

Appendix 13. Soils Geology and Groundwater

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13.1. URS Phase 1 and 2 Environmental Site Assessment

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**Phase 1 and 2
Environmental Site
Assessment**




**ESB Great Island Power
Generating Station**

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EXECUTIVE SUMMARY

URS Ireland Limited (URS) is pleased to present this report to the Electricity Supply Board (ESB), detailing the findings of a Phase 1 and 2 Environmental Site Assessment (ESA) undertaken at the ESB Great Island Power Generating Station, Campile, Co. Wexford.

ESB is in the process of divesting this asset and has engaged URS to undertake the ESA to support the divestment process. The objective of the ESA was to assess the current environmental status of the site, with particular reference to soil, sediment, surface water and groundwater quality.

The Phase 1 assessment comprised a review of information pertaining to environmental soil and groundwater quality on the site, with particular focus on site history, site environmental sensitivity, site operations, and materials storage.

The Phase 2 environmental sampling locations were selected on the basis of the Phase 1 ESA results, observations made during site walkover inspections and information gathered from key site personnel. The sampling approach was influenced by the absence of overburden across many areas of the site, access issues associated with site infrastructure and/or health and safety protocols, the steep gradients between site tiers and the density of vegetation across large areas of the site.

Environmental soil samples were collected through hand augering, test pitting and bore drilling. Monitoring wells were installed at strategic locations and groundwater samples collected and analysed. Samples of surface waters and sediments were also collected and analysed for key contaminants of concern.

Based on the results and observations of the Phase 1 and 2 ESA, the following conclusions were drawn:

- From the perspective of human health and potential risks posed by environmental soil and groundwater quality to commercial site users, the site is considered suitable for the continued industrial use.
- A conservative assessment of the soil analytical data collected during the ESA identified potential risks to controlled waters (i.e. groundwater and surface water) from a number of metals as well as polycyclic aromatic hydrocarbons (PAH) and hydrocarbon indicator compounds. However, URS has concluded that across the majority of the site these potential risks are not significant.
- It is considered that concentrations of PAH in the shallow soil near the southern site boundary and (to a lesser extent) in sediment and surface water samples, warrant some further assessment focussing on identification of likely source(s) and depending on the outcome a (probably limited) Quantitative Risk Assessment (QRA) to assess in more detail potential risks to the local ecosystems (estuary).
- Elevated concentrations of coliforms were detected in groundwater and surface waters in both the former landfill area and the station grounds. The primary source is considered likely to be agricultural practices in areas upgradient of the site, rather than historic or current site practices, however, there are likely to be some site-derived contributions in particular from the septic tank located on the lower tier.

- Elevated concentrations of ammonia in the former disposal area wells, in particular on the western cell, have not been delineated – however, access to drill in downgradient locations would be difficult to achieve. Some further assessment of estuarine waters and sediment quality downgradient of the waste disposal areas would be warranted.
- The presence of asbestos containing materials (ACM) in the subsurface is considered unlikely, except in the capped landfill, where ACM is known to exist.

In summary, no remedial action is currently considered necessary at the site under a continued industrial land use scenario, from the perspective of environmental soil and groundwater quality; however, some requirement for further assessment has been identified.

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1. INTRODUCTION & OBJECTIVES

URS Ireland Limited (URS) is pleased to present this report to the Electricity Supply Board (ESB), detailing the findings of a Phase 1 and 2 Environmental Site Assessment (ESA) undertaken at the ESB Great Island Power Generating Station, Campile, Co. Wexford.

The works were carried out in accordance with URS Proposal No. 3052214 dated 6 June 2008, which was submitted as part of ESB Tender No. PG108T613 and the subsequent scope of work e-mailed to ESB on 24 September 2008.

ESB is in the process of divesting this asset and has engaged URS to undertake the ESA to support the divestment process. The station location is presented on Figure 1 and the area to be divested is shown outlined in red in Figure 2 (hereafter referred to as "the site").

The site, which includes a former waste disposal area and a large area of undeveloped 'wetland' occupies an approximate area of 74.5 ha, while the station grounds proper occupy an approximate area of 30 ha.

The site currently operates as a heavy fuel oil (HFO) burning power-generating station and is located near Campile, on the eastern bank of the River Suir, to the north of its confluence with the Campile River.

An Integrated Pollution Prevention Control (IPPC) licence (Reg. No. P0606-02) was issued to the site by the Environmental Protection Agency (EPA) on 18 January 2005.

The objective of the ESA was to assess the current environmental status of the site, with particular reference to soil, sediment, surface water and groundwater quality. The buildings and structures located on site (and the materials contained in them) were not included in this ESA.

2. PHASE 1 ASSESSMENT – SCOPE AND METHODOLOGY

A Phase 1 Assessment of the site was undertaken by URS in late September 2008.

The Phase 1 assessment comprised a review of information pertaining to environmental soil and groundwater quality on the site, with particular focus on the following:

- Site history;
- Site environmental sensitivity;
- Site operations; and
- Materials storage.

Components of the study included:

- A preliminary walkover inspection of the subject areas on 17 September 2008;
- A desktop review of information from the following sources:
 - Geological Survey of Ireland (GSI) for site geology and hydrogeology;
 - Environmental Protection Agency (EPA);
 - National Parks and Wildlife Service (NPWS) for information pertaining to surrounding Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Natural Heritage Areas (NHAs);
 - Ordnance Survey of Ireland (OSI) for aerial photographs; and
 - IPPC licence application documents and Annual Environmental Reports (AERs) provided by ESB.
- A review of previous environmental site investigation reports undertaken at the site including:
 - An Environmental Impact Assessment of Great Island Generating Station upon the Local Soil and Groundwater Quality, ESBI, July 1996 (ESBI, 1996);
 - ESB Power Generation - Great Island Generating Station - Investigation of Possible Land Contamination, Phase 1, ESBI, October 2000, Ref. P004E001-R3 –Final (ESBI 2000);
 - ESB Power Generation - Great Island Generating Station – Investigation of Possible Land Contamination, Phase 2, ESBI, February 2002, Ref. P004E013 – R3 – Final (ESBI, 2002);
 - Environmental Risk Assessment and Remediation Plan (Final Rev 4) – Former Waste Disposal Areas at Great Island Generating Station, Co. Wexford – 44871-010-447, June 2003 (URS, 2003).
 - Environmental Liabilities Risk Assessment Report – ESB Great Island Generating Station, Co. Wexford – TMS Consulting (Ref. TMS #06036 Rev. 1) – May 2006 (TMS 2006).

3. PHASE 1 FINDINGS

3.1 Site Description

The site layout is presented in Figure 2. The area containing the power generation buildings and infrastructure (“the Station Grounds”) comprises a series of tiered benches cut into the bedrock, which step down toward the River Suir estuary. A former waste disposal area, comprising two rectangular shaped cells, lies to the east of the Station Grounds. Beyond that lies a heavily vegetated undeveloped area known as the Wetlands.

3.1.1 Station Grounds - Lower Tier

A sea wall bounds the lowest tier of the Station Grounds, which is partially underlain by made ground. The main building, associated chimney stacks, cooling water pump house and process water treatment (steam purification) facility are located on the lowest tier.

A jetty connects the HFO unloading facilities with the site. A major pipeline delivers HFO from the jetty to the main oil tank farm, (located on the upper tier). An oil ‘stripping’ tank, located on the lower tier, collects excess HFO from the pipeline after each unloading event. Located to the north of the stripping tank are two storage tanks containing light and heavy fuel wastes. These tanks are contained within below-ground vaults.

A concrete lined water channel runs across the eastern portion of the lower tier and conducts cooling water to the cooling water outlet.

The lower tier is generally flat and lies between approximately 3 m and 4 m above Ordnance Datum (m OD).

3.1.2 Station Grounds – Middle & Upper Tiers

In the far western portion of the site, the station car park and entrance to the main station building occupy a ‘middle’ tier, which in turn steps down to the foreshore area. Across the remainder of the Station Grounds, a heavily vegetated steep slope separates the lower and upper tiers.

The HFO Tank Farm is located on the upper tier and contains seven above ground storage tanks. Each of five primary storage tanks has a 17,000 tonne capacity; the other two tanks are test and transfer tanks and have smaller capacities. A separate 50 tonne bunded storage tank stores diesel used as fuel for boiler start up. A pumping station in this area is used to transfer the HFO between tanks and into the transfer tank, where it is heated to enable it to be gravity fed to the boiler units. The HFO Tank Farm is bunded and concrete lined. Drainage is routed through oil interceptors and discharged to the estuary.

The larger of two switching yards is located to the north of the HFO Tank Farm. The 220 kV compound is a fenced compound containing two main bunded transformers, both of which have associated transformer oil tanks. The remainder of the compound contains

switching gear, electricity pylons and overhead wires. There is an amenities building and toilet block in the southern portion of the compound.

The 110 kV switching yard is located to the west of the 200 kV yard. Part of the plant associated with the 110kV switching yard is housed internally. A separate 38 kV transformer compound is located within the 110 kV compound. The switching yards have unsealed hardcore surfaces. A subsurface oil filled cable runs between the two switching yards. This cable is fitted with alarms that detect pressure loss.

A water reservoir, which feeds the steam generation processes, is located to the north of the 220 kV switching yard. A heavily forested area is located to the east of the 220 kV switching yard. The remainder of the upper tier generally comprises open green space, traversed by power cables supported by pylons leading from the switching compounds.

With the exception of the two switching compounds, which have flat surfaces, the upper tier has a gently undulating surface, with surface elevations ranging between approximately 25 m OD and 35 m OD.

3.1.3 Former Waste Disposal Area and Wetlands

The two cells that make up the former waste disposal area are known as Cell 1 (eastern) and Cell 2 (western). They occupy approximate areas of 2.25 ha and 1.35 ha respectively. The cells are connected to the Station Grounds by an unformed roadway and are separated by a gully, which periodically conducts surface waters to an unnamed stream that forms the southern boundary of the cells and discharges to a pond located to the south west. This pond appears to discharge to the estuary.

Most of the waste material contained within the two cells was deposited during construction of the power station and comprises surplus soil and rock. Prior to 1994, the northern half of Cell 1 also received various waste streams arising from operation of the station; this area was capped as a remediation measure in 2005.

The Wetlands to the east of the former waste disposal area are undeveloped and heavily vegetated. There is no access road into the area and no formal access point on the boundary. The Wetlands occupy an approximate area of 25 ha.

3.1.4 Foreshore Lease Areas

The site includes an area of foreshore leased by ESB. This area includes the mud flats to the west of the former waste disposal areas, the sea wall structure and the reclaimed land behind (to the north of) the wall and the portion of the Estuary occupied by the HFO unloading jetty structure.

3.1.5 Surrounding Land Use

Land-use in the vicinity of the site at the time of the site inspection was predominantly agricultural and can be summarised as follows:

Site Boundary	Land Use
North	Railway track and agricultural lands beyond.
South	River Suir Estuary.
East	Agricultural Lands
West	River Barrow

3.2 Regional Setting

3.2.1 Solid Geology and Hydrogeology

According to the GSI¹, the geology underlying the site comprises Ordovician Volcanics consisting of the Campile Formation with undifferentiated felsic volcanics. The Campile Formation is described as pale coloured rhyolites in grey and brown slaty mudstones with occasional andesites.

The Campile Formation is considered a Regionally Important Fissured bedrock aquifer, with known well yields¹ ranging from 400-2,000m³/d. Groundwater in the west of the site (Station Grounds and beyond) is described by the GSI as extremely vulnerable, due to the importance of the groundwater resource and the presence of rock at/near the ground surface. Only an interim assessment of groundwater vulnerability has been carried out by the GSI in the east of the site (former waste disposal area and beyond), and this has indicated high to low vulnerability. Groundwater at the site is expected to achieve good status in accordance with the Water Framework Directive².

The GSI wells database³ indicates that there are eleven wells within a three-kilometre radius of the site.

- Ten of the identified wells are located at the site and were installed during an ESBI investigation (ESBI, 1996). The wells range in depth from 3.2m bgl (metres below ground level) to 18m bgl. Bedrock was not met in nine of the wells; bedrock was presumed at a depth of 9m in one of the wells located in the east of the site.

¹ Sleeman, A.S. ed. (1994) Geology of South Wexford. A Geological Description to Accompany the Bedrock Geology 1:100,000 Map Series, Sheet 23, South Wexford. Geological Survey of Ireland, Dublin.

² <http://maps.epa.ie/InternetMapView/MapView.aspx>

³ <http://www.gsi.ie/Mapping.htm>

- A well used for domestic supply is located approximately 2.7km to the southwest of the site, across the estuary.

3.2.2 Subsoil Geology and Hydrogeology

Previous investigation reports (see Section 3.5) have identified a distinction between the subsurface conditions encountered beneath the western (Station Grounds) and eastern (former waste disposal area and their environs) portions of the site.

According to the GSI, subsoil geology beneath the Station Grounds consists of made ground and bedrock outcrop. In addition, up to 5m thickness of fill material consisting of sand and gravel was encountered beneath the more southern portions of lower tier of the Station Grounds in the ESBI investigation (ESBI, 1996). Natural soils to the east of the Station Grounds (i.e. beneath the former landfills) consist of marine/estuarine silts and clays. The following subsoil profile was inferred from historical reports in the vicinity of the former waste disposal area.

Approx. depth (m)	Soil Description
0 – 5m	Made ground: Gravel fill material.
5 – 18m	Natural ground: Clayey sandy silt.
18 – 24.5m	Natural ground: Sand and gravel.
24.5 – 27m	Natural ground: Yellow-brown glacial till.
>27m	Weathered volcanic bedrock.

Based on the results of intrusive investigations (ESBI, 1996) it was considered that the dominant shallow groundwater flow direction was towards the estuary. Permeability testing and groundwater modelling were also undertaken by ESBI to characterise the shallow groundwater pathways to the estuary.

It was concluded that the main groundwater flow pathway in the west of the site (Station Grounds) was through the made ground to the estuary. Although wells in the east of the site screened in the silt yielded little water, it was conservatively predicted through numerical modelling that the main groundwater pathway in the east of the site was percolation through the made ground and silt to the sand and gravel layer, with subsequent horizontal migration to the estuary.

Due to the site location on the estuary it is likely that groundwater flow (at least close to the estuary) is tidally influenced. Groundwater quality data compiled by ESBI indicates that groundwater at the site is brackish.

3.2.3 Surface Water Hydrology

The following water bodies are located near the site.

- The site is located on eastern bank of the Suir and Barrow River system – the confluence of these rivers is located to the south west of the site and the Barrow-Nore-Suir Estuary is located to the south.
- The Campile River, located to the south of the site, also drains into the same system.
- An unnamed stream flows through the southern portion of the site, between the former waste disposal area and the Wetlands, and appears to discharge into the Suir, via a natural pond.
- Water in the Barrow-Nore-Suir estuary is described by the EPA⁴ as being of 'moderate' quality.
- Water quality in the River Suir is described by the EPA as being '*at risk of not achieving good status*' under the Water Framework Directive, while waters in the Campile River and the Barrow-Nore-Suir Estuary are described as being '*possibly at risk of not achieving good status*' under the directive.

There is a network of surface water drains across the site, with up to eleven (11) emission points, where surface water is discharged to the estuary. Surface water from the vicinity of the transformer units in the 220kV switching yard discharges into the main tank farm surface water system, which in turn discharges via a settlement tank and interceptor system at SW1, to the south.

A network of surface water drains that service the 110 kV switching yard connect to a surface water discharge point at SW10. There is no dedicated oil interceptor for surface water draining from the 110kV switching yard, however, it is noted there are no transformers in the 110 kV yard.

3.2.4 Protected Areas

According to the NPWS⁵, the River Barrow estuary is a proposed Natural Heritage Area. The River Barrow and River Suir are designated as Special Areas of Conservation.

Groundwater beneath the site is protected as Drinking Water under the Water Framework Directive.

3.3 Site Development History

The station was constructed on agricultural land and in the southern portions on lands partly reclaimed from the estuary through construction of a sea wall and filling using quarried materials (thought likely to have been taken from other areas of the site).

⁴ <http://maps.epa.ie/InternetMapView/InternetMapView.aspx>

⁵ <http://www.npws.ie/>

The power station was constructed in two stages. Stage 1 involved the commissioning of two 60 MW Units in 1967 and 1968 and Stage 2 involved the commissioning of a 120 MW Unit in 1972.

On site disposal of surplus excavated material, construction wastes and station waste was practised until 1994 in the former waste disposal area located in the eastern portion of the site. As mentioned earlier, the northern portion of Cell 1 was capped in 2005 as a remediation measure.

3.4 Aerial Photograph Review

A review of historical aerial photographs obtained from OSI is presented below:

IGNS 0695 (Flown 14/05/1977): The station was established and broadly similar to the current site layout. Agricultural fields bound the site to the north and east. The area east of the 220 kV switchyard and tank farm consist of grassed fields.

No evidence of land surface disturbance is evident in the lands to the east of the 220 kV compound. Some vegetation (trees/shrubs) is evident immediately adjacent to the north-eastern corner of the 220 kV switch yard.

There is no evidence of surface disturbance there however, a drainage ditch has been constructed around the southern and western perimeters.

OSI 9846 (Flown 02/08/1981): No major changes are evident since 1977. Vegetation across the site is more established than in the previous photograph, particularly in the area directly east of the 220 kV switching yard, which appears to be newly forested.

No evidence of land surface disturbance is evident in the lands to the east of the compound in this photograph.

OSI website (2000): Vegetation across the site is generally more established. The former grassed fields east of the 220 kV switchyard and tank farm are heavily forested.

Further drainage features appear to have been added some time after 1977 (this area was not covered by the 1981 photograph).

3.5 Environmental Site Assessments – Previous Reports

3.5.1 ESBI 1996

This ESBI investigation (ESBI, 1996) was undertaken to assess the level and distribution of subsurface contamination at the site. A number of sources were identified which posed a potential risk of contamination:

- A transformer oil spill, disused underground petrol tank and stained tarmac area in the main station area; and
- The disposal of heavy metal-contaminated sludge, waste fuel oil and domestic waste in the former waste disposal area.

The investigation concluded that no contamination had resulted from the transformer oil spill or underground petrol tank. There was evidence that minor heavy metal and hydrocarbon soil contamination had occurred in the stained tarmac areas and in the former waste disposal area where sludge and waste oil disposal is known to have occurred.

3.5.2 ESBI, 2000 – Phase 1 Investigations

ESBI undertook Phase 1 investigations at several ESB generating stations ca. 2000. The process categorised the facilities according to the potential for the presence of contamination. The Phase 1 investigation for Great Island (ESBI, 2000) categorised the former waste disposal area as Class B – being areas where asbestos is known to be present over a large area.

3.5.3 ESBI, 2002 – Phase 2 Investigations – Former Waste Disposal Area

The Phase 2 investigation reported in 2002 comprised a grid based sampling programme (10 m 'herring-bone' grid) across the former waste disposal area. Samples were collected at 43 locations from depth intervals of up to 5.3 m bgl.

The waste materials encountered included brick, plastic, glass, wood, metal, ceramics, cloth, rubber, clinker, paper and concrete. Possible asbestos was visually identified in the soil at four sampling locations. Asbestos was confirmed to be present in these samples through laboratory testing.

From a total of 110 soil samples, 27 samples were found to have detectable levels of asbestos fibres. These were further divided into 15 samples where 'trace' levels were detected and 12 where more 'major' levels were detected. None of the 12 major detections had visual evidence recorded in the field and it was concluded that 'disseminated' asbestos fibres were potentially present across the investigation area – in particular around the perimeter and in the western most part of the investigation area.

Chemical testing was carried out on 106 samples. 'Significant' contamination (copper, nickel and zinc) was reported in 6% of those samples. Vanadium was elevated in several of the samples. 'Slight' hydrocarbon concentrations were also reported in approximately 40% of the samples. There was a marked correlation between the samples where chemical and asbestos contamination was recorded.

3.5.4 URS, 2003 – Risk Assessment – Former Waste Disposal Area

URS completed an environmental risk assessment of the former waste disposal area in 2003. The objectives of the study were to assess potential impacts on relevant environmental receptors from contamination (including asbestos) identified in the former waste disposal area and assess remedial options for the area. The findings are summarised below:

- The two cells in the waste disposal area were developed during two main phases of construction at the station in the mid-1960 and early 1970s, through the placement of excess rock spoils and buildings materials. The northern portion of Cell 1

(eastern cell), known as the 'Station Dump', was used thereafter for ad hoc disposal of wastes generated through site operations. Such wastes were thought to have comprised asbestos, fuel oil, boiler washings, laboratory waste, building rubble and canteen waste.

- The materials deposited in the cells are typically 5 m thick and were placed directly on natural alluvial/estuarine silts. The silt unit is approximately 10 m thick and is underlain by natural sandy gravels.
- Three distinct, water-bearing zones have been identified:
 - Localised, non-continuous water in the base of the fill units,
 - An aquifer with an hydraulic gradient encountered within the silt; and
 - A deeper aquifer within the natural sandy gravels.
- The investigations reported slightly elevated concentrations of metals in the fill materials and no impacts in the underlying natural materials;
- 180 samples were tested for asbestos, with two positive identifications;
- Minor environmental impacts to groundwater were described and included hydrocarbon sheen in water in the fill units near the former station dump and a limited zone of suspected HFO within soils and perched water bodies in the fill also in the former station dump area;
- The risk assessment concluded that the areas outside of the former station dump (northern portion of Cell 1) did not pose a risk to human health of workers or to the Suir estuary. It was noted that the elevated arsenic levels and the presence of the hydrocarbons in the fill in these areas would require further assessment should a change in land use be considered in the future.
- A preliminary evaluation of remedial design identified capping of the northern portion as the preferred remedial option. This remediation approach was implemented in 2005 with EPA agreement.

ESBI were appointed to undertake the detailed design, procurement of contractors and construction supervision of the capping works.

URS were commissioned by ESB to undertake a review of the ESBI tender documents and to provide a construction quality assurance role during construction of the landfill cap. Site visits were carried out by URS over the course of the construction works, which were undertaken between June and August 2008. It was concluded that the landfill caps were constructed in accordance with the contract documents.

3.6 Site Operations

The following summary of site operations is based on information gathered during the site walkovers completed on 17 and 29 September 2008, information provided during

discussions with site personnel, and information provided in the identified previous reports (see Section 3.5), in particular the ELRA prepared by TMS (TMS, 2006).

3.6.1 Power Generation – General Process

Steam is generated in oil-fired boilers at Great Island. The steam is used to drive steam turbines, which power the electricity generators. Exhaust steam is condensed using cooling water, which is taken from the estuary treated with chlorine and returned to the estuary at a slightly elevated temperature.

Transformers are used to raise the voltage of the generated electricity making it suitable for long distance transmission.

There are three electricity-generating units at Great Island. Electricity from Units 1 and 2 is transferred to the indoor 110 kV transformers via underground oil filled cables. Electricity from Unit 3 is transferred to the 220 kV transformers via over ground cables.

3.6.2 Fuel Storage

HFO Tank Farm

HFO is pumped from the oil delivery jetty to the Tank Farm, located on the upper tier, via an above ground pipeline. From the jetty, the pipeline is routed in an eastward direction along the top of the seawall as far as the HFO 'stripping' tank. This tank collects excess HFO draining by gravity from the pipeline after fuel unloading events. The oil is stored in the tank until the next unloading event when it is pumped up to the tank farm.

