



**RVA GROUP**

Specialist consulting engineering, safety and environmental management  
for decommissioning; decontamination; dismantling; demolition.

## **Enemalta Corporation**



### **Marsa Power Station, Church Wharf, Marsa Full Decommissioning Plan**





## DOCUMENT ISSUE/AMENDMENT CERTIFICATE

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30/08/2011	M Taylor	I Wharton	000	Draft
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## **Executive Summary**

Laboratory analysis of soil samples from Marsa has identified low concentrations of metals across the majority of the site. Elevated readings of lead have been recorded in the shallow made ground in the southern part of the site. Polycyclic aromatic hydrocarbons (PAHs) and extractable petroleum hydrocarbons (EPH) have been detected across the site, with higher concentrations recorded towards the south eastern part of the site around Boiler No.8. Low concentrations of volatile and semi-volatile organic compounds (VOCs and SVOCs) have been detected in soils across the south eastern corner. SVOC and VOC tentative identified compounds (TICs) were detected in samples in the south eastern corner.

Methyl Tertiary Butyl Ether (MTBE) has been detected in one location to the west of the IPPC permitted boundary adjacent to the petrol filling station.

The majority of the contaminants detected were below their relevant guideline values whilst the site remains in its current use (commercial/industrial). Only lead and benzo(a)pyrene were detected above their Generic Assessment Criteria (GAC).

The investigation findings have indicated that there is not significant contamination of the land resulting from present activities. However, due to the nature of the natural geology any potential contamination is likely to be confined to its source (sumps pits and culvert channels). Oil staining and minor spills have been noted on the hardstanding and around plant. Therefore there is potential for contamination to exist immediately adjacent to the source.

It is recommended that soil monitoring/validation is undertaken during the removal of any structures at or below ground level. The investigation should be used to determine whether soil contamination has taken place during the operation of the permitted activity in the intervening period.



**ENEMALTA CORPORATION**  
**MARSA POWER STATION, CHURCH WHARF, MARSA**

**FULL DECOMMISSIONING PLAN**

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## **Introduction**

From the requirements of the Integrated Pollution Prevention and Control Regulations (LN 234 of 2002), as amended by LN 230 of 2004 and LN 56 of 2008, Marsa Power Station (MPS) operates under an IPPC Environmental Permit (EP), number IP 0003/07/A.

As part of the requirements of this EP there is a need to provide Full Decommissioning Plan (FDP) for the site – Condition 2.16.2 of the EP.

RVA has been appointed to produce this FDP on behalf of the Enemalta Corporation (Enemalta), who have in turn appointed ENVIRON to assist in the execution and production of a report associated with the ground conditions at the site.

This FDP covers the following requirements of the EP (note the number of the Conditions mirrors that in the EP):

- 2.16.2 Two years before the planned decommissioning of all or part of the site, the operator shall submit to the authority a full Decommissioning Plan which shall at least include all the information required by Conditions 2.16.3 to 2.16.5.
- 2.16.3 The operator shall submit to the Authority a report by a qualified geologist on the likelihood of their being a significant contamination of the land on the site by any of the pollutants in Schedule 10. Should it result that the land is likely to contain environmentally significant amounts of these pollutants, this report shall contain as a minimum the measured concentrations of the substances specified in Schedule 10:
  - 2.16.3.1 This monitoring programme shall amongst other things include the location of the points for the sampling of land, information on the sampling methods, the handling of the samples, the pretreatment/extraction of the analytes (where applicable) and the methods used in order to analyse the samples.
  - 2.16.3.2 Samples should be analysed to the relevant EN or EN ISO standards or equivalent.
  - 2.16.3.3 Samples shall be managed by a lab accredited (or in the process of accreditation, as confirmed by the National



Accreditation Body (NAB-Malta) or equivalent) to at least ENISO 17025:2005/Cor 1:2006 and preferably accredited for each and every analysis.

2.16.4 Following termination, or planned cessation for a period greater than six months, of use or involvement of all or part of the site in the permitted activity, the operator shall to the satisfaction of the Authority, decommission, render safe or remove for disposal/recovery, any land, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.

2.16.5 The full Decommissioning Plan shall at least include the following information:

2.16.5.1 A detailed monitoring programme which will illustrate how the operator will measure the current levels of various pollutants in the land:

2.16.5.1.1 The list of the pollutants to be monitored for shall be as per Schedule 10.

2.16.5.1.2 The monitoring programme shall amongst other things include the location of the points for the sampling of land, the sampling methods, the handling of the samples, the pretreatment/extraction of the analytes (where applicable) and the methods used in order to analyse the samples.

2.16.5.1.3 Samples should be analysed to the relevant EN or EN ISO standards or equivalent.

2.16.5.1.4 Samples shall be managed by a lab accredited (or in the process of accreditation, as confirmed by the National Accreditation Body (NAB-Malta) or equivalent) to at least EN ISO 17025:2005/Cor 1:2006 and preferably accredited for each and every analysis



- 2.16.5.2 The levels to which the site and any affected land will have to be decontaminated.
- 2.16.5.3 The methods which will be used in order to decontaminate the land. Such methods may also include isolation.
- 2.16.5.4 A waste management plan which shall include:
  - 2.16.5.4.1 The identification and characterisation of sources, types and quantities of waste (including equipment, fuels, by-products such as ash, etc.);
  - 2.16.5.4.2 Criteria for segregation of wastes;
  - 2.16.5.4.3 Proposed treatment, conditioning, transport, storage and disposal/recovery methods;
  - 2.16.5.4.4 Potential reuse/recycling of such wastes.
- 2.16.5.5 The identification of potential sources of emissions to the atmosphere, land and water (both seawater and groundwater) pollution which might arise from the decontamination process and corresponding mitigation measures to minimise the likelihood of such emissions.

Both Enemalta and RVA (including ENVIRON) place EHS excellence as prime business drivers and this philosophy has been taken as the base criteria for the compilation of this document.

### **Terms of reference**

Marsa Power Station (MPS) is located at the inner end of the Grand Harbour, on the eastern coast of Malta. The site is located on two levels, the lower level has an elevation of approximately 2m above sea level, and the upper level has an elevation of between 26m and 37m.

MPS was originally constructed underground. A report by General Sir Charles Bonham Carter, Governor of Malta (1936-1940), dated 27<sup>th</sup> October 1936, recommended the construction of a power station (the "A" station) at Church Wharf, Marsa, which was then the site of the Admiralty Coal Stores. The station was installed underground to offer "*a high degree of protection from hostile attack*".

At the time of writing of the 1936 report a level space had already been formed by removing rock (to the south of the Jesuit Hill, Marsa) to a distance of approximately



60m inland. The report also recommended that this level space in front of the rock would be utilised for offices, workshops, coal yard, etc. The new power station, which was installed in the galleries excavated in the base of Jesuits Hill, was inaugurated on 5th December 1953. This power station, which is better known as “Underground Station”, was totally closed down during September 1994.

Due to lack of space in the underground tunnel which housed this first station at Marsa it was decided that a new power station would be erected next to it. The new power station, which is the subject of this FDP, was inaugurated in 1966.

The site comprises operational plant in the centre of the site; and a workshop, administration buildings and a medical centre in the west of site. Bulk storage tanks are located on a higher level on top of Jesuits Hill on the northern part of the site. The tunnels of the underground station remain under Jesuits Hill, the majority of which are now empty.

MPS was constructed in several phases between the 1960s and 1990s, and operates at a generation capacity of 265MW.

Units	Commissioned
2 x 90 Ton/hr Steam Raising Boilers*	1966
2 x 10MW Steam Turbines and Generators	1966
2 x 120 Ton/hr Steam Raising Boilers	1970
2 x 30MW Steam Turbines and Generators	1970
1 x 130 Ton/hr Steam Raising Boiler	1982
1 x 30MW Steam Turbine and Generator**	1982
1 x 130 Ton/hr Steam Raising Boiler	1984
1 x 30MW Steam Turbines and Generator**()	1984
1 x 300 Ton/hr Steam Raising Boiler	1985
1 x 30MW Steam Turbine and Generator**()	1985
1 x 60MW Steam Turbine and Generator***()	1987
1 x 300 Ton/hr Steam Raising Boiler	1987
1 x 37MW Open Cycle Gas Turbine and Generator	1990





\* The steam generators were decommissioned in 1994 and 1999 respectively.

\*\* The steam turbines are refurbished plants, which were first commissioned in 1952 at Palermo in Sicily.

\*\*\* The steam turbine is a refurbished plant, which was first commissioned in 1954 at Little Barford in the UK. In 1996, this unit was refurbished again to extend its lifetime for a further 15 years.

() These units were run on coal between their respective commissioning date and 1995 when coal firing was stopped.

## **Layout of FDP**

The two main sections of this report – Site Condition Report and Waste Management Plan – are two separate stand alone documents.

### **Site Condition Report**

A Site Condition Report describes and records the condition of the land and groundwater at a site; it enables the operator to demonstrate that they have protected land and groundwater during the lifetime of the site's permitted activities and it is in a satisfactory state when they plan to surrender the permit.

The Site Condition Report provides a point of reference at the start of operations or at the time the permit is issued so that when it time to surrender the permit, it can decide whether there has been any additional contamination of the site during the operation and ensure that the condition of the land and groundwater are in a “satisfactory state” when they apply to surrender of the permit.

Therefore a Site Condition Report has three stages; an Application Site Condition Report (Application Site Report) - issued to define a point of reference; an Operational Site Condition Report (Site Protection and Monitoring Plan) - which is used during the operational life of the plant; and a Surrender Site Condition Report (Closure Site Report) – which details the work required to surrender the EP.

For MPS the Application Site Condition Report has not been provided. Therefore to produce the report in this FDP (Operational Site Condition Report) ENVIRON had to go back a stage and generate all the information which would normally have been included in the Application Site Condition Report for inclusion here.

For the purpose of this FDP the sections of the Site Condition Report which relate to the EP requirements as detailed in the Introduction are:

- Section 7.0 to 7.10 for Condition 2.16.3
- Section 7.0 and 8.0 for Condition 2.16.5.1
- Section 9.0 to 9.5 for Condition 2.13.5.2
- Section 9.0 to 9.5 for Condition 2.13.5.3
- Section 8.1 for Condition 2.13.5.5



### Site Waste Management Plan

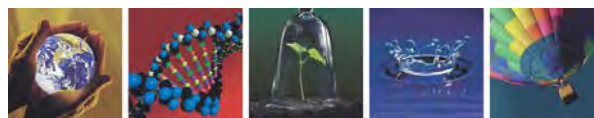
It is intended that the Waste Management Plan will be maintained and then utilised as the base estimate document for the actual decommissioning and demolition activities – whenever they may be.

For the purposes of this FDP the Waste Management Plan constitutes the deliverable for Condition 2.16.5.4 of the EP.



## **Section 1 – Site Condition Report**

Covering EP Conditions: 2.16.3  
2.16.5.1  
2.16.5.2  
2.16.5.3  
2.16.5.5



## Site Condition Report (SCR) & Options Appraisal

Marsa Power Station  
Marsa  
MRS1000  
Malta

Prepared for:

**Enemalta Corporation,  
Marsa, Malta**

Prepared by:

**ENVIRON  
Manchester, UK**

Date:

**August 2011**

Project or Issue Number:

**UK22-16873**

Contract/Proposal No: UK22-16873

Issue: FINAL

Author:  
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Date: August 2011

*This report has been prepared by ENVIRON with all reasonable skill, care and diligence, and taking account of the Services and the Terms agreed between ENVIRON and the Client.*

*This report is confidential to the client, and ENVIRON accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by ENVIRON beforehand. Any such party relies upon the report at their own risk.*

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## 1.0 Introduction

### 1.1 Background to the EP Surrender Application

Enemalta Corporation appointed RVA Group to produce the Full Decommissioning Plan for Marsa Power Station. Part of the Plan requires ground investigations to identify the extent, if any, of ground contamination. RVA Group subsequently sub-contracted the ground investigation (and reporting) sections of the Plan to ENVIRON UK Limited – on approval from Enemalta Corporation.

This document has been prepared by ENVIRON UK Limited (ENVIRON) in support of an Environmental Permit (EP) surrender application as required under the Integrated Pollution and Prevention Control Regulations (LN 234 of 2002 as amended by LN 230 of 2004 and LN 56 of 2008, enforced by the Environmental Protection Act, 2001 – Integrated Pollution Prevention and Control Regulations, 2002), which transpose the EU IPPC Directive (2008/1/EC) under Maltese law.

This document represents the Site Condition Report (SCR) which forms part of a package to be submitted to the IPPC Committee of the Competent Authority by Enemalta Corporation ('the Operator') to satisfy the requirements of the Improvement Programme of IPPC permit number IP 0002/07/A, specified in Condition 1.5.1. The Programme requires the submission of land monitoring data (as per Condition 2.16.1) of the permit and Full Decommissioning Plan (as per condition 2.16.2).

An Environmental Permit (EP) is required where an operator carries out certain prescribed activities, namely installations that undertake Schedule 1 activities, a waste operation or a mobile plant (carrying out either one of the Schedule 1 activities or a waste operation). Enemalta Corporation carry out activities covered in Section 1.1 of the IPPC regulations, comprising:

- **Combustion installations with a rated thermal input exceeding 50 MW**

Where the main activity of the installation is as follows:

- **Generation of electrical energy through the combustion of heavy fuel oil (HFO) and gasoil.**

In the absence of Maltese guidance, ENVIRON has undertaken the production of the SCR in accordance with the Environment Agency of England and Wales (EA) Guidance Document H5 Site Condition Reports Guidance and Templates (Version 080328). The EA regulate IPPC permitting in the United Kingdom under EU IPPC Directive (2008/1/EC).



## 2.0 Location of the Installation

<b>Name of Installation</b>	Marsa Power Station
<b>Permit No.</b>	IP 0003/07/A
<b>Date and Version of SCR</b>	UK22-16873_01_MPS_August 2011

Marsa Power Station (MPS) is located at the inner end of the Grand Harbour, on the eastern coast of Malta (Figure 1, Annex A). The site is general located on two levels, the lower level is elevation of approximately 2m above sea level (ASL), and the upper level is between 26m and 37m ASL.

MPS was originally constructed underground. In a report by General Sir Charles Bonham Carter, Governor of Malta (1936-1940), dated 27<sup>th</sup> October 1936, recommending the construction of a power station (the “A” station) at Church Wharf, Marsa, which was then the site of the Admiralty Coal Stores. The station was installed underground to offer “*a high degree of protection from hostile attack*”. At the time of writing of the report “a level space has already been formed by removing the rock to a distance of about 200 feet inland”. The report also recommends that this level space in front of the rock will be utilised for offices, workshops, coal yard, etc. The new Power Station, which was installed in the galleries excavated in the base of Jesuits Hill at Marsa, was inaugurated on 5th December 1953. This Power Station, which is better known as “Underground Station”, was totally closed down during September 1994.

Due to lack of space in the underground tunnel which housed this first station at Marsa it was decided that a new Power Station will be erected next to it. The new Power Station, which is better known as the Marsa “B” Power station was inaugurated in 1966, is still active today. The IPPC permitted boundary includes all the facility, as shown in Figure 2, Annex A.

The site comprises operational plant in the centre of site, a workshop, administration buildings and a medical centre in the west of site. Bulk storage tanks are located on a higher level on top of Jesuits Hill on the northern part of the site. The tunnels of the underground station remain under Jesuits Hill, the majority of which are now empty. However, turbines, storage tanks (built into the rock), control panels still remain. The majority of old plant including the old boiler are known to contain Asbestos Containing Materials (ACM), as such as a health and safety precaution these have been encapsulated by bricking up the all entrances to these parts of the underground station.

Surrounding land uses are detailed in Table 2.1 below.

<b>Table 2.1: Surrounding Land Uses</b>			
<b>Direction</b>	<b>Description</b>	<b>Company Name</b>	<b>Distance</b>
To the North	Roads	N/A	Immediately north
	Mill	Marsa Flour Mills	Immediately north
	Haulage	White Bros Ltd	40m north west
To the South	Grand Harbour	N/A	Immediately south
To the East	Grand Harbour	N/A	Immediately east
	Mixed use small workshops	Various	Immediately south east

Table 2.1: Surrounding Land Uses			
Direction	Description	Company Name	Distance
To the West	Mixed use of small business units, offices, storage and residential.	N/A	Immediately west.
	Petrol Filling Station	Enemalta Corporation	Immediately west.

Plans showing the location of installation and the installation boundary are provided in Annex A (Ref. UK2216873\_MPS Figure 1 Site Location and, UK2216873\_MPS Figure 2 Installation Boundary).

## 2.1 Site Operations

Permitted activities in accordance with Schedule 1 of the IPPC regulations are listed in Table 2.2 (taken from Table 1.1.1 of the IPPC permit):

Table 2.2: Site Operations		
Activity / Associated Activity	Description	Limits of activity
Combustion installations with a rated thermal input exceeding 50 MW	Generation of electrical energy through the combustion of heavy fuel oil and gas oil	From receipt of fuel to delivery of utility
Associated activity of fuel handling and storage	Handling and storage of heavy fuel oil and gas oil	From receipt of the fuel to combustion in the combustion plant
Associated activity of utilities	Sea water pre-treatment plant	From intake of sea water to delivery of utility.
Associated activity of storage, treatment and disposal / recycling of waste materials	Handling, storage, treatment and disposal / recovery of wastes from installation	From generation of waste to disposal or recycling on site or off site
Associated activity of maintenance	Maintenance carried out in any workshop in the installation	From maintenance activity to appropriate recovery / disposal of any wastes created.

The existing B Station at MPS was constructed in several phases between the 1960s and 1990s, and operates at a generation capacity of 265MW. Operational plant at MPS is listed in Table 2.3 (taken from Table B1.3.1: Plant Listing of Marsa Power Station in Part B of the Supporting Document submitted in support of the IPPC permit).

Table 2.3: Plant of Marsa Power Station			
Plant Type	Details	Fuel	Year Commissioned
Steam unit No1 & No2	Each comprise a boiler, a steam turbine and a 10MW capacity generator. Currently disused.	HFO	1962/64
Steam unit No3 & No4	Each comprise a boiler, a steam turbine and a 30MW capacity generator.	HFO	1969/70

**Table 2.3: Plant of Marsa Power Station**

Plant Type	Details	Fuel	Year Commissioned
Steam unit No5 & No6	Each comprise a boiler, a steam turbine and a 30MW capacity generator. Steam turbines are reconditioned units from abroad, and were manufactured in 1956.	HFO	1982/83
Steam unit No7	Comprise a boiler, a steam turbine and a 30MW capacity generator. Steam turbines are reconditioned units from abroad, and were manufactured in 1956.	HFO	1985/87
Steam unit No8	Comprise a boiler, a steam turbine and a 60MW capacity generator. Steam turbine is a reconditioned unit from abroad, and was manufactured in 1959.	HFO	1985/87
Gas Turbine No9	Open cycle 37 MW gas turbine / generator units.	Gas oil	1990

Bulk fuel storage of fuels and chemicals takes place across the site, with main heavy fuel oil (HFO) tanks located on the elevated levels in the north of the site. A list of bulk chemicals stored on site is shown in Table 4.1, Section 4.

Within the IPPC permitted boundary the site also comprises an administration building and mechanical workshop to the west of the site, a medical centre in the south of site. The operational facilities are concentrated in centre and southern portions of site.

## 2.2 Condition of the Land at Permit Application

### 2.2.1 Geology

According to the soil geology map (Geological Map of the Maltese Islands, Sheet 1 Malta, 1:25,000), MPS is directly underlain by solid geology of Lower Globigerina Limestone Member of the Miocene (Mlg), the thickness of which ranges across the islands from 0m to 80m. The Mlg comprises of pale cream to yellow planktonic foraminiferal pack-stones rapidly becoming wackestones above the base

The Mlg is further underlain by the Il-Mara Member (Om) of the Oligocene Lower Coralline Limestone Formation. The Il-Mara member comprises of tabular beds of pale cream to pale grey carbonate mudstones, wackestones and pack-stones in 1 to 2m thick units.

The geology in this part of the island is reported to be laid horizontal.

### 2.2.2 Hydrogeology

According to the Malta Resources Authority (2004), the Globigerina Limestone functions only locally as an aquifer where it is highly fractured.

The groundwater body underlying the site is classified as Malta Main Mean Sea Level Groundwater Body, sustained in the Lower Coralline limestone aquifer which is present beneath the Globigerina Limestone. The aquifer is in free contact with sea-water, and is described as 'a lens-shaped body of freshwater floating on more saline water, with a thickness of freshwater below sea level approximately

thirty-six times its piezometric height above sea level'. The Malta Main Mean Sea Level Groundwater Body is classed as 'waters used for the abstraction of drinking water'.

According to MEPA's report Establishing Drinking Water Protection Areas under the Water Policy Framework Regulations 2004, the site is located in a Groundwater Protected Zone. The Lower Coralline Limestone Aquifer lies in a Groundwater Protection Zones, which is officially known as Drinking Water Safeguard Zone.

### 2.2.3 Hydrology

The nearest surface water body is the Grand Harbour/Port il-Kbir- Marsamxett, which forms part of the Mediterranean Sea, located immediately south and north-east of the site boundary. According to Article 5 of the Water Framework Directive (WFD), MEPA 2005, the surface water body of Port il-Kbir-Marsamxett is classified as a coastal water. MEPA initially classified the water body as a "Category 1 (Water Bodies at Risk), for which it is already relatively clear that the objectives of the WFD will be failed." Within the 'The Water Catchment Management Plan for the Maltese Islands,' 2011, the water body is assessed as having a "poor" ecological and "bad" chemical status respectively, in line with WFD criteria.

According to Form IPPC Part B<sup>1</sup>, four waste streams are discharged to the sea at several locations around the site as shown in Figure 2. The waste stream include: cooling water, brine discharged from the seawater evaporator, surface water run-off from buildings and roads and boiler blow down.

Surface water is discharged into the sea after passing through oil water interceptors.

Process water from the washing of boilers, electrostatic precipitators and other plant is either passed through settlement tanks and water is discharged to the sea, or directed to collection tanks where the water is collected and transported to Delimara Power Station for further processing.

### 2.2.4 Any additional sensitive issues e.g. Protected Habitats

All of Malta is designated as a nitrate vulnerable zone under L.N. 233 of 2004.

According to publically available information, accessible via the MEPA and European Commission website, and information provided within the Grand Harbour Local Plan (MEPA 2002, approved 2006) there are no ecologically sensitive areas i.e. Special Protected Areas or Special Areas of Conservation in the immediate vicinity of the site.

The nearest site of interest is the 'Marsa Plain' an extensive flood plain designated as a Site of Scientific Importance, located approximately 500m south west. It is of scientific significance in terms of hydrology, geomorphology and Quaternary palaeontology, and is classified as Level 2 under policy RCO 2 of the Structure Plan.

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<sup>1</sup> IPPC Permit Part B (Supporting Documents) prepared by Enemalta dated January 2007

## 2.3 Pollution History

### 2.3.1 Pollution Incidents at the Site

A site spill register was provided to ENVIRON, detailing all recorded pollution/incidents at Marsa Power Station. Table 2.4 provides a summary of each incident, along with the remedial actions taken.

Table 2.4: Spill Register for Marsa Power Station				
Date	Location	Destination	Details	Actions Taken
10/11/10	Boiler No. 7	Land & Sea	<i>Fuel Oil (Volume Unknown)</i> <ul style="list-style-type: none"> <li>• Failure of stud holding cover of suction strainer on fuel oil pump</li> <li>• Oil spill flowed toward interceptors.</li> <li>• Interceptor overflowed and spill spread to the sea.</li> </ul>	<ul style="list-style-type: none"> <li>• Boiler immediately shut down and oil spill stopped.</li> <li>• Aggregate spread on the ground to check the flow of oil on the ground from spreading out especially to the water culverts.</li> <li>• Oil spilled on the ground collected by spades and shovels.</li> <li>• Oil absorbent pads and rags were also used.</li> <li>• Booms placed in the sea by contractor to control spread of heavy fuel oil and segregate contaminated areas.</li> <li>• Cassar Ship Repair started laying booms at 0900 and Alpha Briggs at 1000.</li> <li>• Boomed areas covered by oil absorbent pads.</li> <li>• Oil recovery from the port by contractors.</li> <li>• Interceptors were cleaned from oil by means of mechanical oil skimmers.</li> <li>• Water culverts were cleaned from oil by pumping out water/oil mixture to oil road tanker.</li> </ul>
11/11/10				<ul style="list-style-type: none"> <li>• All other remaining strainer studs checked before boiler was put into service.</li> </ul>
17/11/10				<ul style="list-style-type: none"> <li>• Conclusion of clean-up operation of port area following reports of slight oil slicks or oil contamination from sea vessels.</li> </ul>

**Table 2.4: Spill Register for Marsa Power Station**

Date	Location	Destination	Details	Actions Taken
25/04/11	Boiler No. 7 (Pumping Heating Unit)	Land & Sea	<i>Fuel Oil (Volume Unknown)</i> <ul style="list-style-type: none"> <li>A quantity of oil was found in the drip tray around the pumping and heating unit of Boiler 7 and in the trenches.</li> <li>Interceptors overflowed and some oil flowed to the sea.</li> </ul>	<ul style="list-style-type: none"> <li>Operations engineer took action to stop spill.</li> <li>Emergency Response Team immediately took over to avoid spill from spreading.</li> <li>Trenches blocked by aggregate to prevent seepage and also used as a temporary bund.</li> <li>Oil was recovered by means of diaphragm pumps.</li> <li>Interceptors were cleaned from oil by means of mechanical oil skimmers</li> <li>Oil recovery from land, trenches, drip tray and interceptors.</li> <li>Contractor laid out booms in the sea to segregate spill. The spill did not contaminate the port waters.</li> <li>Oil absorbent pads were also used to absorb patches of oil.</li> <li>Recovery of oil from sea and seawater clean-up.</li> </ul>
28/04/11				<ul style="list-style-type: none"> <li>Conclusion of clean-up operation.</li> </ul>

### 2.3.2 Historical Land Uses and Associated Contaminants

The site was first developed with power generation capacity in the 1950s. In the report by General Sir Charles Bonham Carter, of 1936, which recommended the construction of a power station at Church Wharf, Marsa, which was then the site of the Admiralty Coal Stores. The report also recommends that this level space in front of the rock will be utilised for offices, workshops, coal yard, etc. The new Power Station, which was installed in the galleries excavated in the base of Jesuits Hill at Marsa, was inaugurated on 5th December 1953. This Power Station, which is better known as “Underground Station”, was totally closed down during September 1994.

