visit undertaken on 28th November 2023, and after

the report was drafted and issued. The results of the latest monitoring visit will be included in the next revision of the Phase 2 Geo-Environmental Assessment Report

Table 6-2: Summary of gas monitoring results

Analyte	Min Value (% v/v unless stated)	Max Value (% v/v unless stated)
CH ₄	0.1	72.1
CO ₂	0.1	13.1
O ₂	3.2	20.5

7 Ongoing Management

Any additional data obtained on the ground conditions at the Site, either prior to commencement of construction, or through the construction phase, will be collated within this Site Condition Report. This Site Condition Report will be updated following completion of any additional Site Investigations, groundwater monitoring or ground gas monitoring, and will be maintained throughout the lifetime of the Facility.

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.

7.1 Preventative and mitigation measures

The proposed redevelopment of the Site will implement both preventative and mitigation measures to ensure the design and construction of the facility is robust and therefore minimises the risk of pollution to the environment.

Existing areas of the Site will be upgraded where necessary, with reinstatement works undertaken to areas which have suffered settlement to ensure the integrity of the Facility on a long-term basis.

Areas of additional land within the installation boundary which will be utilised for the processing and storage of IBA will be constructed using similar pollution mitigation measures to the existing land. This will involve constructing hardstanding areas from roller compacted concrete with minimal joints over a continuous impermeable rubber Butyl membrane with welded joints. Hardstandings will be laid to falls and direct rainwater and/ or leachate runoff to a series of drains which discharge into a lagoon structure. Treated water from the lagoon will be discharged to a foul sewer at a controlled rate.

8 Conclusions

This report has identified the historical and current condition of land, the activities to be permitted at the Facility, and detail IBA operations undertaken at the Facility.

During the operational phase of the Facility, 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 Site Condition Report submitted with the original application, 2008

B Groundsure Report, including Phase 1 Geo-Environmental Assessment Report

C Phase 2 Geo-Environmental Assessment Report

D Report on Ground Investigation for New Shed, Western Peninsular Tilbury Free Port, 1994

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