At the stripping tank, the pipeline turns northwards, running 'uphill' to the tank farm located on the upper tier. Before the stripping tank, a short (6m) section of the pipeline runs underground where it crosses under a service roadway.

The tank farm contains a total of seven HFO tanks. Each of five primary storage tanks has a 17,000 tonne capacity; the other two tanks are test and transfer tanks and have smaller capacities. A pumping station is used to transfer the HFO between tanks and into the transfer tank, where it is heated to enable it to be gravity fed to the boiler units.

A separate 50 tonne bunded storage tank stores diesel used in as fuel during boiler start up. The Tank Farm is bunded and concrete lined. Drainage is routed through oil interceptors and discharged to the estuary.

Transformer Yards

The high voltage transformers are all oil filled. Their capacities vary between 13.82m³ and 59.8m³ (TMS, 2006). Oil filled cables run between the 220 kV and 110 kV switching yards. These are equipped with alarms that detect pressure loss.

Propane

Propane is stored on-site and is used in the boiler ignition process.

Waste Fuel Storage

Waste HFO is stored in a 50,000 litre (L) tank located north of the HFO stripping tank. Waste Light Fuel Oil (LFO) is stored in a 18,000 L tank located in the same area. These two tanks are located within below-ground concrete vaults which provide secondary containment.

3.6.3 Water Treatment

Water is used in two separate processes on-site.

- Town supply water (stored in a the reservoir in the north of the site) is treated on-site to make it suitable for boiler use. A condensate polisher (containing beds of resins) captures the soluble solids in the condensate. Dissolved oxygen is removed from the condensate through the addition of hydrazine. A deaeration tank removes oxygen, nitrogen and carbon dioxide. Ammonia is also added to lower the pH.
- Water for the cooling system is taken from the estuary at the pump house and is used to condense steam from the turbines. Chlorine may be added as a biocide. The condensate is then returned to the estuary via the culverted discharge channel located on the lower tier of the Station Grounds.

3.7 Materials Storage

Chemicals used for water conditioning include ammonia, hydrazine, sodium hydroxide, sulphuric acid and phosphate. Most of these are stored in (or near) the water treatment plant, located on the lower tier of the Station Grounds.

Chemicals used on site in the water treatment process include sodium hydroxide and sulphuric acid. These chemicals are stored in bunded areas in the vicinity of the water treatment plant on the central portion of the site.

3.8 Reported Incidents & IPPC Compliance

According to the ELRA prepared by TMS consultants (TMS, 2006) an overflow from the oil-stripping tank occurred in the 1970s during a delivery, with resulting discharge of oil into the estuary. An extensive clean up was carried out and unloading procedures were reviewed and improved.

In 1992, one of the five oil tanks in the HFO Tank Farm leaked into the concrete bund. The spill was contained.

4. PHASE 2 ASSESSMENT

The environmental sampling locations were selected on the basis of the Phase 1 ESA results, observations made during site walkover inspections and information gathered from key site personnel. The locations of the sampling points are presented in Figure 3 and are described below.

The sampling approach was influenced by the absence of overburden across some many areas of the site, access issues associated with site infrastructure and/or health and safety protocols, the steep gradients between site tiers and the density of vegetation across large areas of the site. For these reasons, the approach was largely based on characterisation of groundwater quality in the downgradient portion of the site and shallow soil characterisation in areas where access allowed. These assessments were supported by detailed inspections of inaccessible areas as well as review of historical aerial photographs.

The locations of the monitoring wells installed on the lower tier were selected so as to provide reasonable coverage of the foreshore but were also biased towards key infrastructure including the waste oil tanks, the Oil Stripping tank and the process water treatment plant.

4.1 Soil and Groundwater Sampling

The scope of work carried out during the Phase 2 investigation comprised the following:

- Drilling of seven boreholes (BH201 to BH207) using an air rotary drilling rig;
- Collection of fill and overburden samples during drilling using a split spoon sampler;
- Collection of groundwater samples from:
 - The newly installed monitoring wells (BH201 to BH206). Monitoring well BH207 was a dry well;
 - Two existing groundwater monitoring wells (BH2 and BH3) on the Station Grounds;
 - Three existing wells on the more western of the two landfill cells (MW101, MW102 and MW107);
 - Five existing wells on the eastern landfill cell (MW104, MW106, MW200, MW201 and MW202).
- Surveying the elevations of newly installed groundwater monitoring wells (as well as existing wells where required);
- Excavation of seventeen shallow trial pits (TP101 to TP117) and collection of soil samples;
- Excavation of three hand augered samples from the bund walls around the HFO Tank Farm;

- Walkover inspections of the accessible heavily forested areas;
- Inspection of licensed surface waters discharge points and collection of samples (where water was present) from five points (SW1, SW5, SW6, SW8 and SW10);
- Collection of seven sediment samples (SS01 to SS04 and SS10 to SS12) from the foreshore areas to the west of the former landfill cells and to the west of the Station Grounds (as access would allow);
- Detailed walkover inspection and collection of eight hand augered samples from across the 220 kV compound;
- Detailed walkover inspection and excavation of one⁶ trial pit from the 110 kV compound;
- Elevated photographic survey of the site; and
- 'Bracketing' sampling around hand augered sample HA04.

The drilling, trial pitting and hand augering works took place during week ending 3 October 2008. Groundwater, surface water and sediment sampling took place during the following week.

A second site visit was undertaken on 31 October 2008 when a groundwater sample from existing monitoring well BH2, which was previously covered by a site vehicle, was collected. Bracketing soil samples were collected from around hand auger sample point HA04, where elevated concentrations had been recorded. The elevated survey and survey of the well heads also took place at this time.

4.2 Laboratory Analysis

Soil and water samples selected for chemical analysis were sent under chain of custody procedures to Alcontrol Laboratories in Dublin. Analysis for asbestos in soils was undertaken by Envirochem at their laboratory in Southampton, England. Both laboratories were UKAS accredited for the respective analysis completed by them.

The soil samples were analysed for the following parameters:

Analyte	No. of Samples – Soils	No. of Samples – Sediments
Total Petroleum Hydrocarbons (TPH) Criteria Working Group (CWG) Analysis	51	7
Benzene, Toluene, Ethylbenzene, Xylene (BTEX) Compounds	51	7

⁶ Access to the internal switching yard was not possible – this trial pit was excavated in the grassed area to the north of the internal switching yard building.

Analyte	No. of Samples – Soils	No. of Samples – Sediments
Total Organic Carbon (TOC)	47	0
Metals (As, Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Sb, V, Zn)	47	7
Speciated Polycyclic Aromatic Hydrocarbons (PAHs)	26	7
Total Phenols	24	7
Total Cyanide	24	7
Chloride, Fluoride and Sulphate	17	7
Polychlorinated biphenyls (PCBs)	15	4
Volatile organic compounds (VOCs)	2	1
Asbestos in Soil	30	0

The groundwater samples were analysed for the following parameters:

Analyte	No. of Samples - Groundwater	No. of Samples - Surface Water
TPH CWG Analysis	15	5
BTEX Compounds	15	5
Metals (As, Cd, Co, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se, V, Zn)	15	5
PAHs	12	5
Total Phenols	15	5
Total Cyanide	15	5
PCBs	15	5
VOCs	6	5
SVOCs	4	5
Anions/cations: aluminium, boron, barium, calcium, chloride, iron, potassium, manganese, sodium, sulphate, alkalinity, total hardness, total dissolved solids	15	5
Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD),	15	5
Nutrients: ammoniacal nitrogen, nitrate, nitrite, phosphate	14	5
Total and faecal coliforms	10	5

5. PHASE 2 METHODOLOGY

The intrusive investigation methodologies were based on the British Standard for the Investigation of Potentially Contaminated Sites (BS 10175:2001).

5.1 Soil Sampling

5.1.1 Trial Pitting

A four tonne 'mini'-excavator was used to advance the trial pits. Excavation progressed at each location until natural soils under the fill units were confirmed although refusal or unstable ground conditions limited the location and depth of excavation in some places.

A URS field engineer supervised all excavation works. Each trial pit was one excavator bucket in width (nominal 750mm) and approximately 3m in length and the location was scanned using a cable avoidance tool prior to excavation.

The field engineer then logged, sampled and photographed the excavation as it progressed. The excavations were backfilled with the excavated material before moving to the next location.

5.1.2 Hand Augering

A hand auger was used to collect near surface soil samples where access was restricted such as in the transformer compound. The hand auger was cleaned prior to sampling. Samples were collected directly from the hand auger for logging and analysis.

5.1.3 Borehole Drilling

Where overburden or made ground was encountered during borehole drilling, a representative sample was obtained from the drill arisings and placed into laboratory supplied sample jars. Samples were collected at nominal 1.0m intervals until bedrock was reached using a split barrel sampler. Samples collected for asbestos analysis were placed in a ziploc bag.

The sample containers were labelled with a unique sample number and placed in a suitable container for transportation. The field engineer wore single-use disposable nitrile gloves during sample collection and sample handling.

Soil from each investigation location was visually examined for evidence of contamination and screened using a photoionisation detector (PID) for the presence of volatile compounds. Drill arisings were also inspected for the presence of suspected asbestos containing materials (SACM). Samples were selected for analysis based on evidence of contamination. The URS engineer noted the location on a plan, noted the sample depth and the sample number(s) and recorded the position using a portable GPS.

5.2 Groundwater Monitoring Well Installation

Air rotary drilling techniques were used to advance boreholes into bedrock. Air rotary drilling utilises compressed air and a 'down-hole' percussive hammer to pulverise the

rock and blow the cutting back to the top of the hole. Glover Site Investigation Ltd were contracted to undertake the drilling works.

The boreholes were advanced until groundwater was encountered and a monitoring well was then installed within the completed borehole, with the well screen extended across the observed water table.

The monitoring wells were constructed using 50mm diameter HDPE standpipe with a nominal 3m - 4m screened interval. The screened section was surrounded by a washed gravel filter pack. A bentonite seal was placed at the surface to minimise the potential for surface and shallow groundwater entry. The monitoring well head-works were completed using flush mounted trafficable covers

Following completion, the monitoring wells were developed to enhance the wells' ability to exclude fine-grained material.

5.3 Groundwater Sampling

Prior to sample collection, an interface probe was used to measure depth to groundwater and to assess the presence of free phase oil product in the wells. The monitoring wells were purged of at least three annular volumes of water using manual inertial lift pumps dedicated to each well to ensure representative groundwater samples were collected.

The collected water was placed directly into laboratory supplied sample containers appropriate to the proposed analytes (with appropriate preservatives if required).

In addition to the collected samples, in-situ water quality parameters (temperature, pH, electrical conductivity, redox potential and dissolved oxygen) were recorded. Standard environmental sampling techniques were adopted to minimise the risk of cross contamination between sampling locations and to ensure quality of samples upon receipt at the laboratory.

Field duplicate samples were collected during the groundwater and surface water sampling at a rate of one duplicate for every 10 primary samples.

All sample bottles were labelled with a unique sample number for each monitoring well and placed in a cool box dedicated for water samples.

5.4 Elevated Photograph Survey and Monitoring Well Survey

In order to record the condition of the site prior to divestment, an elevated photograph survey was undertaken by Murphy Surveys Ltd. The elevated panoramic photographs were taken using a high spec digital camera namely a Canon G7. The camera was mounted on a telescopic mast that is capable of reaching 15m in height, thus allowing an overview of the portion of the site at the survey location. Panoramic photographs were taken at several locations around the site.

Murphy Surveys also carried out an elevation survey of each of the newly installed monitoring wells to National Grid (IG75) using a Trimble real-time RTK GPS solution.

The elevated panoramic photographs are presented in Appendix A together with other photographs taken at site surface level. A map showing the locations from where the images were captured is presented in Figure 6.

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6. PHASE 2 FINDINGS

6.1 Site Geology

Boreholes and trial pit logs are presented in Appendix B.

Overburden encountered in the trial pits excavated on the upper tier of the Station Grounds generally comprised a thin layer of fine-grained sandy and silty topsoil overlying weathered bedrock. The thickness of the overburden was typically less than 0.5 m.

Borehole BH207, excavated near the 220 kV switching yard, encountered 1.75 m of loose brown clay overlying bedrock.

On the lower tier, up to 6.5 m of fill material was encountered along the southern margin, within the reclaimed foreshore area. The localised fill material comprised a lower layer of clays with occasional boulders, underlying an upper layer of boulders. Similar conditions were encountered at boreholes BH202, BH203 and BH204.

At the other boreholes located on the lower tier (BH201, BH05 and BH206) up to 3 m of natural clays overlying bedrock were encountered. These locations are to the north, or near the northern margins of, the reclaimed area.

6.2 Site Hydrogeology

6.2.1 Groundwater Occurrence

On the lower tier, a water strike was recorded in BH202, in the fill material at a depth of 4.7 m bgl. Similar 'perched' water was not encountered in the fill material in the other boreholes and its occurrence in BH202 is considered likely to be isolated.

Groundwater strikes in the fractured bedrock were recorded in each of the wells drilled in the lower tier at depths ranging between 7 m and 17 m bgl.

No groundwater was encountered in monitoring well BH207, located on the upper tier, south of the 220 kV switching yard. This bore was advanced to 19 m BGL through fractured bedrock and a monitoring well was installed to 12 m BGL. Subsequent gauging indicated the well had remained dry following installation. Groundwater was not encountered in any of the trial pits excavated on the upper tier.

6.2.2 Inferred Groundwater Flow Direction

Groundwater table elevations are presented on Figures 4 and 5 for the lower tier and former waste disposal area of the site respectively. As stated above, groundwater was not encountered in the well within the upper tier.

Groundwater was inferred to flow through the bedrock aquifer in a south-to-south-eastward direction beneath the southern portion of the site. It is noted this area is almost entirely sealed with concrete or buildings.

Groundwater (likely 'perched' water) was encountered in the fill materials at only one location. A flow direction for this upper water bearing unit was not therefore inferred.

With regard to the former waste disposal area there is insufficient data to infer groundwater flow direction; however, previous studies (Section 3.5) inferred three distinct, water-bearing zones including:

- Localised, non-continuous water at the base of the fill units,
- An aquifer with an hydraulic gradient encountered beneath the silt/fill interface; and
- A deeper aquifer in the underlying natural sandy gravels.

Groundwater modelling (URS, 2003) suggested groundwater flow in this area of the site was towards the estuary.

6.3 Field Evidence of Contamination

During the intrusive site investigation no evidence of contamination in the form of staining or odours was observed, with the exception of a localised area of surface staining on the southern boundary of the 220 kV switching compound (FA04).

6.4 Field Parameters

Measurements of pH, electrical conductivity (EC) and temperature were made on groundwater and surface water samples collected in the field. The data are presented in Tables 22 and 23 respectively. Also presented in this table, for comparison with EC results, are total dissolved solids (TDS) laboratory results.

6.4.1 Surface Waters

For surface waters sampled in the field the EC results are typical of fresh waters, with the exception of SW8, located on the south-western corner, where the EC reading exceeded the IGV for this parameter. It is possible there is some seawater influence in this sample. It is noted the sodium and chloride concentrations were also markedly elevated in this sample, which is consistent with the presence of estuarine waters.

PH in these surface water samples was generally typically neutral. Elevated temperature ranges (14 to 35° C) are likely related to the site processes.

6.4.2 Groundwater Samples

EC (and TDS) results from the western cell (MW101, MW102 and MW107), which ranged from 10,600 to 37,100 $\mu\text{S}/\text{cm}$, appear to be influenced by brackish waters from the estuary. This is consistent with elevated concentrations of some of the anion and cation concentrations recorded in groundwater.

EC results from the eastern cell are within normal ranges for fresh water, with the exception of MW202 and MW201, where results of 2,930 and 5,350 $\mu\text{S}/\text{cm}$ were recorded. Sodium, chloride and other anions and cations were more elevated in these

than in the other wells on the eastern cell, indicating the probably presence of estuarine waters, however, there is also potential the elevated EC to be related to leachate in the former waste cell.

PH in the groundwater samples (measured in the field) in the western former cell (MW101, MW102 and MW107) was generally typical of neutral to slightly alkaline conditions. A pH reading of 9.3 was recorded in MW101, which is slightly outside of normal ranges for groundwater.

6.5 Site Inspections

As described in Section 5, site walk over inspections were undertaken in areas that were inaccessible for investigation by intrusive means. These included the forested areas to the east of the station grounds and in the north-western corner of the site. No evidence of contamination was encountered during these inspections.

In two locations within the forested area east of the station grounds, discarded blue polythene wrapping was noted (see Photograph X). These were to the north of the area, near the access roadway and immediately the east of the HFO tank farm boundary.

A more detailed inspection of these two areas suggested some minor clearing works had been performed there, as there were several sawed logs in the vicinity. There was no evidence that the former contents of the wrapping was present at these locations.

No suspected asbestos containing material (SACM) was encountered at these locations.

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7. ANALYTICAL RESULTS

7.1 Data Assessment Criteria

In order to assess the environmental quality of data gathered through intrusive investigations, criteria were chosen as guidelines against which the analytical results could be compared. These assessment guidelines and the rationale for their use are described below.

7.1.1 Chemical Parameters

Soil Quality

The soil analytical samples were compared with Stage 2 Generic Assessment Criteria (GAC). The GAC are conservative screening criteria protective of human health (assuming on-going industrial use of the site) and controlled waters (groundwater and surface waters).

If the concentrations are below the GAC, then the risks to human health and controlled waters are considered negligible. If the concentrations are above the GAC, there is a potential risk to human health and / or controlled waters.

URS considers that the GACs are consistent with the principles of human health and controlled waters protection in Irish Environmental Protection Agency, UK DEFRA and UK Environment Agency guidance.

Metal concentrations in soil have been compared against background data for Irish soil published by the EPA⁷. The published data was based on test samples collected from across the Republic of Ireland and to remove the effect of statistical outliers, the 95 percentile values were used as screening criteria. It should be noted that these 95-percentile values represent Irish background levels and are not indicators of environmental risk.

The Dutch Screening (S) and Intervention (I) Values are also presented in the data tables for soil and sediment results. These criteria have been presented to provide continuity with preceding environmental assessment reports for the site and are referenced in the discussion sections where pertinent to the current works. The DIVs represent levels above which there may be a risk to human receptors and above which more detailed site-specific risk assessment may be required. With regard to PAH compounds, the Dutch criteria provide a DIV for the sum of ten PAH compounds.

Groundwater Quality

Groundwater analytical results were assessed by comparing them to the EPA Interim Guideline Values (IGVs). These guidelines were developed using a number of existing water quality guidelines in use in Ireland including existing national Environmental Quality

⁷ Environmental Protection Agency, *Towards a National Soil Database (2001-CD/S2-M2)*, 2007

Standards (EQSs), proposed common indicators for the EU Groundwater Directive, Drinking Water Standards and GSI trigger values.

Surface Water Quality The Environmental Protection Agency Environmental Quality Standards (EQS) for Waters (Draft), which provide guidance on the ecological quality of surface water, have been used to assess surface water results. Where available the EQS for estuarine waters has been applied.

7.1.2 Asbestos in Soil

The assessment of asbestos in soil was based on the presence or absence of asbestos as confirmed by a UKAS accredited laboratory. ESB has adopted a generic “asbestos-safe” level for residual asbestos fibres in soil of 0.1%. URS has verified that the adopted “asbestos-safe” level is protective of human health, based on the CLEA CLR10 human health exposure assumptions used in the UK, combined with toxicological data taken from the USEPA IRIS database.

The laboratory used to perform the analysis of soil samples indicated that a ‘No Asbestos Detected’ result was consistent with a detection limit of less than 0.01%, which is consistent with the method used by the laboratory (MDHS 77).

7.2 Soil Analytical Results

The soil data collected from trial pits and during drilling of boreholes are presented in Tables 1 to 7. There were no exceedances of the human health GACs. Exceedances of the other selected guidelines are discussed in the following.

7.2.1 Hydrocarbon Compounds

Hydrocarbon indicator compounds (Table 1) were generally not detected in soils (above the laboratory method detection limit (MDL)), with the following exceptions:

220 kV Compound

- A total TPH concentration of 7,861 mg/kg was recorded in sample HA04 collected from within the 220 kV compound. The concentration of aromatic fractions detected was 653 mg/kg, while the aliphatic fractions (C₁₂ to C₃₅) totalled 7,208 mg/kg. This was above the DIV of 5,000mg/kg. No BTEX compounds were detected in this sample.
- All speciated aromatic and aliphatic hydrocarbon concentrations in sample HA04 were below human health GACs for soil, however, the detected concentrations exceeded some of the controlled waters GACs for soils.
- No hydrocarbon indicator compounds were detected in additional ‘bracketing’ samples collected from around HA04 (samples HA12 to HA15).

Station Grounds – Upper Tier – Trial Pit Samples

- A total TPH concentration of 3,284 mg/kg was recorded in a soil sample collected from a depth of 1.5 m in trial pit TP106, located at the northern site boundary, south of the railway track. TPH was not detected in the sample collected from a shallower depth of 0.5 m in TP106. The TPH fractions represented were aromatic, the highest concentrations (3,037 mg/kg) from the C₁₂-C₁₆ range. The TPH concentrations exceeded the respective GACs for controlled waters.
- A total TPH concentration of 1.14 mg/kg was recorded in trial pit TP108 at a depth of 0.3 m. The location is at the site boundary, near a small boat jetty.
- A total TPH concentration of 0.133 mg/kg was recorded at TP113 at a depth of 0.5 m, located immediately north of the 110 kV compound.
- A total TPH concentration of 0.613 mg/kg was recorded in TP117 in a sample collected from 0.5 m depth. The trial pit is located on the lower tier, near the western foreshore. TPH was not detected in the sample collected from 1.5 m in the same pit.

Borehole Samples – Lower Tier

- TPH concentrations that exceeded the GAC for controlled waters was recorded in soil samples collected from the boreholes excavated in the southern portion of the station grounds, near the sea wall. These included BH203 and BH204, where concentrations ranging between 15.17 and 987.58 mg/kg were recorded.
- In BH205, located to the west of the power generation building, similar concentrations of total TPH aliphatic fractions were detected, but aromatic fractions (C₁₂ to C₃₅) predominated.

7.2.2 PAH Compounds

220 kV Compound

- PAH were detected in sample HA04. The total PAH concentration for the sum of 16 PAH compounds (Total 16 EPA PAH) was 2.761 mg/kg. All of the individual PAH compounds exceeded the respective controlled waters GACs. None were detected in the bracketing sampling completed around HA04 (HA12 to HA15).

Station Grounds – Upper Tier – Trial Pit Samples

- PAHs were detected in trial pit TP106 in a sample collected from a depth of 1.5 m BGL. TP106 is located at the northern site boundary. The concentrations did not exceed GACs.
- PAHs were also detected in the sample collected from 0.3 m depth in TP108. These concentrations exceeded controlled waters GACs.
- PAHs were detected in the 0.5 m sample collected from TP115 and TP117, located in the centre and western portions of the station grounds respectively.