Due to lack of space in the underground tunnel which housed this first station at Marsa it was decided that a new Power Station will be erected next to it. The new Power Station, which is better known as the Marsa “B” Power station was inaugurated in 1966, is still active today.

Until the early 1990s both heavy fuel oil and coal were burned to generate electricity. Coal was stopped in the mid-1990s, and the conveyor systems to move the coal from the old stores on top of Jesuits Hill were removed.

The most common contaminants associated with the sites historic and current use as coal stores and power stations include:

- Metals associated with ash and clinker;

- Fuel oils and polycyclic aromatic hydrocarbons (PAHs) associated with bulk storage and transportation of oil and coal;
- Solvents including chlorinated solvents, associated with degreasing and cleaning;
- Asbestos associated with insulation of pipe works and electrical components;
- Polychlorinated Biphenyls (PCBs) associated with insulating oils in transformers and cables; and
- Chemicals including acids associated with cleaning of process plant.

Further details on potentially contaminative processes are given in Section 4.3 below.

### **2.3.3 Visual or Olfactory Evidence of Existing Contamination**

During the site investigation, carried out between 3<sup>rd</sup> June and 27<sup>th</sup> June 2011, visual and/or olfactory evidence of significant hydrocarbon and oil staining was noted around the site. These were confined to the operational areas containing heavy plant and concrete hardstanding around open gulley drainage channels.

Photographic evidence from the site surveillance is provided in Annex C.

### **2.3.4 Evidence of Damage to Pollution Prevention Measures**

During the site surveillance there was no generic evidence of damage to pollution prevention measures (i.e. bunds, concrete, and interceptors).

### **2.3.5 Baseline Intrusive Data**

ENVIRON have identified no baseline data for review.

### 3.0 Conceptual Site Model

The preliminary conceptual site model is a simplified representation of the environmental conditions and potential risks that exist at and in the vicinity of the site. It is based on the presentation and interpretation of information gathered during the environmental review presented in Sections 2. This allows for the identification of potential pollutant linkages and, therefore, an interpretation of the potential risk to receptors in relation to site operational activities. The principal sources of contamination, receptors and potential pollutant linkages have been assessed using a qualitative source-pathway-receptor approach in line with current guidance.

Information obtained during the environmental site investigation, described in the following sections of this report, is further used to refine and update the conceptual model. The refined conceptual site model is presented in Section 7.10.

#### 3.1 Environmental Receptor Summary

Potential receptors from potentially polluting materials located within the installation are summarised in Table 3.1.

Table 3.1: Summary of Receptors	
Receptor	Description
Human health	Site workers Site visitors Construction workers Neighbours
Land	Lower Globigerina Limestone and Lower Coralline Limestone
Water	Malta Main Mean Sea Level, the Lower Coralline Limestone Aquifer across Malta is a Drinking Water Safeguard Zone. Sea water, Grand Harbour is a Nutrient Sensitive Protected Area. The whole of Malta is a Nitrate Vulnerable Zone.
Water abstraction points	The site does not operate a groundwater abstraction well.
Sensitive land uses	The site does not lie in a habitat protected zone.
Other nearby industry e.g. Control of Major Accident Hazards (COMAH) sites	Site is located in the industrial area of around the Grand Harbour. Dry docks, a ship repair yard, and an area for cargo unloading are all located in the immediate vicinity.
Coastal/estuarine areas	Site is located on the docklands of the Grand Harbour, which empties into the Mediterranean Sea.
Drainage systems/sewers	The site discharges surface water and process water into the Grand Harbour. All discharged water passes through a separator and/or an oil interceptor. Foul water from toilets discharges into the main municipal sewer.

#### 3.2 Potential Sources of Contamination

Potentially polluting materials located within the installation are presented in Table 3.2.



**Table 3.2: Potentially Sources of Polluting Materials Within the Installation**

Source Zone	Process	Activity	Potential Polluting Activity	Potential Polluting Substances
S1	Fuel System Operations	Storage and intermediate transfer via pipelines and pump bays of fuel oil and solid, liquid or sludge waste from fuel oil.	Potential for leaks and spills from primary and secondary containment to occur or have occurred.	Hydrocarbon mixtures of variable consistency (watery to tarry), may be paraffinic, naphthenic or aromatic, potentially containing sulphur compounds and sulphides, nitrogen compounds, trace metals such as nickel, iron, vanadium, salts such as magnesium chloride or sodium chloride, may contain naphthenic acid.
		Filling of bulk process tanks.	Potential for overflow, blockages causing sumps to backup; and potential for leakage or seepage from any discontinuities to the surrounding soils and/or seawater.	Various chemicals including fuel oil additives (magnesium oxide slurry emulsifier), treatment chemicals, fuel sediments and suspended organic compounds.
		Cleaning operations.		Toxic, oxidising, corrosive, carcinogenic or ozone-depleting substances which may affect the aquatic or non-aquatic environment.
S2	Boiler Water Preparation and Treatment	Discharge of brine and chemical treatment deposits in evaporators	Potential for release of chemicals deposits to occur or have occurred.	Water treatment chemical deposits including Tri Sodium Phosphate and Ammonia Solution.
		Liquid waste generated from make-up water demineralisation	Potential for leakage or seepage from any discontinuities to the surrounding soils and/or seawater.	Chemical Regeneration Effluent – inorganic salts, suspended solids, trace metals and oils.  May affect the aquatic or non-aquatic environment.
S3	Boiler Operation and Cleaning	Dust and gaseous emissions generated from combustion of fuels for boiler /s and gas turbine plant	Potential for release of contaminant emissions and dust to occur or have occurred.	Dust and gaseous emissions generated include particulate matter (fly ash), oxides of sulphur, nitrogen, carbon, organic compounds and traces of oil.
		Fireside boiler/s maintenance and cleaning operations.	Potential for leaks and spills from primary, secondary or intermediate containment, or	Solid, sludge and liquid wastes generated include bottom ash and boiler slag, unburnt fuel deposits. These potentially have elevated hydrocarbons, treatment chemicals,

**Table 3.2: Potentially Sources of Polluting Materials Within the Installation**

Source Zone	Process	Activity	Potential Polluting Activity	Potential Polluting Substances
		Waterside boiler/s cleaning and blow down	from pipework to occur or have occurred.	anti-scaling chemicals, acids and trace metals.
		Fuel oil filtration		Toxic, oxidising, corrosive, carcinogenic or ozone-depleting substances which may affect the aquatic or non-aquatic environment.
S4	Cooling Systems Operations	Sea water cooling systems.	Potential for release of contaminant, from effluent discharge or emissions and dust to occur or have occurred.	Liquid waste or contaminants from sea water cooling include treatment chemicals (chlorine dioxide among others).
S5	Plant Maintenance	Changeover of transformer / switchgear oils.	Potential for leaks and spills from primary, secondary or intermediate containment, or from pipework to occur or have occurred.	Hydrocarbons, other organic compounds (PCBs) generated from renewing oils.
		General plant maintenance and repair work		Other wastes generated include metals, plastics and detergents.
S6	Storm Water Collection	Liquid waste from surface water runoff at oil interceptors	Potential for overflow, blockages causing sumps to backup; and potential for leakage or seepage from any discontinuities to the surrounding soils and/or seawater.	Effluent – oil, oily water containing hydrocarbons, inorganic salts, suspended solids, trace metals.
S7	Administrative Operations	General solid waste generated from administrative work and use of electrical / non-electrical equipment	Potential for leaks and/or leaching from primary and secondary containment to occur or have occurred.	General cleaning chemicals, toner (printer inks), and electrical components.

### 3.3 Initial Conceptual Site Model

The initial conceptual site model is presented in Table 3.3. The conceptual site model is based on the site remaining in a commercial/industrial use.

**Table 3.3: Initial Source-Pathway-Receptor Risk Assessment**

<b>Pollutant Linkage</b>	<b>Description</b>	<b>Receptor(s)</b>	<b>Discussion</b>	<b>Pathway Status</b>	<b>Risk Ranking</b>
<b>PL1</b>	Dermal Contact & Ingestion	Humans – Site maintenance workers Site visitors	There is potential for site maintenance workers to come into contact with contaminated soils (for example during excavation works), or to enter sub-surface chambers or confined spaces. However, the use of appropriate risk assessments and control measures will mitigate the potential risks associated with short term maintenance works.	Active	Low based on mitigation measures
<b>PL2</b>	Inhalation – dust, particulates and asbestos fibres			Active	Low based on mitigation measures
<b>PL3</b>	Inhalation - vapours			Active	Low based on mitigation measures
<b>PL4</b>	Leaching of contaminants in unsaturated zone to groundwater	Controlled Waters – Grand Harbour	Potential for leaching of contaminants into the groundwater body and indirect discharge into the Grand Harbour. However, infiltration is limited due to the site being completely covered by hardstanding. The geology beneath comprises of limestone which has a low effective porosity, groundwater flow is commonly restricted to fractures and discontinuities.	Active	Low
<b>PL5</b>	Migration of contaminated perched water off-site via the surface water drain.	Controlled Waters	All surface water on-site passes through oil interceptors before discharge to the Grand Harbour. These are regularly inspected and maintained by site operatives.  Surface water drains are at a shallow depth, and typically are laid directly into the limestone. There is potential for any shallow contaminated to travel along conduits created during the construction of the drains. However, the majority of drains near the surface appear to be encased in concrete.	Active	Moderate

**Table 3.3: Initial Source-Pathway-Receptor Risk Assessment**

<b>Pollutant Linkage</b>	<b>Description</b>	<b>Receptor(s)</b>	<b>Discussion</b>	<b>Pathway Status</b>	<b>Risk Ranking</b>
<b>PL6</b>	Migration of groundwater in Limestone Aquifer	Controlled Waters	There is potential for contaminants to migrate vertically. Foundations and footings of buildings, plant and sumps may create a vertical pathway for contaminants. Migration is limited to the horizontal bedding planes. Vertical migration is limited in the limestone to fractures and fissures.	Active	Low
<b>PL7</b>	Migration of land gases into buildings and structures.	Built Environment	There is a small risk of volatile gasses from hydrocarbons in soil and/or groundwater. However, the majority of the hydrocarbons used on-site are heavy end and less volatile. The entire site is covered by hardstanding.	Active	Low

## 4.0 Dangerous Substances Associated with Permitted Activities

The permitted operations will encompass the use, storage, treatment and/or disposal of a wide-range of materials. The main material categories are outlined within Table 4.1.

Table 4.1: Potentially Polluting Materials Located Within the Installation	
Material Type	Additional Information
Heavy Fuel Oil	With maximum sulphur content of 1% and low ash
Gas Oil	With maximum sulphur content of 0.1%
Fuel oil additives	Magnesium Oxide (MgO) slurry emulsifier Combustion Catalyst (Fuelsolv PEP990)
Sea water treatment chemicals	Chemicals to generate Chlorine Dioxide in situ (Biocaf 1320)
Boiler water intake treatment chemical	Tri Sodium Phosphate Oxygen Scavenger (Cortrol OS5009)
Evaporators chemical treatments	Anti-scaling chemical Sulfamic acid
Demineralisation plant regeneration chemicals	Sulphuric acid 98% Caustic soda flakes
Acid Spills	Sodium bicarbonate (acid neutraliser)

## 5.0 Changes to the Activity

There are no known changes to the permitted activity boundary since IPPC permit issue in March 2010.

There are no known changes to the permitted activities since IPPC permit issue in March 2010.

There are no known 'dangerous substances' not identified in the Application Site Condition Report have been used or produced since IPPC permit issue in March 2010.

## 6.0 Measures Taken to Protect Land

Operational conditions are specified by the IPPC to control the release of substances to the environment. Records are to be maintained and either submitted as part of the Annual Environmental Review or held to be made available for inspection.

Enemalta have prepared a list of the required measures as part of their Environmental Management System (also a requirement of the IPPC Permit) in the form of an Environmental Monitoring Plan (MPS Environmental monitoring plan\_r0\_29-10-10). The Plan is presented in Annex F1, with a summary below:

- Complaints concerning effects on the environment
- Plant and equipment and its maintenance
- Non-compliance with the operating procedures
- Waste management practices and control measures
- Waste oil storage including quantities, nature, manner and date of dispatch of the oil.
- Laboratory analyses of emissions to water.
- Laboratory analyses of discharges to water.
- Results of the laboratory analysis of effluent samples arising from process water and non-process water (surface drainage, fuel bunds drainage etc)
- Daily visual examination of the surface water discharge
- Inspection Reports and Certification by Approved Auditors for:
  - Testing of bunds;
  - Pipes, pumps, valves and flanges for fuel delivery from delivery ship to tank farm;
  - Other flanges, valves and over-ground pipes on site; and
  - Oil interceptors including a log of monthly monitoring and interceptor waste removal.

In addition, the IPPC permit specifies the requirements for physical pollution prevention measures including bunds and high level liquid alarms on pump sumps. In the event of accidental contamination of land, or observations of surface water indicating contamination has taken place, the permit requires for the operator to notify the Authority immediately and submit and implement a decommissioning plan within one week of the event.

Enemalta Corporation operates an Environmental Management System (EMS) as part of its operations to satisfy Condition 1.4 of the IPPC Permit. The EMS manual was first issued in November 2010, with the latest revision issued in July 2011; *file reference EMS Manual\_r2\_04-07-11*. The EMS manual covers Enemalta Corporations Activities as a whole, including operations at Marsa Power Station, Delimara Power Station and Distribution Network.

The EMS manual has identified the following measures to protect environmental impacts to land:

- *Environmental Aspects Register* – evaluation to define rules and responsibilities to identify and evaluate direct and/or indirect environmental aspects. Improvement programmes and operative procedures to keep significant environmental aspects under control. Enemalta has implemented an organisational chart detailing the responsible persons for implementation of EMS. Latest copies of the environmental impacts assessments maintained by Enemalta are present in Annex F2 and F3.
- *Training and Awareness* – Specific environmental training needs are identified within Enemalta' training plans for staff performing activities which may influence environmental impacts. The training programme includes keeping of training records and evaluating the effectiveness of training.
- *Standard Operation Procedures* – documented operational procedures are in place specifying instructions and conditions to carry out operations.
- *Emergency Preparedness and Response* – an emergency plan has been implemented for MPS. The Emergency plan was first issued in 2007, with the latest revision in December 2009, *file reference 99/80/97\_V2.0\_Emerplan-MPS-2010-01-15*. The plan documents the standard procedures in the event of an emergency in order to limit the impact of any such incident.
- *Monitoring* – in order to assess the effectiveness of the protection measures and environmental monitoring plan has been implemented for the site. The environmental monitoring plan defines the parameters to be controlled, frequency of the controls, and responsibilities for monitoring, etc.



## 7.0 Soil Quality Monitoring

### 7.1 Intrusive Investigation

#### 7.1.1 Objectives

The IPPC permit requires for the operator to provide land monitoring data to the issuing Authority. The permit also requires that two years before the planned decommissioning of all or part of the site, the operator shall submit to the authority a Full Decommissioning Plan.

The objectives of the intrusive investigation are:

- to collect sufficient data on the potentially polluting substances identified in Schedule 9 of the IPPC Permit in order to set Reference Data for the site;
- to collect data to an assessment of the likelihood of their being significant contamination of the land on the site by any of the pollutants specified in Schedule 9 of the permit and thus reduce the uncertainties in the conceptual model presented as Section 4 of this report;

The investigation has been undertaken in accordance with conditions 2.16.3 (covered in Section 7, of this report), 2.16.5.1 (covered in Section 8), 2.16.5.4 (not covered in this report) and 2.16.5.5 (covered in Section 8.1) of the IPPC permit.

The works were also undertaken in accordance with the Proposal for the Decommissioning Plans of the Generation Plants of Enemalta Corporation by RVA Group on behalf of Enemalta, file reference GN/MPS/T/6/2010 and ENVIRONs Method Statement for MPS and DPS UKP22-14920MS, dated May 2011.

### 7.2 Investigation and Sampling Strategy

#### 7.2.1 General

ENVIRON UK Limited undertook and managed an intrusive site investigation on behalf of Enemalta Corporation in order to collect the site reference data. This involved the use of suitable third parties (i.e. drilling contractors etc.). All contractors used are vetted and approved and agree to ENVIRON's site protocols and health and safety (H&S) requirements.

The main site investigation was undertaken between the 3<sup>rd</sup> June and 27<sup>th</sup> June 2011. All subcontractors were employed under contract and supervision of ENVIRON. All sampling (soil and groundwater) was undertaken directly by ENVIRON.

Sample locations were positioned to provide general coverage across the site and to target known current potential sources of contamination. Potential sampling locations were restricted to some degree by the location of current buildings and infrastructure (including foul/surface water drains, cables and cable ducts, and pipelines, as well as access for equipment and plant).

The scope of works comprised the following:

- Service clearance undertaken between the 3<sup>rd</sup> and 6<sup>th</sup> June 2011 by qualified utility surveyors to ensure the drilling locations were clear of services prior to drilling.

- Drilling of twenty-four (24) boreholes on the lower platform to depths generally between 4.5-6.5m bgl, and to a maximum depth 8m, using solid stem auger rotary drilling techniques to allow the sampling of the soil. Drilling of five (5) boreholes on the upper platform to depths between 12.0-26.7m bgl, using a combination of open hole and rock core drilling, to allow the sampling of soil at the surface and at the base of the former underground station. The drilling works were undertaken between 15<sup>th</sup> and 27<sup>th</sup> June 2011. The full exploratory borehole logs are present in Annex B1.
- On site screening for hydrocarbon vapours using a portable handheld photo ionization detector (PID) to assist the selection for laboratory analysis by experienced ENVIRON field personnel.
- Analysis of up to fifty-four (54) soil samples for a range of determinands specified in Schedule 9 of the IPPC permit, including a suite of metals, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), volatile and semi-volatile organic compounds (VOCs and SVOCs), polychlorinated biphenyls (PCBs) and asbestos. The analytical suite is presented in Table 7.2, Section 7.7. Analysis of samples in accordance with the relevant British and ISO standards. A summary table of the results is shown in Annex D.

## 7.3 Constraints on Investigations

### 7.3.1 Health and Safety

All work was undertaken in accordance with ENVIRON Safe Working Procedure No.2, Underground/Overhead Services, which controls risk through a safe system of work by using service location plans for the site, where available, and trained site investigation staff that are competent using cable avoidance tools (CAT & GENNY). The works were also undertaken in accordance with Enemalta Corporation health and safety permit to work procedures.

Prior to commencing the intrusive works, each of the sample locations were agreed between ENVIRON and Enemalta. Enemalta undertook an initial utility clearance, and subsequently some of the locations were moved nearby to avoid underground services. As part of ENVIRON's H&S procedures a specialist utility clearance team (an approved ENVIRON contractor) undertook a utility survey of each location. As a final check each location was scanned by ENVIRON personnel using a Cable Avoidance Tool (CAT) immediately prior to the excavation. Due to the presence of underground services in a number of proposed borehole locations, boreholes were relocated to a 'safe' location free of services, ensuring that the borehole location rationale provided in Section 7.5 was still applicable. However, if cleared location was too far away from the target, a hand dug pit was excavated to prove the non-existence of the services, prior to drilling.

### 7.3.2 Drilling Techniques

The justification for the drilling technique selected for the investigation, rotary solid stem auger, is presented in Section 7.4.2. The constraints of using this technique were:

Arising from the auger were effectively 'disturbed'; caused when the soil removed from the base of the borehole travels up the flights and emerges at the ground surface. As such, the quality of the sample taken is reduced. The disturbance may result in some loss of volatile contaminants. However, for the purposes of the investigation the benefits of the technique were considered to outweigh the detriment of a 'disturbed sample'.

Due to the nature of the drilling there is potential for cross contamination between each location. To limit the degree of cross contamination the drilling equipment which comes into contact with the soil (i.e. flight augers) were cleaned. Immediately after drilling a location, the excess soil was removed in-situ, the drilling equipment was then transported to a central dedicated 'wash down' area. Each flight auger was thoroughly washed with water using a pressure washer, where necessary a wire brush was used to remove soil. In the eventuality of contamination being identified in boreholes, the equipment was cleaned with a decontamination solution (Decon 90), and given a final rinse with clean water to remove any residual solution. Waste water from the dedicated wash down area was directed into the surface drainage system which was served by an oil / water interceptor.

### **7.3.3 Minimisation of Disruption to Site**

Borehole locations were positioned to minimize disruption to the site. Locations were positioned to minimize disruption to other site users, where it was possible to do so without compromising the quality of the sampling rationale in Table 7.1.

## **7.4 Soil Investigation and Sampling Techniques and Protocols**

### **7.4.1 Concrete Coring**

Prior to soil sampling, drilling locations positioned on concrete were 'cored', concrete corer unit allowed samples of surface concrete 150mm in diameter and up to 300mm thick to be recovered. This method also allows the surface to be successfully reinstated on completion of the sampling.

### **7.4.2 Rotary Techniques**

#### *Solid Stem Auger*

Solid stem continuous flight auger was a fast method of drilling to the depths required in this investigation. As the auger is rotated and pushed downwards the soil removed from the base of the borehole travels up the flights and emerges at the ground surface. The boreholes drilled using this method are circa 150mm to 200mm in diameter, depending on the size of rods used to drill the hole.

The drilling rig used was a Beretta T44; a tracked drilling rig with reducible tracks enabling it to move over soft ground and width restricted areas with minimal damage.

Solid stem augers have the ability to drill into soft rock, which makes it suitable for this investigation given the geology of Lower Globigerina Limestone. The soil and rock recovered using this method allows for a detailed inspection and logging of the ground conditions encountered and the recovery of disturbed soil samples. As such it is an appropriate and widely used method for investigating shallow soils.

Soil stem auger techniques provided the best option of the available local drilling techniques.

#### *Open Hole & Continuous Rock Coring*

Due to the elevation of locations on the upper platform in relation to the lower platform, the boreholes need to be drilled to >15m bgl which is not possible using the solid stem continuous flight augers. The most appropriate technique was to use open hole rotary drilling.

Open hole drilling involves the rotation of a drill-pipe and bit to cut the rock. A water flush is pumped down the drill-pipe to flush out the debris. The technique allows rapid progression through solid rock,

however there is no sample recovery. In order to take a sample from the upper strata and from the strata from the lower strata (approximately level with base of underground station), continuous rock coring was undertaken. This involves using rotary flush to penetrate the rock with a hollow tube; the tube is drilled to a known depth then withdrawn. A continuous rock core can then be logged and sampled. This technique is much slower than open hole drilling but allows for detailed logging of the rock and sample collection.

The drilling rig used was a Beretta T44; a tracked drilling rig with reducible tracks enabling it to move over soft ground and width restricted areas with minimal damage.

## 7.5 Sample Locations

Sample locations were positioned to provide general coverage across the site and to target potential sources of contamination. Sampling locations were restricted due to location of current buildings and underground services (including foul/surface water drains, oil/water interceptors, culverts, electric and water mains etc.). Sample locations were surveyed relative to local sea level.

Samples are referenced using the following classification system:

Investigation Method + Unique ID
<i>i.e.</i> BH1 (Borehole One) or WS1 (Window Sample One)

Sample locations were approved in principal by MEPA prior to undertaking the investigation. MEPA also confirmed that the sample locations could be relocated on site, to avoid underground services etc., providing the justification in Table 7.1 was applicable.

The sample location rationale for Marsa Power Station is shown in Table 7.1. The proposed sample locations are presented in Figure 3, Annex A and the actual sample locations as drilled are presented in Figure 4 Annex A.

Table 7.1: Marsa Sampling Rationale						
Location ID		Location		Sample Location as Agreed (Y/N)	Rationale for Sample Location	
Proposed (Fig. 3)	Actual (Fig. 4)				Source Zone	Notes
AC	SB01	B Station	Platform north of Transformers No.1 & No.2	N <i>Moved 8m NW to avoid culvert and electricity cables.</i>	S5	Power generation (transformer, generator, turbine), general site coverage
AB	SB02	B Station	Unloading bay between Transformers No.3 & No.4	N <i>Moved 5m S to avoid culvert</i>	S1, S5	Power generation (transformer, generator, turbine), general site coverage
I	SB03	B Station	Adjacent to Waste Oil Tank	Y	S1, S3	Waste oil tanks and general site coverage.