Borehole Samples – Lower Tier

- An elevated concentration (15.451 mg/kg) of PAHs was detected in soils collected from borehole BH203 at a depth of 3.0 m in a unit of soft gravelly clays. The component PAHs exceeded respective GACs for controlled waters. Relatively lower concentrations (< 0.5 mg/kg) were detected in samples BH201 and BH204.

7.2.3 Heavy Metals

With the exception of antimony, cadmium, mercury and selenium all of the other heavy metals concentrations in samples collected from across all areas of the site exceeded the GACs for controlled waters. Also presented on Table 3 are typical regional background concentrations. The concentrations are discussed further in Section 8.

7.2.4 Other Analytes

- Phenols were detected at low levels in several samples collected from across the site. Given the apparent random distribution of these detections across the site and the lack of an immediately identifiable source, these results were queried with the laboratory and an internal investigation was completed. It was concluded by the laboratory the low level concentrations were related to a batch of filters used in sampling handling. The data were removed from the summary tables presented herein. The low level occurrences are not related to the site.
- Chloride was detected at several locations, however, no GACs are derived for comparison for this compound. Fluoride concentrations marginally exceeded GACs for controlled waters at eight sampling locations (HA05, HA11, TP101, TP103, TP117, BH201, BH204).
- PCBs and VOCs were not detected in any of the soil samples analysed.
- No suspected asbestos containing material was identified during the program. No asbestos was identified through laboratory analysis of the collected soil samples.

7.3 Sediment Analytical Results

7.3.1 Hydrocarbon Compounds

Hydrocarbon indicator compounds were detected in all of the seven sediment samples. Both aliphatic and aromatic fractions were represented, but the majority of the total TPH concentration was represented by aliphatic heavy end (C₂₁ to C₃₅) fractions. Higher concentrations (50 to 200 mg/kg) were recorded in samples SS01, SS02 and SS03, collected from the foreshore to the west of the former landfill cells, near the cooling water outlet. The remaining four samples, which were collected from the foreshore area to the west of the Station Grounds recorded lower (< 5 mg/kg) concentrations. The samples collected near the landfill mostly contained aliphatic fractions, which were absent from the samples collected west of the station grounds.

7.3.2 PAH Compounds

PAH were detected in all sediment samples. No exceedances of the controlled waters GACs were recorded.

7.3.3 Heavy Metals

Mercury and selenium were not detected (above the MDL) in the sediment samples analysed. Molybdenum was detected at concentrations that did not exceed GACs in four of the samples, chiefly those from the western foreshore. Nearly all other heavy metal results exceeded the respective GACs for controlled waters.

Also presented on Table 3 are typical regional background concentrations. The concentrations are discussed further in Section 8.

7.3.4 Other Parameters

Chloride concentrations were elevated in the collected samples. No GACs exist for comparison.

7.4 Groundwater

The groundwater results are divided between the wells located on the former waste disposal areas and those recently installed on the Station Grounds.

7.4.1 Hydrocarbons

Hydrocarbon indicator compounds were not detected in the groundwater samples.

7.4.2 PAH Compounds

PAHs were not detected in the wells located in the former waste disposal area.

PAHs were detected in one of the wells located on the Station Grounds (existing well BH2). Some of the PAHs (benzo(a)pyrene and benzo(b) and benzo(k)fluoranthene) exceeded IGVs.

7.4.3 Heavy Metals

Metal concentrations in excess of the IGVs were detected for arsenic. All other metal concentrations were below their respective IGVs (where present).

The arsenic concentrations observed are discussed further in Section 8.

7.4.4 Volatile Organic Compounds

VOCs were not detected in any of the targeted wells, which included two wells in the former waste disposal area (MW104 and MW107) and four wells in the Station Grounds (BH201, BH206, BH2 and BH3).

7.4.5 Semi-Volatile Organic Compounds

SVOC were not detected (above the MDL) in the four wells for which this analysis was scheduled (BH2, BH202, BH203 and BH205).

Trace concentrations of tentatively identified compounds (TIC) were reported for one well (BH2).

7.4.6 Other Analytes

- Many of the anions and cations were elevated above respective IGVs, in particular in the wells located in the western cell of the former waste disposal area (Cell 2).
- Ammonia concentrations were elevated in the groundwater samples collected from monitoring wells located in the former waste disposal area, in particular those on the western side (Cell No. 2) where concentrations ranged from 0.77 to 76 mg/L (against an IGV of 0.15 mg/L). Ammonia concentrations in the Station Grounds wells were markedly lower.
- Nitrite and phosphate concentrations marginally exceeded respective IGVs across the site in both Station Grounds and former waste disposal area wells.
- Phenols were detected in two wells (MW101 and BH2) where concentrations exceeded the IGV. As detailed above for soil data, it was concluded by the laboratory the low level concentrations were related to a batch of filters used in sampling handling. The data were removed from the summary tables presented herein. The low level occurrences are not related to the site.

7.5 Surface Waters

- PAHs were detected in each of the five surface water samples collected, with the exception of SW10. Guidelines are not available for the individual PAHs. The sum of 6 PAHs exceeded the respective EQS at sample location SW6, located on the southern site boundary.
- Metals were detected in all surface water samples, generally at concentrations that were less than respective EQSs. One exceedance of the EQS for selenium was recorded for surface water sample SW8, collected from an outfall located on the south-western corner of the site.
- Anions and cations were generally below respective EQSs, with the exception of SW8, where elevated concentrations were recorded. It is likely that seawater formed a large portion of the sample collected here.
- Nitrite and phosphate also exceeded EQSs in several of the samples.
- Coliforms were detected in all samples. The concentration recorded in SW6 was greater than the respective EQS.

7.6 Data Validation

A limited number of duplicate samples were collected during the course of the site works. The results are presented in Table 6.

Upon request by URS, the laboratory (Alcontrol, Dublin) undertook ionic balance calculations for two of the data batches relating to the Great Island site. These included B05857 and B05930, which related to surface and groundwaters respectively.

In batch B05857, the laboratory identified anomalies in the surface water results for cations calcium and magnesium, which were considered abnormally low and indicated this could be due to a number of reasons including matrix interferences. The low cations results resulted in a percentage difference result, which was considerably outside of acceptable ranges. The laboratory has indicated the other ionic data is within acceptable ranges and suitable for interpretative use.

In batch B05930 the anion sulphate was identified as being abnormally high in the context of the other anions and cations. An investigation showed that errors were made during analyses and the sulphate results were subsequently withdrawn from the groundwater data set. The laboratory has indicated the other ionic data is within acceptable ranges and suitable for interpretative use.

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8. DISCUSSION

There were no exceedances of the GACs protective of human health in any of the targeted media; consequently the concentrations of analysed parameters are not considered to pose a risk to current or future users of the site in a continued industrial land use scenario.

There were some exceedances of the GACs protective of controlled waters, the DSVs and DIVs for soils and the GACs for sediments. There were also some exceedances of the IGVs protective of groundwater and the EQSs protective of surface water. These exceedances are discussed below.

8.1 Soil Quality

8.1.1 TPH and PAH in Soil

Upper Tier – Trial Pit Samples

Samples in which TPH aromatic fractions (C₁₂ to C₃₅) were detected in shallow soils from trial pits located on the upper tier of the station grounds also contained slightly elevated concentrations of PAHs. These investigation locations included TP106, TP108, TP113 and TP117.

No field evidence of fuel related contamination such as staining or odours were noted at these locations. BTEX compounds or aliphatic TPH fractions, which would generally indicate a fuel based contaminant source, were not detected in these samples either. It is considered the TPH detections generally reflect the PAHs in the sampled materials.

Possible sources of PAH contamination would include boiler ash or other remnants of partially combusted materials. It is considered likely there could be minor isolated occurrences of such materials at these locations.

While some of the individual PAH concentrations exceeded GACs for controlled waters, the sum of 10 PAHs were less than the DIV in all cases.

BH207 (located immediately south of the 220 kV switching yard) was excavated to a depth of 19 m and no groundwater was encountered. The monitoring well, installed to a depth of 12 m, remained dry after installation. Given the relatively deep groundwater table beneath the upper tier, there is no pathway between the observed impact in shallow soil and the receptor (i.e. groundwater and surface water). It is unlikely, therefore, that there is a risk to the underlying aquifer beneath the subject area and these exceedances are not considered significant.

Switching Yards

Based on the results of the bracketing sampling (HA12 to HA15) undertaken near the south-eastern boundary of the 220 kV switching yard, it is considered the contamination encountered in sample HA04 is localised. Given the distance from the two oil tanks located in the switching compound, it is considered unlikely to be related to a spill or leak

from those potential sources. It appears the area concerned is used for storage of replacement (or spent) parts for the switching yard and it is considered likely the isolated contamination relates to these practices.

Lower Tier – Borehole Samples

PAHs were detected in soil samples collected from boreholes (BH203 and BH204) located along the foreshore area.

The likely closest source of PAH in this instance is considered to be the boiler wash effluent tank, located approximately 50 m to the north east, however, it is unclear whether spillage from this process has occurred historically.

The PAH concentrations detected in these soil samples exceeded the GACs for controlled waters and given the proximity to the estuary the concentrations are considered to warrant further assessment. It is noted the DSV for total PAHs was exceeded in only one of the soil samples (BH203) in this area. It is also noted PAHs were detected in surface water sample SW6, located downgradient.

In contrast to the TPH concentrations detected in samples collected from the trial pits on the Upper Tier, those detected in soil sample BH204 had both aliphatic and aromatic fractions present.

While the aromatic TPH compounds are likely to be related to the PAHs, the heavy end aliphatic fractions are more likely related to a heavy fuel oil source. However, these TPH concentrations did not exceed the individual GACs or DIV. They may be remnants of the spill that occurred at the stripping tank in the 1970s. The recorded concentrations are not considered to be a significant risk to the environment.

8.1.2 Metals in Soil

Almost all of the metal concentrations in soil exceeded the respective controlled waters GACs and a small number of metal concentrations were above the published EPA background values. The DIV for arsenic of 55mg/kg was exceeded in samples collected from locations HA01, TP08 and TP116, all at depths of less than 0.5m bgl. The DIV for copper was exceeded in sample HA02_2.5m and the DIV for zinc was exceeded in sample HA05_0.2m.

The EPA report identifies arsenic, lead and vanadium as occurring at naturally elevated concentrations in the southeastern region of the country. In addition, vanadium and nickel are known to be present in the HFO stored on-site and detections of these metals at low levels are not uncommon on fuel-fired power stations.

Based on the comparison with the published background concentrations, the recorded concentrations in soils are not considered to be a risk to the environment.

8.1.3 Other Compounds in Soil

Fluoride concentrations that exceeded the screening level GACs for controlled waters in soils are not considered to be a significant issue. They are widely distributed across the

site through developed and undeveloped areas, which is not consistent with potential point source (or sources) on site. Furthermore, the GACs are conservative screening criteria and the exceedances recorded for fluoride were marginal.

8.2 Sediment Quality

PAHs in Sediment

PAH concentrations detected in sediment are likely related to site activities, most likely being derivatives of combustion in the site boilers and/or the boiler clean out activities.

The concentrations did not exceed GACs for soils designed to be protective of controlled waters. PAHs were not detected in groundwater samples collected from monitoring wells located in the former waste disposal area, indicating there are unlikely to derive from materials contained therein. Equally, with the exception of BH2, PAHs were not detected in monitoring wells located in the Station Grounds.

PAHs were detected in at low concentrations in surface water samples collected from several of the process drain outlets across the foreshore and it is likely the PAH detected in the sediment are a result of low PAH concentrations in the surface water discharges and/or runoff.

TPH in Sediment

Aromatic TPH fractions detected in sediments may be due to the presence of PAHs (as outlined in the preceding section). The aliphatic fractions are more likely fuel related. The aliphatic fractions did not exceed the respective controlled waters GACs.

It is noted surface waters from the Tank Farm discharge (via an interceptor) to the estuary near these sediment-sampling locations. While TPH was not detected in the surface waters at this outfall on this occasion, it is possible that historical discharges have contained low levels of hydrocarbons and this is considered to be the most likely source in the sediments.

Heavy Metals in Sediment

The occurrence and concentrations of heavy metals in the sediment samples were similar to those for soils and were generally lower than respective EPA background values.

Other Parameters in Sediment

Elevated concentrations of anions and cations, in particular chloride, are likely related to presence of brackish water in the samples.

8.3 Groundwater

The following sections discuss groundwater quality at the monitoring wells installed across the lower tier and in the former landfill cells. Groundwater was not encountered beneath the upper tier.

Heavy Metals

Arsenic was detected at concentrations marginally above the IGV of 0.01mg/l in groundwater samples collected from monitoring wells MW101, MW102, MW104 and MW202 located within the former landfill areas. The concentrations detected in these samples ranged from 0.022mg/l to 0.037mg/l. Groundwater in the area is not suitable for potable abstraction given its brackish nature. It is therefore considered that there is no risk to human health from the observed arsenic concentrations. In addition, the concentrations observed were below the EQS for surface waters of 0.05mg/l, inferring that the observed concentrations in groundwater do not pose a risk to the adjacent estuary.

Anions and Cations

The detection of elevated concentrations of anions and cations in groundwater in several of the wells is likely related to brackish nature of the groundwater, caused by proximity to the estuary.

The concentrations of some are higher in the wells located in the reclaimed area along the southern boundary of the site, than in those located further upgradient on site (BH205 and BH206). This distribution is consistent with the influence of the estuarine waters.

However, as discussed above (see Section 7.6), discrepancies were reported in the laboratory data, in particular for sulphate results, which make further detailed assessment of these results difficult.

It is noted, however, that the distribution of conductivity field measurements is consistent with that for the anions and cations, with elevated readings near the estuary and lower reading further in land.

Ammonia

Ammonia was detected in several wells across the site, in particular those in the former waste disposal area. The highest concentrations were detected in the western cell. It is understood that the station dump received wastes that included canteen wastes and other putrescible wastes (TMS, 2006); it is likely the elevated ammonia concentrations indicate the natural biodegradation of these wastes.

There are no suitable wells present to assess whether ground waters discharging from the former dumps to the estuary contain elevated levels of ammonia. Access would not be possible to install a down gradient well.

Ammonia is also stored on-site as part of the boiler water conditioning process. Ammonia was detected at concentrations that exceeded IGVs at BH3 and BH202, both located on the lower tier. The actual volume of ammonia stored on-site is quite small (2 x 1 m³) and it is stored in banded IBCs. The concentrations detected in these wells may relate to minor historical losses to ground, however, it is considered there is no significant ongoing source on the site.

Phosphate and Nitrate

Phosphate and nitrite concentrations detected in several of the monitoring locations may be associated with local agricultural practices and the application of fertilizer to surrounding lands.

Coliforms

Coliforms were detected in several wells across the site. While the distribution would suggest the primary source is generally more likely to be agricultural practices in areas upgradient of the site, rather than historic or current site practices, it is noted BH3 (where one of the more elevated concentrations was recorded) is located reasonably close to, but upgradient of, the septic tank on the lower tier, which is connected to the sewage treatment plant. Groundwater in the area is not suitable for potable abstraction given its brackish nature. In addition, groundwater is not abstracted on site for any use. It is therefore considered that there is no risk to human health from the observed coliform concentrations in groundwater.

8.4 Surface Waters

PAHs were detected in each of five surface water samples. As discussed above, these concentrations likely relate to site 'runoff' containing PAHs derived from a variety of site sources, potentially including boiler washings, occasional deposits from chimneystacks or from the steam 'blow-down' process.

With the exception of a marginal exceedance of the EQS for Sum of 6 PAHs, the recorded concentrations did not exceed the respective EQS and as such are not considered to pose a risk to the surrounding environment.

8.5 Inaccessible Areas

Access to the area known as the Wetlands was not possible during the course of the investigation. The area is separated from the southern boundary of the former waste disposal area by a stream, which was not passable at the time of the site inspection. There is no other known access point to the area and it appeared the density of vegetation would preclude inspection if access had been possible.

The vegetation, which is well established, comprised bushes and thick gorse and is considered likely to have spread naturally, rather than having been planted. Based on the difficulty of access and the availability of a site dump (during the 70s and 80s) it is considered unlikely that wastes generated on-site would have been placed there. It is also likely that large portions of the land would be seasonally water logged or marshy, making access more difficult during these periods. It is therefore considered unlikely the area contains any site-derived contamination.

9. CONCLUSIONS

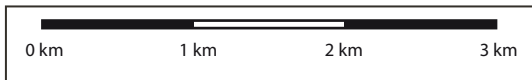
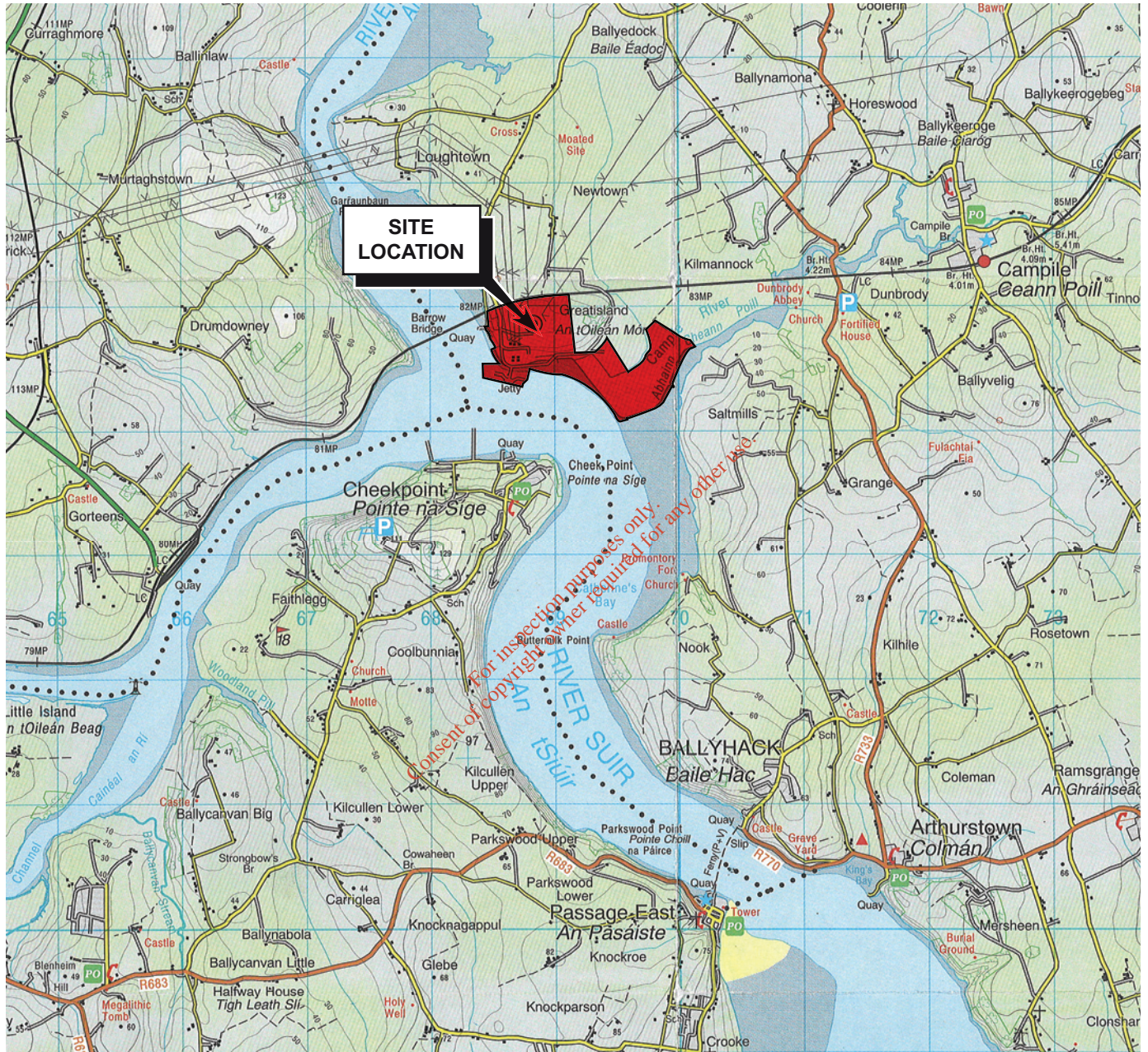
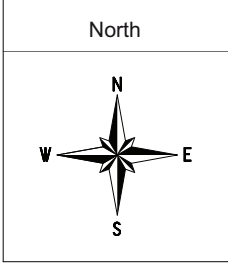
Based on the results and observations of the Phase 1 and 2 ESA, URS has drawn the following conclusions:

- From the perspective of human health and potential risks posed by environmental soil and groundwater quality to commercial site users, the site is considered suitable for the continued industrial use.
- A conservative assessment of the soil analytical data collected during the ESA identified potential risks to controlled waters (i.e. groundwater and surface water) from a number of metals as well as polycyclic aromatic hydrocarbons (PAH) and hydrocarbon indicator compounds. However, URS has concluded that across the majority of the site these potential risks are not significant.
- In general, the analytical results for most analytes were comparable to Dutch screening values (DSVs). Isolated (4 instances) of Dutch intervention value exceedances were not considered to warrant further assessment.
- It is considered that concentrations of PAH in the shallow soil near the southern site boundary and (to a lesser extent) in sediment and surface water samples, warrant some further assessment focussing on identification of likely source(s) and depending on the outcome a (probably limited) Quantitative Risk Assessment (QRA) to assess in more detail potential risks to the local ecosystems (estuary).
- Elevated concentrations of coliforms were detected in groundwater and surface waters in both the former landfill area and the station grounds. The primary source is considered likely to be agricultural practices in areas upgradient of the site, rather than historic or current site practices, however, there are likely to be some site-derived contributions in particular from the septic tank located on the lower tier.
- Elevated concentrations of ammonia in the former disposal area wells, in particular on the western cell, have not been delineated – however, access to drill in downgradient locations would be difficult to achieve. Some further assessment of estuarine waters and sediment quality downgradient of the waste disposal areas would be warranted.
- The presence of asbestos containing materials (ACM) in the subsurface is considered unlikely, except in the capped landfill, where ACM is known to exist.

In summary, no remedial action is currently considered necessary at the site under a continued industrial land use scenario, from the perspective of environmental soil and groundwater quality; however, some requirement for further assessment has been identified.

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Figures



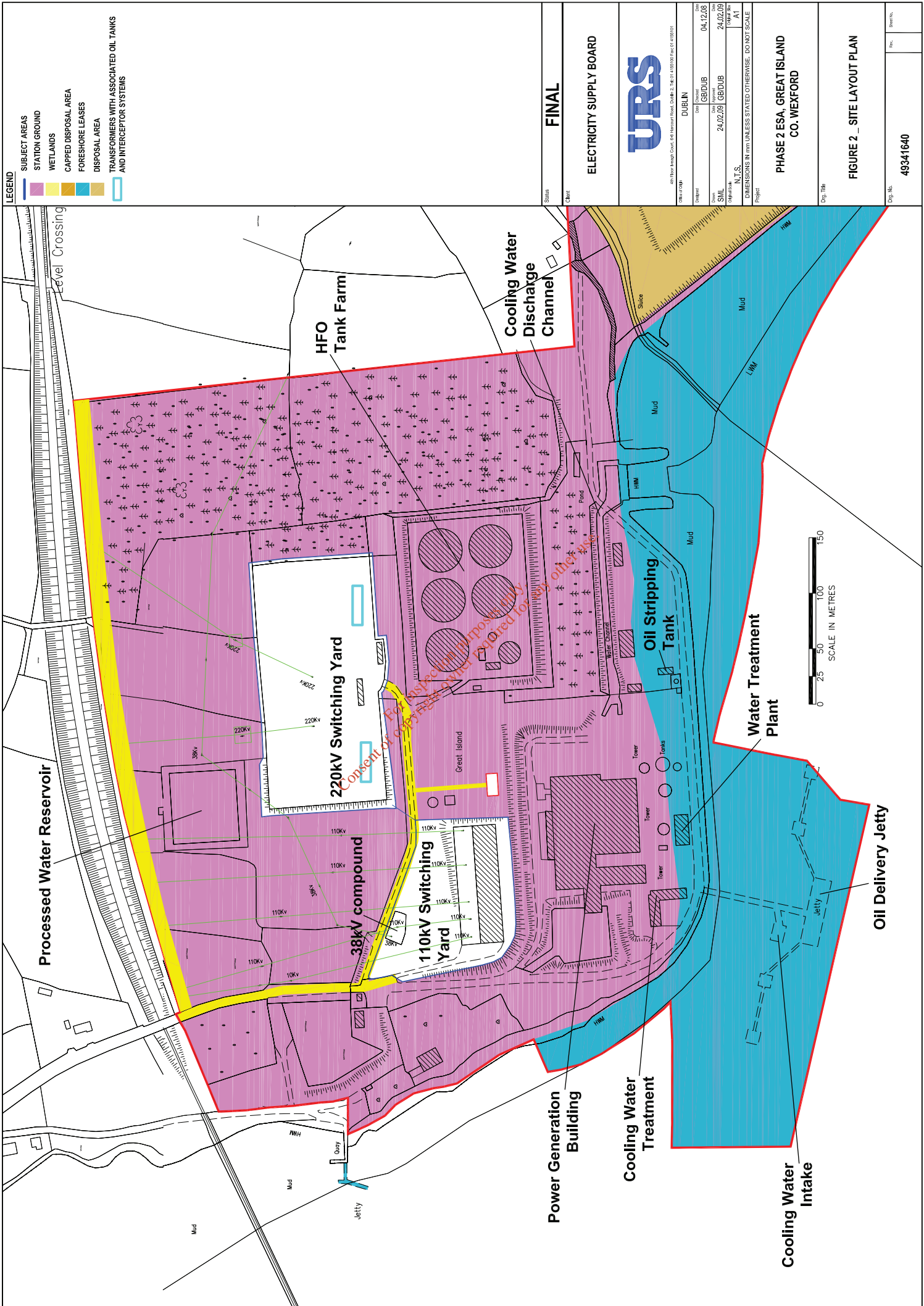
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PROJECT LOCATION	PHASE 2 ESA, GREAT ISLAND CO. WEXFORD
DRAWING TITLE	FIGURE 1 - SITE LOCATION PLAN

ENVIRONMENTAL CONSULTANTS

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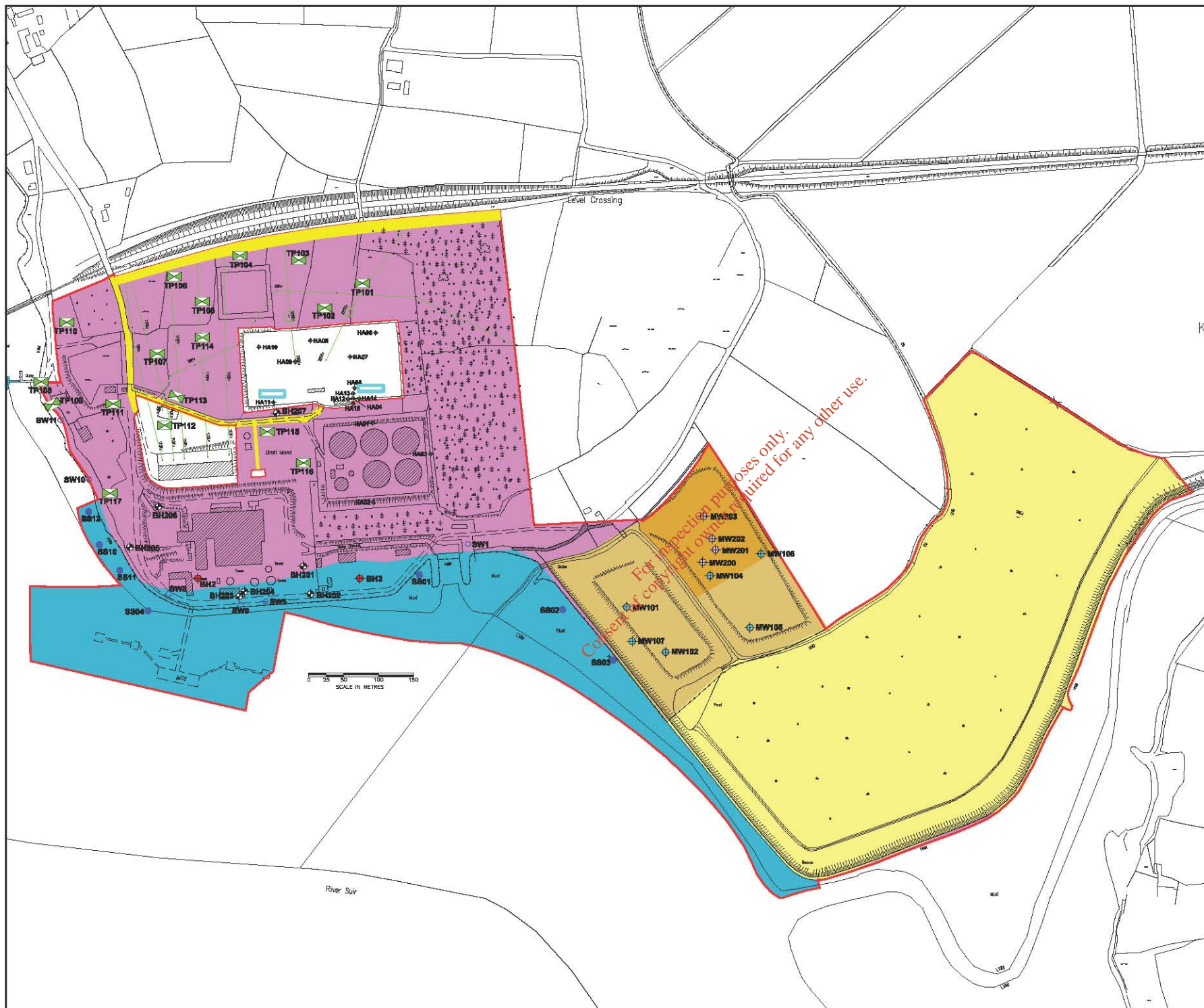


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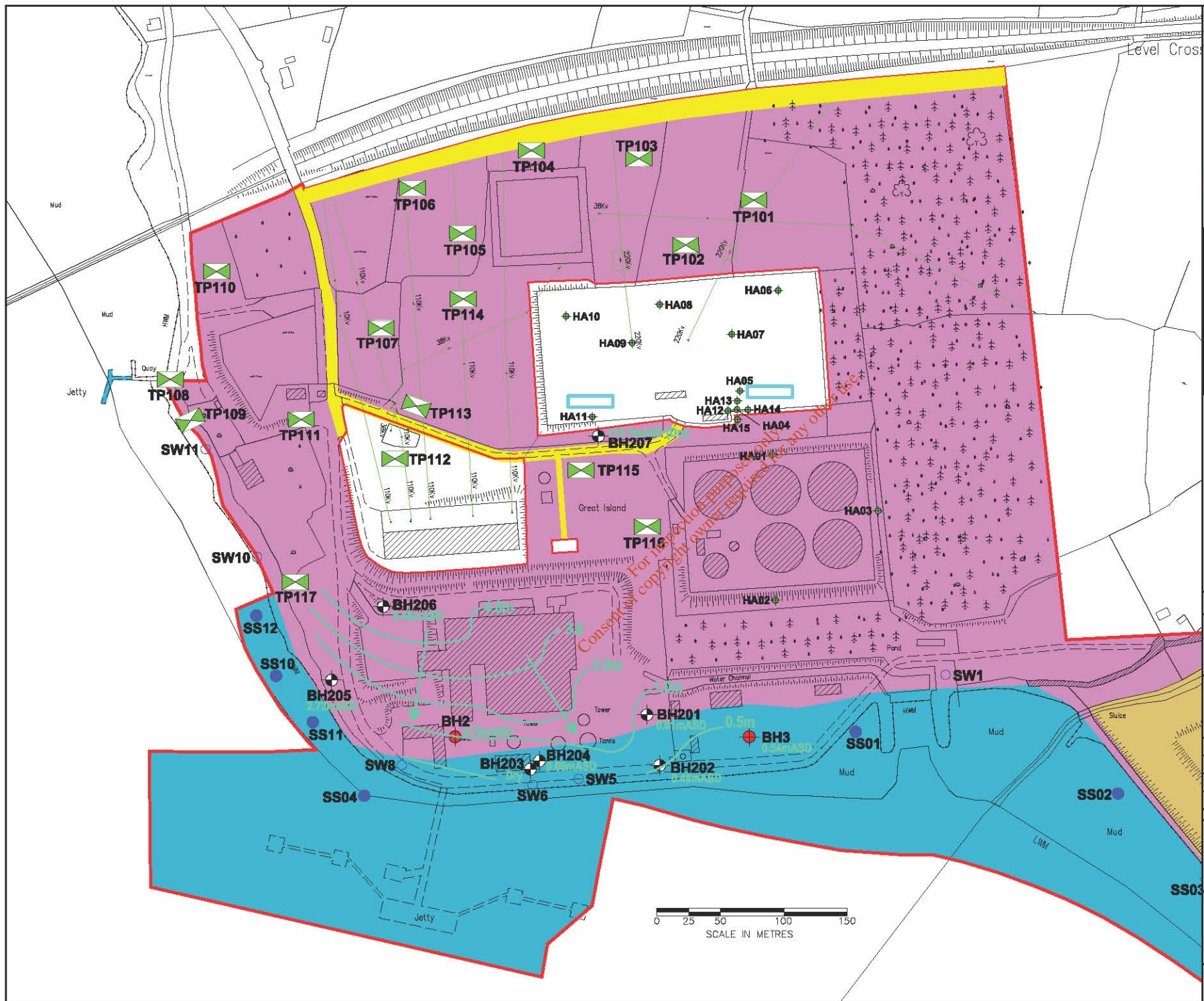
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FIGURE 2 - SITE LAYOUT PLAN

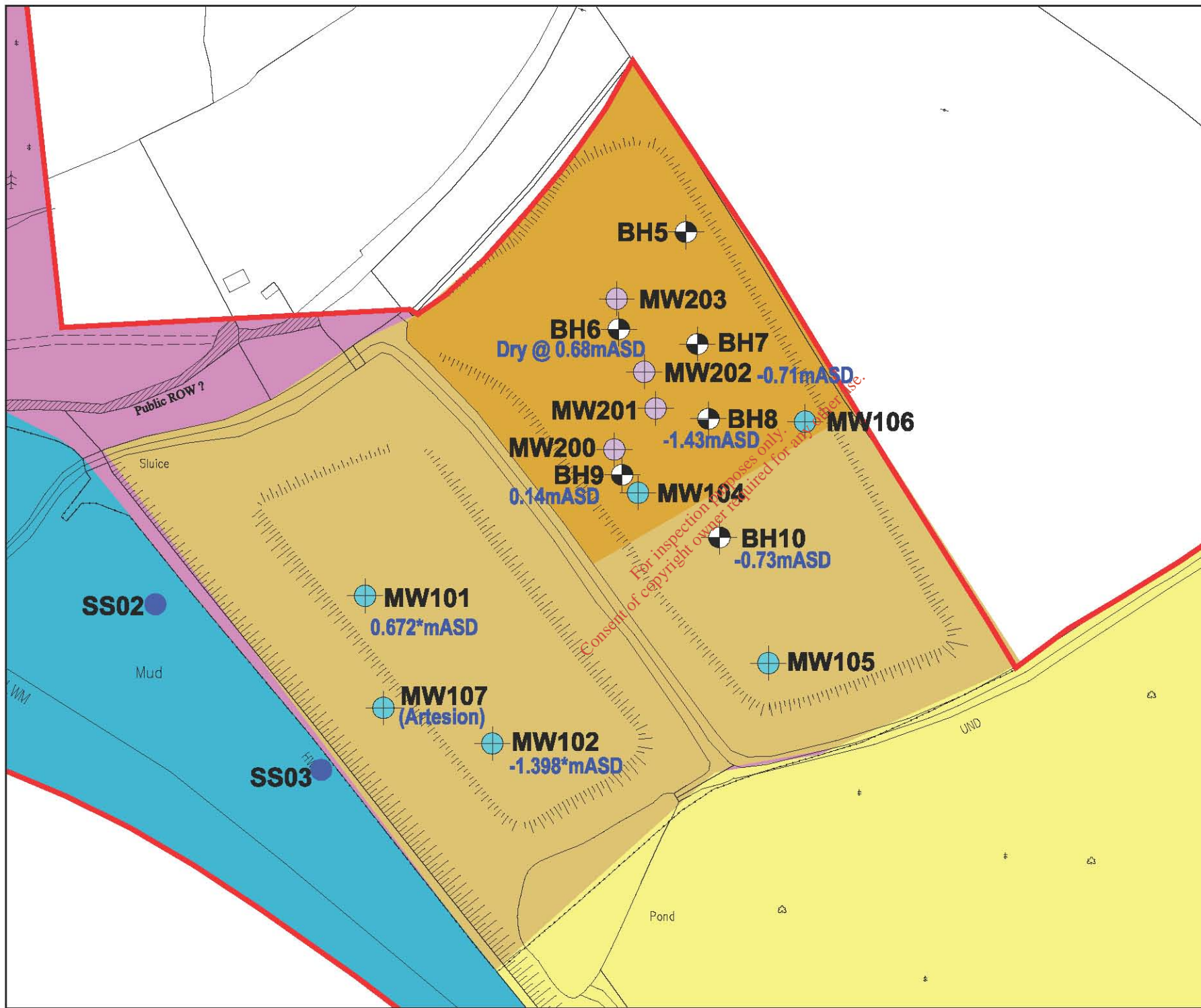
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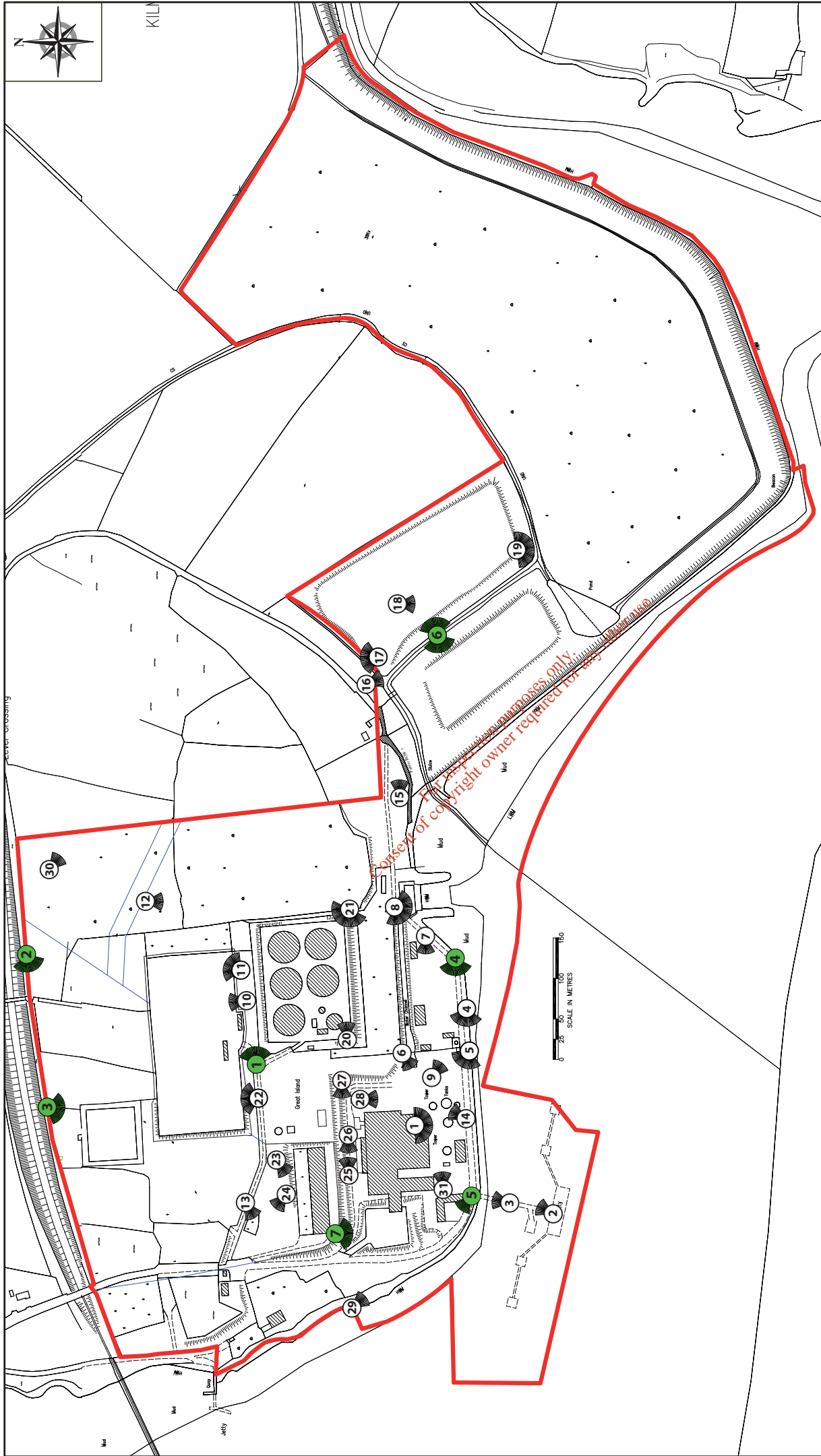
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URS INVESTIGATION OCTOBER 2008			
	BOREHOLE / MONITORING WELL LOCATION		
	HAND EXCAVATION / SAMPLE		
	BEDIMENT SAMPLE LOCATION		
	TRIAL PIT LOCATION		
	SURFACE WATER SAMPLE LOCATION		
	STATION GROUND		
	WETLANDS		
	SWITCHING YARDS		
	CAPPED DISPOSAL AREA		
	FORESHORE LEASES		
	DISPOSAL AREA		
	TRANSFORMERS WITH ASSOCIATED OIL TANKS AND INTERCEPTOR SYSTEMS		
PREVIOUS INVESTIGATION LOCATIONS			
	EXISTING MONITORING WELL ESB1 1996		
	EXISTING MONITORING WELL ESB1 2003		
	EXISTING MONITORING WELL ESB		
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		GB/DUB	27.11.08
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Original Scale	N.T.S.		
DIMENSIONS IN mm UNLESS STATED OTHERWISE. DO NOT SCALE			
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Dwg. Title	FIGURE 3 _ INVESTIGATION LOCATIONS		
Dwg. No.	49341640	Rev	Sheet No.



LEGEND			
URS INVESTIGATION OCTOBER 2008			
	BOREHOLE / MONITORING WELL LOCATION		HAND EXCAVATION / SAMPLE
	BEDIMENT SAMPLE LOCATION		TRIAL PIT LOCATION
	SURFACE WATER SAMPLE LOCATION		REDUCED GROUNDWATER LEVELS RELATIVE TO MALIN HEAD
	GROUNDWATER CONTOURS		GROUNDWATER FLOW DIRECTION
	STATION GROUND		WETLANDS
	SWITCHING YARDS		CAPPED DISPOSAL AREA
	FORESHORE LEASES		DISPOSAL AREA
	TRANSFORMERS WITH ASSOCIATED OIL TANKS AND INTERCEPTOR SYSTEMS		
PREVIOUS INVESTIGATION LOCATIONS			
	EXISTING MONITORING WELL EBS1 1996		EXISTING MONITORING WELL EBS1 2003
	EXISTING MONITORING WELL ESB		
Scale	FINAL		
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Scale	S.M.L.		
Client Name	N.T.S.		
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Dwg. Title	FIGURE 4 _ GROUNDWATER CONTOUR PLAN MAIN SITE 9th OCTOBER 2008		
Dwg. No.	49341640	Rev	



LEGEND	
URS INVESTIGATION OCTOBER 2008	
	BOREHOLE / MONITORING WELL LOCATION
	HAND EXCAVATION / SAMPLE
	BEDIMENT SAMPLE LOCATION
	TRIAL PIT LOCATION
	SURFACE WATER SAMPLE LOCATION
	REDUCED GROUNDWATER LEVELS RELATIVE TO MALIN HEAD
	ESTIMATE FROM ASSUMED PIEZO STICK UP (0.6m)
PREVIOUS INVESTIGATION LOCATIONS	
	EXISTING MONITORING WELL EBBI 1996
	EXISTING MONITORING WELL EBBI 2003
	EXISTING MONITORING WELL EBB
STATION GROUND	
	STATION GROUND
	WETLANDS
	SWITCHING YARDS
	CAPPED DISPOSAL AREA
	FORESHORE LEASES
	DISPOSAL AREA
	OIL TANKS
FINAL	
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Drawn	Date: 24.02.09 Approved: GBDUB
Scale	N.T.S.
DIMENSIONS IN mm UNLESS STATED OTHERWISE. DO NOT SCALE	
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FIGURE 5 _ REDUCED GROUNDWATER LEVELS - ASH DISPOSAL AREA - 9th OCTOBER 2008	
Dwg. No.	49341640



STATUS

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Notes:



SITE BOUNDARY LINE
 URS GROUND LEVEL PHOTOGRAPH LOCATION



MURPHY'S SURVEY LTD PANORAMIC PHOTOGRAPHIC SURVEY LOCATION

DRAWING TITLE
FIGURE 6 - PANORAMIC AND GROUND LEVEL PHOTOGRAPHIC SURVEY LOCATIONS

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PROJECT
PHASE 2 ESA GREAT ISLAND

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Tables

Client
 ESB
 Project
 ESB Great Island
 Location
 ESB Great Island
 Job Number
 49341640
 Table 1:
 Hydrocarbon Laboratory Results - Soil