**Table 7.1: Marsa Sampling Rationale**

Location ID		Location		Sample Location as Agreed (Y/N)	Rationale for Sample Location	
Proposed (Fig. 3)	Actual (Fig. 4)				Source Zone	Notes
F	SB04	B Station	Condensate Tank No.8	Y	S2	Condensate tank and general site coverage
H	SB05	B Station	Boiler No.8	Y	S1	Diesel tank and general site coverage.
B	SB06	B Station	South of Transformer No.4	N <i>Moved 25m SE adjacent to compressed gas cylinder cages to avoid HV cables.</i>	S2, S4	Power generation (transformer, generator, turbine), general site coverage
D	SB07	B Station	Interceptor	Y	S2, S6	Interceptor and Chemical storage area
Y	SB08	B Station	South of acid storage tanks	Y	S2	Bulk acid storage
X	SB09	B Station	Fly Ash Silo	Y	S2, S3	Fly ash silo and demineralization plan.
L	SB10	B Station	Boiler No.7	Y	S3	Boiler operations, general site coverage
N	SB11	B Station	Boiler No.7	Y	S3	Boiler operations, general site coverage
K	SB12	B Station	Boiler No.7	Y	S3	Boiler operations, general site coverage
O	SB13	B Station	Boiler No.7 oil staining	Y	S3	Area of oil spills (see Table 2.4) and general site coverage
E	SB14	B Station	Adjacent to waste storage	Y	S3	General process plant and waste storage
G	SB15	B Station	Fire Water Tank	Y	S1	Diesel tank and general site coverage.
J	SB16	B Station	Outlet for Boiler No.8 surface drain interceptor	Y	S2, S6	General site coverage
A	SB17	B Station	South of Transformer No.2	Y	S5	Power generation (transformer, generator, turbine), general site coverage

**Table 7.1: Marsa Sampling Rationale**

Location ID		Location		Sample Location as Agreed (Y/N)	Rationale for Sample Location	
Proposed (Fig. 3)	Actual (Fig. 4)				Source Zone	Notes
C	SB18	B Station	South of Transformer No.6	Y	S5	Power generation (transformer, generator, turbine), staining on ground, general site coverage
V	SB19	B Station	South of RFO Tank 1 & 2 bund wall	N <i>Moved 6m E to avoid pipework.</i>	S1	Integrity of RFO tank bund, general site coverage
W	SB20	B Station	Between Boiler No.3 & No.4	N <i>Moved 3m E to avoid culvert.</i>	S1, S3	Boiler operations, general site coverage.
AA	SB21	B Station	Unloading bay between Transformers No.4 & No.5	Y	S1, S5	Power generation (transformer, generator, turbine), general site coverage
Q	SB22	A Station & B Station	South of RFO Tank 3 & 4 bund wall.	Y	S1	Integrity of RFO tank bund, A Station
P	SB23	A Station & B Station	Adjacent to settling pond	Y	S1, S2	Settling pond and general site coverage
R	SB24	A Station & B Station	North-west of RFO Tank 3 & 4 bund wall.	Y	S1	Integrity of RFO tank bund, A Station and general site coverage
S	SB25	A Station & B Station	East of RFO Tank 1 & 2 bund wall.	N <i>Moved 25m NW adjacent to the drum storage shed to north of Tank 2 bund, to avoid tunnels in Station A.</i>	S1	Seepage from RFO Tank 2, integrity of RFO tank and distillate oil tank bunds, A Station and general site coverage
T	SB26	A Station & B Station	West of RFO Tank 6 bund and adjacent to the RFO Tank 5 loading point	Y	S1	Integrity of RFO tank bund, A Station and western site boundary

Table 7.1: Marsa Sampling Rationale						
Location ID		Location		Sample Location as Agreed (Y/N)	Rationale for Sample Location	
Proposed (Fig. 3)	Actual (Fig. 4)				Source Zone	Notes
Z	SB27	B Station	Boiler No.5	Y	S1, S3, S5	Pit next to Boiler No.5
M	SB28	B Station	Boiler No.7 & Gas Turbine Unit 9	N <i>Moved 20m NW to other side of GT9.</i>	S3, S5	Power generation from turbine, general site coverage
U	SB29	A Station & B Station	South-west of RFO Tank 5 bund	N <i>Moved 15m S, to west of the petrol filling station, to avoid HV cables.</i>	S1	Integrity of RFO tank bund, A Station and western site boundary

Position SB29 is located outside the IPPC permit boundary, was positioned to provide a general assessment of the sites western boundary.

## 7.6 Sampling Techniques

Soil samples were obtained from the boreholes by ENVIRON personnel at regular intervals. The soil samples were placed in containers appropriate to the type of analysis to be undertaken. The samples were stored in cool boxes and/or a refrigerator to maintain an appropriate temperature prior to being couriered to the local DHL depot and air freighted to an approved laboratory in the UK.

## 7.7 Analytical Strategy

Conditions 2.16.3 and 2.16.5.1.1 of the IPPC permit require monitoring of the substances specified in Schedule 9 of the permit. The analytical strategy was devised in accordance with Schedule 9 and presented in Table 7.2.

Table 7.2: Analytical Strategy				
Analytical Suite	Determinant			Quantity
Metals	Arsenic	Mercury	Vanadium	54
	Cadmium	Nickel	Cobalt	
	Chromium	Tin	Thallium	
	Copper	Antimony	Manganese	
	Lead	Selenium	Zinc	
Inorganic	pH	Sulphate	Sulphide	54
Polycyclic Aromatic Hydrocarbon (PAHs) (US EPA Priority 16 Speciated)	Naphthalene	Fluoranthene	Benzo(a)pyrene	54
	Acenaphthylene	Pyrene	Indeno(123cd)pyrene	

**Table 7.2: Analytical Strategy**

Analytical Suite	Determinant			Quantity
	Acenaphthene	Benzo(a)anthracene	Dibenzo(ah)anthracene	
	Fluorene	Chrysene	Benzo(ghi)perylene	
	Phenanthrene	Benzo(b)fluoranthene	PAH 16 Total	
	Anthracene	Benzo(k)fluoranthene		
BTEX Compounds – analysed as part of Volatile Organic Compounds (VOCs)	Benzene	Ethyl Benzene	m/p-xylene	16
	Toluene	o-xylene		
Total Petroleum Hydrocarbons/mineral oil	EPH >C8-C10	EPH >C20-C30	Total EPH >C8-C40	54
	EPH >C10-C20	EPH >C30-C40		
Polychlorinated biphenyls (PCBs)	PCB 28	PCB 118	PCB 153	16
	PCB 52	PCB 138	PCB 180	
	PCB 101	Total 7 PCBs		
Volatile Organic Compounds (VOCs) and Tentatively Identified Compounds (VOC TICs)	Methyl Tertiary Butyl Ether	Trichloroethene	1,2,3-Trichloropropane	16
	Chloromethane	1,2-Dichloropropane	Propylbenzene	
	Vinyl Chloride	Dibromomethane	2-Chlorotoluene	
	Bromomethane	Bromodichlorometh	1,3,5-	
	Chloroethane	cis-1-3-Dichloropropene	4-Chlorotoluene	
	Trichlorofluoromethane	trans-1-3-Dichloropropene	tert-Butylbenzene	
	1,1-Dichloroethene	1,1,2-	1,2,4-	
	Dichloromethane	Tetrachloroethene	sec-Butylbenzene	
	trans-1-2-Dichloroethene	1,3-Dichloropropane	4-Isopropyltoluene	
	1,1-Dichloroethane	Dibromochlorometh	1,3-	
	cis-1-2-Dichloroethene	1,2-Dibromoethane	1,4-Dichlorobenzene	
	2,2-Dichloropropane	Chlorobenzene	n-Butylbenzene	
	Bromochloromethane	1,1,1,2-Tetrachloroethane	1,2-Dichlorobenzene	
	Chloroform	Styrene	1,2-Dibromo-3-chloropropane	
	1,1,1-Trichloroethane	Bromoform	1,2,4-Trichlorobenzene	



Table 7.2: Analytical Strategy				
Analytical Suite	Determinant			Quantity
	1,1-Dichloropropene	Isopropylbenzene	Hexachlorobutadiene	
	Carbon tetrachloride	1,1,2,2-Tetrachloroethane	1,2,3-Trichlorobenzene	
	1,2-Dichloroethane	Bromobenzene		
Semi-Volatile Organic Compounds (SVOC) and Tentatively Identified Compounds (SVOC TICs).	2-Chlorophenol	Butylbenzylphthalate	4-Chlorophenyl phenylether	16
	2-Methylphenol	Di-n-butyl phthalate	4-Nitroaniline	
	2-Nitrophenol	Di-n-Octyl phthalate	Azobenzene	
	2,4-Dichlorophenol	Diethyl phthalate	Bis(2-chloro-ethoxy)methane	
	2,4-Dimethylphenol	Dimethyl phthalate	Bis(2-chloro-ethyl) ether	
	2,4,5-Trichlorophenol	1,2-Dichlorobenzene	Carbazole	
	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	Dibenzofuran	
	4-Chloro-3-methylphenol	1,3-Dichlorobenzene	Hexachlorobenzene	
	4-Methylphenol	1,4-Dichlorobenzene	Hexachlorobutadiene	
	4-Nitrophenol	2-Nitroaniline	Hexachlorocyclopentadiene	
	Pentachlorophenol	2,4-Dinitrotoluene	Hexachloroethane	
	Phenol	2,6-Dinitrotoluene	Isophorone	
	2-Chloronaphthalene	3-Nitroaniline	N-nitrosodi-n-propylamine	
	2-Methylnaphthalene	4-Bromophenylphenyl	Nitrobenzene	
	Bis(2-ethyl-hexyl) phthalate	4-Chloroaniline		
Asbestos Screen	N/A			17

### 7.7.1 Justification of Analytical Suites

Where specific compounds were not specified in Schedule 9 of the permit, justification for the testing criteria selected is as follows:

- **Cycloalkanes** – there is no specification for any individual compounds in this group. ENVIRON recommends that analysis be undertaken for semi-volatile organic compounds (SVOCs) to cover this group of compounds.

- **Alkyl-benzenes** – whilst the common alkyl benzene are listed (methyl benzene – toluene, ethyl benzene, xylene), there is no specification for which others are required in the analysis. ENVIRON therefore recommend that analysis be undertaken for volatile organic compounds (**VOCs**) to cover this group of compounds.
- **Straight chain alkane C10-C70** – whilst heavy fuel oil used on site can contain hydrocarbons up to C70, analysis is only common for C10 to C40 carbon banding groups, and this would address the key hydrocarbons used on the facility. Analysis was also requested for ‘mineral oil’ which is essentially duplicating this analysis.

### 7.7.2 Justification of Analytical Field Techniques and Detection Limits

No field testing of samples occurred beyond the testing of soil gas headspace using a Photo-ionisation Detector (PID). The PID detects volatile organic compounds in the range of 0 to 5,000 ppm.

Substances have been analysed in soil phase only.

### 7.7.3 Laboratory Accreditation / Quality Assurance and Quality Control

Conditions 2.16.3.2 and 2.16.3.3 of the IPPC permit require for samples to be analysed to the relevant EN or EN ISO standards or equivalent, and for samples to be tested by a lab accredited by the National Accreditation Body (NAB-Malta or equivalent) or at least EN ISO 17025:2005/Cor 1:2006.

Analytical testing was contracted to Jones Environmental Forensics Laboratory (Jones); an ENVIRON approved laboratory, Jones is an ISO 17025 and MCERTS accredited laboratory, they work to a recognised international standard and have a Quality Management System (QMS) in place. ISO/IEC 17025 specifies the general requirements for the competence to carry out tests and/or calibrations, including sampling. It covers testing and calibration performed using standard methods, non-standard methods and laboratory-developed methods. MCERTS is the Monitoring Certification Scheme established by the UK Environment Agency to deliver high quality environmental measurements. It provides for product certification of instruments, competency certification of personnel and the accreditation of laboratories based on international standards. MCERTS requires laboratories to first be accredited to the current version of the European and international standard ISO/IEC 17025. MCERTS requires a more stringent level of control for laboratory practices. In the UK the Environment Agency will only accept analytical data from laboratories who are accredited under the MCERTS Chemical Testing of Soil scheme.

ISO/IEC 17025 requires laboratories to validate non-standard methods, laboratory-designed/developed methods, standard methods used outside their intended scope and amplifications and modifications of standard methods, to confirm the methods are fit for the intended use. All but one of the below methods are accredited to ISO/IEC 17025 as a minimum, the SVOC method is included in the laboratories ongoing validation plan, but is based on USEPA 8270.

The analytical testing method, accreditation and limits of detection are presented in Table 7.3.

Table 7.3 Analytical Methods and Accreditations

Test Method	Code	Soils	Sampling Method	ISO 17025	MCERTS	MDL
005S	EPH	Total EPH (C8-40) by GC-FID (calibrated against diesel and lube oil )	Determination of Extractable Petroleum Hydrocarbons by GC-FID. Following extraction of as-received sample with hexane/acetone. Extraction using end/end, orbital shaker or soxhlet. Calibrated against diesel and lube oil.	Y	Y	30 mg/kg
004S	PAH 16/17	Total PAH 16 by GC-MS	Determination of Polynuclear Aromatic Hydrocarbons by GC-MS. End/end extraction using DCM on as received sample. In house method modified <b>USEPA 8270</b> .	Y	Y	0.02-0.07 mg/kg
015S	VOC	VOC target list (incl. BTEX/MTBE) by GC-MS	VOC target list by Headspace GC-MS - modified <b>USEPA 8260</b>	Y	N	2-27/100 ug/kg
016S	SVOC	SVOC target list including PAHs, phenol and chlorinated phenols by GC-MS	SVOC target list by GC-MS - modified <b>USEPA 8270</b> on as received sample extracted with DCM or hexane acetone	N	N	10/100 ug/kg
086S	PCB 7	PCB 7 congeners	7 congeners (101,118,138,153,180,28,52) by GC-ECD - modified <b>USEPA 8250/625</b>	Y	N	5ug/kg (per Cong.)
030S	Metals	As(0.5), Cd(0.1), Cr(0.5), Cu(1), Hg(0.1), Ni(0.7), Pb(5), Se(1), V(1), Zn(5), Sb(1), Co(0.5), Mn(1), Ti(1), Tn(1)	ICP-OES	Y	Y	Various (mg/kg)
074S	WSB	Water Soluble Boron	ICP-OES	Y	Y	1 mg/kg

## **7.8 Findings of the Ground Investigation**

### **7.8.1 General Observations**

The majority of the site surface comprises concrete hardstanding, varying in thickness from approximately 200mm to 1200mm, with an average of 400mm. The condition of the concrete varied, with some parts with steel reinforcement. In roads the surface generally comprised tarmac, thickness varying between 100 and 150mm. On the upper platform the majority of the site was bare ground or gravel.

Positions SB02, and SB12 were terminated due to encountering sea water culverts. Position SB24 on the upper platform was terminated at 12m bgl due to drilling in to the void of the underground A Station.

### **7.8.2 Geology**

Made ground was encountered immediately beneath the surface in all twenty nine (29) locations drilled. Made ground across the majority of the site generally comprised of a layer of limestone gravel or reworked natural limestone. The made ground was encountered to depths between 0.3m bgl (SB25 and BH26) and 2.0m bgl (SB06).

Made ground along the eastern part of the site (i.e. east of Boiler No 8) was generally more extensive. The made ground was encountered to depths between 2.5m to 5.5m bgl. The made ground generally comprise of reworked limestone gravel with fragments of brick, tarmac and concrete. Closer to the seawall the soils at depth contained more silt sediments resulting in poor recovery. It is likely that the made ground in this area was due to the raising of land levels when creating the wharf.

Natural geology was encountered in all of the twenty nine (29) locations. Pale cream fine grained pack-stone limestone, was encountered in eight (8) of the locations to depths between 0.7m ASL and 2.2m below sea level (bsl). The limestone was underlain by a grey occasionally grey green calcium rich mudstone (marl). Mudstone was encountered in all locations to a proven depth of 4.9m bsl.

The pale cream limestone encountered is consistent with the geological description for the site of Lower Globigerina Limestone. The mudstone encountered is consistent with the geological description for the site of Lower Coralline Limestone.

### **7.8.3 Hydrology**

Groundwater was encountered in seven (7) of the twenty nine (29) locations between depths of 1.5m and 4.0m below ground level (bgl) (0.17m above sea level (asl) and 1.76m bsl respectively). The majority of locations were located in the south east of the site, in the made ground. The stratum was found to be 'damp' but not wet in a further nine (9) locations across the site.

### **7.8.4 Evidence of Contamination**

Across the majority of the site there was little visual or olfactory evidence of hydrocarbon contamination identified in the soil during the investigation. Evidence of hydrocarbons was noted in SB14, located in the south-eastern corner of the site. Grey staining and a hydrocarbon odour was noted in soils from the saturated zone below 3.0m bgl. There was a slight hydrocarbon odour in SB15 at 3.0 to 3.5m bgl. Grey green staining was also noted in the soils in SB29, position outside the IPPC

permit boundary to the west. The staining correlated with elevated PID readings which are likely associated with the adjacent petrol filling station.

Concentrations of volatile organic compounds detected using the photo ionization detector (PID) were generally low not exceeding 10ppm by volume. Only one reading was recorded above 10ppm within the installation boundary, a concentration of 54.7ppm was recorded in the soils from SB14 at 3.0m. This corresponded with evidence of hydrocarbons in the saturated soils.

Elevated PID readings were recorded in the soils from location SB29, the position adjacent to the petrol filling station. A maximum concentration of 62.2ppm was recorded from soils from 1.8m to 2.0m bgl. Elevated PID readings above 10ppm were recorded through the soil profile from 0.8m to 4.0m bgl.

PID readings are presented on the exploratory borehole logs in Annex B1.

## **7.9 Chemical Analyses**

### **7.9.1 Criteria for Assessment**

In the absence of current Maltese guidance, the UK risk-based approach to contaminated land has been adopted. In accordance with UK statutory guidance and based on the principles of risk assessment, ENVIRON has derived generic criteria (ENVIRON Generic Assessment Criteria – ENVIRON GAC) for the assessment of soil. The assessment of chemical data from an intrusive investigation is undertaken in a tiered approach, and the first stage is a Generic Quantitative Risk Assessment (GQRA). The ENVIRON GACs are considered to be threshold based screening concentrations, at which a significant risk is not considered to be present to the relevant receptors.

The ENVIRON GACs for soil assessment are based on the generic scenarios outlined in the Contaminated Land Exposure Assessment (CLEA) methodology and guidance documents, and include inhalation, ingestion, dermal contact of soil and dust as pathways for commercial and residential scenarios; as well as ingestion of vegetables for residential with gardens scenario. A commercial / industrial scenario has been selected for comparison as it is most applicable for the continued use of the Delimara Power Station site. These have been calculated by use of two proprietary risk assessment models (CLEA Version 1.06 and the ASTM RBCA2 Tool Kit Version 2.5 for Chemical Releases) which have been amended, where necessary, to reflect the current UK approach to human health risk assessment as set out in the Contaminated Land Report (CLR) 11 and the CLEA guidance documents (incorporating Science Reports SC050021/SR2, SR3 and SR4 published in January 2009). The physiochemical data has been taken from or derived using the methodology detailed in SR7 (November 2008), where feasible. The toxicology data has been taken from the current published EA toxicology documents.

### **7.9.2 Results of Intrusive Investigation**

Results of the soil laboratory analyses are summarized in Annex C and the full analytical results are presented in the original laboratory reports in Annex D. The key analytical findings are summarized as follows:

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2 American Society for Testing and Materials Risk Based Corrective Action Model.

**Metals:**

- Concentrations of cadmium, chromium, manganese, mercury, nickel, vanadium and zinc exceeded laboratory method detection limits in all of the fifty four (54) samples analysed. All were detected below their relevant ENVIRON GAC.
- Concentrations of antimony were detected in eleven (11) of the fifty four (54) samples analysed. A maximum concentration of 29mg/kg was recorded in SB18 at 0.5m bgl, which is below the ENVIRON GAC (7,550mg/kg).
- Concentrations of arsenic were detected in fifty three (53) of the fifty four (54) samples analysed. A maximum concentration of 21mg/kg was recorded in SB18 at 0.5m bgl, which is below the ENVIRON GAC (762mg/kg).
- Concentrations of cobalt were detected in fifty three (53) of the fifty four (54) samples analysed. A maximum concentration of 21mg/kg was recorded in SB18 at 0.5m bgl. There is no ENVIRON GAC for cobalt.
- Concentrations of lead were detected in twenty six (26) of the fifty four (54) samples analysed. A maximum concentration of 7259mg/kg was recorded in SB18 at 0.5m bgl, which is above the ENVIRON GAC (750mg/kg).
- Concentrations of selenium were detected in one (1) of the fifty four (54) samples analysed. A concentration of 8mg/kg was recorded in SB17 at 3.0m bgl, which is below the ENVIRON GAC (13,000mg/kg).
- Concentrations of tin were detected in fifteen (15) of the fifty four (54) samples analysed. A maximum concentration of 155mg/kg was recorded in SB18 at 0.5m bgl. There is no ENVIRON GAC for cobalt.
- Concentrations of thallium did not exceed laboratory method detection limits in any of the samples analysed.

**Inorganics:**

- pH ranged from 8.44 in SB23 (1.8-2.0m bgl) to 12.07 in SB07 (1.1-1.5m bgl).
- Sulphide was detected in two (2) of the fifty four (54) samples analysed. A maximum concentration of 6.4mg/kg in SB14 (3.5m bgl)
- Total sulphate ranged from 609mg/kg in SB01 (2.5-3.0m bgl) to 5617mg/kg in SB19A (0.8-1.0m bgl).
- Asbestos fibres were not detected in any of the seventeen (17) samples analysed.

**Polycyclic Aromatic Hydrocarbons (PAHs):**

- Concentrations of PAHs were detected above method detection limits in sixteen (16) of the fifty four (54) samples analysed. The majority of the exceedances were from samples in the made ground. The maximum Total PAH (sum of 16), was 171.1mg/kg, recorded in SB16 (0.6-1.0m bgl). Four further locations had a total PAH concentration greater than 10mg/kg, all were taken from the upper 0.5m. This sample was taken from the made ground which had fragments of coal and tarmacadam.

- Where concentrations of individual PAH determinants were detected only one location recorded a concentration exceeding their respective ENVIRON GAC. Benzo(a)pyrene was detected above its ENVIRON GAC (14mg/kg) with a concentration of 18.59mg/kg in the sample from SB16 (0.6-1.0m bgl).

### **Total Petroleum Hydrocarbons (TPHs):**

- Fifty four (54) samples were tested for extractable petroleum hydrocarbons (EPH) with basic carbon banding. Concentrations of EPH were detected above laboratory method detection limits in fifteen (15) samples (SB02 0.3-0.5m, SB03 0.3-0.5m, SB04 0.5-1.0m, SB05 0.25-0.5m, SB05 1.5-2.0m, SB06 0.6m, SB06 1.0-1.5m, SB14 3.5m, SB15 3.0-3.5m, SB16 0.6-1.0m, SB17 0.3m, SB18 0.5m, SB19A 0.8-1.0m, SB20 0.8-1.0m, and SB28 0.3-0.4m). All were encountered on the lower platform, the majority of which are in the south eastern corner around Boiler No. 8 and across the western corner of the site.
- The maximum concentration of total EPH detected was 2325mg/kg at BH19A (0.8-1.0m bgl) which does not exceed the ENVIRON GAC of 5,000mg/kg for total TPH. The EPH concentrations recorded were generally in the heavier end ranges of >C20-30 and >C30-40, which are typically contain gas oil, heavy fuel oil and mineral oils.
- Middle range hydrocarbons (>C10-C20) typically including light fuel oils such as gas oil, were detected in eight (8) of the locations sampled, with a maximum concentration of 605mg/kg BH19A (0.8-1.0m bgl).
- Light end hydrocarbons (>C8-C10) were only detected in one (1) of the locations sampled, with a concentration of 29mg/kg in SB08 (0.8-1.0m bgl).
- No GACs are available for hydrocarbon banding. All concentrations of total EPH did not exceed the ENVIRON's GAC of 5,000 mg/kg.

### **Volatile Organic Compounds (VOCs):**

- Concentrations of Volatile Organic Compounds (VOCs) were detected above the detection limits in six (6) of the sixteen (16) samples analysed (SB05, 0.25-0.5m bgl; SB14, 3.5m bgl; SB18, 0.5m bgl; SB27, 0.4-0.5m bgl; SB28, 2.3-2.5m bgl; and SB29, 1.8-2.0m bgl). The determinant with highest concentration detected was 1,2,4-Trimethylbenzene (2.523mg/kg) in SB14 at 3.5m bgl. The sample from SB14 also recorded concentrations of Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, 4-isopropyltoluene, and n-Butylbenzene.
- BTEX components were detected in four (4) of the six (6) samples detecting VOCs (SB05, SB14, SB18, and SB27). The determinant with highest concentration detected was o-xylene (0.814mg/kg) in SB14 at 3.5m bgl
- Methyl Tertiary Butyl Ether (MTBE) was detected in the sample from SB29 (1.8-2.0m bgl) with a concentration of 0.006mg/kg. This sample is outside the permitted boundary, located to the west of the site adjacent to the petrol filling station.
- Dichloromethane was detected in the three (3) of the six samples detecting VOCs (SB27, SB28 and SB29), with a maximum concentration of 0.035mg/kg in sample from SB27 (0.4-0.5m bgl).
- Trichloroethene was detected in the sample from SB18 (0.5m bgl) with a concentration of 0.117mg/kg.



- Styrene was detected in the sample from SB05 (0.25-0.5m bgl) with a concentration of 0.006mg/kg.

None of the concentrations of VOCs detected were above their respective ENVIRON GAC.

- Tentative identified compounds (TICs) of VOCs were detected in one (1) of the sixteen (16) samples analysed. Twenty five TICs were identified in SB14 at 3.5m bgl. The majority are derivations of benzene; the maximum TIC detected was dodecane at 4.582mg/kg.

### **Semi-Volatile Organic Compounds (SVOCs)**

- Concentrations of Semi-Volatile Organic Compounds (SVOCs) were detected above the detection limits in three (3) of the sixteen (16) samples analysed. 2-Methylnaphthalene was detected in SB05, SB14 and SB18, with a maximum concentration of 2.28mg/kg recorded in SB14 (3.5m bgl). The sample from SB05 also recorded concentrations carbazole (0.021mg/kg) and dibenzofuran (0.034mg/kg). None of the concentrations detected were above their respective ENVIRON GAC.
- Tentative identified compounds (TICs) of SVOCs were detected in five (5) of the sixteen (16) samples analysed (SB05, 0.25-0.5m bgl; SB05, 1.5-2.0m bgl; SB12, 0.3-0.5m bgl; SB14, 3.5m bgl; and SB18, 0.5m bgl). The majority are derivations of decane, naphthalene, the maximum TIC detected was dodecane in SB14 (3.5m bgl) with a concentration of 8.396mg/kg.

### **Polychlorinated Biphenyls (PCBs)**

- Concentrations of polychlorinated biphenyls (PCBs) were below laboratory detection limits in all sixteen (16) samples analysed.