220 KV Compound

Sample Type	Sample ID	Depth	Collection Date	Human Health Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil HA01 0.5m 02-Oct-08	Soil HA02 1.5m 02-Oct-08	Soil HA02 2.5m 02-Oct-08	Soil HA03 0.5m 02-Oct-08	Soil HA03 2.0m 02-Oct-08	Soil HA04 0.2m 01-Oct-08	Soil HA05 0.2m 01-Oct-08	Soil HA06 0.2m 01-Oct-08
Parameters	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value									
Aromatics															
TPH (>EC6-7) aromatic	mg/kg	0.01	650	0.09	nv	nv	nv								
TPH (>EC7-8) aromatic	mg/kg	0.01	670	0.11	nv	nv	nv								
TPH (>EC8-10) aromatic	mg/kg	0.01	230	0.14	nv	nv	nv								
TPH (>EC10-12) aromatic	mg/kg	0.01	45,000	0.22	nv	nv	nv								
TPH (>EC12-16) aromatic	mg/kg	0.1	73,000	0.44	nv	nv	nv					546.2			
TPH (>EC16-21) aromatic	mg/kg	0.1	57,000	1.4	nv	nv	nv					60.8			
TPH (>EC21-35) aromatic	mg/kg	0.1	57,000	11.1	nv	nv	nv					45.8			
Total Aromatic TPH	mg/kg	0.1	nv	nv	nv	nv	nv					652.7			
Aliphatics															
TPH (>EC5-6) aliphatic	mg/kg	0.01	370	0.09	nv	nv	nv								
TPH (>EC6-8) aliphatic	mg/kg	0.01	740	0.39	nv	nv	nv								
TPH (>EC8-10) aliphatic	mg/kg	0.01	230,000	2.84	nv	nv	nv								
TPH (>EC10-12) aliphatic	mg/kg	0.01	150,000	22.2	nv	nv	nv								
TPH (>EC12-16) aliphatic	mg/kg	0.1	180,000	441	nv	nv	nv					270.3			
TPH (>EC16-21) aliphatic	mg/kg	0.1	IR	55,500	nv	nv	nv					4,810.4			
TPH (>EC21-35) aliphatic	mg/kg	0.1	nv	668,000	nv	nv	nv					2,127.5			
Total Aliphatics (MO)	mg/kg	0.1	nv	nv	50	5000	5000					7,208.3			
Total TPH	mg/kg	0.1	nv	nv	nv	nv	nv					7,861.0			
BTEX															
Benzene	mg/kg	0.01	1.5	0.001	0.01	0.01	0.01								
Toluene	mg/kg	0.01	150	0.01	0.01	130	130								
Ethylbenzene	mg/kg	0.01	48,000	0.04	0.03	50	50								
Total Xylene	mg/kg	0.01	320	0.04	0.1	25	25								
BTEX	mg/kg	-	nv	nv	nv	nv	nv								
MTBE	mg/kg	0.01	1,780	0.01	nv	100	100								

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors
 MO Mineral Oil

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Client
 ESB
 Project
 ESB Great Island
 Location
 ESB Great Island
 49341640
 Job Number
 Hydrocarbon Laboratory Results - Soil
 Table 1:

220 kV Compound

Sample Type	Sample ID	Depth	Collection Date	Parameters	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil HA07 01-Oct-08 0.2m	Soil HA08 01-Oct-08 0.2m	Soil HA09 01-Oct-08 0.2m	Soil HA10 01-Oct-08 0.2m	Soil HA11 01-Oct-08 0.2m	Soil HA12 03-Nov-08 0.2m	Soil HA13 03-Nov-08 0.2m	Soil HA14 03-Nov-08 0.2m	Soil HA15 03-Nov-08 0.2m	
Aromatics																				
TPH (>EC6-7) aromatic				0.01	mg/kg	0.01	650	0.09	nv	nv										
TPH (>EC7-8) aromatic				0.01	mg/kg	0.01	670	0.11	nv	nv										
TPH (>EC8-10) aromatic				0.01	mg/kg	0.01	230	0.14	nv	nv										
TPH (>EC10-12) aromatic				0.01	mg/kg	0.01	45,000	0.22	nv	nv										
TPH (>EC12-16) aromatic				0.1	mg/kg	0.1	73,000	0.44	nv	nv										
TPH (>EC16-21) aromatic				0.1	mg/kg	0.1	57,000	1.4	nv	nv										
TPH (>EC21-35) aromatic				0.1	mg/kg	0.1	57,000	11.1	nv	nv										
Total Aromatic TPH				0.1	mg/kg	0.1	nv	nv	nv	nv										
Aliphatics																				
TPH (>EC5-6) aliphatic				0.01	mg/kg	0.01	370	0.09	nv	nv										
TPH (>EC6-8) aliphatic				0.01	mg/kg	0.01	740	0.39	nv	nv										
TPH (>EC8-10) aliphatic				0.01	mg/kg	0.01	230,000	2.84	nv	nv										
TPH (>EC10-12) aliphatic				0.01	mg/kg	0.01	150,000	22.2	nv	nv										
TPH (>EC12-16) aliphatic				0.1	mg/kg	0.1	180,000	441	nv	nv										
TPH (>EC16-21) aliphatic				0.1	mg/kg	0.1	IR	55,500	nv	nv										
TPH (EC21-35) aliphatic				0.1	mg/kg	0.1	nv	668,000	nv	nv										
Total Aliphatics (MO)				0.1	mg/kg	0.1	nv	nv	50	5000										
Total TPH				0.1	mg/kg	0.1	nv	nv	nv	nv										
BTEX																				
Benzene				0.01	mg/kg	0.01	1.5	0.001	0.01	0.01										
Toluene				0.01	mg/kg	0.01	150	0.01	0.01	130										
Ethylbenzene				0.01	mg/kg	0.01	48,000	0.04	0.03	50										
Total Xylene				0.01	mg/kg	0.01	320	0.04	0.1	25										
BTEX				-	mg/kg	-	nv	nv	nv	nv										
MTBE				0.01	mg/kg	0.01	1,780	0.01	nv	100										

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors
 MO Mineral Oil

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Client
 ESB
 Project
 ESB Great Island
 Location
 ESB Great Island
 Job Number
 49341640
 Table 1:
 Hydrocarbon Laboratory Results - Soil

Upper Tier - Station Ground - Trial Pits

Sample Type	Sample ID	Depth	Collection Date	Human Health Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil	Soil	Soil	Soil	Soil	Soil
Parameters	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Aromatics													
TPH (>EC6-7) aromatic	mg/kg	0.01	650	0.09	nv	nv	nv	TP101	TP102	TP103	TP104	TP105	TP105
TPH (>EC7-8) aromatic	mg/kg	0.01	670	0.11	nv	nv	nv	0.5m	0.5m	0.5m	1.0m	1.0m	1.5m
TPH (>EC8-10) aromatic	mg/kg	0.01	230	0.14	nv	nv	nv	01-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08
TPH (>EC10-12) aromatic	mg/kg	0.01	45,000	0.22	nv	nv	nv						
TPH (>EC12-16) aromatic	mg/kg	0.1	73,000	0.44	nv	nv	nv						
TPH (>EC16-21) aromatic	mg/kg	0.1	57,000	1.4	nv	nv	nv						
TPH (>EC21-35) aromatic	mg/kg	0.1	57,000	11.1	nv	nv	nv						
Total Aromatic TPH	mg/kg	0.1	nv	nv	nv	nv	nv						
Aliphatics													
TPH (>EC5-6) aliphatic	mg/kg	0.01	370	0.09	nv	nv	nv						
TPH (>EC6-8) aliphatic	mg/kg	0.01	740	0.39	nv	nv	nv						
TPH (>EC8-10) aliphatic	mg/kg	0.01	230,000	2.84	nv	nv	nv						
TPH (>EC10-12) aliphatic	mg/kg	0.01	150,000	22.2	nv	nv	nv						
TPH (>EC12-16) aliphatic	mg/kg	0.1	180,000	441	nv	nv	nv						
TPH (>EC16-21) aliphatic	mg/kg	0.1	IR	55,500	nv	nv	nv						
TPH (>EC21-35) aliphatic	mg/kg	0.1	nv	668,000	nv	nv	nv						
Total Aliphatics (MO)	mg/kg	0.1	nv	nv	50	5000	5000						
Total TPH	mg/kg	0.1	nv	nv	nv	nv	nv						
BTEX													
Benzene	mg/kg	0.01	1.5	0.001	0.01	0.01	0.01						
Toluene	mg/kg	0.01	150	0.01	0.01	130	130						
Ethylbenzene	mg/kg	0.01	48,000	0.04	0.03	50	50						
Total Xylene	mg/kg	0.01	320	0.04	0.1	25	25						
BTEX	mg/kg	-	nv	nv	nv	nv	nv						
MTBE	mg/kg	0.01	1,780	0.01	nv	100	100						

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors
 MO Mineral Oil

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Client
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 Project
 ESB Great Island
 Location
 ESB Great Island
 Job Number
 49341640
 Hydrocarbon Laboratory Results - Soil

Upper Tier - Station Ground - Trial Pits

Sample Type	Sample ID	Depth	Collection Date	Parameters	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Aromatics	TPH (>EC6-7) aromatic				mg/kg	0.01	650	0.09	nv	nv	TP106	TP106	TP108	TP109	TP110	TP111		
	TPH (>EC7-8) aromatic				mg/kg	0.01	670	0.11	nv	nv	0.5m	0.3m	0.4m	0.5m	1.5m	0.2m		
	TPH (>EC8-10) aromatic				mg/kg	0.01	230	0.14	nv	nv	01-Oct-08	03-Oct-08	03-Oct-08	03-Oct-08	03-Oct-08	03-Oct-08		
	TPH (>EC10-12) aromatic				mg/kg	0.01	45,000	0.22	nv	nv								
	TPH (>EC12-16) aromatic				mg/kg	0.1	73,000	0.44	nv	nv								
	TPH (>EC16-21) aromatic				mg/kg	0.1	57,000	1.4	nv	nv								
	TPH (>EC21-35) aromatic				mg/kg	0.1	57,000	11.1	nv	nv								
	Total Aromatic TPH				mg/kg	0.1	nv	nv	nv	nv								
Aliphatics	TPH (>EC5-6) aliphatic				mg/kg	0.01	370	0.09	nv	nv								
	TPH (>EC6-8) aliphatic				mg/kg	0.01	740	0.39	nv	nv								
	TPH (>EC8-10) aliphatic				mg/kg	0.01	230,000	2.84	nv	nv								
	TPH (>EC10-12) aliphatic				mg/kg	0.01	150,000	22.2	nv	nv								
	TPH (>EC12-16) aliphatic				mg/kg	0.1	180,000	441	nv	nv								
	TPH (>EC16-21) aliphatic				mg/kg	0.1	IR	55,500	nv	nv								
	TPH (EC21-35) aliphatic				mg/kg	0.1	nv	668,000	nv	nv								
	Total Aliphatics (MO)				mg/kg	0.1	nv	nv	50	5000								
	Total TPH				mg/kg	0.1	nv	nv	nv	nv								
BTEX	Benzene				mg/kg	0.01	1.5	0.001	0.01	0.01								
	Toluene				mg/kg	0.01	150	0.01	0.01	130								
	Ethylbenzene				mg/kg	0.01	48,000	0.04	0.03	50								
	Total Xylene				mg/kg	0.01	320	0.04	0.1	25								
	BTEX				mg/kg	-	nv	nv	nv	nv								
	MTBE				mg/kg	0.01	1,780	0.01	nv	100								

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors
 MO Mineral Oil

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 1: Hydrocarbon Laboratory Results - Soil

Upper Tier - Station Ground - Trial Pits

Sample Type	Sample ID	Depth	Collection Date	Parameters	Units	MDL	Human Health GAC Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
											TP112 0.5m 02-Oct-08	TP112 1.5m 02-Oct-08	TP113 0.5m 02-Oct-08	TP114 0.5m 02-Oct-08	TP115 0.5m 02-Oct-08	TP116 0.5m 02-Oct-08	Dup for TP116 0.5m 02-Oct-08	TP117 0.5m 02-Oct-08
Aromatics	TPH (>EC6-7) aromatic			650	0.01		0.09											
	TPH (>EC7-8) aromatic			670	0.01		0.11											
	TPH (>EC8-10) aromatic			230	0.01		0.14											
	TPH (>EC10-12) aromatic			45,000	0.01		0.22											
	TPH (>EC12-16) aromatic			73,000	0.01		0.44											
	TPH (>EC16-21) aromatic			57,000	0.1		1.4											
	TPH (>EC21-35) aromatic			57,000	0.1		11.1											
	Total Aromatic TPH				nv	0.1												
Aliphatics	TPH (>EC5-6) aliphatic			370	0.01		0.09											
	TPH (>EC6-8) aliphatic			740	0.01		0.39											
	TPH (>EC8-10) aliphatic			230,000	0.01		2.84											
	TPH (>EC10-12) aliphatic			150,000	0.01		22.2											
	TPH (>EC12-16) aliphatic			180,000	0.1		441											
	TPH (>EC16-21) aliphatic			IR	0.1		55,500											
	TPH (EC21-35) aliphatic			668,000	0.1		668,000											
	Total Aliphatics (MO)				nv	0.1												
BTEX	Benzene			1.5	0.01		0.001											
	Toluene			150	0.01		0.01											
	Ethylbenzene			48,000	0.01		0.04											
	Total Xylene			320	0.01		0.04											
	BTEX				nv													
MTBE			1,780	0.01		0.01												

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 xx Generic Assessment Criteria
 GAC Method Detection Limit
 MDL Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors
 MO Mineral Oil

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 1: Hydrocarbon Laboratory Results - Soil

Borehole Samples

Sample Type	Sample ID	Depth	Collection Date	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Parameters	Units	MDL	Human Health Soil	GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Controlled Water	Soil	Soil	Soil	Soil
Aromatics											
TPH (>EC6-7) aromatic	mg/kg	0.01	650	0.09	nv	nv					
TPH (>EC7-8) aromatic	mg/kg	0.01	670	0.11	nv	nv					
TPH (>EC8-10) aromatic	mg/kg	0.01	230	0.14	nv	nv					
TPH (>EC10-12) aromatic	mg/kg	0.01	45,000	0.22	nv	nv					
TPH (>EC12-16) aromatic	mg/kg	0.1	73,000	0.44	nv	nv					
TPH (>EC16-21) aromatic	mg/kg	0.1	57,000	1.4	nv	nv					
TPH (>EC21-35) aromatic	mg/kg	0.1	57,000	11.1	nv	nv					
Total Aromatic TPH	mg/kg	0.1	nv	nv	nv	nv					
Aliphatics											
TPH (>EC5-6) aliphatic	mg/kg	0.01	370	0.09	nv	nv					
TPH (>EC6-8) aliphatic	mg/kg	0.01	740	0.39	nv	nv					
TPH (>EC8-10) aliphatic	mg/kg	0.01	230,000	2.84	nv	nv					
TPH (>EC10-12) aliphatic	mg/kg	0.01	150,000	22.2	nv	nv					
TPH (>EC12-16) aliphatic	mg/kg	0.1	180,000	441	nv	nv					
TPH (>EC16-21) aliphatic	mg/kg	0.1	IR	55,500	nv	nv					
TPH (>EC21-35) aliphatic	mg/kg	0.1	nv	668,000	nv	nv					
Total Aliphatics (MO)	mg/kg	0.1	nv	nv	50	5000					
BTEX											
Benzene	mg/kg	0.01	1.5	0.001	0.01	0.01					
Toluene	mg/kg	0.01	150	0.01	0.01	130					
Ethylbenzene	mg/kg	0.01	48,000	0.03	0.03	50					
Total Xylene	mg/kg	0.01	320	0.04	0.1	25					
BTEX	mg/kg	-	nv	nv	nv	nv					
MTBE	mg/kg	0.01	1,780	0.01	nv	100					

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors
 MO Mineral Oil

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 Table 2:

ESB
 ESB Great Island
 ESB Great Island
 49341640
 PAH Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	220 kV Compound						
											Soil HA01 0.5m 02-Oct-08	Soil HA02 2.0m 02-Oct-08	Soil HA03 2.0m 02-Oct-08	Soil HA04 0.2m 01-Oct-08	Soil HA05 0.2m 01-Oct-08	Soil HA06 0.2m 01-Oct-08	Soil HA08 0.2m 01-Oct-08
				Naphthalene*	mg/kg	1	270	0.011	nv	nv	-	-	-	-	-	-	-
				Acenaphthylene	mg/kg	1	2,100	0.497	nv	nv	-	-	-	-	-	-	-
				Acenaphthene	mg/kg	1	3,400	23	nv	nv	-	-	-	-	-	-	-
				Fluorene	mg/kg	1	69,000	30	nv	nv	-	-	-	-	-	-	-
				Phenanthrene*	mg/kg	1	34,000	2.02	nv	nv	-	-	-	-	-	-	-
				Anthracene*	mg/kg	1	520,000	0.026	nv	nv	-	-	-	-	-	-	-
				Fluoranthene*	mg/kg	1	3,400	0.094	nv	nv	-	-	-	-	-	-	-
				Pyrene	mg/kg	1	35,000	168	nv	nv	-	-	-	-	-	-	-
				Benzo(a)anthracene*	mg/kg	1	340	0.030	nv	nv	-	-	-	-	-	-	-
				Chrysene*	mg/kg	1	3,500	0.372	nv	nv	-	-	-	-	-	-	-
				Benzo(b)+Benzo(k) fluoranthene*	mg/kg	1	350	nv	nv	nv	-	-	-	-	-	-	-
				Benzo(a)pyrene*	mg/kg	1	35	0.090	nv	nv	-	-	-	-	-	-	-
				Indeno(1,2,3-cd)pyrene*	mg/kg	1	350	nv	nv	nv	-	-	-	-	-	-	-
				Dibenzof(a,h)anthracene	mg/kg	1	35	0.308	nv	nv	-	-	-	-	-	-	-
				Benzo(g,h)perylene*	mg/kg	1	52,000	nv	nv	nv	-	-	-	-	-	-	-
				Sum of 10 PAH	mg/kg	-	nv	nv	1	40	-	-	-	-	-	-	-
				Total 16 EPA PAHs (16)	mg/kg	-	nv	nv	nv	nv	-	-	-	-	-	-	-

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

* Included in sum of ten PAHs

Client
 Project
 Location
 Job Number
 Table 2:

ESB
 ESB Great Island
 ESB Great Island
 49341640
 PAH Laboratory Results - Soil

Upper Tier - Station Grounds - Trial Pits																							
Sample Type	Sample ID	Depth	Date	Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Soil												
											TP101	TP103	TP106	TP106	TP106	TP108	TP110	TP111	TP113	TP115	TP117	TP117	
												01-Oct-08		01-Oct-08		03-Oct-08		03-Oct-08		02-Oct-08		02-Oct-08	
				Naphthalene*	mg/kg	1	270	0.011	nv	nv	nv	-	0.002	0.017	-	0.002	0.002	0.006	0.002	0.006	0.002	0.002	0.002
				Acenaphthylene	mg/kg	1	2,100	0.497	nv	nv	nv	-	0.002	0.004	-	0.002	0.004	0.006	0.002	0.006	0.002	0.002	0.002
				Acenaphthene	mg/kg	1	3,400	23	nv	nv	nv	-	0.018	0.028	-	0.018	0.021	0.018	0.021	0.018	0.021	0.018	0.021
				Fluorene	mg/kg	1	69,000	30	nv	nv	nv	-	0.001	0.015	-	0.001	0.002	0.008	0.001	0.008	0.001	0.002	0.008
				Phenanthrene*	mg/kg	1	34,000	2.02	nv	nv	nv	-	0.003	0.164	-	0.002	0.022	0.011	0.003	0.011	0.003	0.022	0.011
				Anthracene*	mg/kg	1	520,000	0.026	nv	nv	nv	-	0.001	0.037	-	0.001	0.004	0.004	0.001	0.004	0.001	0.004	0.004
				Fluoranthene*	mg/kg	1	3,400	0.094	nv	nv	nv	-	0.001	0.242	-	0.001	0.042	0.021	0.001	0.021	0.001	0.042	0.021
				Pyrene	mg/kg	1	35,000	168	nv	nv	nv	-	0.001	0.183	-	0.001	0.037	0.018	0.001	0.018	0.001	0.037	0.018
				Benzo(a)anthracene*	mg/kg	1	340	0.030	nv	nv	nv	-	0.007	0.061	-	0.004	0.023	0.035	0.007	0.035	0.007	0.023	0.035
				Chrysene*	mg/kg	1	3,500	0.372	nv	nv	nv	-	0.004	0.113	-	0.004	0.028	0.016	0.004	0.016	0.004	0.028	0.016
				Benzo(b)fluoranthene*	mg/kg	1	350	nv	nv	nv	nv	-	-	0.226	-	0.002	0.035	0.026	0.002	0.035	0.002	0.035	0.026
				Benzo(a)pyrene*	mg/kg	1	35	0.090	nv	nv	nv	-	0.001	0.115	-	0.001	0.023	0.011	0.001	0.023	0.001	0.023	0.011
				Indeno(1,2,3-cd)pyrene*	mg/kg	1	350	nv	nv	nv	nv	-	0.001	0.066	-	0.001	0.008	0.008	0.001	0.008	0.001	0.008	0.008
				Dibenzofuran	mg/kg	1	35	0.308	nv	nv	nv	-	0.001	0.016	-	0.001	0.003	0.003	0.001	0.003	0.001	0.003	0.003
				Benzo(ghi)perylene*	mg/kg	1	52,000	nv	nv	nv	nv	-	0.001	0.073	-	0.001	0.01	0.007	0.001	0.01	0.001	0.007	0.008
				Sum of 10 PAH	mg/kg	-	nv	nv	1	40	40	-	0.023	1.114	-	0.023	1.197	0.145	0.023	1.197	0.145	0.023	0.428
				Total 16 EPA PAHs (16)	mg/kg	-	nv	nv	nv	nv	nv	-	0.046	1.360	-	0.046	0.263	0.198	0.046	0.263	0.198	0.046	0.68

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

* Included in sum of ten PAHs

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Client
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 Location
 Job Number
 Table 2:

ESB
 ESB Great Island
 ESB Great Island
 49341640
 PAH Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch Screening (S) Value	Dutch Intervention (I) Value	Borehole Samples					
											Soil	Soil	Soil	Soil	Soil	Soil
				Naphthalene*	mg/kg	1	270	0.011	nv	nv	0.002	0.003	0.017	0.001	-	-
				Acenaphthylene	mg/kg	1	2,100	0.497	nv	nv	0.003	0.13	0.009	0.002	-	-
				Acenaphthene	mg/kg	1	3,400	23	nv	nv	0.022	0.291	0.02	0.009	-	-
				Fluorene	mg/kg	1	69,000	30	nv	nv	0.003	0.636	0.02	0.005	-	-
				Phenanthrene*	mg/kg	1	34,000	2.02	nv	nv	0.009	3.727	0.008	0.01	-	-
				Anthracene*	mg/kg	1	520,000	0.026	nv	nv	0.003	1.342	0.045	0.004	-	-
				Fluoranthene*	mg/kg	1	3,400	0.094	nv	nv	0.003	3.826	0.027	0.009	-	-
				Pyrene	mg/kg	1	35,000	168	nv	nv	0.003	3.137	0.045	0.013	-	-
				Benzo(a)anthracene*	mg/kg	1	340	0.030	nv	nv	0.021	0.949	0.045	0.008	-	-
				Chrysene*	mg/kg	1	3,500	0.372	nv	nv	0.014	0.605	0.035	0.013	-	-
				Benzo(b)+Benzo(k) fluoranthene*	mg/kg	1	350	nv	nv	nv	0.003	-	0.471	0.015	0.007	-
				Benzo(a)pyrene*	mg/kg	1	35	0.090	nv	nv	0.001	0.265	0.05	0.014	-	-
				Indeno(1,2,3-cd)pyrene*	mg/kg	1	350	nv	nv	nv	0.001	0.051	0.021	0.003	-	-
				Dibenzof(a,h)anthracene	mg/kg	1	35	0.308	nv	nv	0.001	0.01	0.009	0.005	-	-
				Benzo(g,h)perylene*	mg/kg	1	52,000	nv	nv	nv	0.001	0.018	0.036	0.012	-	-
				Sum of 10 PAH	mg/kg	-	nv	nv	1	40	0.068	11.247	0.299	0.081	-	-
				Total 16 EPA PAHs (16)	mg/kg	-	nv	nv	nv	nv	0.090	15.451	0.402	0.115	-	-