### **7.9.3 Summary of Results**

In general metals were detected at low concentrations across the majority of the site. Elevated readings of lead have been recorded in the shallow made ground in the southern part of the site. PAHs and EPH have been detected across the site, with higher concentrations recorded towards the south eastern part of the site around Boiler No.8. Low concentrations of VOC and SVOCs have been detected in soils across the south eastern corner. SVOC and VOC TICs were detected in samples in the south eastern corner; the highest concentrations recorded are dodecane which is used as a solvent of distillation chaser.

MTBE has been detected in one location to the west of the permitted boundary adjacent to the petrol filling station.

### **7.10 Refined Conceptual Site Model**

Condition 2.16.3 requires for an assessment of the likelihood of their being significant contamination of the land on the site by the pollutants specified in Schedule 9. Given the findings of the investigation, the initial conceptual model can be refined conceptual model, and it is presented in Table 7.4. The refined conceptual site model is presented in diagrammatic format in Figure 5 Annex A.



**Table 7.4: Refined Source-Pathway-Receptor Risk Assessment**

Pollutant Linkage	Description	Receptor(s)	Discussion	Pathway Status	Risk Ranking
PL1	Dermal Contact & Ingestion	Humans – Site maintenance workers	<p>In general metals have been detected in low concentrations. Lead has been detected above the ENVIRON GAC in one sample location only. Small amounts of hydrocarbon / solvent contamination have been identified in the south eastern part of the site. No asbestos has been detected in any of the soil samples.</p> <p>There remains potential for contaminated soils in the immediate vicinity of plant, tanks, pipework. However, the use of appropriate risk assessments and control measures will mitigate the potential risks associated with short term maintenance works.</p>	Active	Low <i>Based on mitigation measures</i>
PL2	Inhalation – dust, particulates and asbestos fibres	Site visitors		Inactive	Low
PL3	Inhalation - vapours			Active	Low
PL4	Leaching of contaminants in unsaturated zone to groundwater	Controlled Waters – Grand Harbour	Concentrations of contaminants have been detected in soils within the saturated zone in the south eastern corner of the site. Concentrations through the soil profile suggest that these have migrated laterally.	Active	Low
PL5	Migration of contaminated perched water off-site via the surface water drain.	Controlled Waters	No significant volume of perched water has been detected during the investigation works. Any potential for perched water would be limited to sustained precipitation. However, the site is completely covered with hardstanding.	Inactive	Low

**Table 7.4: Refined Source-Pathway-Receptor Risk Assessment**

<b>Pollutant Linkage</b>	<b>Description</b>	<b>Receptor(s)</b>	<b>Discussion</b>	<b>Pathway Status</b>	<b>Risk Ranking</b>
PL6	Migration of groundwater in Limestone Aquifer	Controlled Waters	Only very small volumes (if any) of groundwater was encountered in the limestone. Groundwater encountered was within the made ground in the south eastern corner of the site. Contamination has been found in the saturated strata indicating that there is potential for contaminants to migrate.	Inactive in Natural Limestone	Low
PL7	Migration of land gases into buildings and structures.	Built Environment	Only small volumes of volatile contaminants have been detected in the soils. The entire site is covered by hardstanding.	Active	Low

## 8.0 Monitoring Programme and Decommissioning

It is a requirement of the IPPC permit that two years prior to the decommissioning of Marsa Power Station that the operator must submit a Site Closure Report as part of the Decommissioning plan, to the Regulator. The report should provide detail of the soil quality to determine whether any contamination has had an impact on the land during the operational stage of the permitted activities.

If any contamination has taken place during the lifetime of the IPPC permit, the site must be returned to a 'satisfactory state' before the permit can be surrendered.

The outputs of the refined conceptual model (refer Section 7.10) do not identify a significant pollution risk from the concentrations of contaminants measured in soil and rock samples during the current land investigation. However, the investigation works (June 2011) have indicated that limited amounts of hydrocarbons and organic compounds have been detected on site in isolated locations. The determinants detected are common with the permitted activities undertaken onsite. The levels of contamination recorded are generally below relevant guideline values whilst the site remains in its current use (commercial/industrial).

Due to the nature of the natural geology any potential contamination is likely to be confined to its source (foundations, sumps pits and culvert channels). Oil staining and minor spills have been noted on the hardstanding and around plant. Therefore there is potential for contamination to exist immediately adjacent to the source.

As a result of the initial findings of the land investigation in relation to contamination, it is recommended that a programme of soil monitoring is undertaken immediately prior to the permit surrender. In addition, it would be prudent to presently investigate those areas identified as containing hydrocarbons and delineate any potential source of contamination. The pre surrender investigation, (similar to that already undertaken in June 2010) should take into account any potential polluting incidents, with the scope modified accordingly in order to satisfy Condition 2.16.2 of the IPPC permit. Operational conditions specified within the permit are required to control the release of substances to the environment, with records to be maintained. Such records are required to be submitted as part of the Annual Environmental Review, maintained within the EMS and to be made available for inspection, by the Regulator; however they can also be used to determine the scope of the pre surrender investigation.

There is no requirement for an investigation of the hydrogeological conditions at the site; nor is there a requirement for the installation of monitoring wells or for groundwater sampling and analysis. However a detailed monitoring plan would typically consider groundwater monitoring to assess the potential impacts from site activities, especially in areas of raw material, chemical storage and handling. Generally, a 'decontamination plan' would be expected to address the risk of impacts to all potential receptors, i.e., sensitive water bodies. By excluding a groundwater assessment from this initial study, the risk assessment process may result in uncertainty when fully developing the decontamination plans.

Installation of groundwater wells at selected permanent borehole locations at the initial stage, with an appropriate sampling and testing regime allows for a more robust site monitoring programme to be put

in place. By assessing on-going impacts to groundwater during the 'lifetime' of the permitted activities allows for more informed decision making with regard to decommissioning planning.

Should significant contamination be identified as a consequence of the operation of the permitted activities, ENVIRON recommend that land is 'decontaminated' so that concentrations of substances specified in Schedule 9 of the IPPC Permit are below those identified within ENVIRON's Generic Assessment Criteria (GACs) for a generic commercial / industrial land use scenario (unless an alternative land use is identified at the time of surrender). These GACs represent those minimal risk levels, below which there is no perceived risk to human health receptors (GACs are presented in Annex E). Concentrations exceeding the GACs may be considered 'acceptable', however use of such concentrations for risk assessment purposes would require a further detailed assessment and consultation with MEPA.

## 8.1 Decontamination Plans

During the decontamination process there is the potential for 'contaminative emissions' to impact the atmosphere, land and water (groundwater and sea water). In accordance with Condition 2.16.5.5 of the IPPC Permit, the potential sources of emissions and corresponding mitigation measures required to minimize the likelihood of the emissions, during any generic decontamination process, are summarized in Table 8.1.

Table 8.1: Potential Sources of Emissions and Mitigation Measures		
Environmental Media	Potential Sources	Mitigation Measures
Land	Spillage of potentially polluting substances listed in Table 4.0 during removal of soil / rock, storage containers (e.g. tanks and sumps) and equipment.	Preparation of method statements, management plans, health and safety plans prior to undertaking decontamination, including an emergency response plan.
		Loading of vehicles in an organised manner so as to prevent the spread of substances. Sheeting and cleaning vehicles prior to leaving site, if required. All reasonable and applicable measures taken to prevent the escape of material during transportation.
		Storage of liquids and solids of a potentially hazardous nature (e.g. diesel fuel, oils, solvents) in designated areas, for example on surfaced areas, with appropriate containment measures (e.g. bunding) in place during the decontamination process.
		To prevent cross contamination, segregation of substances (including chemicals, contaminated soil/rock, materials, equipment) into hazardous and non-hazardous.
Water	Spillage of potentially polluting substances listed in Table 4.0 and migration or leaching to groundwater and coastal water	Preparation of method statements, management plans, health and safety plans prior to undertaking decontamination, including an emergency response plan.
		Loading of tankers in an organised manner so as to prevent the spread of contaminants. Sheeting and cleaning vehicles if required, prior to leaving site. All reasonable and applicable measures taken to prevent the escape of material during transportation.

**Table 8.1: Potential Sources of Emissions and Mitigation Measures**

Environmental Media	Potential Sources	Mitigation Measures
Atmosphere		Where drains are not served by an interceptor, suitable 'drain stops' should be employed to intercept direct run-off from any disturbed areas, or to seal off ingress points to the system, thereby stopping any potential impact to the overall drainage system, and discharge points.
		Storage of liquids and solids of a potentially hazardous nature (e.g. diesel fuel, oils, solvents) in designated areas, for example on surfaced areas, with appropriate containment measures (e.g. bunding) in place during the decontamination process. Use of dedicated spill kits.
		To prevent cross contamination, segregation of substances (including chemicals, contaminated soil/rock, materials, equipment) into hazardous and non-hazardous.
	Dust generated by the movement of soil.	Appropriate Personal Protective Equipment (PPE) (e.g. dust masks).
		Continuous monitoring of the quality of the atmospheric environment, both on site and at the site boundary.
		Provision of appropriate dust suppression infrastructure (i.e. water sprinklers and sprayers)
		Use of covered trucks for the movement of materials.
	Vapours that may be present in chemical storage containers (i.e. tanks, sumps) and released to the atmosphere when disturbed.	Appropriate Personal Protective Equipment (PPE) (e.g. personal vapour alarms).
		Releasing vapours into open air rather than confined spaces. Ensuring vapour release occurs away from personnel and buildings in a controlled manner.
	Noise	Continuous monitoring of noise, where required and identification of dedicated noise control areas, where standards are exceeded. Provision of appropriate PPE.

## 9.0 Options Appraisal

The requirements of the Full Decommissioning Plan are to include 'options' on how the land within the permitted installation boundary should be "decontaminated". ENVIRON have assumed that at this stage, the need for and level of remedial works required will be based on achieving a level of 'acceptable risk.' For example, the weight of evidence (for remedial action) required by the regulator will be influenced by the level of actual or perceived risk, which will in turn be influenced by:

- the sensitivity of the site, in terms of the strategic resource value of groundwater and the presence and proximity of vulnerable receptors (based on a specific end use);
- the hazardous properties of the contamination in terms of its mobility, persistence and toxicity, and the potential to degrade to other substances with those properties;
- the seriousness of the pollution, for example, severe pollution by List I and II substances under the EC Groundwater Directive;
- the nature of the dominant attenuation mechanisms, particularly the reversibility of processes; and
- the level of uncertainty in the definition of the conceptual model and in the assessment/monitoring data available.

In practice, there may be a number of ways to reduce or control unacceptable risks, all of which have advantages and limitations in any particular case. The requirements of the Full Decommissioning Plan are addressed through undertaking an Options Appraisal, which is to establish those techniques (either singly or in combination) that offer the best overall approach to remedying the site as a whole, taking all the prevailing and proposed circumstances into account.

There are three main stages of an Options Appraisal:

- Identifying feasible remediation options for each relevant pollutant linkage.
- Carrying out an evaluation of feasible remediation options to identify the most appropriate option for any particular linkage.
- Producing an outline remediation strategy that addresses all relevant pollutant linkages, where appropriate by combining remediation options.

In assessing potential remedial Options Appraisals, the following criteria are considered:

- degree to which risks need to be reduced or controlled;
- time within which the remediation strategy is required to take effect;
- practicability of implementing and, where appropriate, maintaining the strategy;
- technical effectiveness of the strategy in reducing or controlling risks;
- durability of the strategy (i.e. whether it provides a robust solution over the design life);
- sustainability of the strategy (i.e., how well it meets other environmental objectives, for example, the use of energy and other material resources, and the avoidance or minimisation of adverse

environmental impacts in off-site locations, such as a landfill, or on other environmental media, such as air and water);

- benefits of the strategy – all remediation strategies should deliver direct benefits (the reduction or control of unacceptable risks) but many have merits that extend beyond the boundaries of the site. For example, remediation may enhance the amenity or ecological value of an area.; and
- the legal, financial and commercial context for the site including any specific legal requirements that remediation should comply, and the views of stakeholders on how unacceptable risks should be mitigated and managed.

Whilst the remedial Options Appraisal will address the requirements for remediation (decontamination) in accordance with current guidance and legislation (and based on discussion with MEPA), any proposed remediation must be able to be achieved technically, pragmatically and cost-effectively.

## 9.1 Key Issues at MPS

The primary driver in determining the requirement for remediation is based on an unacceptable risk (source-pathway-receptor approach). The issue of potential risks to human health, any risks to future site users through site development and risk to controlled water (groundwater and surface water) is the responsibility of the Local Authority (MEPA).

The current investigation has indicated that there is not a significant contamination of the land resulting from present activities. In addition due to the nature of the natural geology any potential contamination is likely to be confined to its source (sumps pits and culvert channels). However oil staining and minor spills have been noted on the hardstanding around the installation and there is therefore the potential for contamination to exist locally adjacent to the source.

ENVIRON have undertaken a qualitative risk assessment identifying the source, pathways and receptors to produce a conceptual site model (see Section 3 and 7.10, Figure 5).

Whilst the site remains in its current use (commercial/industrial) the pollutant linkages are limited and carry a reduced risk. During the decommissioning of the installation there is potential for contamination associated with the sumps and foundation pits to be released. Those measures undertaken during decommissioning of the installation will likely involve the requirement to further identify, quantify and remove any free phase product.

## 9.2 Treatment Options Feasibility

The refined site conceptual model (Table 7.4) identifies the main potential pollutant linkages. These linkages have been assessed below in the following table (Table 9.1).

**Table 9.1: Significant Pollutant Linkages**

Pollutant Linkage	Source	Pollutant Linkage	Plausible Pathway
PL1	Dermal contact & ingestion of metals, hydrocarbons and other organic compounds.	No significant elevated concentrations. However, there is potential for localised 'hotspots' of contaminants located close to pipelines and plant machinery. The risk level is dependent on the future use of the site.	✓
PL2	Inhalation – elevated metals or asbestos fibres in dust	No exposure to soils due to site being completely covered with hardstanding. No asbestos has been detected in soils.	✗
PL3	Inhalation – vapours from volatile organic compounds	No significant elevated concentrations detected. Site covered with hardstanding.	✗
PL4	Leaching of contaminants in unsaturated zone to groundwater	Only very small volumes (if any) of groundwater was encountered in the limestone. Concentrations of contaminants have been detected in made ground within the saturated zone in the south eastern corner of the site. Concentrations through the soil profile suggest that these have migrated laterally. However, the concentrations of determinants detected are below relevant guideline values.	✓ <i>NB: Only in made ground, in south eastern corner</i>
PL5	Migration of contaminated perched water off-site via the surface water drain.	No significant volume of perched water has been detected during the investigation works.	✗
PL6	Migration of contaminants in groundwater in Limestone Aquifer	Only very small volumes (if any) of groundwater was encountered in the limestone. Groundwater encountered was within the made ground in the south eastern corner of the site. Contamination has been found in the saturated strata indicating that there is potential for contaminants to migrate.	✓ <i>NB: Only in made ground, in south eastern corner</i>
PL7	Migration of land gases from volatiles organic compounds into buildings and structures.	No significant levels of made ground have been identified. No significant elevated concentrations of volatile contaminants have been detected in the soils. No free phase product has been detected. The entire site is covered by hardstanding.	✗

Whilst the site remains in its current use, the significant pollutant linkages identified are those of a low risk to human health from dermal contact of soils (limited to excavation works) and the risk to controlled waters. The risk to controlled waters is limited to the south-eastern part of the site, and that the natural geology comprise of carbonate mudstones have a low permeability. Reworked made ground in the south-eastern part of the site has increased the permeability, resulting in its hydraulic connectivity with the sea. It is considered that whilst there is potential for 'localised' impact of the groundwater, levels of organic compounds in soils have only been detected at low concentrations. Further, investigation in the south-eastern corner of the site and monitoring of soils and groundwater may reduce the potential risk to controlled waters.



### 9.3 Remediation Options Feasibility

MEPA have produced General Binding Rules (GBRs) for the use of Mobile Plant for Site Remediation, along with a Terms of Reference (TOR) for land remediation. Within these documents MEPA have identified remediation technologies which are applicable to the local market.

Table 9.2 identifies possible feasible remediation technologies for addressing the pollutant linkages identified. Appropriate

<b>Table 9.2 Treatment Options Applicability</b>				
<b>Remedial Method</b>	<b>Media</b>	<b>Significant Pollutant Linkages (from Table 9.1)</b>		
		<b>PL1</b>	<b>PL4</b>	<b>PL6</b>
Engineering based process				
Excavation and Disposal	Soil	✓	✓	✗
Containment/cover systems	Soil	✓	✗	✗
Containment – hydraulic barriers	Water	✗	✓	✓
Biological based process				
Ex-situ bioremediation	Soil	✓	✓	✗
In-situ bioremediation	Soil/Water	✓	✓	✓
Natural attenuation	Water	✗	✗	✓
Chemical based process				
Soil flushing	Soil	✓	✓	✓
Permeable Reactive Barriers	Water	✗	✓	✓
In-situ chemical additives	Water	✗	✓	✓
Physical based process				
Soil Washing	Soil	✓	✓	✗
Soil vapour extraction	Soil	✗	✓	✗
Multi and dual phase extraction	Soil/water	✓	✓	✓
Air sparging	Water	✗	✗	✗
Solidification	Soil	✓	✓	✗
Thermal Based process	Soil	✗	✗	✓

Considering the more feasible technologies in Table 9.2, the range of potential remedial options suitable for the site specific conditions is presented in Table 9.3, based on this initial review of technologies.

With regard to the other appraisal criteria discussed previously, those included

- Degree of risk which needs to be reduced - this is essentially the basis of the risk assessment and based a qualitative risk assessment within the CSM. ENVIRON do not consider that the installation currently constitutes a wider risk, i.e. beyond the boundary affecting third parties, the issues are primarily linked to localised hotspots.

- Cost – at this stage a broad range of unit costs are provided below for comparison purposes between each technology. Note the costs provided are unit costs for the use of technology in the UK.
- Benefits – the overall decommissioning and decontamination could contribute towards locally improved economic activity by removing blight or encouraging regeneration in the wider area.
- Legal – in relation to IPPC permit requirements, the legal element of compliance has been met by the acceptance of 'surrender' by the regulator. In terms of the wider legal context, ENVIRON considers that this is outside the scope of this assessment.

**Table 9.3 Summary of Remediation Options Assessment**

Option	Timescale & Cost	Practicability	Technical Effectiveness	Durability	Sustainability
<b>Engineering Based Process</b>					
1) Excavate, segregate and sort, re-use or dispose to landfill. Shallow groundwater (where encountered) - dewater, treat and discharge to sewer.	6-8 months €80-300/m <sup>3</sup> . Depends on classification of soils	Yes – Although most applicable for localised hotspots. Possible to apply to shallow soils in the south-eastern corner of the site, but dewatering would be required below 2m bgl. Requirement for a landfill nearby to except waste, otherwise needs to be exported by tanker. Leading to increased unit costs.	Yes Effective as it removes the source.	Yes	Some possible re-use of none contaminated excavated materials through segregation and separation, and materials below 'remediation' criteria in areas that are 'suitable for use'.
2) Excavate, segregate and treat ex-situ (various technologies such as bioremediation and stabilisation) and replacement Shallow groundwater - dewater, treat and discharge to sea.	9-12 months €40-80/m <sup>3</sup>	Yes – Although most applicable for localised hotspots. Possible to apply to shallow soils in the south-eastern corner of the site, but dewatering would be required below 2m bgl. Would require sufficient space to set up treatment area. Requirement for permit for treatment of this nature?	Yes Effective as it removes the source in high risk areas and through treatment (inc sorting and segregation) material is placed in area 'suitable for use'.	Yes	Expected re-use of significant amount of excavated and treated materials.

**Table 9.3 Summary of Remediation Options Assessment**

Option	Timescale & Cost	Practicability	Technical Effectiveness	Durability	Sustainability
3) Containment of soils by capping and of groundwater by barrier on the site boundary	<6 month €60-80/m <sup>3</sup> for capping depending on strength, €500/m for barrier to 4m bgl	Yes - site wide 'cap'; ensure the pathway for dermal/ingestion of the heterogeneous nature of made ground and as such 'random' distribution of elevated concentrations of metals and some hydrocarbons. Installing an impermeable groundwater barrier may create ponding on the site side of the barrier.	Yes Effective as it isolates the source – although not effective to vapour phase without additional engineering (protection measures) in building footprint.	Yes	Yes – as provides long term protection. Materials remain on-site.
<b>Biological Based Process</b>					
4) ex-situ treatment (bioremediation)	9-12 months €40-60/m <sup>3</sup>	No – requirement for treatment facility nearby, waste will need to be transported to/from foreign facility.	Reduced effectiveness for 'weathered' and heavier residual hydrocarbons, particularly in winter months.	Yes	Normally expected re-use of significant amount of excavated and treated materials.
5) in-situ treatment (vapour extraction – MPE, bio-venting/bio-sparging or similar).	24 months + €30-50/m <sup>3</sup>	No – volume of contamination are only small. Treatment only has a limited area of impact. Numerous well installations would be needed; limited permeability within natural geology will reduce effectiveness.	Limited effectiveness for 'weathered' and heavier residual hydrocarbons.	No	Limited – high energy consumption against the likely residual mass remaining post treatment.
<b>Solidification/stabilisation</b>					

**Table 9.3 Summary of Remediation Options Assessment**

Option	Timescale & Cost	Practicability	Technical Effectiveness	Durability	Sustainability
6) Solidification/stabilisation.	3-6 months €30-40/m <sup>3</sup>	Yes – although most applicable for localised hotspots. Possible to apply to shallow soils in the south-eastern corner of the site, but dewatering would be required below 2m bgl. Would need a sufficient space to set up treatment area.	Can be limited with elevated hydrocarbons.	Yes	Normally expected re-use of significant amount of excavated and treated materials.

## 9.4 Evaluation of Remediation Options

The preliminary review of remedial options has identified that potential remedial works could be necessary where contamination (including hydrocarbons and other organic compounds) in soils, could leach to groundwater. However, the areas of the site which would require remedial action is dependent on the final use of the site, the agreed acceptance criteria for contaminants and the ability to achieve such levels.

The investigation works have only identified local hotspots of elevated levels of contaminants (hydrocarbons); the majority of which do not exceed current ENVIRON Generic Acceptance Criteria for a commercial end use. As such there is currently no requirement for significant site wide remedial works. Evidence of significant hydrocarbon staining at the surface suggests a high potential for contamination of sub surface soils in the immediate location of underground infrastructure, i.e. pipelines, pits, sumps and foundations.

Additionally any remedial works undertaken on-site will be subject to other practical and physical constraints. The Marsa Power Station has been developed in several stages over the past sixty years as demand for electricity increased, resulting in a constrained and compact site. Sub surface remedial works should ideally be undertaken after the decommissioning (and in some areas the dismantling) of above ground buildings and plant. However, ENVIRON currently understands that it is likely the administration block which includes mechanical workshops at the ground level would remain. Any remedial works would need to take into account mitigation measures to reduce those potential risks to workers within the remaining administration block. The permitted area also includes the access road Il-Mont Tal-Pont and storage workshops on the eastern boundary. Any potential works required in this area may temporarily restrict access to adjacent site users.

## 9.5 Outline Remediation Strategy

Based on the Options Appraisal it is considered that no one single option will address all the requirements of the remedial works and many of the options in Table 9.3 are applicable to some degree. However, given the potential pollution linkages remaining on-site, the most suitable remedial

approach would be the excavation of localised hotspots of contamination with on-site ex-situ treatments. This strategy would provide the most cost effective and most sustainable approach for reuse of materials on-site.

The principle behind the remedial works is a 'suitable for use' approach. This requires that risks to sensitive receptors are reduced to acceptable levels, and that residual contaminants will remain on site, where they are present either below suitable threshold criteria or where there are no identified plausible pathways or risks (mainly beneath hardstanding areas and buildings). However, severely hydrocarbon impacted materials should be removed and/ or treated irrespective of risk.

The outline of the remediation strategy is generally associated with three key activities:

- Enabling works – reducing main buildings down to ground level, cleaning, breaking out, crushing and stockpiling of concrete hard standing for re-use where suitable; excavation, processing and stockpiling of clean demolition rubble;
- Engineering works – excavation and removal of buried sub-structures, pits, chambers, drains found, specification for backfilling, as well as the excavation and removal of all supporting network structures (e.g. pipework);
- Remedial Works – a site specific remedial strategy would be needed to be produced and agreed with the Regulator.

In accordance with best practice, a 'watching brief' should be implemented during the earthworks programme, whereby unusual or 'out-of-character' materials (if identified) can be assessed or stockpiled/contained until such assessment can be undertaken. If hazardous materials such as asbestos containing materials etc are identified, these should be subject to site contingency plans, health & safety and risk assessment and method statements/procedures for their identification, handling, removal and disposal. All remedial activities would be validated and a completion report generated.

## 10.0 Reference Data and Remediation

Reference Data for the site has been collected by this report and these are presented in summary in Annex C. The laboratory testing certificates are presented in Annex D.

## 11.0 Statement of Site Condition

ENVIRON undertook a soil monitoring investigation to satisfy Conditions 1.5.1, 2.16.1, 2.16.3, 2.16.5 (Points 1, 4 and 5) of the IPPC permit. The investigation comprised the advancement of twenty nine (29) soil borings to depths of up to 26.8m bgl. Using solid stem auger rotary or solid core recovery drilling techniques to allow the sampling of the soil and rock. Soil samples were tested for the range of substances in Schedule 9 of the IPPC permit.

Ground conditions encountered comprise small amounts made ground across the site, with a greater depth of reworked materials in the south-eastern corner of the site. The underlying natural strata comprise horizontal beds of cream limestone of the Lower Globigerina, underlain by grey carbonate mudstone of the Lower Coralline. Groundwater was discontinuous across the site, limited to the reworked materials in the south eastern corner and small strikes across the site. The natural geology beneath the site have moderate porosity, however the effective porosity and transmissivity is low.

Laboratory analysis identified low concentrations of metals across the majority of the site. Elevated readings of lead have been recorded in the shallow made ground in the southern part of the site. PAHs and EPH have been detected across the site, with higher concentrations recorded towards the south eastern part of the site around Boiler No.8. Low concentrations of VOC and SVOCs have been detected in soils across the south eastern corner. SVOC and VOC TICs were detected in samples in the south eastern corner.

MTBE has been detected in one location to the west of the IPPC permitted boundary adjacent to the petrol filling station.

The majority of the contaminants detected were below their relevant guideline values whilst the site remains in its current use (commercial/industrial). Only lead and benzo(a)pyrene were detected above their ENVIRON GAC.

The investigation findings have indicated that there is not significant contamination of the land resulting from present activities. However, due to the nature of the natural geology any potential contamination is likely to be confined to its source (sumps pits and culvert channels). Oil staining and minor spills have been noted on the hardstanding and around plant. Therefore there is potential for contamination to exist immediately adjacent to the source.

It is recommended that soil monitoring/validation is undertaken during the removal of any structures at or below ground level. The investigation is used to determine whether soil contamination has taken place during the operation of the permitted activity in the intervening period. Operational conditions specified within the permit are required to control the release of substances to the environment, with records to be maintained. Such records are required to be submitted as part of the Annual Environmental Review, maintained within the EMS and to be made available for inspection, by the Regulator; however they can also be used to determine the scope of the pre surrender investigation.

## **Annex A: Figures**

Figure 1 Site Location

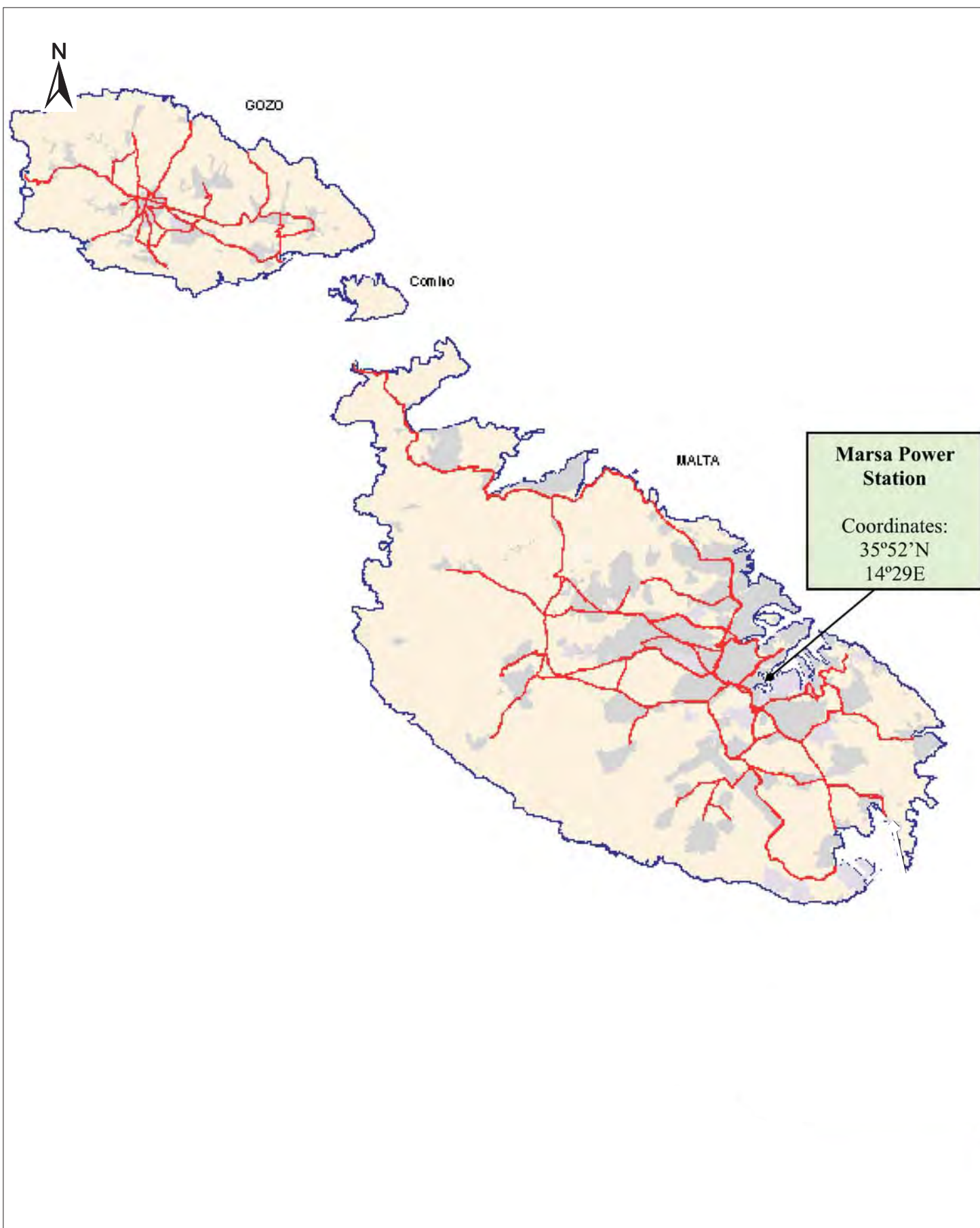
Figure 2 Installation Boundary

Figure 3 Proposed Sample Location Plan

Figure 4 Actual Sample Location Plan

Figure 5 Conceptual Site Model





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Scale

1 : 2500 @ A4

Title **Figure 1: Site Location Plan**

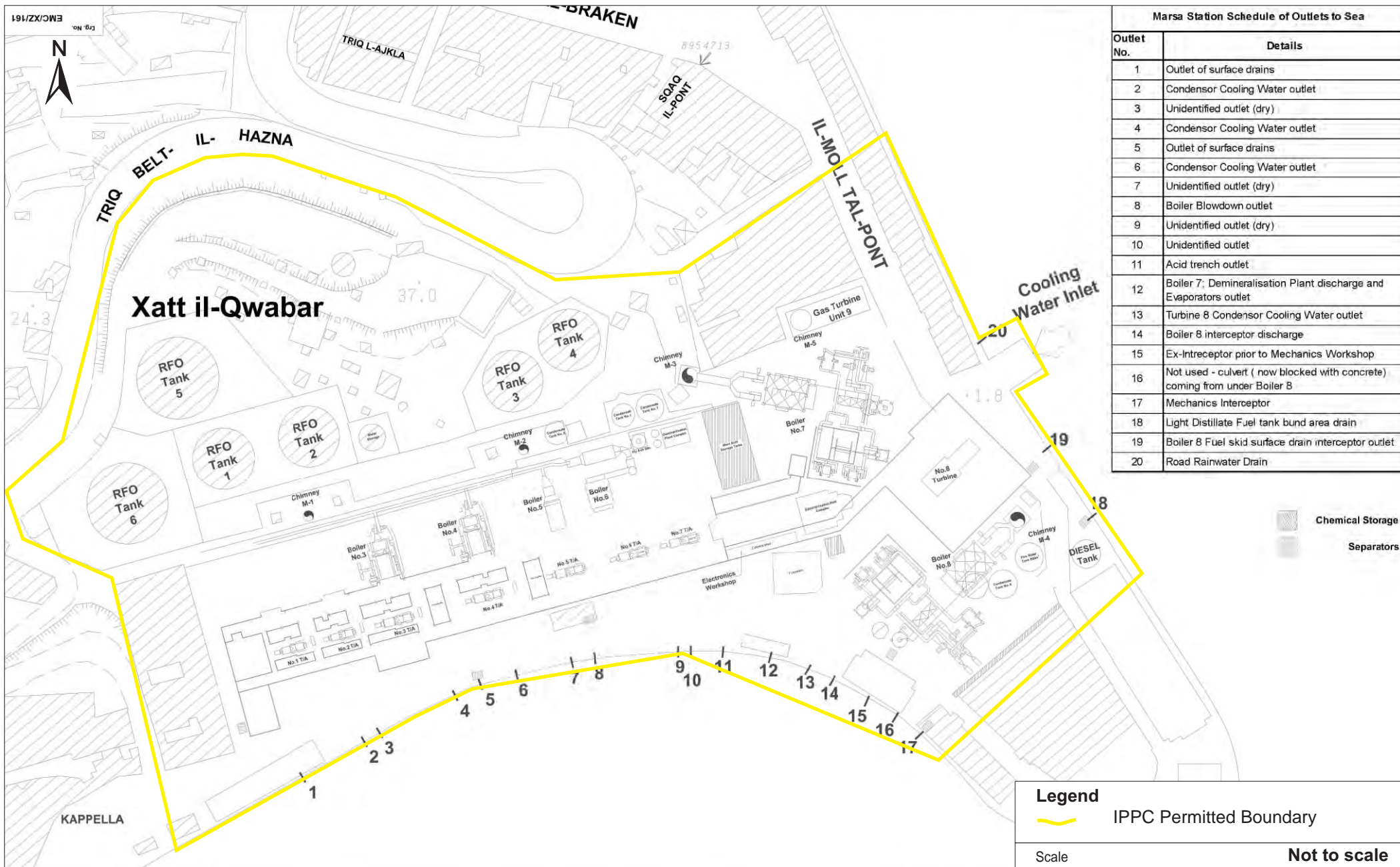
Site **Marsa Power Station  
Enemalta Corporation,  
Church Wharf,  
Marsa  
MRS 1000**

Client **Enemalta Corporation**

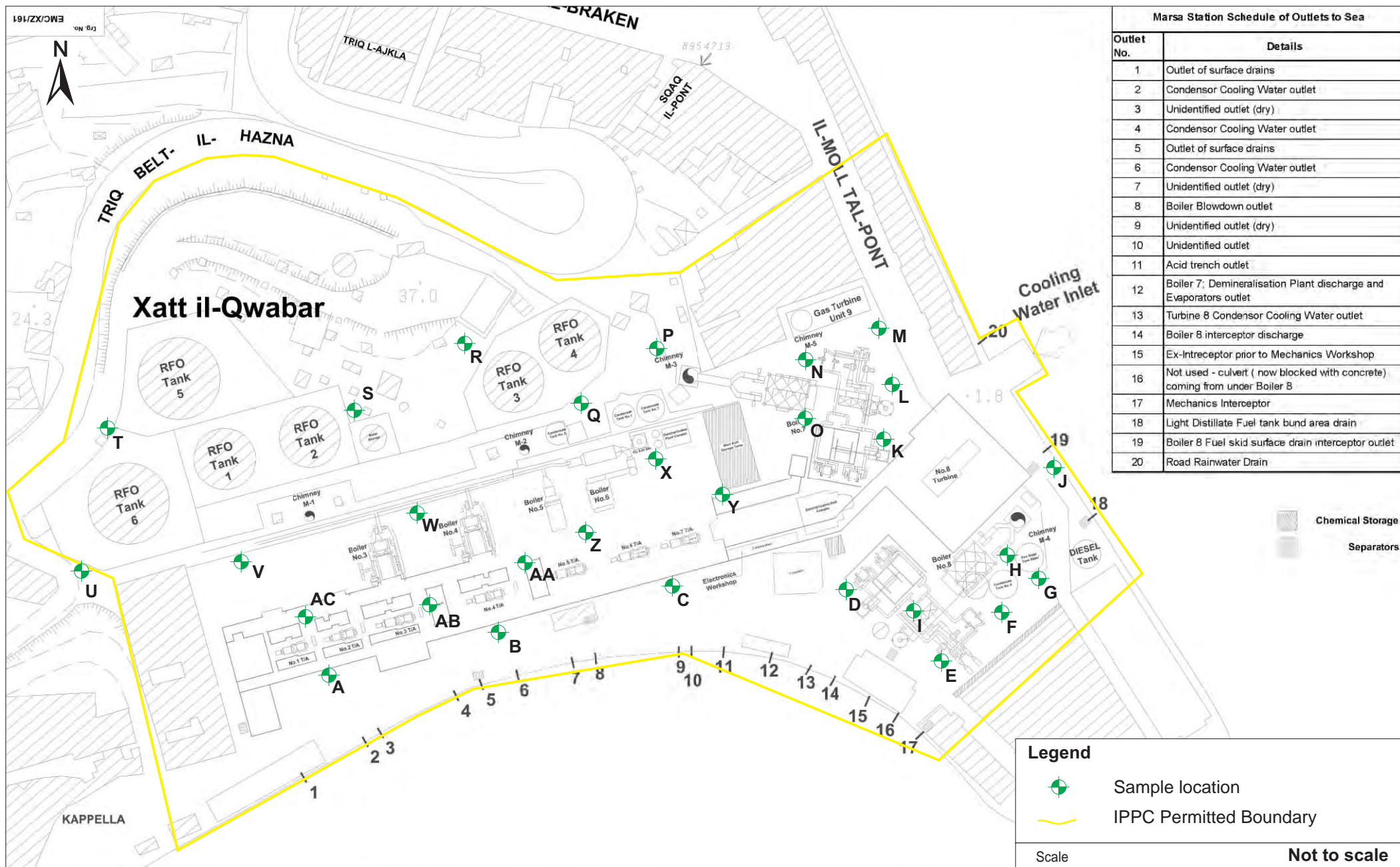
Project No. **UK22-16783** Issue **1**

Date **August 2011** Drawn by **CW**

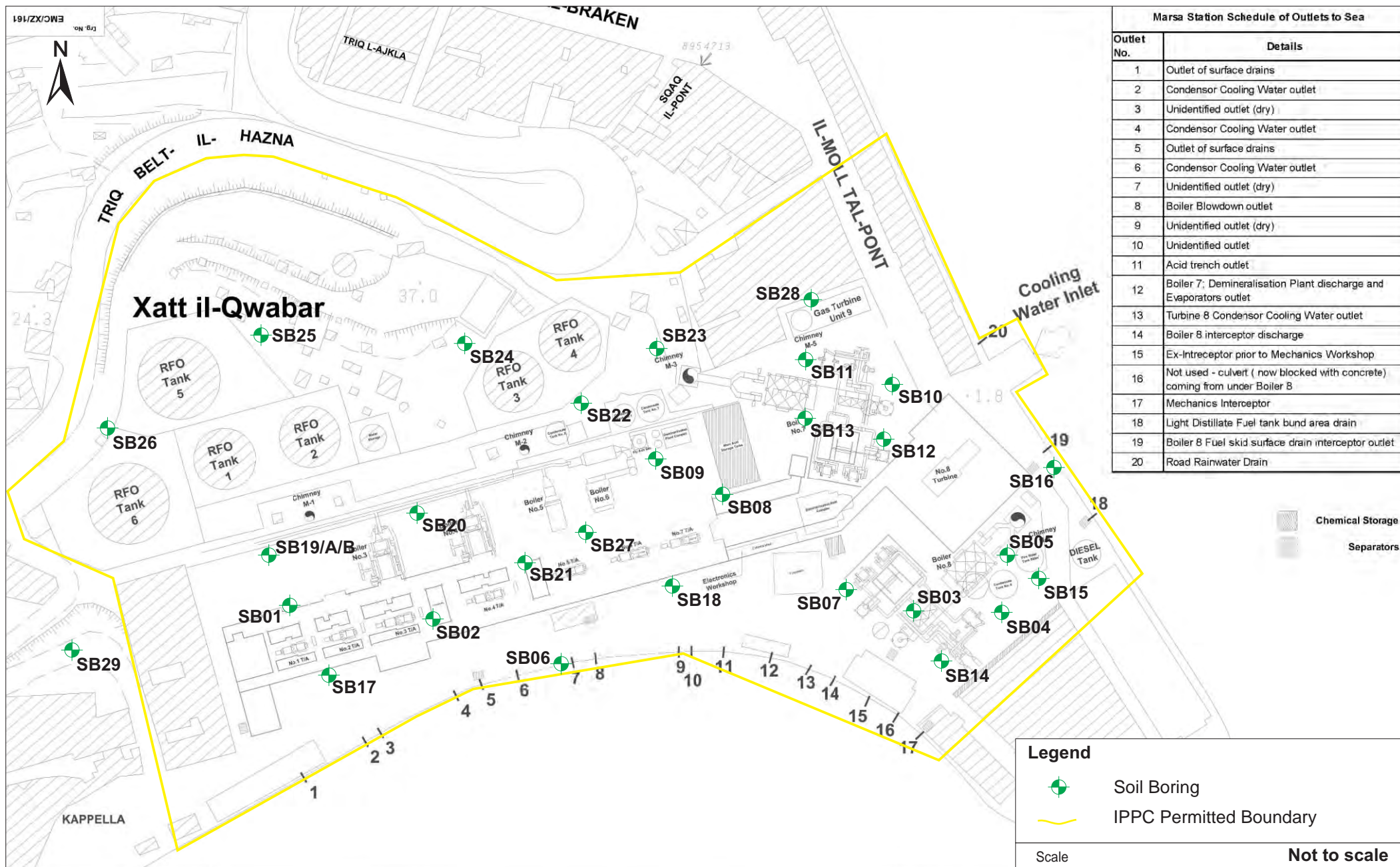
**ENVIRON**







Marsa Station Schedule of Outlets to Sea	
Outlet No.	Details
1	Outlet of surface drains
2	Condensor Cooling Water outlet
3	Unidentified outlet (dry)
4	Condensor Cooling Water outlet
5	Outlet of surface drains
6	Condensor Cooling Water outlet
7	Unidentified outlet (dry)
8	Boiler Blowdown outlet
9	Unidentified outlet (dry)
10	Unidentified outlet
11	Acid trench outlet
12	Boiler 7, Demineralisation Plant discharge and Evaporators outlet
13	Turbine 8 Condensor Cooling Water outlet
14	Boiler 8 interceptor discharge
15	Ex-Interceptor prior to Mechanics Workshop
16	Not used - culvert ( now blocked with concrete) coming from under Boiler 8
17	Mechanics Interceptor
18	Light Distillate Fuel tank bund area drain
19	Boiler 8 Fuel skid surface drain interceptor outlet
20	Road Rainwater Drain





## **Annex B: Records of Investigation Findings**

B1 Borehole Logs

B2 Photographs



Project No: UK22-16873

Borehole: SB01

Client: Enemalta Corporation

Date: 15 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.302m ASL

Logged by: KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.3				Backfilled with arisings
		MADE GROUND	2.0				
		Concrete					
		MADE GROUND	1.6	0-0.5	x	1.7	
		Wet cream brown Gravel of concrete.					
1.0		LOWER GLOBIGERINA LIMESTONE		0.5-1.0		0.0	
		Medium strong cream LIMESTONE					
		(recovered as gravel).		1.0-1.5		0.3	
		2.5m bgl becoming damp					
2.0				1.5-2.0		0.2	
				2.0-2.5	x	0.0	
3.0				2.5-3.0		0.0	
4.0				3.5-4.0		0.0	
5.0				4.5-5.0		0.0	
6.0				5.5-6.0		0.0	
			-4.2	6.0-6.5		0.0	
7.0		End of Borehole at 6.5 m bgl					

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB02

Client: Enemalta Corporation

Date: 15 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.869m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.9				Cluvert inspection well installed by Enemalta
		MADE GROUND	1.6				
		Concrete	1.5				
		MADE GROUND		0.3-0.5	x	0.0	
		Wet cream brown Gravel of concrete.					
		LOWER GLOBIGERINA LIMESTONE		0.5-1.0		0.3	
		Medium strong cream LIMESTONE (recovered as gravel).					
		2.5m bgl becoming damp		1.0-1.5		0.4	
				1.5-2.0		0.3	
				2.0-2.5	On Hold	0.2	
				2.5-3.0		0.2	
			-1.6				
		VOID					
		Void likely to be seawater culvert, proven void to 4.5m bgl.					
			-2.6				
		End of Borehole at 4.5 m bgl					
5.0							
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1



Project No: UK22-16873

Borehole: SB03

Client: Enemalta Corporation

Date: 15 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.568m ASL

Logged by: KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.6				Backfilled with arisings
		MADE GROUND Concrete	2.3				
		MADE GROUND Grey sandy Gravel. Gravel is fine to coarse, angular and subangular. Gravel of igneous material possibly granite..	2.1	0.3-0.5	X	0.9	
1.0		MADE GROUND Grey medium and coarse, angular and subangular Gravel of igneous material possibly granite..		0.5-1.0		0.1	
				1.0-1.5		1.2	
2.0		LOWER GLOBIGERINA LIMESTONE Yellow beige LIMESTONE (recovered as gravel). 3.5m bgl becoming damp	0.9	1.5-2.0		0.0	
				2.0-2.5		1.2	
3.0				2.5-3.0		0.9	
4.0				3.5-4.0	X	0.0	
5.0				4.5-5.0		0.4	
6.0				5.5-6.0		0.4	
				6.0-6.5		0.6	
7.0		End of Borehole at 6.5 m bgl	-3.9				

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB04

Client: Enemalta Corporation

Date: 15 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.034m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.0				Backfilled with arisings
		MADE GROUND Tarmacadam	1.6				
		MADE GROUND White/beige medium and coarse, subangular Gravel of limestone (hardcore).		0.3-0.5	X	0.0	
1.0		MADE GROUND Pale brown grey Gravel of limestone (reworked).	1.0	0.5-1.0		0.0	
		MADE GROUND Damp grey yellow beige Gravel of limestone (reworked). Rare dark grey fine gravel and red coarse gravel. 2.5m bgl rare rubber and glass fragments.		1.0-1.5		0.0	
2.0				1.5-2.0		0.0	
			-0.5	2.0-2.5	On Hold	0.0	
3.0		MADE GROUND Wet yellow mottled orange Limestone (reworked) possibly old sea bed. Gravel is fine and medium angular to subrounded of mixed lithology.		3.0-3.5		0.0	
4.0							
5.0		End of Borehole at 4.5 m bgl					
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB05

Client: Enemalta Corporation

Date: 16 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.486m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.5				Backfilled with arisings
		MADE GROUND	2.2				
		Concrete					
		MADE GROUND		0.25-0.5	X	0.0	
		Grey Gravel of limestone. Gravel is fine to coarse, angular and subangular. Occasional fragmetns of plastic, plaster, fine wire metal, slag, concrete, organic matter and gravel of mixed lithologies. 0.5m bgl: damp 1.5-1.8m bgl: concrete obstruction 2.7m bgl: wet		0.5-1.0		0.0	
1.0				1.0-1.5		0.5	
				1.5-2.0	X	0.6	
2.0							
3.0							
4.0							
			-1.9				
		LOWER GLOBIGERINA LIMESTONE					Backfilled with arisings
		Wet grey cream LIMESTONE (recovered as gravel).	-2.5	4.5-5.0		0.2	
5.0		End of Borehole at 5 m bgl					
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB06

Client: Enemalta Corporation

Date: 20 & 21 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.668m ASL

Logged by: MH & KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.7				Backfilled with arisings
		MADE GROUND Tarmacadam	1.5			0.2	
		MADE GROUND Dark brown and grey sandy Gravel of limestone (hardcore).	1.2	0.3	X	0.3	
		MADE GROUND Dark brown and black ashy sandy Gravel. Gravel and cobbles of limestone, concrete and tarmacada.	0.5	0.6			
1.0		MADE GROUND Brown sandy Gravel. Fragments of concrete, vitreous clay drain pipe, floor tiles and coal.	-0.3	1.0-1.5	X	0.3	
2.0		MADE GROUND Pale yellow brown mottled grey slightly gravelly LIMESTONE (recovered as gravel).		1.5-2.0		0.3	
3.0		LOWER GLOBERIGINA LIMESTONE Pale cream brown LIMESTONE (recovered as gravel).		2.0-2.5		0.2	
				2.5-3.0		0.3	
4.0				3.5-4.0		0.3	
5.0		End of Borehole at 5 m bgl	-3.3	4.5-5.0		0.1	
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB07

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.476m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.5				Backfilled with arisings
		MADE GROUND					
		Concrete					
			1.9				
1.0		LOWER GLOBIGERINA LIMESTONE		0.6-1.0		0.0	
		Pale cream fine grained LIMESTONE		1.1-1.5	X	0.0	
		(recovered as sandy gravel).		1.6-2.0		0.0	
2.0		2.5m bgl becoming damp		2.1-2.5		0.0	
		4.0m bgl wet, recovered as silt		3.1-3.5	X	0.0	
4.0							
			-2.0				
5.0		End of Borehole at 4.5 m bgl					
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB08

Client: Enemalta Corporation

Date: 21 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.764m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.8				Backfilled with arisings
		MADE GROUND Concrete	1.5				
		MADE GROUND Light grey sandy Gravel of limestone (hardcore). Gravel is fine and medium, angular and subangular.	0.8	0-0.5	x	0.0	
1.0		MADE GROUND Concrete slab.	0.3	0.5-1.0		1.0	
		LOWER CORALLINE LIMESTONE Pale cream brown LIMESTONE (recovered as gravel).		1.0-1.5		0.4	
2.0				1.5-2.0		1.0	
				2.0-2.5		0.6	
3.0				2.5-3.0		0.2	
4.0				3.5-4.0	On hold	0.5	
5.0				4.5-5.0		0.2	
6.0				5.5-6.0		0.1	
		End of Borehole at 6.5 m bgl	-4.7				
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB09

Client: Enemalta Corporation

Date: 21 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.459m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading 50      150 ppm	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.5				Backfilled with arisings
		MADE GROUND	2.3				
		Reinforced concrete					
		Lower Coralline Limestone		0.5	X	0.0	
		Weak grey brown fine grained wackestone		0.5-1.0		0.1	
1.0		LIMESTONE (recovered as gravel).		1.0-1.5		0.2	
				1.5-2.0		0.2	
2.0			0.0				
		Lower Coralline Limestone		2.5-3.0	X	0.6	
3.0		Grey very fine grained carbonate		3.5-4.0		0.2	
		MUDSTONE (recovered as gravel).		4.5-5.0		0.3	
4.0				5.5-6.0		0.4	
5.0							
6.0			-4.0				
		End of Borehole at 6.5 m bgl					
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB10

Client: Enemalta Corporation

Date: 21 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.760m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.8				Backfilled with arisings
		MADE GROUND	1.6				
		Reinforced concrete					
		MADE GROUND	1.3	0.4	X	0.0	
		Pale cream and grey sandy gravel of Limestone (hardcore).					
1.0		LOWER GLOBIGERINA LIMESTONE		0.5-1.0		0.0	
		Weak grey brown fine grained wackestone LIMESTONE (recovered as gravel). <5% shell fragments.		1.0-1.5		0.0	
2.0				1.5-2.0		0.0	
				2.0-2.5		0.0	
			-1.0				
3.0		LOWER GLOBIGERINA LIMESTONE		2.8-3.0	X	0.0	
		Strong pale cream fine grained packstone LIMESTONE (recovered as gravel). 3.2m bgl becoming damp		3.0-3.5		0.0	
4.0				3.5-4.0		0.0	
				4.0-4.5		0.0	
5.0		End of Borehole at 5 m bgl	-3.2	4.5-5.0		0.0	
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1



Project No: UK22-16873

Borehole: SB11

Client: Enemalta Corporation

Date: 21 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.786m ASL

Logged by: KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.8				Backfilled with arisings
		MADE GROUND Concrete					
1.0			0.6				
		LOWER GLOBIGERINA LIMESTONE Pale cream brown LIMESTONE (recovered as gravel).		1.2-1.5	X	0.0	
2.0			-0.4	1.5-2.0		0.2	
		LOWER CORALLINE LIMESTONE Green grey brown carbonate MUDSTONE (recovered as gravel).		2.0-2.5		0.0	
3.0				2.5-3.0		0.1	
4.0				3.5-4.0		0.4	
5.0			-2.8	4.5-5.0		0.6	
		LOWER CORALLINE LIMESTONE Greeny brown LIMESTONE (recovered as gravel). 5.75m bgl becoming damp		5.5-6.0	X	0.0	
6.0			-4.7				
		End of Borehole at 6.5 m bgl					
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB12

Client: Enemalta Corporation

Date: 21 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.648m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.6				Temporary cover placed Enemalta to reinstate
		MADE GROUND	1.3				
		Concrete					
		MADE GROUND	0.9	0.3-0.5	X	0.0	
		Cream Gravel of limestone (hardcore).					
1.0		LOWER CORALLINE LIMESTONE		0.5-1.0		0.2	
		Green grey brown carbonate MUDSTONE					
		(recovered as gravel).					
				1.0-1.5		0.3	
2.0				1.5-2.0		0.3	
				2.0-2.5		0.1	
3.0				2.5-3.0		0.2	
4.0				3.5-4.0		0.0	
5.0		LOWER CORALLINE LIMESTONE	-3.4	4.5-5.0	X	0.1	
		Wet cream LIMESTONE (possibly					
		concrete)	-3.9				
6.0		VOID Sewater culvert.					
			-4.9				
7.0		End of Borehole at 6.5 m bgl					

Remarks: Hole terminated due to presence of sea water culvert.