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

* Included in sum of ten PAHs

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 3 : PCBs PCB Laboratory Results - Soil

Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID	HA01	HA02	HA03	HA04	HA05	HA06	HA07	HA08		
Depth	0.5m	2.5m	2.0m	0.2m	0.2m	0.2m	0.2m	0.2m		
Date	02-Oct-08	02-Oct-08	02-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08		
Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value				
PCB Total of 7 Congeners	mg/kg	0.001	16.8	0.004	0.02	1				

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 3 : PCBs PCB Laboratory Results - Soil

Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID	HA09	HA10	HA11	TP103	TP113	BH201	BH201	Soil
Depth	0.2m	0.2m	0.2m	0.5m	0.5m	1.0-2.0m	4.0m	
Date	01-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08	02-Oct-08	01-Oct-08	01-Oct-08	01-Oct-08
Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value		
PCB Total of 7 Congeners	mg/kg	0.001	16.8	0.004	0.02	1	-	-

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 4: Heavy Metal Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	EPA Background	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil HA01 0.5m 02-Oct-08	Soil HA02 0.5m 02-Oct-08	Soil HA02 1.5m 02-Oct-08	Soil HA02 2.5m 02-Oct-08	Soil HA03 0.5m 02-Oct-08	Soil HA03 2.0m 02-Oct-08	Soil HA03 0.2m 01-Oct-08	Soil HA04 0.2m 01-Oct-08	Soil HA05 0.2m 01-Oct-08	Soil HA06 0.2m 01-Oct-08	Soil HA07 0.2m 01-Oct-08
Antimony				mg/kg	1.5	15	0.23	1.54	3	15	-	-	-	-	-	-	-	-	-	-	-
Arsenic				mg/kg	3	500	0.29	21.9	29	65	173	17	8	15	16	13	31	9	12	7	7
Barium				mg/kg	6	28,000	4.11	454.5	160	625	72	76	74	74	90	85	70	78	68	63	63
Cadmium				mg/kg	0.2	1,400	0.55	11.652	0.8	12	-	-	-	-	-	-	-	-	-	-	-
Chromium				mg/kg	4.5	5,000	6.50	86.8	100	380	30	24	26	27	27	20	1	24	3	11	11
Copper				mg/kg	6	IR	0.04	45.9	36	190	20	41	21	231	25	30	16	68	17	15	15
Lead				mg/kg	2	750	0.40	61.9	8.5	530	32	77	52	52	82	105	69	107	27	67	67
Mercury				mg/kg	0.4	480	0.022	0.237	0.3	10	2	5	2	2	3	4	-	-	-	-	-
Molybdenum				mg/kg	0.6	1,310	0.76	3.29	3	200	24	21	22	22	24	20	18	36	33	42	42
Nickel				mg/kg	0.3	8,000	0.05	2.87	0.77	700	-	-	-	-	-	-	-	-	-	-	-
Selenium				mg/kg	3	23,400	20	104.8	42	290	54	56	56	61	58	50	50	78	72	113	113
Vanadium				mg/kg	1.5	IR	0.29	144.7	140	720	82	287	147	127	221	299	115	890	84	100	100
Zinc				mg/kg	2.5	IR	0.29	144.7	140	720	82	287	147	127	221	299	115	890	84	100	100

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds EPA Background 95 Percentile
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors

Note: There may be some minor variations in MDL between the tables and the lab certificates, as some samples were analysed by Abstronics facility at Chester.

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 4: Heavy Metal Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Parameter	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	EPA Background	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil HA08 0.2m 01-Oct-08	Soil HA09 0.2m 01-Oct-08	Soil HA10 0.2m 01-Oct-08	Soil HA11 0.2m 01-Oct-08	Soil IP101 0.5m 01-Oct-08	Soil IP102 0.5m 01-Oct-08	Soil IP103 0.5m 01-Oct-08	Soil IP104 0.5m 01-Oct-08	Soil TP104 1.0m 01-Oct-08	
				Antimony	mg/kg	1.5	15	0.23	1.54	3	75	-	-	-	-	-	-	-	-	-	-
				Arsenic	mg/kg	3	500	0.29	21.9	29	65	9	19	11	59	16	2.1	13	19	25	29
				Barium	mg/kg	6	28,000	4.11	454.5	160	625	126	80	84	64	76	60	88	79	63	67
				Cadmium	mg/kg	0.2	1,400	0.55	11.652	0.8	12	-	-	-	-	-	-	-	-	-	-
				Chromium	mg/kg	4.5	5,000	6.50	86.8	100	380	2	12	7	29	21	24	26	34	34	34
				Copper	mg/kg	6	IR	0.04	45.9	3.6	190	12	23	14	8	14	16	11	27	36	38
				Lead	mg/kg	2	750	0.40	61.9	8.5	530	23	23	23	23	30	23	20	34	21	24
				Mercury	mg/kg	0.4	480	0.002	0.237	0.3	10	-	-	-	-	-	-	-	-	-	-
				Molybdenum	mg/kg	0.6	1,310	1.41	3.29	3	200	-	-	-	-	-	0.9	1	1.2	0.8	1
				Nickel	mg/kg	0.9	5,000	0.76	50	35	270	35	28	39	8	18	17	10	24	36	38
				Selenium	mg/kg	3	8,000	0.05	2.87	0.77	700	-	-	-	-	-	-	-	-	-	-
				Vanadium	mg/kg	1.5	23,400	20	104.8	42	290	89	61	71	45	52	27	46	30	37	37
				Zinc	mg/kg	2.5	IR	0.29	144.7	140	720	102	102	85	101	60	57	49	78	92	92

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeding EPA Background 95 Percentile
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors

Note: There may be some minor variations in MDL between the tables and the lab certificates, as some samples were analysed by Abstronics facility at Chester.

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 4: Heavy Metal Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	EPA Background	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil TP105 0.5m 01-Oct-08	Soil TP105 1.0m 01-Oct-08	Soil TP105 1.5m 01-Oct-08	Soil TP105 2.0m 01-Oct-08	Soil TP106 0.5m 01-Oct-08	Soil TP106 1.5m 01-Oct-08	Soil TP108 0.3m 03-Oct-08	Soil TP109 0.4m 03-Oct-08	Soil Dup for TP108 0.4m 03-Oct-08	Soil TP110 0.5m 03-Oct-08
Antimony		mg/kg	1.5		15	0.23	1.54	3	75		3	2.2	3.7	4.3	-	-	na	na	na	na
Arsenic		mg/kg	3		500	0.29	21.9	29	65		20	19	25	28	17	33	82	31	24	15
Barium		mg/kg	6		28,000	4.11	454.5	160	625		73	56	71	72	64	81	126	114	76	76
Cadmium		mg/kg	0.2		1,400	0.55	1.652	0.8	12		-	-	-	-	-	-	-	-	-	-
Chromium		mg/kg	4.5		5,000	6.50	86.8	100	380		27	21	31	31	24	34	35	38	36	13
Copper		mg/kg	6		IR	0.04	45.9	36	190		25	16	36	36	14	34	40	26	23	24
Lead		mg/kg	2		750	0.40	61.9	85	530		25	19	35	25	23	32	251	59	49	33
Mercury		mg/kg	0.4		480	0.002	0.237	0.3	10		1.2	0.9	-	-	-	-	-	-	-	-
Molybdenum		mg/kg	0.6		1,310	1.41	3.29	3	200		28	21	38	40	16	35	31	22	21	2
Nickel		mg/kg	0.9		5,000	0.76	50	35	270		-	-	-	-	-	-	-	-	-	9
Selenium		mg/kg	3		8,000	0.05	2.87	0.77	700		-	-	-	-	-	-	-	-	-	-
Vanadium		mg/kg	1.5		23,400	20	104.8	42	290		30	25	35	31	44	63	54	57	53	30
Zinc		mg/kg	2.5		IR	0.29	144.7	140	720		76	64	94	95	82	82	137	88	76	57

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeding EPA Background 95 Percentile
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 nv Not Analysed
 IR Insignificant risk to identified potential receptors

Note: There may be some minor variations in MDL between the tables and the lab certificates, as some samples were analysed by Abstronics facility at Chester.

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 4: Heavy Metal Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Parameter	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	EPA Background	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil TP110 1.5m 03-Oct-08	Soil TP111 0.2m 03-Oct-08	Soil TP112 0.5m 02-Oct-08	Soil TP112 1.5m 02-Oct-08	Soil TP113 0.5m 02-Oct-08	Soil TP114 0.5m 02-Oct-08	Soil TP115 0.5m 02-Oct-08	Soil TP116 0.5m 02-Oct-08	Soil Dup for TP116 0.5m 02-Oct-08	Soil TP117 0.5m 02-Oct-08
				Antimony	mg/kg	1.5	15	0.23	1.54	3	75	na	na	-	-	-	-	-	-	-	-
				Arsenic	mg/kg	3	500	0.29	21.9	29	65	17	31	12	12	15	14	13	156	13	13
				Barium	mg/kg	6	28,000	4.11	454.5	160	625	63	88	60	98	70	79	76	76	76	82
				Cadmium	mg/kg	0.2	1,400	0.55	1,652	0.8	12	-	-	-	-	-	-	-	-	-	-
				Chromium	mg/kg	4.5	5,000	6.50	86.8	100	380	12	19	19	44	25	23	28	28	28	30
				Copper	mg/kg	6	IR	0.04	45.9	3.6	190	15	17	12	13	15	12	14	17	20	20
				Lead	mg/kg	2	750	0.40	61.9	8.5	530	26	16	15	13	28	25	29	27	27	36
				Mercury	mg/kg	0.4	480	0.002	0.237	0.3	10	1	2	-	-	-	-	-	-	-	-
				Molybdenum	mg/kg	0.6	1,310	1.41	3.29	3	200	7	19	12	29	17	11	17	18	20	34
				Nickel	mg/kg	0.9	5,000	0.76	50	35	270	-	-	-	-	-	-	-	-	-	-
				Selenium	mg/kg	3	8,000	0.05	2.87	0.77	700	-	-	-	-	-	-	-	-	-	-
				Vanadium	mg/kg	1.5	23,400	20	104.8	42	290	25	32	69	135	42	43	46	48	46	49
				Zinc	mg/kg	2.5	IR	0.29	144.7	140	720	56	65	54	72	73	49	61	62	61	61

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeding EPA Background 95 Percentile
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 nv Not Analysed
 IR Insignificant risk to identified potential receptors

Note: There may be some minor variations in MDL between the tables and the lab certificates, as some samples were analysed by Abstronics facility at Chester.

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 4: Heavy Metal Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Parameter	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	EPA Background	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil	Soil	Soil	Soil	Soil	Soil	Soil
				Antimony	mg/kg	1.5	15	0.23	1.54	3	75							
				Arsenic	mg/kg	3	500	0.29	21.9	29	65							
				Barium	mg/kg	6	28,000	4.11	454.5	160	625							
				Cadmium	mg/kg	0.2	1,400	0.55	1.652	0.8	12							
				Chromium	mg/kg	4.5	5,000	6.50	86.8	100	380							
				Copper	mg/kg	6	IR	0.04	45.9	3.6	190							
				Lead	mg/kg	2	750	0.40	61.9	8.5	530							
				Mercury	mg/kg	0.4	480	0.022	0.237	0.3	10							
				Molybdenum	mg/kg	0.6	1,310	1.41	3.29	3	200							
				Nickel	mg/kg	0.9	5,000	0.76	50	35	270							
				Selenium	mg/kg	3	8,000	0.05	2.87	0.77	700							
				Vanadium	mg/kg	1.5	23,400	20	104.8	42	290							
				Zinc	mg/kg	2.5	IR	0.29	144.7	140	720							

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds EPA Background 95 Percentile
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 nv Not Analysed
 IR Insignificant risk to identified potential receptors

Note: There may be some minor variations in MDL between the tables and the lab certificates, as some samples were analysed by Abstronics facility at Chester.

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 5: Various Laboratory Results - Soil

Sample Type	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil HA01 0.5m 02-Oct-08	Soil HA02 1.5m 02-Oct-08	Soil HA02 2.5m 02-Oct-08	Soil HA03 0.5m 02-Oct-08	Soil HA03 2.0m 02-Oct-08	Soil HA04 0.2m 01-Oct-08	Soil HA05 0.2m 01-Oct-08	Soil HA06 0.2m 01-Oct-08	Soil HA07 0.2m 01-Oct-08
TOC	%	0.2	nv	nv	nv	nv	1.2	2.3	2.2	2.1	4.1	1.1	0.2	0.9	0.8
Total Organic Carbon															
Miscellaneous															
Total Phenols	mg/kg	0.01	nc	nc	0.05	40	-	na	0.10	na	-	0.07	0.04	0.05	na
Total Cyanide	mg/kg	2.50	50	nv	1	20	-	na	-	na	-	-	-	-	na
Chloride	mg/kg	5.00	nv	nv	nv	nv	na	na	na	na	na	8	-	na	na
Fluoride	mg/kg	0.50	36,900	0.08	nv	nv	na	na	na	na	na	-	0.7	na	na
Sulphate	g/l	0.003	nv	32.9	nv	nv	na	na	na	na	na	0.003	-	na	na
VOCs	ug/kg	1	nv	nv	nv	nv	na	na	na	na	na	na	na	na	na

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 5: Various Laboratory Results - Soil

Sample Type	Sample ID	Depth	Parameters	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil HA08 0.2m 01-Oct-08	Soil HA09 0.2m 01-Oct-08	Soil HA10 0.2m 01-Oct-08	Soil HA11 0.2m 01-Oct-08	Soil TP101 0.5m 01-Oct-08	Soil TP102 0.5m 01-Oct-08	Soil TP103 0.5m 01-Oct-08	Soil TP104 0.5m 01-Oct-08	Soil TP104 1.0m 01-Oct-08	Soil TP104 1.5m 01-Oct-08
TOC				%	0.2	nv	nv	nv	nv	0.9	0.5	0.8	1.1	1.1	1.3	0.7	0.8	0.3	-
Miscellaneous				mg/kg	0.01	nc	nc	0.05	40	0.04	na	na	0.06	0.03	na	0.03	na	na	na
Total Phenols				mg/kg	2.50	50	nv	1	20	-	na	na	-	-	na	-	na	na	na
Total Cyanide Chloride				mg/kg	5.00	nv	nv	nv	nv	na	na	na	6	-	na	72	na	na	na
Fluoride				mg/kg	0.50	36,900	0.08	nv	nv	na	na	na	0.5	0.6	na	4.2	na	na	na
Sulphate				g/l	0.003	nv	32.9	nv	nv	na	na	na	-	-	na	-	na	na	na
VOCs				ug/kg	1	nv	nv	nv	nv	na	na	na	na	na	na	-	na	na	na

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 5: Various Laboratory Results - Soil

Sample Type	Sample ID	Depth	Parameters	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil TP105 0.5m 01-Oct-08	Soil TP105 1.0m 01-Oct-08	Soil TP105 1.5m 01-Oct-08	Soil TP105 2.0m 01-Oct-08	Soil TP106 0.5m 01-Oct-08	Soil TP106 1.5m 01-Oct-08	Soil TP108 0.3m 03-Oct-08	Soil TP109 0.4m 03-Oct-08	Soil Dup for TP108 0.4m 03-Oct-08	Soil TP110 0.5m 03-Oct-08
TOC				%	0.2	nv	nv	nv	nv	0.9	0.2	-	-	0.9	-	2.3	1.1	0.8	1.1
Miscellaneous				mg/kg	0.01	nc	nc	0.05	40	na	na	na	na	0.02	0.12	0.09	na	0.04	0.03
Total Phenols				mg/kg	2.50	50	nv	1	20	na	na	na	na	-	-	-	na	-	-
Total Cyanide				mg/kg	5.00	nv	nv	nv	nv	na	na	na	na	-	na	10	na	15	8
Chloride				mg/kg	0.50	36,900	0.08	nv	nv	na	na	na	na	-	na	-	na	-	-
Fluoride				g/l	0.003	nv	32.9	nv	nv	na	na	na	na	-	na	-	na	-	-
Sulphate				ug/kg	1	nv	nv	nv	nv	na	na	na	na	-	na	na	na	-	-
VOCs										na	na	na	na	na	na	na	na	na	na

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 5: Various Laboratory Results - Soil

Sample Type	Sample ID	Depth	Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil TP110 1.5m 03-Oct-08	Soil TP111 0.2m 03-Oct-08	Soil TP112 0.5m 02-Oct-08	Soil TP112 1.5m 02-Oct-08	Soil TP113 0.5m 02-Oct-08	Soil TP114 0.5m 02-Oct-08	Soil TP115 0.5m 02-Oct-08	Soil TP116 0.5m 02-Oct-08	Soil Dup for TP116 0.5m 02-Oct-08	Soil TP117 0.5m 02-Oct-08	Soil TP117 1.5m 02-Oct-08
TOC				%	0.2	nv	nv	nv	nv	0.8	0.8	0.7	0.3	1	1.1	1.3	1.2	1.3	0.9	0.5
Miscellaneous				mg/kg	0.01	nc	nc	0.05	40	na	0.07	na	na	-	na	0.03	na	na	0.07	na
Total Phenols				mg/kg	2.50	50	nv	1	20	na	na	na	na	-	na	-	na	na	-	na
Total Cyanide				mg/kg	5.00	nv	nv	nv	nv	na	-	na	na	6	na	na	na	na	45	na
Chloride				mg/kg	0.50	36,900	0.08	nv	nv	na	-	na	na	-	na	na	na	na	0.8	na
Fluoride				g/l	0.003	nv	32.9	nv	nv	na	-	na	na	-	na	na	na	na	0.005	na
Sulphate				ug/kg	1	nv	nv	nv	nv	na	na	na	na	na	na	na	na	na	na	na
VOCs																				

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 5: Various Laboratory Results - Soil

Sample Type	Sample ID	Depth	Date	Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch MAC - Screening (S) Value	Dutch MAC - Intervention (I) Value	Soil BH201 1-2.0m 01-Oct-08	Soil BH201 4.0m 01-Oct-08	Soil BH203 3.0m 03-Oct-08	Soil BH204 1.0m 03-Oct-08	Soil BH204 2.0m 03-Oct-08	Soil BH205 1.0m 02-Oct-08	Soil BH205 2.0m 02-Oct-08	Soil BH207 1.0m 02-Oct-08
TOC				Total Organic Carbon	%	0.2	nv	nv	nv	nv	0.3	-	-	1	0.8	1.3	0.8	0.2
Miscellaneous				Total Phenols	mg/kg	0.01	nc	nc	0.05	40	0.11	0.03	na	0.06	0.02	na	na	0.08
				Total Cyanide	mg/kg	2.50	50	nv	1	20	-	-	na	-	-	-	-	-
				Chloride	mg/kg	5.00	nv	nv	nv	nv	85	5	na	118	62	na	na	17
				Fluoride	mg/kg	0.50	36,900	0.08	nv	nv	3.7	-	na	1.3	1.5	na	na	-
				Sulphate	g/l	0.003	nv	32.9	nv	nv	0.058	0.040	na	0.046	0.017	na	na	0.007
				VOCs	ug/kg	1	nv	nv	nv	nv	na	-	na	na	na	na	na	na

xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client ESB
 Project ESB Great Island
 Location Great Island
 Job Number 49341640
 Table 6: Relative Percentage Difference

Sample Type	Sample ID	Depth (m)	Date	Soil		%RPDs	Soil		%RPDs
				TP109	Dup for TP109		TP116	Dup for TP116	
				0.4m	0.4m		0.5m	0.5m	
			03-Oct-08	03-Oct-08		02-Oct-08	02-Oct-08		
Parameters	Units	MDL							
Hydrocarbons									
Aromatics									
C6-C7	mg/kg	0.01	-	-	NC	-	-	NC	
C7-C8	mg/kg	0.01	-	-	NC	-	-	NC	
C8-C10	mg/kg	0.01	-	-	NC	-	-	NC	
C10-C12	mg/kg	0.01	-	-	NC	-	-	NC	
C12-C16	mg/kg	0.1	-	-	NC	-	-	NC	
C16-C21	mg/kg	0.1	-	-	NC	-	-	NC	
C21-C35	mg/kg	0.1	-	-	NC	-	-	NC	
Total Aromatics	mg/kg	0.1	-	-	NC	-	-	NC	
Aliphatics									
C5-C6	mg/kg	0.01	-	-	NC	-	-	NC	
C6-C8	mg/kg	0.01	-	-	NC	-	-	NC	
C8-C10	mg/kg	0.01	-	-	NC	-	-	NC	
C10-C12	mg/kg	0.01	-	-	NC	-	-	NC	
C12-C16	mg/kg	0.1	-	-	NC	-	-	NC	
C16-C21	mg/kg	0.1	-	-	NC	-	-	NC	
C21-C35	mg/kg	0.1	-	-	NC	-	-	NC	
Total Aliphatics (MO)	mg/kg	0.1	-	-	NC	-	-	NC	
Total TPH	mg/kg	0.1	-	-	NC	-	-	NC	
BTEX									
Benzene	mg/kg	0.01	-	-	NC	-	-	NC	
Toluene	mg/kg	0.01	-	-	NC	-	-	NC	
Ethylbenzene	mg/kg	0.01	-	-	NC	-	-	NC	
Total Xylene	mg/kg	0.01	-	-	NC	-	-	NC	
BTEX	mg/kg	0.01	-	-	NC	-	-	NC	
MTBE	mg/kg	0.01	-	-	NC	-	-	NC	
TOC									
Total Organic Carbon	%	0.2	1	1	32	1	1	8	
Heavy Metals									
Antimony	mg/kg	1.5	na	na	NC	-	-	NC	
Arsenic Low Level	mg/kg	3	31	24	25	156	13	169	
Barium	mg/kg	6	126	114	10.0	79	76	3.9	
Cadmium Low Level	mg/kg	0.2	-	-	NC	-	-	NC	
Chromium	mg/kg	4.5	38	36	5.4	28	28	0.0	
Copper	mg/kg	6	26	23	12	37	20	16	
Lead	mg/kg	2	59	49	18.5	27	27	0.0	
Mercury Low Level	mg/kg	0.4	-	-	NC	-	-	NC	
Molybdenum	mg/kg	0.6	2	2	0.9	2	2	0.0	
Nickel	mg/kg	0.9	22	21	4.7	18	20	10.5	
Selenium Low Level	mg/kg	3	-	-	NC	-	-	NC	
Vanadium	mg/kg	1.5	57	53	7.3	48	46	4.3	
Zinc	mg/kg	2.5	88	76	14.6	62	61	1.6	

"-" - Less than MDL
 na - Not Analysed
 NC - Not Calculable

Bold - % RPD greater than 40% and results reported greater than ten times the MDL.