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB13

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.548m ASL

Logged by: KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.5				Backfilled with arisings
		MADE GROUND	1.3				
		Concrete	1.1				
		MADE GROUND		0.2-0.3	x	0.4	
		Grey sandy Gravel of limestone (hardcore).		0.3-0.5		0.0	
1.0		LOWER CORALLINE LIMESTONE		0.5-1.0		1.0	
		Green grey brown carbonate MUDSTONE (recovered as gravel).		1.0-1.5		0.2	
2.0				1.5-2.0		0.1	
				2.0-2.5		0.1	
3.0				2.5-3.0		0.1	
				3.0-3.5		0.1	
4.0				3.5-4.0		0.1	
5.0				4.5-5.0		0.2	
6.0				5.5-6.0	x	0.6	
				6.5		0.1	
7.0		End of Borehole at 6.5 m bgl	-5.0				

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB14

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.568m ASL

Logged by: KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.6				Backfilled with arisings
		MADE GROUND					
		Concrete	2.3				
		MADE GROUND	2.1				
		Pale brown sandy Gravel of limestone (hardcore).		0.3-0.5	X	0.4 0.2	
1.0		LOWER GLOBIGERINA LIMESTONE		0.5-1.0		0.2	
		Pale brown LIMESTONE.		1.0-1.5		0.1	
		2.2m bgl wet		1.5-2.0		0.2	
		3.0m bgl grey staining possible hydrocarbons		2.0-2.5	X	0.2	
		3.5m bgl 'clean' limestone.		3.0		54.7	
2.0					X		
3.0							
4.0		End of Borehole at 4 m bgl	-1.4				
5.0							
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB15

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.216m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.2				Backfilled with arisings
		MADE GROUND Tarmacadam	1.9				
		MADE GROUND Concrete (recovered as gravel).	1.7	0.3-0.5		0.4	
1.0		MADE GROUND Pale cream sandy Gravel. Gravel is fine to coarse, angular of concrete and limestone.	1.2	0.5-1.0	X	0.0	
		MADE GROUND Pale cream Gravel of limestone. Rare fragment of slag. 3.0-3.5m bgl - slight hydrocarbon odour		1.0-1.5		0.0	
2.0				1.5-2.0		0.1	
				2.0-2.5		0.4	
3.0				2.5-3.0		0.3	
			-1.3	3.0-3.5	X	4.0	
4.0		LOWER GLOBIGERINA LIMESTONE Pale cream grey LIMESTONE (recovered as clayey gravel).		3.5-4.0		3.2	
5.0				4.5-5.0		1.1	
6.0				5.5-6.0		1.8	
			-4.3				
7.0		End of Borehole at 6.5 m bgl					

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB16

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.107m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.1				Backfilled with arisings
		MADE GROUND	1.9				
		Tarmacadam					
		MADE GROUND		0.2-0.5		0.8	
		Brown sandy coarse Gravel of limestone. Fragments of concrete, coal and vitreous clay.		0.6-1.0	X	0.1	
1.0				1.1-1.5		0.3	
			0.4	1.7-2.0	X	0.5	
2.0		MADE GROUND		2.1-2.5		0.0	
		Damp pale cream grey Limestone recovered as gravel (reworked). 3.0m-5.0m bgl no returns		2.6-3.0		0.0	
3.0							
4.0							
5.0							
6.0		LOWER GLOBIGERINA LIMESTONE	-3.4				
		Wet grey to pale cream fine grained LIMESTONE (recovered as clayey gravel).		6.0-6.5		0.0	
		End of Borehole at 6.5 m bgl	-4.4				
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB17

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.928m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.9				Backfilled with arisings
		MADE GROUND Tarmacadam	1.7				
		MADE GROUND Pale cream and grey sandy gravel of Limestone (hardcore).		0.3	X	0.2	
1.0		LOWER GLOBIGERINA LIMESTONE Strong pale cream fine grained packstone LIMESTONE (recovered as gravel).		1.0-1.5		0.0	
2.0				1.5-2.0		0.0	
				2.0-2.5		0.0	
				2.5-3.0		0.1	
3.0		End of Borehole at 3 m bgl	-1.1	3.0	X	0.2	
4.0							
5.0							
6.0							
7.0							

Remarks: Hole terminated at 3.0m bgl due to presence of unknown concrete structure

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB17

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.956m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.0				Backfilled with arisings
		MADE GROUND	1.8				
		Tarmacadam					
		MADE GROUND	1.4	0.5	X	0.2	
		Dark brown and grey sandy gravel of Limestone. Large limestone blocks, possible old road stones. Fragments of coal/coke and metal.					
1.0		LOWER GLOBIGERINA LIMESTONE		1.0-1.5		0.1	
		Brown and pale cream fine grained LIMESTONE (recovered as gravel). 2.5m becoming damp					
2.0				1.5-2.0		0.2	
				2.0-2.5		0.5	
3.0				2.5-3.0	X	0.7	
4.0				3.5-4.0		0.3	
5.0				4.5-5.0	On hold	0.3	
6.0				5.5-6.0		0.2	
			-4.5				
		End of Borehole at 6.5 m bgl					
7.0							

Remarks:

Checked by:

Sheet: 1 of 1



Project No: UK22-16873

Borehole: SB19

Client: Enemalta Corporation

Date: 22 June 2011


Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.302m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface <b>MADE GROUND</b> Bareground over grey brown sandy Gravel of limestone. Gravel includes cobbles of concrete and fragments of metal, vitreous clay pipe fragments.	2.3			50 ppm 150	Backfilled with arisings
1.0							
2.0							
3.0							
4.0							
5.0							
6.0							
7.0			-4.7				

Remarks: Hole terminated at 0.4m bgl due to refusal.

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB19A

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.302m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.3				Backfilled with arisings
		<b>MADE GROUND</b>					
		Bareground over grey brown sandy Gravel of limestone. Gravel includes cobbles of concrete and fragments of metal, vitreous clay pipe fragments.		0.4-0.5		0.5	
1.0		1.0m bgl concrete					
		1.1m bgl refusal on rebar	1.2	0.8-1.0	X	2.6	
		End of Borehole at 1.1 m bgl					
2.0							
3.0							
4.0							
5.0							
6.0							
7.0							

Remarks: Hole terminated at 1.1m bgl due to refusal on reinforced concrete

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB19B

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.302m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.3				Backfilled with arisings
		<b>MADE GROUND</b> Bareground over grey brown sandy Gravel of limestone. Gravel includes cobbles of concrete and fragments of metal, vitreous clay pipe fragments.					
1.0							
			0.5				
2.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Pale cream fine grained LIMESTONE (recovered as gravel). 3.4m bgl becoming damp. 4.0m bgl wet		1.9-2.0		1.2	
				2.1-2.5		1.1	
3.0				2.6-3.0		0.3	
				3.1-3.5		0.6	
4.0				4.1-4.5	X	0.3	
5.0		End of Borehole at 5 m bgl	-2.7	4.6-5.0		0.3	
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB20

ENVIRON

Client: Enemalta Corporation

Date: 22 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.700m ASL

Logged by: MH

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.7				Backfilled with arisings
		MADE GROUND Reinforced concrete					
			0.9				
1.0		MADE GROUND Grey green gravelly Sand, fragments of wood and rootlets (reworked mudstone).	0.4	0.8-1.0	X	4.2	
		LOWER CORALLINE LIMESTONE Grey green carbonate MUDSTONE (recovered as gravel). Rare shell fragments.		1.1-1.5		1.4	
2.0				1.6-2.0	X	0.8	
				2.1-2.5		0.7	
3.0				2.6-3.0		0.8	
4.0				3.6-4.0		0.4	
5.0				4.6-5.0		0.5	
6.0				5.6-6.0		0.2	
			-4.8				
		End of Borehole at 6.5 m bgl					
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB21

Client: Enemalta Corporation

Date: 23 June 2011

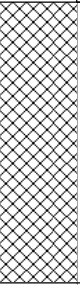


Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.276m ASL

Logged by: MH

ENVIRON

SUBSURFACE PROFILE			SAMPLE			PID Reading 50      ppm      150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface MADE GROUND Concrete	2.3				Backfilled with arisings
		LOWER CORALLINE LIMESTONE Grey green carbonate MUDSTONE (recovered as gravel). Rare fragments of white and balck shells.	2.0				
				0.3-0.5	x	0.0	
1.0				0.6-1.0		0.0	

Remarks:

Checked by:

Sheet: 1 of 3

Project No: UK22-16873

Borehole: SB21

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.276m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
						50 ppm 150	
				1.1-1.5		0.3	
2.0				1.6-2.0	X	0.4	

Remarks:

Checked by:

Sheet: 2 of 3

Project No: UK22-16873

Borehole: SB21

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.276m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
				2.1-2.5		0.1	
3.0							

Remarks:

Checked by:

Project No: UK22-16873

Borehole: SB22

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 21.773

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	21.0			50 ppm 150	
1.0		<b>MADE GROUND</b> Grey and cream Gravel of limestone and concrete.					
2.0			18.7				
3.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Moderately weak pale cream LIMESTONE. Orange/ochre and grey staining and sand infill along fractures. Core Run: 2.3-3.0m bgl: RQD = 28% TCR = 100% SCR= 100% FI = 7	18.0	2.8-2.85	X		
4.0							
5.0							
6.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Cream LIMESTONE recovered as silt (depth to base is approximatle)					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0			6.0				

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
 Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 1 of 2



Project No: UK22-16873

Borehole: SB22

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 21.773

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
16.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Grey carbonate MUDSTONE recovered as silt (depth to top is approximate).				50 ppm 150	
17.0							
18.0			3.0				
18.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Moderately strong thinly laminated, grey carbonate MUDSTONE. Discontinuities: Closely to widely spaced, horizontal, planar, smooth, open and clean. Core Run - 18.0-21.0m bgl: RQD = 87% TCR = 100% SCR = 100% FI = 4		18.09-18.11	X		
19.0							
20.0			0.9				
21.0			0.0				
21.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Moderately weak thickly bedded pale cream LIMESTONE. Discontinuities: fresh, closely spaced, horizontal, undulating smooth, open to wide open. FI = 3					
22.0							
23.0							
24.0		End of Borehole at 21 m bgl					
25.0							
26.0							
27.0							
28.0							
29.0							
30.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 2 of 2

Project No: UK22-16873

Borehole: SB23

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 17.699m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	17.7			50 ppm 150	
1.0		<b>MADE GROUND</b> Grey and cream Gravel of limestone and concrete.	16.2				
2.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Moderately weak pale cream thinly laminated LIMESTONE. Discontinuities: Extremely closely spaced, horizontal, slightly convex, undulating, tight and open, clean. Core Run: 0.0-3.0m bgl: RQD = 0% TCR = 47% SCR= 13%	14.7	1.7-1.8	X		
3.0							
4.0							
5.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Cream LIMESTONE recovered as silt (depth to base is approximate)	12.6				
6.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Grey carbonate MUDSTONE recovered as silt (depth to top is approximate).					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
 Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 1 of 2

Project No: UK22-16873

Borehole: SB23

Client: Enemalta Corporation

Date: 23 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 17.699m ASL

Logged by: KW



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
16.0						50 ppm 150	
17.0			0.7				
18.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Very strong thickly bedded, grey carbonate MUDSTONE. Core Run - 17.0-19.4m bgl: RQD = 65% TCR = 100% SCR = 100%	-0.7				
19.0			-1.7	18.70-18.77	X		
20.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Very strong cream LIMESTONE. End of Borehole at 19.4 m bgl					
21.0							
22.0							
23.0							
24.0							
25.0							
26.0							
27.0							
28.0							
29.0							
30.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
 Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 2 of 2

Project No: UK22-16873

Borehole: SB24

Client: Enemalta Corporation

Date: 24 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 28.226m ASL

Logged by: KW

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	28.2			50 ppm 150	
1.0		MADE GROUND Concrete.					
2.0							
3.0							
4.0		LOWER GLOBIGERINA LIMESTONE Cream LIMESTONE recovered as silt.	24.7				
5.0							
6.0							
7.0		VOID Void possible tunnel or solution feature	21.8				
8.0		LOWER GLOBIGERINA LIMESTONE Cream LIMESTONE recovered as silt.	20.3				
9.0							
10.0							
11.0							
12.0		VOID Hole terminated due to void likely to be roof of tunnel in former underground power station.	16.2				
13.0							
14.0		End of Borehole at 14 m bgl	14.2				
15.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB25

Client: Enemalta Corporation

Date: 24 & 25 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 27.509

Logged by: KW & MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	27.5				
		<b>MADE GROUND</b> Grey and cream Gravel of limestone and concrete.	27.2				
1.0				0.5-0.6	X		
2.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Strong thickly bedded pale cream LIMESTONE. Rare grey staining. Discontinuities: fresh, widely spaced, undulating, horizontal, clean and open.	25.0				
3.0		Core Run 0.0-2.5m bgl: RQD = 78% TCR = 100% SCR = 95%					
4.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Cream LIMESTONE recovered as silt.					
5.0							
6.0							
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0			12.5				

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 1 of 2

Project No: UK22-16873

Borehole: SB25

Client: Enemalta Corporation

Date: 24 & 25 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 27.509

Logged by: KW & MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
16.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Grey carbonate MUDSTONE recovered as silt.				50 ppm 150	
17.0							
18.0							
19.0							
20.0							
21.0							
22.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Cream LIMESTONE recovered as silt.	5.5				
23.0							
24.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Stong thick pale cream and grey LIMESTONE. Fractures: medium and closely spaced, smooth planar, moderately open. Weathered between 25.6-25.8m bgl.	3.7				
25.0		Core Run - 23.8-26.8m bgl:					
26.0		RQD = 90%		25.5-25.8	X		
27.0		TCR = 100%	0.7				
27.5		SCR = 100%					
28.0		FI = 1					
28.5		End of Borehole at 26.8 m bgl					
29.0							
30.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 2 of 2

Project No: UK22-16873

Borehole: SB26

Client: Enemalta Corporation

Date: 25 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 21.033

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	21.0	0.4-0.5	X		
		<b>MADE GROUND</b> Tarmacadam					
1.0		<b>MADE GROUND</b> Grey and cream Gravel of limestone and concrete.					
2.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Moderately strong thickly bedded pale cream LIMESTONE. Discontinuities: closely spaced, smooth planar, horizontal, clean and open. Core Run 0.0-3.0m bgl: RQD = 100% TCR = 100% SCR= 100% FI = 7	18.5				
3.0							
4.0							
5.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Cream LIMESTONE recovered as silt (depth to base is approximate)					
6.0							
7.0							
8.0							
9.0							
10.0			11.0				
		<b>LOWER GLOBIGERINA LIMESTONE</b> Grey carbonate MUDSTONE recovered as silt (depth to top is approximate).					
11.0							
12.0							
13.0							
14.0							
15.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
 . Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 1 of 2

Project No: UK22-16873

Borehole: SB26

Client: Enemalta Corporation

Date: 25 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 21.033

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
16.0						50 ppm 150	
17.0							
18.0							
19.0			2.0				
20.0		<b>LOWER GLOBIGERINA LIMESTONE</b> Very strong thick pale cream and grey MUDSTONE. Core Run - 19.0-22.5m bgl: RQD = 100% TCR = 100% SCR = 100% FI = 1		20.4-20.5	X		
21.0							
22.0			-1.5				
23.0		End of Borehole at 22.5 m bgl					
24.0							
25.0							
26.0							
27.0							
28.0							
29.0							
30.0							

Remarks: Solid core recovery at top and base of borehole, open hole in between.  
 Flush: Water, Core Barrel: 98mm

Checked by:

Sheet: 2 of 2



Project No: UK22-16873

Borehole: SB27

Client: Enemalta Corporation

Date: 25 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 1.695m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	1.7				Backfilled with arisings
		MADE GROUND	1.4				
		Concrete	1.3				
		MADE GROUND		0.4-0.5	X	0.0	
		Loose dark brown sandy Gravel of limestone. Gravel is fine to coarse, subangular and subrounded. 0.4m bgl small pocket of black staining		0.8-1.0		0.3	
1.0		LOWER CORALLINE LIMESTONE		1.3-1.5		0.0	
		Grey green carbonate MUDSTONE (recovered as gravel). Rare fragments of shells. 3.2m bgl damp		1.8-2.0		0.0	
2.0				2.3-2.5	X	0.5	
3.0				2.8-3.0		0.1	
			-1.8	3.3-3.5		0.1	
		End of Borehole at 3.5 m bgl					
4.0							
5.0							
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB28

Client: Enemalta Corporation

Date: 25 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 2.008m ASL

Logged by: MH

**ENVIRON**

SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	2.0				Backfilled with arisings
		MADE GROUND	1.8				
		Concrete	1.6				
		MADE GROUND		0.3-0.4	X	0.1	
		Brown sandy Gravel of Limestone. Gravel is fine to coarse, subangular and subrounded, cobbles of limestone. Rare fragment of textile.		0.8-1.0		0.2	
1.0		LOWER GLOBIGERINA LIMESTONE	0.7			1.4	
		Pale cream fine grained LIMESTONE (recovered as gravel)		1.4-1.5		1.0	
		LOWER CORALLINE LIMESTONE		1.8-2.0		1.8	
2.0		Grey green carbonate MUDSTONE (recovered as gravel)..		2.3-2.5	X	1.5	
3.0				2.8-3.0		0.6	
			-1.5	3.3-3.5			
		End of Borehole at 3.5 m bgl					
4.0							
5.0							
6.0							
7.0							

Remarks:

Checked by:

Sheet: 1 of 1

Project No: UK22-16873

Borehole: SB29

Client: Enemalta Corporation

Date: 27 June 2011

Location: Marsa Power Station

Plant Used: Beretta T44

Datum: 13.910m ASL

Logged by: MH



SUBSURFACE PROFILE			SAMPLE			PID Reading ppm 50 150	Well Installation
Depth	Symbol	Description	Elevation	Sample	Lab Analysis		
0.0		Ground Surface	13.9				Backfilled with arisings
		MADE GROUND Tarmacadam	13.4	0.3-0.5	X	2.6	
1.0		MADE GROUND Brown sandy Gravel of limestone. Gravel is fine to coarse, subangular and subrounded. Fragments of concrete, tarmacadam.		0.8-1.0		20.6	
				1.3-1.5		26.3	
2.0		LOWER GLOBIGERNIA LIMESTONE Weak pale cream fine grained LIMESTONE (recovered as gravel).	11.9	1.8-2.0	X	62.2	
		LOWER GLOBIGERNIA LIMESTONE Pale grey green LIMESTONE (recovered as gravel).		2.3-2.5		41.7	
3.0				2.8-3.0		36.6	
				3.3-3.5		14.8	
4.0				3.8-4.0		16.7	
5.0				4.8-5.0		5.5	
6.0				5.8-6.0		6.8	
7.0				6.8-7.0		6.5	
8.0		End of Borehole at 8 m bgl	5.9	7.8-8.0		2.3	
9.0							
10.0							

Remarks:

Checked by:

Sheet: 1 of 1



Photo 1.  
Malta B Power Station



Photo 2.  
General view across southern boundary



Photo 3.  
Oil interceptor adjacent to SB07



Photo 4.  
Bunded waste storage area



Photo 5.  
Bunded gas oil tank



Photo 6.  
Oil staining from spill in April 2011,  
adjacent to location SB13.

**Site:** Marsa Power Station, Malta

**Date:** August 2011

**Client:** Enemalta

**Document Version:** 1



Photo 7.  
Oil staining and spill granules around plant, adjacent to location SB27.



Photo 8.  
Bunded bulk acid above ground storage tanks.

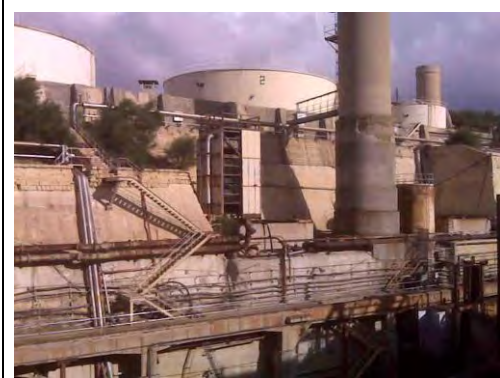


Photo 9.  
Bunded bulk RFO tanks on upper platform



Photo 10.  
Transformer location adjacent to location SB17



Photo 11.  
Beretta T44 drilling rig



Photo 12.  
Beretta T44 drilling rig

**Site:** Marsa Power Station, Malta

**Date:** August 2011

**Client:** Enemalta

**Document Version:** 1





Photo 13.  
Arisings from SB03



Photo 14.  
Hand dig pit profile form SB06



Photo 15.  
Arisings from SB06



Photo 16  
Arisings from SB07



Photo 17.  
Arisings from SB08



Photo 18.  
Arisings from SB09

**Site:** Marsa Power Station, Malta

**Date:** August 2011

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Photo 19.  
Arisings from SB10



Photo 20.  
Arisings from SB11



Photo 21.  
Arisings from SB12



Photo 22.  
Arisings from SB14



Photo 23.  
Arisings from SB14



Photo 24.  
Arisings from SB16

**Site:** Marsa Power Station, Malta

**Date:** August 2011

**Client:** Enemalta

**Document Version:** 1





Photo 25.  
Hand dig pit SB17



Photo 26.  
Arisings from SB17



Photo 27.  
Arisings from SB18



Photo 28.  
Arisings from SB20



Photo 29.  
Rock core SB22 (2.3-3.0m bgl)



Photo 30.  
Rock core SB22 (18.0-21.0m bgl)

**Site:** Marsa Power Station, Malta

**Date:** August 2011

**Client:** Enemalta

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Photo 31.  
Rock core SB22 (0.0-3.0m bgl)



Photo 32.  
Rock core SB22 (17.0-19.0m bgl)



Photo 33.  
Rock core SB24 (0.0-3.0m bgl)



Photo 34.  
Rock core SB25 (0.0-3.0m bgl)



Photo 35.  
Rock core SB24 (24.0-26.8m bgl)

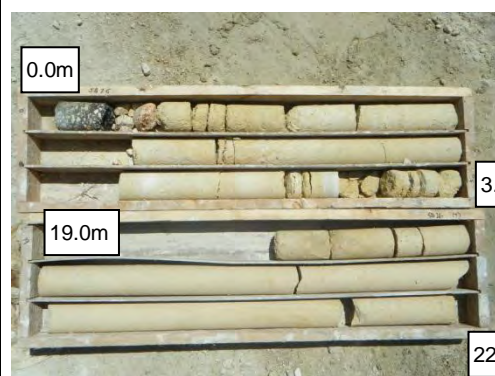


Photo 36.  
Rock core SB24 (0.0-3.0m bgl, top)  
(19.0-22.5m bgl, bottom)

**Site:** Marsa Power Station, Malta

**Date:** August 2011

**Client:** Enemalta

**Document Version:** 1

## **Annex C: Summary of Analytical Results**









ENVIRON

Enemalta	ENVIRON GAC (Commercial)																										
				SAMPLE ID	SB14	SB14	SB14	SB15	SB15	SB16	SB16	SB17	SB17	SB18	SB18	SB19A	SB19B	SB20	SB20	SB21	SB21	SB22	SB22	SB23	SB23	SB25	SB25
				DEPTH (m)	0.3-0.5	2.0-2.5	3.5	0.5-1.0	3.0-3.5	0.6-1.0	1.7-2.0	3	0.3	2.5-3.0	0.5	0.8-1.0	4.1-4.5	0.8-1.0	1.6-2.0	0.3-0.5	1.6-2.0	2.8-2.85	18.09-18.11	1.7-1.8	18.7-18.77	0.5-0.6	25.5-25.8
				LOCATION	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS
SAMPLE DATE				22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	23/06/2011	23/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011		
		Units	Method	LOD																							
4-Chlorophenylphenylether	0.37833	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
4-Nitroaniline	170	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Azobenzene	151.511	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Bis(2-chloro-ethoxy)methane	1.301749	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Bis(2-chloro-ethyl)ether	0.2736435	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Carbazole	897	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Dibenzofuran	6666.492	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Hexachlorobenzene	0.199	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Hexachlorobutadiene	17.6	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Hexachlorocyclopentadiene	1.0913	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Hexachloroethane	8.13	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Isophorone	887.232	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
N-nitrosodi-n-propylamine	1.90493	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
Nitrobenzene	131.262	mg/kg	TM16/PM8	<0.01			<0.01					<0.01		<0.01	<0.1						<0.01						
VOCs																											
Dichlorodifluoromethane	1500	mg/kg	TM15/PM10	<0.002			<0.002					<0.002		<0.002	<0.002						<0.002						
Methyl Tertiary Butyl Ether	4020	mg/kg	TM15/PM10	<0.002			<0.002					<0.002		<0.002	<0.002						<0.002						
Chloromethane	0.593	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
Vinyl Chloride	0.04033	mg/kg	TM15/PM10	<0.002			<0.002					<0.002		<0.002	<0.002						<0.002						
Bromomethane	27.046	mg/kg	TM15/PM10	<0.001			<0.001					<0.001		<0.001	<0.001						<0.001						
Chloroethane	567	mg/kg	TM15/PM10	<0.002			<0.002					<0.002		<0.002	<0.002						<0.002						
Trichlorofluoromethane	2200	mg/kg	TM15/PM10	<0.002			<0.002					<0.002		<0.002	<0.002						<0.002						
1,1-Dichloroethene	15.4	mg/kg	TM15/PM10	<0.006			<0.006					<0.006		<0.006	<0.006						<0.006						
Dichloromethane	399	mg/kg	TM15/PM10	<0.007			<0.007					<0.007		<0.007	<0.007						<0.007						
trans-1-2-Dichloroethene	12.3	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
1,1-Dichloroethane	148	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
cis-1-2-Dichloroethene	7.74	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
2,2-Dichloropropane	20.46	mg/kg	TM15/PM10	<0.004			<0.004					<0.004		<0.004	<0.004						<0.004						
Bromochloromethane	1.1	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
Chloroform	57.3	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
1,1,1-Trichloroethane	391.511	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
1,1-Dichloropropene	12.853	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
Carbon tetrachloride	1.74	mg/kg	TM15/PM10	<0.004			<0.004					<0.004		<0.004	<0.004						<0.004						
1,2-Dichloroethane	0.356	mg/kg	TM15/PM10	<0.004			<0.004					<0.004		<0.004	<0.004						<0.004						
Benzene	15.826	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
Trichloroethene	6.611	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	0.117						<0.003						
1,2-Dichloropropane	1.72	mg/kg	TM15/PM10	<0.006			<0.006					<0.006		<0.006	<0.006						<0.006						
Dibromomethane		mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
Bromodichloromethane	1.1	mg/kg	TM15/PM10	<0.003			<0.003					<0.003		<0.003	<0.003						<0.003						
cis-1-3-Dichloropropene	19.358	mg/kg	TM15/PM10	<0.004			<0.004					<0.004		<0.004	<0.004						<0.004						
Toluene	835	mg/kg	TM15/PM10	<0.003			0.038					<0.003		<0.003	0.006						<0.003						
trans-1-3-Dichloropropene	12.853	mg/kg	TM1																								

ENVIRON

Enemalta	ENVIRON GAC (Commercial)			SAMPLE ID									
				DEPTH (m)		SB26	SB26	SB27	SB27	SB28	SB28	SB29	SB29
				LOCATION		MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS
				SAMPLE DATE		25/06/2011	25/06/2011	23/06/2011	23/06/2011	25/06/2011	27/06/2011	27/06/2011	27/06/2011
		Units	Method	LOD									
Metals													
Antimony	7,550	mg/kg	TM30/PM15	<1	1	<1	<1	<1	2	<1	<1	<1	
Arsenic	635	mg/kg	TM30/PM15	<0.5	3.5	1.4	2.9	1.8	5.8	2.4	2.2	2.5	
Cadmium	230	mg/kg	TM30/PM15	<0.1	0.6	0.3	0.4	0.3	0.3	0.3	0.3	0.2	
Chromium	35	mg/kg	TM30/PM15	<0.5	22.1	16.8	16.9	14.7	15.8	17.2	13.9	18.1	
Cobalt	NG	mg/kg	TM30/PM15	<0.5	1.5	0.8	2.1	1	2	1.4	1.1	1	
Copper	71,700	mg/kg	TM30/PM15	<1	8	10	16	4	15	7	9	7	
Lead	750	mg/kg	TM30/PM15	<5	<5	<5	19	<5	40	8	10	<5	
Manganese	NG	mg/kg	TM30/PM15	<1	44	28	66	43	102	63	46	46	
Mercury	3,640	mg/kg	TM30/PM15	<0.1	0.5	0.4	0.5	0.5	0.4	0.3	0.5	0.4	
Nickel	1,790	mg/kg	TM30/PM15	<0.7	23.6	17.5	16.5	9.8	10.2	11.8	11.3	14.9	
Selenium	13,000	mg/kg	TM30/PM15	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Thallium	NG	mg/kg	TM30/PM15	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Tin	NG	mg/kg	TM30/PM15	<1	<1	<1	1	<1	<1	<1	<1	<1	
Vanadium	3,160	mg/kg	TM30/PM15	<1	25	14	15	9	13	10	15	17	
Zinc	665,000	mg/kg	TM30/PM15	<5	39	31	38	19	38	22	32	25	
Others													
Asbestos Screen	N/A	None	Subcontracted	-			NAD		NAD		NAD		
pH	N/A	pH units	TM73/PM11	<0.1	9.15	8.76	9.1	8.47	10.71	8.9	8.81	8.83	
Sulphide	N/A	mg/kg	Subcontracted	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	
Total Sulphate	N/A	mg/kg	TM50/PM15	<50	792	758	1419	1376	2281	1291	816	700	
Fraction Organic Carbon	N/A	None	TM21/PM24	<0.001				0.003		0.003			
PAHs													
Naphthalene	75	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	0.08	<0.04	
Acenaphthylene	162	mg/kg	TM4/PM8	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Acenaphthene	56.7	mg/kg	TM4/PM8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluorene	160	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
Phenanthrene	21,900	mg/kg	TM4/PM8	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	0.12	<0.03	
Anthracene	522,000	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
Fluoranthene	22,600	mg/kg	TM4/PM8	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.2	<0.03	
Pyrene	54,300	mg/kg	TM4/PM8	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.2	<0.03	
Benz(a)anthracene	91	mg/kg	TM4/PM8	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.29	<0.06	
Chrysene	140.0	mg/kg	TM4/PM8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.21	<0.02	
Benzo(bk)fluoranthene	102	mg/kg	TM4/PM8	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	0.31	<0.07	
Benzo(a)pyrene	14	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.17	<0.04	
Indeno(123cd)pyrene	61.0	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.13	<0.04	
Dibenzo(ah)anthracene	13	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	
Benzo(ghi)perylene	658	mg/kg	TM4/PM8	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.17	<0.04	
PAH 16 Total	NG	mg/kg	TM4/PM8	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	1.9	<0.6	
Benzo(b)fluoranthene	102	mg/kg	TM4/PM8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	
Benzo(k)fluoranthene	143	mg/kg	TM4/PM8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	
Hydrocarbons													
EPH >C8-C10	N/A	mg/kg	TM5/PM8	<5	<5	<5	<5	<5	<5	<5	<5	<5	
EPH >C10-C20	N/A	mg/kg	TM5/PM8	<10	<10	<10	<10	<10	44	<10	<10	<10	
EPH >C20-C30	N/A	mg/kg	TM5/PM8	<10	<10	<10	<10	<10	287	<10	<10	<10	
EPH >C30-C40	N/A	mg/kg	TM5/PM8	<10	<10	<10	<10	<10	182	<10	<10	<10	
EPH >C8-C40	5,000	mg/kg	TM5/PM8	<35	<35	<35	<35	<35	513	<35	<35	<35	
PCBs													
PCB 28	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
PCB 52	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
PCB 101	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
PCB 118	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
PCB 138	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
PCB 153	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
PCB 180	0.24	mg/kg	TM86/PM8	<0.005			<0.005			<0.005		<0.005	
Total 7 PCBs	NG	mg/kg	TM86/PM8	<0.035			<0.035			<0.035		<0.035	
SVOCs													
2-Chlorophenol	3590	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2-Methylphenol	14200	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2-Nitrophenol	910,5972844	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2,4-Dichlorophenol	3530	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2,4-Dimethylphenol	1330	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2,4,5-Trichlorophenol	2300	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2,4,6-Trichlorophenol	848	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
4-Chloro-3-methylphenol	8333,156	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
4-Methylphenol	25800	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
4-Nitrophenol	1000	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Pentachlorophenol	1230	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Phenol	3200	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2-Chloronaphthalene	113	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2-Methylnaphthalene	7148,11124	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Bis(2-ethyl-hexyl) phthalate	85400	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Butylbenzyl phthalate	942000	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Di-n-butyl phthalate	12.9	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Di-n-Octyl phthalate	89100	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Diethyl phthalate	109	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
Dimethyl phthalate	275	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
1,2-Dichlorobenzene	562	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
1,2,4-Trichlorobenzene	123	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
1,3-Dichlorobenzene	177	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
1,4-Dichlorobenzene	221	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2-Nitroaniline	651,305	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2,4-Dinitrotoluene	3750	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
2,6-Dinitrotoluene	1860	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
3-Nitroaniline	200	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
4-Bromophenylphenylether	0.9827873	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	
4-Chloroaniline	2300	mg/kg	TM16/PM8	<0.01			<0.01			<0.01		<0.01	

ENVIRON

Enemalta	ENVIRON GAC (Commercial)				SAMPLE ID	SB26	SB26	SB27	SB27	SB28	SB28	SB29	SB29
					DEPTH (m)	0.4-0.5	20.4-20.5	0.4-0.5	2.3-2.5	0.3-0.4	2.3-2.5	0.3-0.5	1.8-2.0
					LOCATION	MPS	MPS	MPS	MPS	MPS	MPS	MPS	MPS
					SAMPLE DATE	25/06/2011	25/06/2011	23/06/2011	23/06/2011	25/06/2011	27/06/2011	27/06/2011	27/06/2011
		Units	Method	LOD									
4-Chlorophenylphenylether	0.37833	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
4-Nitroaniline	170	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Azobenzene	151.511	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Bis(2-chloro-ethoxy)methane	1.301749	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Bis(2-chloro-ethyl)ether	0.2736435	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Carbazole	897	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Dibenzofuran	6666.492	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Hexachlorobenzene	0.199	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Hexachlorobutadiene	17.6	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Hexachlorocyclopentadiene	1.0913	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Hexachloroethane	8.13	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Isophorone	887.232	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
N-nitrosodi-n-propylamine	1.90493	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
Nitrobenzene	131.262	mg/kg	TM16/PM8	<0.01			<0.01			<0.01			<0.01
VOCs													
Dichlorodifluoromethane	1500	mg/kg	TM15/PM10	<0.002			<0.002			<0.002			<0.002
Methyl Tertiary Butyl Ether	4020	mg/kg	TM15/PM10	<0.002			<0.002			<0.002			0.006
Chloromethane	0.593	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Vinyl Chloride	0.04033	mg/kg	TM15/PM10	<0.002			<0.002			<0.002			<0.002
Bromomethane	27.046	mg/kg	TM15/PM10	<0.001			<0.001			<0.001			<0.001
Chloroethane	567	mg/kg	TM15/PM10	<0.002			<0.002			<0.002			<0.002
Trichlorofluoromethane	2200	mg/kg	TM15/PM10	<0.002			<0.002			<0.002			<0.002
1,1-Dichloroethene	15.4	mg/kg	TM15/PM10	<0.006			<0.006			<0.006			<0.006
Dichloromethane	399	mg/kg	TM15/PM10	<0.007			0.035			0.024			0.015
trans-1-2-Dichloroethene	12.3	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,1-Dichloroethane	148	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
cis-1-2-Dichloroethene	7.74	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
2,2-Dichloropropane	20.46	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
Bromochloromethane	1.1	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Chloroform	57.3	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,1,1-Trichloroethane	391.511	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,1-Dichloropropene	12.853	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Carbon tetrachloride	1.74	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,2-Dichloroethane	0.356	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
Benzene	15.826	mg/kg	TM15/PM10	<0.003			0.025			<0.003			<0.003
Trichloroethene	6.611	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,2-Dichloropropane	1.72	mg/kg	TM15/PM10	<0.006			<0.006			<0.006			<0.006
Dibromomethane		mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Bromodichloromethane	1.1	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
cis-1-3-Dichloropropene	19.358	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
Toluene	835	mg/kg	TM15/PM10	<0.003			0.019			<0.003			<0.003
trans-1-3-Dichloropropene	12.853	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,1,2-Trichloroethane	51.1	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Tetrachloroethene	72.2	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,3-Dichloropropane	12.853	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Dibromochloromethane	264	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,2-Dibromoethane		mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Chlorobenzene	32.8	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,1,1,2-Tetrachloroethane	62.718	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Ethylbenzene	508	mg/kg	TM15/PM10	<0.003			0.004			<0.003			<0.003
p/m-Xylene	564	mg/kg	TM15/PM10	<0.006			0.045			<0.006			<0.006
o-Xylene	467	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Styrene	607	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Bromoform	417	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Isopropylbenzene	753	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,1,2,2-Tetrachloroethane	156	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
Bromobenzene	53.7	mg/kg	TM15/PM10	<0.002			<0.002			<0.002			<0.002
1,2,3-Trichloropropane	3.1434	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
Propylbenzene	399	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
2-Chlorotoluene	1.42	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
1,3,5-Trimethylbenzene	12.7	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
4-Chlorotoluene	1.418	mg/kg	TM15/PM10	<0.003			<0.003			<0.003			<0.003
tert-Butylbenzene	440	mg/kg	TM15/PM10	<0.005			<0.005			<0.005			<0.005
1,2,4-Trimethylbenzene	22.9	mg/kg	TM15/PM10	<0.006			0.013			<0.006			<0.006
sec-Butylbenzene	1300	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
4-Isopropyltoluene	388	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,3-Dichlorobenzene	17.7	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,4-Dichlorobenzene	221	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
n-Butylbenzene	430	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,2-Dichlorobenzene	562	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,2-Dibromo-3-chloropropane	1.037	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,2,4-Trichlorobenzene	123	mg/kg	TM15/PM10	<0.007			<0.007			<0.007			<0.007
Hexachlorobutadiene	17.6	mg/kg	TM15/PM10	<0.004			<0.004			<0.004			<0.004
1,2,3-Trichlorobenzene	56.8	mg/kg	TM15/PM10	<0.007			<0.007			<0.007			<0.007



Enemalta		SAMPLE ID	SB05	SB05	SB12	SB14	SB18
			DEPTH (m)	0.25-0.5	1.5-2.0	0.3-0.5	3.5
			LOCATION	MPS	MPS	MPS	MPS
			SAMPLE DATE	16/06/2011	16/06/2011	21/06/2011	22/06/2011
	Units	Method					
<b>SVOC TICs</b>							
Biphenylene	mg/kg	TM15/PM10	0.227				
Benzo[b]naphtho[2,3-d]furan	mg/kg	TM15/PM10	0.193				
Benzo[b]naphtho[1,2-d]furan	mg/kg	TM15/PM10	0.157				
Pyrene, 1-methyl-	mg/kg	TM15/PM10	0.374				
Pyrene, 2-methyl-	mg/kg	TM15/PM10	0.149				
Pyrene, 4-methyl-	mg/kg	TM15/PM10	0.280				
7H-Benz[de]anthracen-7-one	mg/kg	TM15/PM10	0.178				
Benzo[b]naphtho[2,1-d]thiophene	mg/kg	TM15/PM10	0.444				
Cyclopenta[cd]pyrene	mg/kg	TM15/PM10	0.491				
Benz[a]anthracene, 8-methyl-	mg/kg	TM15/PM10	0.157				
Benz[a]anthracene, 7-methyl-	mg/kg	TM15/PM10	0.202				
Benzo[e]pyrene	mg/kg	TM15/PM10	1.826	0.213			1.548
Dibenzo[def,mno]chrysene	mg/kg	TM15/PM10	0.418				
Cyclotetrasene, 1,2-dimethyl-	mg/kg	TM15/PM10	0.324				
3,4,9,10-Dibenzopyrene	mg/kg	TM15/PM10	0.199				
1,2,4,5-Dibenzopyrene	mg/kg	TM15/PM10	0.212				
3,4,8,9-Dibenzopyrene	mg/kg	TM15/PM10	0.152				
Coronene	mg/kg	TM15/PM10	0.209				
Indeno[1,2,3-fg]naphthacene	mg/kg	TM15/PM10	0.478				
Dibenz[a,e]aceanthrylene	mg/kg	TM15/PM10	0.231				
Rubcene-	mg/kg	TM15/PM10	0.209				
Pentadecane	mg/kg	TM15/PM10			0.296		
Hexadecane	mg/kg	TM15/PM10			0.362	2.262	
Heptadecane	mg/kg	TM15/PM10			0.366		
Octadecane	mg/kg	TM15/PM10			0.359		
Hexadecane, 2,6,10,14-tetramethyl-	mg/kg	TM15/PM10			0.243		
Nonadecane	mg/kg	TM15/PM10			0.377		
Eicosane	mg/kg	TM15/PM10			0.286		
Heneicosane	mg/kg	TM15/PM10			0.259		
Docosane	mg/kg	TM15/PM10			0.192		
Decane	mg/kg	TM15/PM10				0.966	
Decane, 2-methyl-	mg/kg	TM15/PM10				0.878	
Decane, 3-methyl-	mg/kg	TM15/PM10				0.577	
trans-Decalin, 2-methyl-	mg/kg	TM15/PM10				2.191	
Undecane	mg/kg	TM15/PM10				5.416	
Decane, 3,8-dimethyl-	mg/kg	TM15/PM10				1.993	
Undecane, 3-methyl-	mg/kg	TM15/PM10				1.433	
Dodecane	mg/kg	TM15/PM10				8.396	
Undecane, 3,6-dimethyl-	mg/kg	TM15/PM10				3.787	
Cyclohexane, (4-methylpentyl)-	mg/kg	TM15/PM10				2.262	
Dodecane, 4-methyl-	mg/kg	TM15/PM10				1.612	
Undecane, 2,10-dimethyl-	mg/kg	TM15/PM10				1.544	
Naphthalene, 1-methyl-	mg/kg	TM15/PM10				1.440	
Nonane, 3-methyl-	mg/kg	TM15/PM10				3.870	
Tridecane	mg/kg	TM15/PM10				8.172	
Cyclotetradecane	mg/kg	TM15/PM10				1.178	
Naphthalene, 2-ethyl-	mg/kg	TM15/PM10				3.131	
Naphthalene, 1,6-dimethyl-	mg/kg	TM15/PM10				2.100	
Naphthalene, 1,8-dimethyl-	mg/kg	TM15/PM10				4.723	
Tetradecane	mg/kg	TM15/PM10				8.221	
Naphthalene, 2,6-dimethyl-	mg/kg	TM15/PM10				0.349	
Cyclohexane, octyl-	mg/kg	TM15/PM10				2.590	
Cyclononane, 1,1,4,4,7,7-hexamethyl-	mg/kg	TM15/PM10				1.162	
Dodecane, 2,6,11-trimethyl-	mg/kg	TM15/PM10				2.571	
Naphthalene, 1,6,7-trimethyl-	mg/kg	TM15/PM10				1.058	
Naphthalene, 1,6,7-trimethyl-	mg/kg	TM15/PM10				1.130	
Pentadecane	mg/kg	TM15/PM10				4.338	
Naphthalene, 1,4,6-trimethyl-	mg/kg	TM15/PM10				0.721	
Naphthalene, 1,4,6-trimethyl-	mg/kg	TM15/PM10				1.026	
28-Nor-17.alpha.(H)-hopane	mg/kg	TM15/PM10					5.331
28-Nor-17.alpha.(H)-hopane	mg/kg	TM15/PM10					4.257
28-Nor-17.alpha.(H)-hopane	mg/kg	TM15/PM10					2.787
<b>VOC TICs</b>							
Cyclohexane, methyl-	mg/kg	TM15/PM10				0.134	
Cyclohexane, ethyl-	mg/kg	TM15/PM10				0.190	
1-Ethyl-4-methylcyclohexane	mg/kg	TM15/PM10				0.130	
Cyclohexanone, 2,3-dimethyl-	mg/kg	TM15/PM10				0.489	
Benzene, (1-methylethyl)-	mg/kg	TM15/PM10				0.375	
Benzene, propyl-	mg/kg	TM15/PM10				0.313	
Decane	mg/kg	TM15/PM10				2.609	
Benzene, 1-ethyl-2-methyl-	mg/kg	TM15/PM10				1.000	
Benzene, 1,2,3-trimethyl-	mg/kg	TM15/PM10				1.669	
2-Tolylloxirane	mg/kg	TM15/PM10				0.646	
Benzene, 1,3-diethyl-	mg/kg	TM15/PM10				0.654	
Undecane	mg/kg	TM15/PM10				3.134	
Benzene, 1-methyl-4-propyl-	mg/kg	TM15/PM10				0.606	
Benzene, 1-ethyl-2,4-dimethyl-	mg/kg	TM15/PM10				1.161	
Benzene, 4-ethyl-1,2-dimethyl-	mg/kg	TM15/PM10				1.063	
Benzene, 1,2,4,5-tetramethyl-	mg/kg	TM15/PM10				0.893	
Dodecane	mg/kg	TM15/PM10				4.582	
Undecane, 2,6-dimethyl-	mg/kg	TM15/PM10				1.620	
Benzene, (3-methyl-2-butenyl)-	mg/kg	TM15/PM10				1.149	
Tridecane	mg/kg	TM15/PM10				3.166	
Benzene, (1-methyl-1-butenyl)-	mg/kg	TM15/PM10				1.066	
Dodecane, 2,6,10-trimethyl-	mg/kg	TM15/PM10				0.795	
Naphthalene, 1-methyl-	mg/kg	TM15/PM10				1.527	
Tetradecane	mg/kg	TM15/PM10				1.408	
Naphthalene, 2-methyl-	mg/kg	TM15/PM10				1.521	

## **Annex D: Analytical Certificates**



## Jones Environmental Laboratory

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Fax: +44 (0) 1244 833781



No.4225

<b>Attention :</b>	Michael Hazlehurst
<b>Date :</b>	8th July, 2011
<b>Your reference :</b>	UK22-16873
<b>Our reference :</b>	Test Report 11/4615 Batch 4
<b>Location :</b>	MPS
<b>Date samples received :</b>	27th June, 2011
<b>Status :</b>	Final report
<b>Issue :</b>	2

Eight samples were received for analysis on 27th June, 2011, which was completed on 5th July 2011. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**J W Farrell- Jones CChem FRSC**  
**Chartered Chemist**

# **Jones Environmental Laboratory**

**Client Name:** Environ

**Report : Solid**

**Reference:** UK22-16873

**Location:** MPS

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

**Contact:** Michael Hazlehurst

**JE Job No.:** 11/4615

J E Sample No.	92-94	95-96	97-99	102-103	104-105	106-108	109-110				Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB06	MPS-SB06	MPS-SB08	MPS-SB09	MPS-SB09	MPS-SB10	MPS-SB10						
Depth	0.6	1.0-1.5	0.3-0.5	0.5	2.5-3.0	0.4	2.5-3.0						
COC No / misc													
Containers	V B	V	V B	V	V	V B	V						
Sample Date	20/06/2011	21/06/2011	21/06/2011	21/06/2011	21/06/2011	21/06/2011	21/06/2011						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	4	4	4	4	4	4	4						
Date of Receipt	27/06/2011	27/06/2011	27/06/2011	27/06/2011	27/06/2011	27/06/2011	27/06/2011				LOD	Units	Method No.
Antimony	<1	<1	<1	<1	<1	<1	<1				<1	mg/kg	TM30/PM15
Arsenic #	3.0	3.1	1.9	2.2	1.8	4.7	0.9				<0.5	mg/kg	TM30/PM15
Cadmium #	0.4	0.4	0.5	0.3	0.3	0.4	0.2				<0.1	mg/kg	TM30/PM15
Chromium #	16.0	17.7	16.3	19.9	16.2	16.1	17.3				<0.5	mg/kg	TM30/PM15
Cobalt #	2.1	1.8	1.5	1.6	1.0	1.1	1.2				<0.5	mg/kg	TM30/PM15
Copper #	17	31	8	12	4	6	4				<1	mg/kg	TM30/PM15
Lead #	25	162	12	<5	<5	<5	<5				<5	mg/kg	TM30/PM15
Manganese #	77	76	96	131	44	57	42				<1	mg/kg	TM30/PM15
Mercury #	0.5	0.5	0.5	0.4	0.4	0.5	0.4				<0.1	mg/kg	TM30/PM15
Nickel #	12.7	15.2	12.7	16.5	10.1	7.6	8.3				<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1				<1	mg/kg	TM30/PM15
Thallium	<1	<1	<1	<1	<1	<1	<1				<1	mg/kg	TM30/PM15
Tin	1	31	<1	<1	<1	<1	<1				<1	mg/kg	TM30/PM15
Total Sulphate	1283	1205	2080	2583	1719	1650	1019				<50	mg/kg	TM50/PM15
Vanadium	16	20	17	16	11	8	11				<1	mg/kg	TM30/PM15
Zinc #	37	40	31	33	20	12	20				<5	mg/kg	TM30/PM15
<b>PAH MS</b>													
Naphthalene #	0.62	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Acenaphthylene	1.56	0.09	0.08	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.47	0.06	0.33	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Anthracene #	0.70	0.05	0.12	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Fluoranthene #	5.34	0.28	0.41	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Pyrene #	6.87	0.38	0.52	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	8.90	0.28	0.59	<0.06	<0.06	<0.06	<0.06				<0.06	mg/kg	TM4/PM8
Chrysene #	4.55	0.21	0.28	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	16.00	0.79	0.62	<0.07	<0.07	<0.07	<0.07				<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	8.68	0.45	0.40	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	11.13	0.51	0.30	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	2.20	0.11	0.08	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	13.06	0.56	0.36	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
PAH 16 Total	80.1	3.8	4.1	<0.6	<0.6	<0.6	<0.6				<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	11.52	0.57	0.45	<0.05	<0.05	<0.05	<0.05				<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	4.48	0.22	0.17	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	96	100	98	96	91	97	93				<0	%	TM4/PM8
EPH >C8-C10 #	<5	<5	<5	<5	<5	<5	<5				<5	mg/kg	TM5/PM8
EPH >C10-C20 #	<10	<10	<10	<10	<10	<10	<10				<10	mg/kg	TM5/PM8
EPH >C20-C30 #	18	<10	<10	<10	<10	<10	<10				<10	mg/kg	TM5/PM8
EPH >C30-C40 #	1006	355	<10	<10	<10	<10	<10				<10	mg/kg	TM5/PM8
EPH >C8-C40 #	1024	355	<35	<35	<35	<35	<35				<35	mg/kg	TM5/PM8