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Client Electricity Supply Board
Project ESB Great Island
Location ESB Great Island
Job Number 49341640
Table 7: Asbestos Identification Results - Soil

Sample Location	Depth Sampled (m)	Material Sampled	Asbestos Detected / Type
TP101		Soil	No asbestos detected
TP102		Soil	No asbestos detected
TP103		Soil	No asbestos detected
TP104		Soil	No asbestos detected
TP105		Soil	No asbestos detected
TP106		Soil	No asbestos detected
TP108		Soil	No asbestos detected
TP109		Soil	No asbestos detected
TP110		Soil	No asbestos detected
TP111		Soil	No asbestos detected
TP112		Soil	No asbestos detected
TP113		Soil	No asbestos detected
TP114		Soil	No asbestos detected
TP115		Soil	No asbestos detected
TP116		Soil	No asbestos detected
TP117		Soil	No asbestos detected
BH201		Soil	No asbestos detected
BH204		Soil	No asbestos detected
BH205		Soil	No asbestos detected
BH207		Soil	No asbestos detected
HA01		Soil	No asbestos detected
HA02		Soil	No asbestos detected
HA03		Soil	No asbestos detected
HA04		Soil	No asbestos detected
HA05		Soil	No asbestos detected
HA06		Soil	No asbestos detected
HA08		Soil	No asbestos detected
HA09		Soil	No asbestos detected
HA10		Soil	No asbestos detected
HA11		Soil	No asbestos detected
QA01		Soil	No asbestos detected
QA02		Soil	No asbestos detected

Note: Detection limit <0.01 %

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 8 : Hydrocarbon Laboratory Results - Sediment

Sample Type	Units	MDL	Human Health Soil	Controlled Water GAC - Soil	Dutch - Screening (S) Value	Dutch - Intervention (I) Value	Sed SS01 Surface 06-Oct-08	Sed SS02 Surface 06-Oct-08	Sed SS03 Surface 06-Oct-08	Sed SS04 Surface 06-Oct-08	Sed SS10 Surface 01-Oct-08	Sed SS11 Surface 01-Oct-08	Sed SS12 Surface 01-Oct-08
Aromatics													
TPH (>EC6-7) aromatic	mg/kg	0.01	3100	0.341	nv	nv	-	-	-	-	-	-	-
TPH (>EC7-8) aromatic	mg/kg	0.01	3,200	0.429	nv	nv	-	-	-	-	-	-	-
TPH (>EC8-10) aromatic	mg/kg	0.01	1,100	0.541	nv	nv	-	-	-	-	-	-	-
TPH (>EC10-12) aromatic	mg/kg	0.01	45,000	0.855	nv	nv	-	-	-	-	-	-	-
TPH (>EC12-16) aromatic	mg/kg	0.1	73,000	1.71	nv	nv	1.94	2.10	2.15	1.45	0.19	0.14	0.16
TPH (>EC16-21) aromatic	mg/kg	0.1	57,000	5.39	nv	nv	1.03	0.77	0.82	0.71	0.18	0.11	0.16
TPH (>EC21-35) aromatic	mg/kg	0.1	57,000	42.8	nv	nv	-	0.11	0.11	-	-	-	-
Total Aromatics	mg/kg	0.1	nv	nv	nv	nv	2.97	2.98	3.08	2.16	0.37	0.25	0.31
Aliphatics													
TPH (>EC5-6) aliphatic	mg/kg	0.01	1,000	0.320	nv	nv	-	-	-	-	-	-	-
TPH (>EC6-8) aliphatic	mg/kg	0.01	2,800	1.43	nv	nv	-	-	-	-	-	-	-
TPH (>EC8-10) aliphatic	mg/kg	0.01	230,000	10.9	nv	nv	-	-	-	-	-	-	-
TPH (>EC10-12) aliphatic	mg/kg	0.01	180,000	85.6	nv	nv	-	-	-	-	-	-	-
TPH (>EC12-16) aliphatic	mg/kg	0.1	180,000	1,705	nv	nv	-	-	-	-	-	-	-
TPH (>EC16-21) aliphatic	mg/kg	0.1	IR	214,533	nv	nv	-	-	-	-	-	-	-
TPH (EC21-35) aliphatic	mg/kg	0.1	nv	2,580,630	nv	nv	205.47	61.19	62.44	-	-	-	-
Total Aliphatics (MO)	mg/kg	0.1	nv	nv	50	5,000	205.47	61.19	62.44	-	-	-	-
Total TPH	mg/kg	0.1	nv	nv	nv	nv	208.47	61.19	65.52	2.16	0.37	0.25	0.31
BTEX													
Benzene	mg/kg	0.01	7	0.0047	0.01	1	-	-	-	-	-	-	-
Toluene	mg/kg	0.01	680	0.05	0.01	130	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	0.01	48,000	0.15	0.03	50	-	-	-	-	-	-	-
Total Xylene	mg/kg	0.01	1,500	0.15	0.1	25	-	-	-	-	-	-	-
BTEX	mg/kg	-	nv	nv	nv	nv	-	-	-	-	-	-	-
MTBE	mg/kg	0.01	3,800	0.01	nv	100	-	-	-	-	-	-	-

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xx Exceeds Human Health Soil Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 * Minimum of DWS and EQS (mg/kg)
 IR Insignificant risk to identified potential receptors

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 9: PAH Laboratory Results - Sediment

Sample Type	Sample ID	Depth	Date	Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch - Screening (S) Value	Dutch - Intervention (I) Value	Sed	Sed	Sed	Sed	Sed	Sed	
											SS01 Surface 06-Oct-08	SS02 Surface 06-Oct-08	SS03 Surface 06-Oct-08	SS04 Surface 06-Oct-08	SS10 Surface 01-Oct-08	SS11 Surface 01-Oct-08	SS12 Surface 01-Oct-08
				Naphthalene *	mg/kg	1	1,300	0.04	nv	nv	0.006	0.016	0.015	0.010	0.008	0.005	0.012
				Acenaphthylene	mg/kg	1	3,100	1.91	nv	nv	0.008	0.011	0.016	0.012	0.007	0.005	0.006
				Acenaphthene	mg/kg	1	34,000	87.9	nv	nv	0.019	0.059	0.062	0.033	0.025	0.021	0.027
				Fluorene	mg/kg	1	69,000	114	nv	nv	0.010	0.007	0.013	0.008	0.006	0.006	0.006
				Phenanthrene *	mg/kg	1	34,000	7.79	nv	nv	0.020	0.036	0.055	0.052	0.025	0.017	0.019
				Anthracene*	mg/kg	1	520,000	0.10	nv	nv	0.006	0.011	0.017	0.013	0.013	0.008	0.007
				Fluoranthene *	mg/kg	1	3,400	0.36	nv	nv	0.059	0.087	0.121	0.115	0.062	0.043	0.050
				Pyrene	mg/kg	1	35,000	650	nv	nv	0.052	0.075	0.103	0.100	0.053	0.035	0.040
				Benzo(a)anthracene *	mg/kg	1	340	0.12	nv	nv	0.053	0.080	0.115	0.111	0.044	0.021	0.036
				Chrysene *	mg/kg	1	3,500	1.43	nv	nv	0.035	0.051	0.075	0.066	0.047	0.026	0.038
				Benzo(b)+Benzo(k) fluoranthene *	mg/kg	1	350	nv	nv	nv	0.055	0.104	0.122	0.126	0.067	0.055	0.061
				Benzo(a)pyrene *	mg/kg	1	35	0.35	nv	nv	0.022	0.015	0.016	0.022	0.016	0.017	0.027
				Indeno(1,2,3cd)pyrene *	mg/kg	1	350	nv	nv	nv	0.015	0.015	0.038	0.033	0.023	0.011	0.023
				Dibenzo(a,h)anthracene	mg/kg	1	35	1.19	nv	nv	0.004	0.004	0.006	0.005	0.009	0.005	0.005
				Benzo(ghi)perylene *	mg/kg	1	52,000	nv	nv	nv	0.003	0.033	0.046	0.041	0.027	0.025	0.026
				Sum of 10 PAH	mg/kg	-	nv	nv	1	40	0.274	26.433	0.620	0.589	0.332	0.228	0.299
				Total 16 EPA PAHs (16)	mg/kg	-	nv	nv	nv	nv	0.367	0.615	0.820	0.747	0.432	0.300	0.383

xx Exceeds Human Health Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 10: Heavy Metal Laboratory Results - Sediment

Sample Type	Sample ID	Depth	Date	Sediment												
				Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	EPA Background	Dutch MAC - Intervention (I) Value	Sed SS01 Surface 06-Oct-08	Sed SS02 Surface 06-Oct-08	Sed SS03 Surface 06-Oct-08	Sed SS04 Surface 06-Oct-08	Sed SS10 Surface 01-Oct-08	Sed SS11 Surface 01-Oct-08	Sed SS12 Surface 01-Oct-08
Antimony				mg/kg	1.5	15	0.23	1.54	15	2.8	2.9	2.4	2.7	-	-	-
Arsenic				mg/kg	0.5	500	0.29	21.9	55	6	8	9	8	-	-	-
Barium				mg/kg	1	28,000	4.10	454.5	625	45	50	51	40	44	47	40
Cadmium				mg/kg	0.5	1,400	0.55	1.652	12	0.5	0.6	0.7	0.6	-	-	-
Chromium				mg/kg	1	5,000	6.50	36.8	380	42	50	51	41	47	51	44
Copper				mg/kg	1	IR	0.04	45.9	190	18	22	24	18	15	16	13
Lead				mg/kg	1	750	0.40	61.97	530	30	34	35	27	31	31	27
Mercury				mg/kg	0.3	480	0.0018	0.237	10	-	-	-	-	-	-	-
Molybdenum				mg/kg	1	1,310	1.41	3.29	200	-	0.7	-	-	1	1	1
Nickel				mg/kg	1	5,000	0.76	50	210	22	25	27	20	19	16	12
Selenium				mg/kg	0.5	8,000	0.05	2.67	100	-	-	-	-	-	-	-
Vanadium				mg/kg	1	23,400	20	104.8	750	26	29	29	24	49	54	44
Zinc				mg/kg	1	IR	0.29	144.7	720	110	130	140	110	96	100	87

xx Exceeds Human Health Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeding EPA Background 95 Percentile
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value
 IR Insignificant risk to identified potential receptors

Note: There may be some minor variations in MDL between the tables and the lab certificates, as some samples were analysed by Alcontrols facility at Chester.

Client ESB
 Project ESB Great Island
 Location ESB Great Island
 Job Number 49341640
 Table 11 : Various Laboratory Results - Sediment

Sample Type	Sample ID	Depth	Date	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Parameters	Units	MDL	Human Health GAC - Soil	Controlled Water GAC - Soil	Dutch MAC - Intervention (l) Value	SS01 Surface 06-Oct-08	SS02 Surface 06-Oct-08	SS03 Surface 06-Oct-08	SS04 Surface 06-Oct-08	SS10 Surface 01-Oct-08	SS11 Surface 01-Oct-08	SS12 Surface 01-Oct-08		
TOC														
Total Organic Carbon	%	0.2	nv	nv	nv	na	na	na	na	3.5	3.1	3.7		
Miscellaneous														
Total Phenols	mg/kg	0.01	nv	nv	40	0.27	0.06	0.06	0.05	0.03	2.2	0.15		
Total Cyanide	mg/kg	2.50	50	nv	20	-	-	-	-	-	-	-		
Chloride	mg/kg	5.00	nv	nv	nv	24,202	29,330	37,326	15,663	15,753	22,810	16,611		
Fluoride	mg/kg	0.50	369,000	0.05	nv	2.7	2.6	1.8	2.6	3.5	2.3	2.7		
Sulphate	g/l	0.003	nv	nv	nv	1.045	1.222	1.11	0.919	0.568	0.763	0.238		
PCB Total of 7 Congeners	mg/kg	0.001	16.8	0.014	nv	na	-	na	-	-	na	na		
VOCs	ug/kg	1	nv	nv	nv	na	na	na	-	na	na	na		

xx Exceeds Human Health Generic Assessment Criteria
 xx Exceeds Controlled Water Generic Assessment Criteria
 xx Exceeds Dutch Intervention Value
 GAC Generic Assessment Criteria
 MDL Method Detection Limit
 - Less than MDL
 na Not Analysed
 nv No Value

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Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 12: Hydrocarbons and PAH Laboratory Results - Groundwater

Sample Type Sample ID Date	Disposal Area											
	Ground Water MW200 07-Oct-08	Ground Water MW104 08-Oct-08	Ground Water MW106 08-Oct-08	Ground Water MW202 08-Oct-08	Ground Water MW101 08-Oct-08	Ground Water MW102 08-Oct-08	Ground Water MW107 08-Oct-08	Ground Water MW201 09-Oct-08				
Parameters	UNITS	MDL	IGV									
Hydrocarbons												
Aromatics												
C6-C7	ug/L	10	nv									
C7-C8	ug/L	10	nv									
C8-C10	ug/L	10	nv									
C10-C12	ug/L	10	nv									
C12-C16	ug/L	10	nv									
C16-C21	ug/L	10	nv									
C21-C35	ug/L	10	nv									
Total Aromatics	ug/L	10	nv									
Aliphatics												
C5-C6	ug/L	10	nv									
C6-C8	ug/L	10	nv									
C8-C10	ug/L	10	nv									
C10-C12	ug/L	10	nv									
C12-C16	ug/L	10	nv									
C16-C21	ug/L	10	nv									
C21-C35	ug/L	10	nv									
Total Aliphatics (MO)	ug/L	10	nv									
Total TPH	ug/L	10	10									
Diesel Range Organics (DRO)												
BTEX												
Benzene	ug/L	10	1									
Toluene	ug/L	10	10									
Ethylbenzene	ug/L	10	10									
Total Xylene	ug/L	10	10									
MTBE	ug/L	10	30									
BTEX	ug/L	10	nv									
PAHs												
Naphthalene	ug/L	0.01	1									
Acenaphthylene	ug/L	0.01	nv									
Acenaphthene	ug/L	0.01	nv									
Fluorene	ug/L	0.01	nv									
Phenanthrene	ug/L	0.01	nv									
Anthracene	ug/L	0.01	10000									
Fluoranthene**	ug/L	0.01	1									
Pyrene	ug/L	0.01	nv									
Benzo(a)anthracene	ug/L	0.01	nv									
Chrysene	ug/L	0.01	nv									
Benzo(b)fluoranthene**	ug/L	0.01	0.05*									
Benzo(k)fluoranthene**	ug/L	0.01	0.01									
Indeno(1,2,3-cd)pyrene**	ug/L	0.01	0.05									
Dibenz(a,h)anthracene	ug/L	0.01	nv									
Benzo(ghi)perylene**	ug/L	0.01	0.05									
Sum 6 PAHs	ug/L	-	0.1									
Total 16 EPA PAHs	ug/L	0.01	nv									

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IGV Interim Guidelines Value for Groundwater
 * Exceeds IGV for Groundwater
 ** Method Detection Limit
 MDL
 - Less than the MDL
 na Not Analysed
 nv No Value
 MO Mineral Oil
 * Laboratory results are presented as a sum of the 2 compounds.

Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 12: Hydrocarbons and PAH Laboratory Res

Sample Type Sample ID Date	Main Power Station Site					
	Ground Water BH2 31-Oct-08	Ground Water BH3 09-Oct-08	Ground Water BH201 09-Oct-08	Ground Water BH202 09-Oct-08	Ground Water BH203 09-Oct-08	Ground Water BH206 09-Oct-08
Parameters	UNITS	MDL	IGV			
Hydrocarbons						
Aromatics						
C6-C7	ug/L	10	nv	-	-	-
C7-C8	ug/L	10	nv	-	-	-
C8-C10	ug/L	10	nv	-	-	-
C10-C12	ug/L	10	nv	-	-	-
C12-C16	ug/L	10	nv	-	-	-
C16-C21	ug/L	10	nv	-	-	-
C21-C35	ug/L	10	nv	-	-	-
Total Aromatics	ug/L	10	nv	-	-	-
Aliphatics						
C5-C6	ug/L	10	nv	-	-	-
C6-C8	ug/L	10	nv	-	-	-
C9-C10	ug/L	10	nv	-	-	-
C10-C12	ug/L	10	nv	-	-	-
C12-C16	ug/L	10	nv	-	-	-
C16-C21	ug/L	10	nv	-	-	-
C21-C35	ug/L	10	nv	-	-	-
Total Aliphatics (MO)	ug/L	10	nv	-	-	-
Total TPH	ug/L	10	10	-	-	-
Diesel Range Organics (DRO)						
BTEX						
Benzene	ug/L	10	1	-	na	na
Toluene	ug/L	10	10	-	na	na
Ethylbenzene	ug/L	10	10	-	na	na
Total Xylene	ug/L	10	10	-	na	na
MTBE	ug/L	10	30	-	na	na
BTEX	ug/L	10	nv	-	na	na
PAHs						
Naphthalene	ug/L	0.01	1	0.032	na	na
Acenaphthylene	ug/L	0.01	nv	0.051	na	na
Acenaphthene	ug/L	0.01	nv	0.013	na	na
Fluorene	ug/L	0.01	nv	0.029	na	na
Fluoranthene	ug/L	0.01	nv	0.055	na	na
Anthracene	ug/L	0.01	10000	0.016	na	na
Fluoranthene**	ug/L	0.01	1	0.09	na	na
Pyrene	ug/L	0.01	nv	0.077	na	na
Benzo(a)anthracene	ug/L	0.01	nv	0.1	na	na
Chrysene	ug/L	0.01	nv	0.079	na	na
Benzo(b)+Benzo(k)fluoranthene**	ug/L	0.01	0.05*	0.092	na	na
Benzo(a)pyrene**	ug/L	0.01	0.01	0.038	na	na
Indeno(1,2,3-cd)pyrene**	ug/L	0.01	0.05	0.028	na	na
Dibenz(a,h)anthracene	ug/L	0.01	nv	-	na	na
Benzo(ghi)perylene**	ug/L	0.01	0.05	0.027	na	na
Sum 6 PAHs	ug/L	-	0.1	0.273	na	na
Total 16 EPA PAHs	ug/L	0.01	nv	0.724	na	na

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IGV Exceeds IGV for Groundwater
 xx Method Detection Limit
 MDL
 - Less than the MDL
 na Not Analysed
 nv No Value
 MO Mineral Oil
 * Laboratory results are presented as a s

Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 13: Heavy Metal Laboratory Results - Groundwater

Sample ID Date	Former Landfill Cell No. 2 (West)				Former Landfill Cell No.1 (East)			
	MW101 08-Oct-08	MW102 08-Oct-08	MW107 08-Oct-08	MW200 07-Oct-08	MW104 08-Oct-08	MW106 08-Oct-08	MW202 08-Oct-08	
Parameter	Units	MDL	IGV					
Metals								
Antimony	mg/L	0.001	nv	na	na	na	na	na
Arsenic	mg/L	0.001	0.01	0.037	0.004	0.003	0.022	0.022
Barium	mg/L	0.001	0.1	0.05	0.084	0.013	0.022	0.022
Cadmium	mg/L	0.0004	0.005	-	0.0006	-	-	-
Chromium	mg/L	0.001	0.03	0.006	0.018	0.003	0.006	0.006
Copper	mg/L	0.001	0.03	0.002	0.007	0.002	0.005	0.01
Cobalt	mg/L	0.001	nv	0.002	0.004	-	-	-
Lead	mg/L	0.001	0.01	0.003	0.003	-	-	0.001
Mercury Low	mg/L	0.00005	0.001	-	-	-	-	-
Molybdenum	mg/L	0.001	nv	-	-	0.005	-	-
Nickel	mg/L	0.001	0.02	0.003	0.005	0.002	0.002	0.002
Selenium	mg/L	0.001	nv	0.02	0.036	-	-	0.003
Vanadium	mg/L	0.001	nv	0.028	0.048	0.005	0.003	0.021
Zinc	mg/L	0.001	0.1	0.031	0.007	0.004	0.005	0.006

IGV Interim Guideline Value for Groundwater

xx Exceeds IGV for Ground Water

MDL Method Detection Limit

- Less than the MDL

nv Not Analysed

no value no value

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Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 13: Heavy Metal Laboratory Results - Gro.

Sample ID Date	Station Grounds									
	MW201 09-Oct-08	BH2 31-Oct-08	BH3 09-Oct-08	BH201 09-Oct-08	BH202 09-Oct-08	BH203 09-Oct-08	BH205 09-Oct-08	BH206 09-Oct-08		
Parameter	Units	MDL	IGV							
Metals										
Antimony	mg/L	0.001	nv	na	na	na	na	na	na	na
Arsenic	mg/L	0.001	0.01	0.008	0.001	0.004	0.004	0.004	0.004	0.004
Barium	mg/L	0.001	0.1	0.05	0.022	0.029	0.009	0.01	0.005	0.005
Cadmium	mg/L	0.0004	0.005	-	-	-	-	-	-	-
Chromium	mg/L	0.001	0.03	0.004	0.003	0.006	0.004	0.002	0.002	0.002
Copper	mg/L	0.001	0.03	0.002	0.003	0.001	0.002	-	-	-
Cobalt	mg/L	0.001	nv	-	-	-	-	-	-	-
Lead	mg/L	0.001	0.01	0.005	0.002	-	-	-	-	-
Mercury Low	mg/L	0.00005	0.001	-	-	-	-	-	-	0.00005
Molybdenum	mg/L	0.001	nv	-	-	-	-	-	-	-
Nickel	mg/L	0.001	0.02	0.002	0.002	0.005	0.007	-	-	-
Selenium	mg/L	0.001	nv	0.014	0.005	0.035	0.012	0.003	0.003	0.003
Vanadium	mg/L	0.001	nv	0.006	0.013	0.018	0.007	0.002	0.002	0.002
Zinc	mg/L	0.001	0.1	0.016	0.009	0.005	0.008	0.012	0.002	0.008

IGV Interim Guideline Value for Groundwat
 Exceeds IGV for Ground Water
 MDL Method Detection Limit
 - Less than the MDL
 nv Not Analysed
 no value no value

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Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 14: Various Laboratory Results - Groundwater

Sample ID Date	Former Landfill Cell No. 2 (West)				Former Landfill Cell No. 1 (East)			
	MMV101 08-Oct-08	MMV102 08-Oct-08	MMV107 08-Oct-08	MMV104 08-Oct-08	MMV200 07-Oct-08	MMV106 08-Oct-08	MMV202 08-Oct-08	MMV201 09-Oct-08
Parameter	Units	MDL	IGV					
Anions and Cations								
Aluminium	mg/L	0.002		0.131	0.013	0.019	0.069	0.002
Boron	mg/L	0.943		0.317	-	-	0.628	0.306
Calcium	mg/L	73.21		185.8	46.43	69.95	26.69	61.86
Chloride	mg/L	1		51	30	59	523	1.661
Iron	mg/L	0.002		0.314	0.013	0.101	0.483	0.239
Potassium (Total as K)	mg/L	0.2		2.921	-	4.4	33.6	4.4
Magnesium	mg/L	0.01		2.69	1.83	0.07	0.764	0.202
Sodium (Total as Na)	mg/L	0.05		0.09	20.4	30.4	496.1	720
Sulphate	mg/L	150		7.997	2.112	2.845	3.979	143
Alkalinity as CaCO ₃	mg/L	3		2.668	2.112	2.845	3.979	143
Total Hardness as CaCO ₃	mg/L	5		480	1140	260	400	100
Total Dissolved Solids (TDS)	mg/L	1		844	3.203	215	189	615
	mg/L	5		17.800	4.570	243	1.300	na
Nutrients								
Ammonia*	mg/L	0.257		76.888	0.772	0.886	5.273	-
Nitrate (as NO ₃)	mg/L	0.3		-	-	2.6	-	2.9
Nitrite (as NO ₂)	mg/L	0.05		0.14	-	0.55	0.05	-
Phosphate	mg/L	0.03		0.04	0.03	-	0.05	0.04
Miscellaneous								
Total Phenols	mg/L	0.01		0.02	-	-	-	-
Total Cyanide	mg/L	0.05		-	-	-	-	-
PCB Total of 7 Congeners	ug/L	0.01		-	-	-	-	-
VOCs	ug/L	1		na	na	na	na	na
SVOCs	ug/L	100		na	na	na	na	na

IGV Interim Guideline Value for Groundwater
 ** Exceeds IGV for Ground Water
 MDL Method Detection Limit
 - Less than the MDL
 na Not Analysed
 nv no value
 * Conversion factor of 1.286 used to convert ammoniacal nitrogen (as N) to ammoniac (as ammonium as NH₄)

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Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 14: Various Laboratory Results - Groundwater

Sample ID Date	Station Grounds					
	BH2 31-Oct-08	BH3 09-Oct-08	BH201 09-Oct-08	BH202 09-Oct-08	BH203 09-Oct-08	BH206 09-Oct-08
Parameter	Units	MDL	IGV			
Anions and Cations						
Aluminium	mg/L	0.002	0.14	0.037	0.049	0.028
Boron	mg/L	0.003	0.188	1.182	0.578	0.011
Calcium	mg/L	200	34.89	142.3	45.91	13.57
Chloride	mg/L	30	4.875	6.108	1.931	23
Iron	mg/L	0.002	0.137	0.137	0.118	0.069
Potassium (Total as K)	mg/L	5	93	140	45	15
Magnesium	mg/L	0.001	0.012	0.014	0.025	0.032
Sodium (Total as Na)	mg/L	0.2	1,500	310	670	20
Sulphate	mg/L	3	555	88	368	12
Alkalinity as CaCO ₃	mg/L	5	170	210	110	80
Total Hardness as CaCO ₃	mg/L	1	1,064	206	469	62
Total Dissolved Solids (TDS)	mg/L	5	na	na	na	na
Nutrients						
Ammonia	mg/L	0.257	na	0.643	na	na
Nitrate (as NO ₃)	mg/L	0.3	0.6	12.7	5.9	6.9
Nitrite (as NO ₂)	mg/L	0.05	na	na	na	na
Phosphate	mg/L	0.03	na	0.16	0.05	0.05
Miscellaneous						
Total Phenols	mg/L	0.01	0.06	na	na	na
Total Cyanide	mg/L	0.05	0.05	na	na	na
PCB Total of 7 Congeners	ug/L	0.01	na	na	na	na
VOCs	ug/L	1	na	na	na	na
SVOCS	ug/L	100	na	na	na	na

IGV Interim Guideline Value for Groundwater

xx Exceeds IGV for Ground Water

MDL Method Detection Limit

- Less than the MDL

na Not Analysed

nv no value

* Conversion factor of 1.286 used to convert ε to ammonium (as ammonium as NH4)

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Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 15: VOC Laboratory Results - Groundwater

Sample Type				Disposal Area		Main Power Station Site				
	Sample ID	Units	MDL	IGV	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					MW104	MW107	BH201	BH206	BH3	BH2
Date					06-Oct-08	06-Oct-08	09-Oct-08	09-Oct-08	09-Oct-08	31-Oct-08
Parameters	Units	MDL	IGV							
1,1,1,2-Tetrachloroethane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,1,1-Trichloroethane	ug/l	1.00	500	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,1,2-Trichloroethane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,1-Dichloroethane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,1-Dichloroethene	ug/l	1.00	nv	-	-	-	-	-	-	-
1,1-Dichloropropene	ug/l	1.00	nv	-	-	-	-	-	-	-
1,2,3-Trichlorobenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
1,2,3-Trichloropropane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	ug/l	1.00	40	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,2-Dibromoethane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,2-Dichlorobenzene	ug/l	1.00	10	-	-	-	-	-	-	-
1,2-Dichloroethane	ug/l	1.00	3	-	-	-	-	-	-	-
1,2-Dichloropropane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
1,3-Dichloropropane	ug/l	1.00	nv	-	-	-	-	-	-	-
1,4-Dichlorobenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
2,2-Dichloropropane	ug/l	1.00	nv	-	-	-	-	-	-	-
2-Chlorotoluene	ug/l	1.00	nv	-	-	-	-	-	-	-
4-Chlorotoluene	ug/l	1.00	nv	-	-	-	-	-	-	-
4-Isopropyltoluene	ug/l	1.00	nv	-	-	-	-	-	-	-
Benzene	ug/l	1.00	1	-	-	-	-	-	-	-
Bromobenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
Bromochloromethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Bromodichloromethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Bromoform	ug/l	1.00	nv	-	-	-	-	-	-	-
Bromomethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Carbon disulphide	ug/l	1.00	nv	-	-	-	-	-	-	-
Carbontetrachloride	ug/l	1.00	nv	-	-	-	-	-	-	-
Chlorobenzene	ug/l	1.00	1	-	-	-	-	-	-	-
Chloroethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Chloroform	ug/l	1.00	12	-	-	-	-	-	-	-
Chloromethane	ug/l	1.00	nv	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	ug/l	1.00	nv	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	ug/l	1.00	nv	-	-	-	-	-	-	-
Dibromochloromethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Dibromomethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Dichlorodifluoromethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Dichloromethane	ug/l	1.00	10	-	-	-	-	-	-	-
Ethylbenzene	ug/l	1.00	10	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/l	1.00	0.1	-	-	-	-	-	-	-
Isopropylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
Naphthalene	ug/l	1.00	1	-	-	-	-	-	-	-
n-Butylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
o-Xylene	ug/l	1.00	10	-	-	-	-	-	-	-
p/m-Xylene	ug/l	1.00	10	-	-	-	-	-	-	-
Propylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
sec-Butylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
Styrene	ug/l	1.00	nv	-	-	-	-	-	-	-
tert-butyl methyl ether (MTBE)	ug/l	1.00	30	-	-	-	-	-	-	-
tert-Butylbenzene	ug/l	1.00	nv	-	-	-	-	-	-	-
Tetrachloroethene	ug/l	1.00	40	-	-	-	-	-	-	-
Toluene	ug/l	1.00	10	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	ug/l	1.00	nv	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	ug/l	1.00	nv	-	-	-	-	-	-	-
Trichloroethene	ug/l	1.00	70	-	-	-	-	-	-	-
Trichlorofluoromethane	ug/l	1.00	nv	-	-	-	-	-	-	-
Vinyl Chloride	ug/l	1.00	nv	-	-	-	-	-	-	-
VOC- TIC	ug/l	1.00	nv	-	-	-	-	-	-	-

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IGV Interim Guideline Value for Groundwater
 xx Exceeds IGV for Ground Water
 MDL Method Detection Limit
 - Less than the MDL
 na Not Analysed
 nv no value

Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 16: SVOC Laboratory Results - Groundwater

Sample Type	Main Power Station Site						
	Groundwater	Groundwater	Groundwater	Groundwater			
	BH2	BH202	BH203	BH205			
Sample ID							
Date							
Parameters	Units	MDL	IGV				
Phenol	ug/l	1	0.5	-	-	-	-
2-Chlorophenol	ug/l	1	200	-	-	-	-
2-Methylphenol	ug/l	1	nv	-	-	-	-
4-Methylphenol	ug/l	1	nv	-	-	-	-
2-Nitrophenol	ug/l	1	nv	-	-	-	-
4-Nitrophenol	ug/l	1	nv	-	-	-	-
2,4-Dichlorophenol	ug/l	1	nv	-	-	-	-
2,4-Dimethylphenol	ug/l	1	nv	-	-	-	-
4-Chloro-3-methylphenol	ug/l	1	nv	-	-	-	-
2,4,6-Trichlorophenol	ug/l	1	200	-	-	-	-
2,4,5-Trichlorophenol	ug/l	1	nv	-	-	-	-
Pentachlorophenol	ug/l	1	2	-	-	-	-
1,3-Dichlorobenzene	ug/l	1	nv	-	-	-	-
1,4-Dichlorobenzene	ug/l	1	10	-	-	-	-
1,2-Dichlorobenzene	ug/l	1	10	-	-	-	-
1,2,4-Trichlorobenzene	ug/l	1	0.4	-	-	-	-
Nitrobenzene	ug/l	1	10	-	-	-	-
Azobenzene	ug/l	1	nv	-	-	-	-
Hexachlorobenzene	ug/l	1	0.03	-	-	-	-
Naphthalene	ug/l	1	1	-	-	-	-
Acenaphthylene	ug/l	1	nv	-	-	-	-
Acenaphthene	ug/l	1	nv	-	-	-	-
Fluorene	ug/l	1	nv	-	-	-	-
Phenanthrene	ug/l	1	nv	-	-	-	-
Anthracene	ug/l	1	10000	-	-	-	-
Fluoranthrene	ug/l	1	1	-	-	-	-
Pyrene	ug/l	1	nv	-	-	-	-
Benzo(a)anthracene	ug/l	1	nv	-	-	-	-
Chrysene	ug/l	1	nv	-	-	-	-
Benzo(b)fluoranthrene	ug/l	1	0.5	-	-	-	-
Benzo(k)fluoranthrene	ug/l	1	0.05	-	-	-	-
Benzo(a)pyrene	ug/l	1	0.01	-	-	-	-
Indeno(1,2,3-cd)pyrene	ug/l	1	0.05	-	-	-	-
Dibenzo(a,h)anthracene	ug/l	1	nv	-	-	-	-
Benzo(ghi)perylene	ug/l	1	0.05	-	-	-	-
2-Chloronaphthalene	ug/l	1	nv	-	-	-	-
2-Methylnaphthalene	ug/l	1	nv	-	-	-	-
Carbazole	ug/l	1	nv	-	-	-	-
Isophorone	ug/l	1	nv	-	-	-	-
Dibenzofuran	ug/l	1	nv	-	-	-	-
Dimethyl phthalate	ug/l	1	nv	-	-	-	-
Diethyl phthalate	ug/l	1	10	-	-	-	-
Di-n-butylphthalate	ug/l	1	2	-	-	-	-
Di-n-octylphthalate	ug/l	1	0.1	-	-	-	-
Bis(2-ethylhexyl)phthalate	ug/l	1	nv	-	-	-	-
Butylbenzylphthalate	ug/l	1	1	-	-	-	-
4-Chloroaniline	ug/l	1	nv	-	-	-	-
2-Nitroaniline	ug/l	1	10	-	-	-	-
3-Nitroaniline	ug/l	1	10	-	-	-	-
4-Nitroaniline	ug/l	1	nv	-	-	-	-
2,4-Dinitrotoluene	ug/l	1	nv	-	-	-	-
2,6-Dinitrotoluene	ug/l	1	nv	-	-	-	-
Bis(2-chloroethyl)ether	ug/l	1	30	-	-	-	-
4-Bromophenylphenylether	ug/l	1	nv	-	-	-	-
4-Chlorophenylphenylether	ug/l	1	40	-	-	-	-
Hexachloroethane	ug/l	1	10	-	-	-	-
Hexachlorobutadiene	ug/l	1	0.1	-	-	-	-
Hexachlorocyclopentadiene	ug/l	1	nv	-	-	-	-
Bis(2-chloroethoxy)methane	ug/l	1	10	-	-	-	-
N-nitrosodi-n-propylamine	ug/l	1	nv	-	-	-	-
SVOC-TIC							
Heneicosane (CAS), n-Heneicosane	ug/l	1	nv	1.11	nd	nd	nd
14-.BETA.-H-PREGNA,14-.BETA.-PREGNA	ug/l	1	nv	2.1	nd	nd	nd
1-Octadecanethiol (CAS), Octadecanethiol	ug/l	1	nv	3.4	nd	nd	nd
9-Octadecenamide, (Z)- (CAS), OLEOAMIDE	ug/l	1	nv	1.2	nd	nd	nd

IGV Interim Guideline Value for Groundwater
 xx Exceeds IGV for Ground Water
 MDL Method Detection Limit
 - Less than the MDL
 na Not Analysed
 nv no value
 nd not detected

Client: ESB
Project: ESB Great Island
Location: ESB Great Island
Job No.: 49341640
Table 17: Biological Laboratory Results - Groundwater

Sample ID Date	Former Landfill Cell No. 2 (West)				Former Landfill Cell No. 1 (East)			
	MW101 10/08/2008	MW102 10/08/2008	MW107 10/08/2008	MW200 10/07/2008	MW104 10/08/2008	MW106 10/08/2008	MW202 10/08/2008	MW201 10/09/2008
Parameter	Units	MDL	IGV					
Biological								
Biological Oxygen Demand (BOD)	mg/L	2	nv	8	na	na	2	-
Total coliforms	cfu/100ml	1	0	2	-	80,000	1,200	1,400
Faecal coliforms	cfu/100ml	1	0	-	-	100	2	4

Interim Guideline Value for Groundwater

IGV
 Exceeds IGV for Ground Water
 Method Detection Limit
 Less than the MDL
 Not Analysed
 no value

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Client: ESB
Project: ESB Great Island
Location: ESB Great Island
Job No.: 49341640
Table 17: Biological Laboratory Results - Grc

Sample ID	Station Grounds						
	BH2 10/31/2008	BH3 10/09/2008	BH201 10/09/2008	BH202 10/09/2008	BH203 10/09/2008	BH205 10/09/2008	BH206 10/09/2008
Date							
Parameter	Units	MDL	IGV				
Biological							
Biological Oxygen Demand (BOD)	mg/L	2	nv		4		
Total coliforms	cfu/100ml	1	0	1,700	1,700	900	200
Faecal coliforms	cfu/100ml	1	0	1,700	200	200	200

IGV Interim Guideline Value for Ground
 xx Exceeds IGV for Ground Water
 MDL Method Detection Limit
 - Less than the MDL
 nv Not Analysed
 no value no value

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 For inspection purposes only.

Client: ESB
Project: ESB Great Island
Location: ESB Great Island
Job No: 49341640
Table 18: Hydrocarbons and PAH Laboratory Results - Surface Water

Sample Type	Sample ID	Date	Surface Water					
			SW5	SW6	SW10	SW8	SW1	
			07-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	
Parameters	UNITS	MDL	EQS					
Hydrocarbons								
Aromatics								
C6-C7	ug/L	10	nv	-	-	-	-	-
C7-C8	ug/L	10	nv	-	-	-	-	-
C8-C10	ug/L	10	nv	-	-	-	-	-
C10-C12	ug/L	10	nv	-	-	-	-	-
C12-C16	ug/L	10	nv	-	-	-	-	-
C16-C21	ug/L	10	nv	-	-	-	-	-
C21-C35	ug/L	10	nv	-	-	-	-	-
Total Aromatics	ug/L	10	nv	-	-	-	-	-
Aliphatics								
C5-C6	ug/L	10	nv	-	-	-	-	-
C6-C8	ug/L	10	nv	-	-	-	-	-
C8-C10	ug/L	10	nv	-	-	-	-	-
C10-C12	ug/L	10	nv	-	-	-	-	-
C12-C16	ug/L	10	nv	-	-	-	-	-
C16-C21	ug/L	10	nv	-	-	-	-	-
C21-C35	ug/L	10	nv	-	-	-	-	-
Total Aliphatics (MO)	ug/L	10	300	-	-	-	-	-
Total TPH	ug/L	10	nv	-	-	-	-	-
Diesel Range Organics (DRO)	ug/L	nv	nv	-	-	-	-	-
BTEX								
Benzene	ug/L	10	10	-	-	-	-	-
Toluene	ug/L	10	10	-	-	-	-	-
Ethylbenzene	ug/L	10	10	-	-	-	-	-
Total Xylene	ug/L	10	10	-	-	-	-	-
MTBE	ug/L	10	nv	-	-	-	-	-
BTEX	ug/L	10	nv	-	-	-	-	-
PAHs								
Naphthalene	ug/L	0.01	nv	-	-	-	-	-
Acenaphthylene	ug/L	0.01	nv	0.053	0.047	-	0.033	0.051
Acenaphthene	ug/L	0.01	nv	0.04	0.031	-	0.022	0.038
Fluorene	ug/L	0.01	nv	0.085	0.055	-	0.047	0.071
Phenanthrene	ug/L	0.01	nv	0.304	0.218	-	0.177	0.26
Anthracene	ug/L	0.01	nv	0.108	0.072	-	0.072	0.1
Fluoranthene*	ug/L	0.01	nv	0.145	0.205	-	0.1	0.151
Pyrene	ug/L	0.01	nv	0.093	0.17	-	0.071	0.098
Benzo(a)anthracene	ug/L	0.01	nv	0.066	0.162	-	-	0.079
Chrysene	ug/L	0.01	nv	0.015	0.04	-	0.01	0.017
Benzo(b)+Benzo(k)fluoranthene*	ug/L	0.01	nv	0.01	0.026	-	-	0.013
Benzo(a)pyrene*	ug/L	0.01	nv	-	-	-	-	-
Indeno(123cd)pyrene*	ug/L	0.01	nv	-	-	-	-	-
Dibenzo(ah)anthracene	ug/L	0.01	nv	-	-	-	-	-
Benzo(ghi)perylene*	ug/L	0.01	nv	-	-	-	-	-
Sum 6 PAHs	ug/L	nv	0.2	0.155	0.231	-	0.1	0.164
Total 16 EPA PAHs	ug/L	0.01	nv	0.93	1.038	-	0.552	0.888

EQS EPA Proposed Environmental Quality Standards for Surface Water
 xx Exceeds EQS for Surface Waters
 MDL Method Detection Limit
 - Less than the MDL
 na Not Analysed
 nv no value

Client: ESB
 Project: ESB Great Island
 Location: Great Island
 Job No: 4934.1640
 Table 19: Metals Laboratory Results - Surface Water

Sample Type	Sample ID	Date	UNITS		EQS	Surface Water		Surface Water		Surface Water	
			MDL			SW5	SW6	SW10	SW8	SW1	
Metals											
Arsenic			mg/L	0.001	0.05	-	-	-	0.012	-	-
Cadmium			mg/L	0.0004	0.005	-	-	-	-	-	-
Chromium			mg/L	0.001	0.1	0.009	0.015	0.011	0.009	0.006	0.006
Copper			mg/L	0.001	0.05	0.027	0.007	0.002	0.005	-	-
Cobalt			mg/L	0.001	nv	-	-	-	-	-	-
Lead			mg/L	0.001	0.005	0.001	0.001	-	-	-	-
Mercury			mg/L	0.00005	0.0001	-	-	-	na	na	na
Molybdenum			mg/L	0.001	0.1	-	0.004	-	0.005	-	-
Nickel			mg/L	0.001	0.1	0.012	0.009	0.003	0.003	0.001	0.001
Selenium			mg/L	0.001	0.02	0.002	-	0.001	0.066	-	-
Vanadium			mg/L	0.001	nv	0.01	0.017	0.001	0.034	0.009	0.009
Zinc			mg/L	0.001	0.1	0.078	0.05	0.023	0.009	0.007	0.007

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 Consent of owner required for any other use.

EQS EPA Proposed Environmental Quality Standards for Surface Water

xx Exceeds EQS for Surface Waters

MDL Method Detection Limit

- Less than the MDL

na Not Analysed

nv no value

Client: ESB
 Project: ESB Great Island
 Location: ESB Great Island
 Job No: 49341640
 Table 20: Various Laboratory Results - Surface Water

Sample Type	Sample ID	Date	Surface Water				Surface Water				Surface Water			
			SW5	SW6	SW10	SW8	SW10	SW8	SW1	SW1				
			07-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08
Parameter	Units	MDL	EQS											
Anions and Cations														
Aluminium	mg/L	0.002	0.082	0.110	0.062	0.060	0.061							
Boron	mg/L	0.003	-	-	-	2.121	-							
Barium	mg/L	0.001	0.011	0.002	0.005	0.033	0.042							
Calcium	mg/L	0.12	0.883	1.719	42.07	245.6	23.17							
Chloride	mg/L	2	-	2	21	10.239	11							
Iron	mg/L	0.002	0.121	0.098	0.057	0.091	1.147							
Potassium (Total as K)	mg/L	0.2	0.4	0.6	18.7	253.1	na							
Manganese	mg/L	0.001	0.019	0.007	0.003	0.001	0.014							
Sodium (Total as Na)	mg/L	0.2	1.6	5.6	484.2	6.161	na							
Sulphate	mg/L	5	7	10	na	1.404	6							
Alkalinity as CaCO ₃	mg/L	1	30	30	130	200	80							
Total Hardness as CaCO ₃	mg/L	1	3	7	118	3162	66							
Total Dissolved Solids (TDS)	mg/L	5	11	20	154	33	106							
Nutrients														
Ammonia*	mg/L	0.257	0.514	0.386	0.2572	-	0.643							
Nitrate (as NO ₃)	mg/L	0.3	-	1	na	-	na							
Nitrite (as NO ₂)	mg/L	0.05	-	-	-	0.35	0.06							
Phosphate	mg/L	0.03	-	1.39	0.1	0.13	0.32							
Miscellaneous														
Total Phenols	mg/L	0.01	0.04	0.04	0.05	0.04	0.04							
Total Cyanide	mg/L	0.05	-	-	-	-	-							
PCB Total of 7 Congeners	ug/L	0.001	-	-	-	-	-							
VOCs	ug/L	1.000	-	-	-	-	-							

EQS EPA Proposed Environmental Quality Standards for Surface Water

xx Exceeds EQS for Surface Waters

MDL Method Detection Limit

- Less than the MDL

na Not Analysed

nv no value

* Conversion factor of 1.286 used to convert ammoniacal nitrogen (as N)

to ammonia (as ammonium as NH4)

Client: ESB
Project: ESB Great Island
Location: ESB Great Island
Job No: 49341640
Table 21: Biological Laboratory Results - Surface Water

Sample Type	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample ID	SW5	SW6	SW10	SW8	SW1	
Date	07-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	08-Oct-08	
Parameter	Units	MDL	EQS			
Biological						
Biological Oxygen Demand (BOD)	mg/L	2	4	-	-	-
Total coliforms	cfu/100ml	1	5000	20,000	900	2,300
Faecal coliforms	cfu/100ml	1	1000	6	10	-

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EPA Proposed Environmental Quality Standards for Surface Water

Exceeds EQS for Surface Waters
 Method Detection Limit
 Less than the MDL
 Not Analysed
 no value

EQS
 xx
 MDL
 -
 na
 nv