**Client Name:** Environ  
**Reference:** UK22-16873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4615

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

***Client Name:*** Environ  
***Reference:*** UK22-16873  
***Location:*** MPS  
***Contact:*** Michael Hazlehurst  
***JE Job No.:*** 11/4615

**SVOC Report : Solid**

J E Sample No.	104-105	106-108								Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB09	MPS-SB10										
Depth	2.5-3.0	0.4										
COC No / misc												
Containers	V	V B										
Sample Date	21/06/2011	21/06/2011										
Sample Type	Soil	Soil										
Batch Number	4	4										
Date of Receipt	27/06/2011	27/06/2011								LOD	Units	Method No.
SVOC MS												
Phenols												
2-Chlorophenol	<10	<10								<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10								<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10								<10	ug/kg	TM16/PM8
2,4-Dichlorophenol	<10	<10								<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10								<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10								<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10								<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10								<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10								<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10								<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10								<10	ug/kg	TM16/PM8
Phenol	<10	<10								<10	ug/kg	TM16/PM8
PAHs												
2-Chloronaphthalene	<10	<10								<10	ug/kg	TM16/PM8
2-Methylnaphthalene	<10	<10								<10	ug/kg	TM16/PM8
Phthalates												
Bis(2-ethylhexyl) phthalate	<10	<10								<10	ug/kg	TM16/PM8
Butylbenzyl phthalate	<10	<10								<10	ug/kg	TM16/PM8
Di-n-butyl phthalate	<10	<10								<10	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<10	<10								<10	ug/kg	TM16/PM8
Diethyl phthalate	<10	<10								<10	ug/kg	TM16/PM8
Dimethyl phthalate	<10	<10								<10	ug/kg	TM16/PM8
Other SVOCs												
1,2-Dichlorobenzene	<10	<10								<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene	<10	<10								<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10								<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10								<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10								<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10								<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10								<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10								<10	ug/kg	TM16/PM8
4-Bromophenylphenylether	<10	<10								<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10								<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10								<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10								<10	ug/kg	TM16/PM8
Azobenzene	<10	<10								<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10								<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10								<10	ug/kg	TM16/PM8
Carbazole	<10	<10								<10	ug/kg	TM16/PM8
Dibenzofuran	<10	<10								<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10								<10	ug/kg	TM16/PM8
Hexachlorobutadiene	<10	<10								<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10								<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10								<10	ug/kg	TM16/PM8
Isophorone	<10	<10								<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine	<10	<10								<10	ug/kg	TM16/PM8
Nitrobenzene	<10	<10								<10	ug/kg	TM16/PM8

# Jones Environmental Laboratory

**Client Name:** Environ  
**Reference:** UK22-16873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4615

**VOC Report :** Solid

J E Sample No.	104-105	106-108									Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB09	MPS-SB10											
Depth	2.5-3.0	0.4											
COC No / misc													
Containers	V	V B											
Sample Date	21/06/2011	21/06/2011											
Sample Type	Soil	Soil											
Batch Number	4	4											
Date of Receipt	27/06/2011	27/06/2011											
VOC MS											LOD	Units	Method No.
Dichlorodifluoromethane	<2	<2									<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether <sup>#</sup>	<2	<2									<2	ug/kg	TM15/PM10
Chloromethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2									<2	ug/kg	TM15/PM10
Bromomethane	<1	<1									<1	ug/kg	TM15/PM10
Chloroethane <sup>#</sup>	<2	<2									<2	ug/kg	TM15/PM10
Trichlorofluoromethane <sup>#</sup>	<2	<2									<2	ug/kg	TM15/PM10
1,1-Dichloroethene <sup>#</sup>	<6	<6									<6	ug/kg	TM15/PM10
Dichloromethane <sup>#</sup>	<7	<7									<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,1-Dichloroethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4									<4	ug/kg	TM15/PM10
Bromochloromethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Chloroform <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,1-Dichloropropene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Carbon tetrachloride <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dichloroethane <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
Benzene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Trichloroethene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,2-Dichloropropane <sup>#</sup>	<6	<6									<6	ug/kg	TM15/PM10
Dibromomethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Bromodichloromethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4									<4	ug/kg	TM15/PM10
Toluene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3									<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Tetrachloroethene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,3-Dichloropropane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Dibromochloromethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,2-Dibromoethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Chlorobenzene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane	<3	<3									<3	ug/kg	TM15/PM10
Ethylbenzene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
p/m-Xylene <sup>#</sup>	<6	<6									<6	ug/kg	TM15/PM10
o-Xylene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Styrene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Bromoform <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Isopropylbenzene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2									<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
Propylbenzene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3									<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene <sup>#</sup>	<3	<3									<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3									<3	ug/kg	TM15/PM10
tert-Butylbenzene <sup>#</sup>	<5	<5									<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene <sup>#</sup>	<6	<6									<6	ug/kg	TM15/PM10
sec-Butylbenzene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
4-Isopropyltoluene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
n-Butylbenzene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane <sup>#</sup>	<4	<4									<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene <sup>#</sup>	<7	<7									<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4									<4	ug/kg	TM15/PM10
Naphthalene	<27	<27									<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene <sup>#</sup>	<7	<7									<7	ug/kg	TM15/PM10

## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

### SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C

Asbestos screens where requested will be undertaken by a UKAS accredited laboratory.

### WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples. All samples are treated as groundwaters and analysis performed on settled samples unless we are instructed otherwise.

### DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

*The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:*

\$	Sample temperature on receipt considered inappropriate for analysis requested.
^	Samples exceeding recommended holding times.
&	Samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials).
~	No sampling date given, unable to confirm if samples are with acceptable holding times.

### SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130%. Results are not surrogate corrected.

### AQCs

Where AQC's fall outside UKAS/MCERTS criteria analysis is repeated if possible.

### NOTE

Data is only accredited when all the requirements of our Quality System have been met. In certain circumstances where the requirements have not been met, the laboratory may issue the data in its final report if it believes that the validity of the data has not been compromised but will remove the accreditation. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.



**ABBREVIATIONS and ACRONYMS USED**

#	UKAS accredited.
M	MCERTS accredited.
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
SS	Calibrated against a single substance.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
W	Results expressed on as received basis.
+	Accreditation has been removed from this result see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
DR	Dilution required.

[illegible]



# Jones Environmental Laboratory

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No.4225

<b>Attention :</b>	Michael Hazlehurst
<b>Date :</b>	6th July, 2011
<b>Your reference :</b>	UK22-14873
<b>Our reference :</b>	Test Report 11/4779 Batch 2
<b>Location :</b>	MPS
<b>Date samples received :</b>	24th June, 2011
<b>Status :</b>	Final report
<b>Issue :</b>	1

Twenty six samples were received for analysis on 24th June, 2011, which was completed on 6th July 2011. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**J W Farrell- Jones CChem FRSC**  
**Chartered Chemist**

# **Jones Environmental Laboratory**

**Client Name:** Environ

**Report : Solid**

**Reference:** UK22-14873

**Location:** MPS

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

**Contact:** Michael Hazlehurst

**JE Job No.:** 11/4779

J E Sample No.	24-25	26-27	28-30	31-32	33-35	36-37	38-40	41-42	43-44	45-46	Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-11	MPS-SB-11	MPS-SB-12	MPS-SB-12	MPS-SB-13	MPS-SB-13	MPS-SB-14	MPS-SB-14	MPS-SB-14	MPS-SB-15			
Depth	1.2-1.5	5.5-6.0	0.3-0.5	4.5-5.0	0.2-0.3	5.5-6.0	0.3-0.5	2.0-2.5	3.5	0.5-1.0			
COC No / misc													
Containers	V	V	VB	V	VB	V	VB	V	V	V			
Sample Date	21/06/2011	21/06/2011	21/06/2011	21/06/2011	21/06/2011	21/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	LOD	Units	Method No.
Antimony	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Arsenic #	4.5	3.6	1.5	2.4	8.6	2.3	6.2	3.7	1.6	1.1	<0.5	mg/kg	TM30/PM15
Cadmium #	0.4	0.3	0.5	0.4	0.2	0.3	0.4	0.4	0.3	0.3	<0.1	mg/kg	TM30/PM15
Chromium #	20.4	14.1	11.8	16.2	15.5	15.4	15.8	14.5	15.1	12.6	<0.5	mg/kg	TM30/PM15
Cobalt #	3.0	1.4	<0.5	1.9	2.6	1.6	1.6	1.2	0.9	0.8	<0.5	mg/kg	TM30/PM15
Copper #	14	7	3	7	15	7	9	6	6	4	<1	mg/kg	TM30/PM15
Lead #	20	<5	<5	<5	8	<5	7	7	17	<5	<5	mg/kg	TM30/PM15
Manganese #	81	51	48	63	112	59	95	57	55	46	<1	mg/kg	TM30/PM15
Mercury #	0.4	0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.6	<0.1	mg/kg	TM30/PM15
Nickel #	14.2	12.5	4.5	13.2	49.6	10.7	8.4	10.0	7.9	7.4	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Thallium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Tin	1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	mg/kg	TM30/PM15
Total Sulphate	3219	1044	1019	1783	5252	1678	2920	1206	1385	728	<50	mg/kg	TM50/PM15
Vanadium	13	14	6	15	14	12	15	14	11	8	<1	mg/kg	TM30/PM15
Zinc #	154	24	7	26	43	24	21	23	24	14	<5	mg/kg	TM30/PM15
<b>PAH MS</b>													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.41	<0.20	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	<0.15	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.20	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.15	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.20	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.07	0.05	<0.15	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.07	0.05	<0.15	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.09	0.08	<0.30	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.04	<0.10	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	0.09	<0.07	<0.35	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.20	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	<0.04	<0.20	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.20	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	<0.04	<0.20	<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.7	<3.0	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.25	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.10	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	116	101	122	109	110	114	112	110	125	102	<0	%	TM4/PM8
VOC TICs	-	-	ND	-	ND	-	-	-	See Attached	-		None	TM15/PM10
SVOC TICs	-	-	See Attached	-	ND	-	-	-	See Attached	-		None	TM10/PM8
EPH >C8-C10 #	<5	<5	<5	<5	<5	<5	<5	<5	29	<5	<5	mg/kg	TM5/PM8
EPH >C10-C20 #	<10	<10	<10	<10	<10	<10	<10	<10	488	<10	<10	mg/kg	TM5/PM8

**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

# **Jones Environmental Laboratory**

**Client Name:** Environ

**Report : Solid**

**Reference:** UK22-14873

**Location:** MPS

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

**Contact:** Michael Hazlehurst

**JE Job No.:** 11/4779

J E Sample No.	47-48	49-50	53-54	55-57	58-60	61-63	64-65	66-68	69-70	71-72	Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-15	MPS-SB-18	MPS-SB-17	MPS-SB-18	MPS-SB-17	MPS-SB-19A	MPS-SB-19B	MPS-SB-20	MPS-SB-20	MPS-SB-21			
Depth	3.0-3.5	2.5-3.0	3.0	0.5	0.3	0.8-1.0	4.1-4.5	0.8-1.0	1.6-2.0	0.3-0.5			
COC No / misc													
Containers	V	V	V	V B	V B	V B	V	V B	V	V			
Sample Date	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	23/06/2011			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2	LOD	Units	Method No.
Date of Receipt	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011			
Antimony	<1	<1	<1	29	<1	2	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Arsenic #	3.2	2.0	1.4	21.0	1.3	13.3	2.6	1.8	1.8	2.2	<0.5	mg/kg	TM30/PM15
Cadmium #	0.3	0.3	0.3	2.3	0.5	0.6	0.4	0.3	0.3	0.3	<0.1	mg/kg	TM30/PM15
Chromium #	16.8	17.4	18.1	61.1	13.6	27.3	16.1	17.4	16.4	19.1	<0.5	mg/kg	TM30/PM15
Cobalt #	1.7	2.1	0.8	21.0	1.3	8.3	1.8	1.6	1.2	1.4	<0.5	mg/kg	TM30/PM15
Copper #	6	5	7	3509	112	82	7	5	4	5	<1	mg/kg	TM30/PM15
Lead #	<5	<5	<5	884	17	102	<5	<5	<5	<5	<5	mg/kg	TM30/PM15
Manganese #	65	55	29	757	59	430	67	72	50	53	<1	mg/kg	TM30/PM15
Mercury #	0.5	0.5	0.4	1.0	0.4	0.4	0.5	0.5	0.3	0.4	<0.1	mg/kg	TM30/PM15
Nickel #	14.5	10.6	18.0	78.5	14.9	66.3	13.7	11.6	10.0	12.4	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	8	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Thallium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Tin	<1	<1	<1	155	2	3	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Total Sulphate	688	1090	1364	1557	883	5617	779	2775	1476	1776	<50	mg/kg	TM50/PM15
Vanadium	13	13	14	64	23	115	13	13	10	14	<1	mg/kg	TM30/PM15
Zinc #	23	26	30	1360	52	421	29	22	21	40	<5	mg/kg	TM30/PM15
<b>PAH MS</b>													
Naphthalene #	<0.04	<0.04	<0.04	0.59	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	0.43	<0.30	<0.30	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.40	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	0.08	<0.03	0.65	<0.30	<0.30	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.40	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	0.08	<0.03	1.38	<0.30	<0.30	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	0.07	<0.03	1.45	<0.30	<0.30	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	<0.06	0.08	<0.06	1.76	<0.60	<0.60	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	0.05	<0.02	1.45	<0.20	<0.20	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	2.79	<0.70	<0.70	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	1.47	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	1.84	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	0.44	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	1.76	<0.40	<0.40	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	16.0	<6.0	<6.0	<0.6	<0.6	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	2.01	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	0.78	<0.20	<0.20	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	117	113	120	99	94	100	108	120	117	112	<0	%	TM4/PM8
VOC TICs	-	ND	ND	ND	-	-	-	-	-	-		None	TM15/PM10
SVOC TICs	-	ND	ND	See Attached	-	-	-	-	-	-		None	TM10/PM8
EPH >C8-C10 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	TM5/PM8
EPH >C10-C20 #	28	<10	<10	90	<10	605	<10	<10	<10	<10	<10	mg/kg	TM5/PM8

**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

# **Jones Environmental Laboratory**

**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**Report : Solid**

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	73-74	75-77	78-79	80-81	82-83						Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-21	MPS-SB-16	MPS-SB-16	MPS-SB-07	MPS-SB-07								
Depth	1.6-2.0	0.6-1.0	1.7-2.0	1.1-1.5	3.1-3.5								
COC No / misc													
Containers	V	V B	V	V	V								
Sample Date	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	2	2	2	2	2						LOD	Units	Method No.
Date of Receipt	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011								
Antimony	<1	1	1	<1	<1						<1	mg/kg	TM30/PM15
Arsenic #	1.9	5.3	4.2	6.0	5.3						<0.5	mg/kg	TM30/PM15
Cadmium #	0.3	0.4	0.3	0.2	0.3						<0.1	mg/kg	TM30/PM15
Chromium #	15.8	16.4	17.0	14.1	15.9						<0.5	mg/kg	TM30/PM15
Cobalt #	1.0	2.4	2.6	1.4	1.2						<0.5	mg/kg	TM30/PM15
Copper #	4	20	29	12	10						<1	mg/kg	TM30/PM15
Lead #	<5	34	108	5	<5						<5	mg/kg	TM30/PM15
Manganese #	52	102	150	68	58						<1	mg/kg	TM30/PM15
Mercury #	0.5	0.5	1.5	0.5	0.5						<0.1	mg/kg	TM30/PM15
Nickel #	10.0	13.9	13.9	11.1	11.7						<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1						<1	mg/kg	TM30/PM15
Thallium	<1	<1	<1	<1	<1						<1	mg/kg	TM30/PM15
Tin	<1	2	17	<1	<1						<1	mg/kg	TM30/PM15
Total Sulphate	1443	1109	1501	2260	2595						<50	mg/kg	TM50/PM15
Vanadium	10	16	15	17	18						<1	mg/kg	TM30/PM15
Zinc #	20	32	33	29	19						<5	mg/kg	TM30/PM15
<b>PAH MS</b>													
Naphthalene #	<0.04	0.96	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	2.81	0.05	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<1.00	<0.05	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.80	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	5.61	0.11	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	1.97	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	20.61	0.40	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	20.20	0.38	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	<0.06	19.64	0.40	<0.06	<0.06						<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	15.08	0.30	<0.02	<0.02						<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	29.35	0.51	<0.07	<0.07						<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	18.59	0.30	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	16.73	0.29	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	2.71	0.05	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	16.83	0.27	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	171.1	3.1	<0.6	<0.6						<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	21.13	0.37	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	8.22	0.14	<0.02	<0.02						<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	109	93	110	117	103						<0	%	TM4/PM8
VOC TICs	ND	-	-	ND	-						None		TM15/PM10
SVOC TICs	ND	-	-	ND	-						None		TM10/PM8
EPH >C8-C10 #	<5	<5	<5	<5	<5						<5	mg/kg	TM5/PM8
EPH >C10-C20 #	<10	21	<10	<10	<10						<10	mg/kg	TM5/PM8



**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms



**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**SVOC Report : Solid**

[illegible]

# Jones Environmental Laboratory

**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**VOC Report :** Solid

J E Sample No.	28-30	33-35	43-44	49-50	53-54	55-57	73-74	80-81			Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-12	MPS-SB-13	MPS-SB-14	MPS-SB-18	MPS-SB-17	MPS-SB-18	MPS-SB-21	MPS-SB-07					
Depth	0.3-0.5	0.2-0.3	3.5	2.5-3.0	3.0	0.5	1.6-2.0	1.1-1.5					
COC No / misc													
Containers	V B	V B	V	V	V	V B	V	V					
Sample Date	21/06/2011	21/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011	23/06/2011	23/06/2011					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	2	2	2	2	2	2	2	2					
Date of Receipt	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011	24/06/2011			LOD	Units	Method No.
<b>VOC MS</b>													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2 <sup>SV</sup>	<2	<2			<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether <sup>#</sup>	<2	<2	<2	<2	<2	<2 <sup>SV</sup>	<2	<2			<2	ug/kg	TM15/PM10
Chloromethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2 <sup>SV</sup>	<2	<2			<2	ug/kg	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1 <sup>SV</sup>	<1	<1			<1	ug/kg	TM15/PM10
Chloroethane <sup>#</sup>	<2	<2	<2	<2	<2	<2 <sup>SV</sup>	<2	<2			<2	ug/kg	TM15/PM10
Trichlorofluoromethane <sup>#</sup>	<2	<2	<2	<2	<2	<2 <sup>SV</sup>	<2	<2			<2	ug/kg	TM15/PM10
1,1-Dichloroethene <sup>#</sup>	<6	<6	<6	<6	<6	<6 <sup>SV</sup>	<6	<6			<6	ug/kg	TM15/PM10
Dichloromethane <sup>#</sup>	<7	<7	<7	<7	<7	<7 <sup>SV</sup>	<7	<7			<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,1-Dichloroethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
Bromochloromethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Chloroform <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,1-Dichloropropene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Carbon tetrachloride <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
1,2-Dichloroethane <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
Benzene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Trichloroethene <sup>#</sup>	<3	<3	<3	<3	<3	117 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,2-Dichloropropane <sup>#</sup>	<6	<6	<6	<6	<6	<6 <sup>SV</sup>	<6	<6			<6	ug/kg	TM15/PM10
Dibromomethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Bromodichloromethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
Toluene <sup>#</sup>	<3	<3	38	<3	<3	6 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Tetrachloroethene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,3-Dichloropropane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Dibromochloromethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,2-Dibromoethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Chlorobenzene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Ethylbenzene <sup>#</sup>	<3	<3	220	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
p/m-Xylene <sup>#</sup>	<6	<6	745	<6	<6	<6 <sup>SV</sup>	<6	<6			<6	ug/kg	TM15/PM10
o-Xylene <sup>#</sup>	<3	<3	814	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Styrene <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Bromoform <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Isopropylbenzene <sup>#</sup>	<3	<3	128	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane <sup>#</sup>	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2 <sup>SV</sup>	<2	<2			<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
Propylbenzene <sup>#</sup>	<4	<4	226	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene <sup>#</sup>	<3	<3	693	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3 <sup>SV</sup>	<3	<3			<3	ug/kg	TM15/PM10
tert-Butylbenzene <sup>#</sup>	<5	<5	<5	<5	<5	<5 <sup>SV</sup>	<5	<5			<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene <sup>#</sup>	<6	<6	2523 <sup>++</sup>	<6	<6	<6 <sup>SV</sup>	<6	<6			<6	ug/kg	TM15/PM10
sec-Butylbenzene <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
4-Isopropyltoluene <sup>#</sup>	<4	<4	122	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
n-Butylbenzene <sup>#</sup>	<4	<4	326	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane <sup>#</sup>	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene <sup>#</sup>	<7	<7	<7	<7	<7	<7 <sup>SV</sup>	<7	<7			<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4 <sup>SV</sup>	<4	<4			<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	6623 <sup>++</sup>	<27	<27	<27 <sup>SV</sup>	<27	<27			<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene <sup>#</sup>	<7	<7	<7	<7	<7	<7 <sup>SV</sup>	<7	<7			<7	ug/kg	TM15/PM10

**VOCs - Tentatively Identified Compounds (TICs)**

**Job number:** 11/4779  
**Sample number:** 44  
**Sample identity:** MPS-SB-14  
**Sample depth:** 3.5  
**Sample Type:** Soil  
**Units:** ug/kg

**Method** TM15/PM10

*note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.*

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
Cyclohexane, methyl-	4.63	134
Cyclohexane, ethyl-	5.50	190
1-Ethyl-4-methylcyclohexane	6.04	130
Cyclohexanone, 2,3-dimethyl-	6.18	489
Benzene, (1-methylethyl)-	6.24	375
Benzene, propyl-	6.45	313
Decane	6.52	2609
Benzene, 1-ethyl-2-methyl-	6.65	1000
Benzene, 1,2,3-trimethyl-	6.95	1669
2-Tolyloxirane	7.05	646
Benzene, 1,3-diethyl-	7.09	654
Undecane	7.13	3134
Benzene, 1-methyl-4-propyl-	7.18	606
Benzene, 1-ethyl-2,4-dimethyl-	7.24	1161
Benzene, 4-ethyl-1,2-dimethyl-	7.28	1063
Benzene, 1,2,4,5-tetramethyl-	7.52	893
Dodecane	7.69	4582
Undecane, 2,6-dimethyl-	7.76	1620
Benzene, (3-methyl-2-butenyl)-	7.94	1149
Tridecane	8.21	3166
Benzene, (1-methyl-1-butenyl)-	8.36	1066
Dodecane, 2,6,10-trimethyl-	8.61	795
Naphthalene, 1-methyl-	8.68	1527
Tetradecane	8.72	1408
Naphthalene, 2-methyl-	8.79	1521

### SVOCs - Tentatively Identified Compounds (TICs)

**Job number:** 11/4779  
**Sample number:** 28  
**Sample identity:** MPS-SB-12  
**Sample depth:** 0.3-0.5  
**Sample Type:** Soil  
**Units:** ug/kg

**Method**      **TM16/PM8**

**note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.**

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
Pentadecane	9.05	296
Hexadecane	9.63	362
Heptadecane	10.16	366
Octadecane	10.63	359
Hexadecane, 2,6,10,14-tetramethyl-	10.68	243
Nonadecane	11.06	377
Eicosane	11.46	286
Heneicosane	11.84	259
Docosane	12.20	192

**SVOCs - Tentatively Identified Compounds (TICs)**

**Job number:** 11/4779  
**Sample number:** 43  
**Sample identity:** MPS-SB-14  
**Sample depth:** 3.5  
**Sample Type:** Soil  
**Units:** ug/kg

**Method** TM16/PM8

*note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.*

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
Decane	4.08	966
Decane, 2-methyl-	5.48	878
Decane, 3-methyl-	5.55	577
trans-Decalin, 2-methyl-	5.77	2191
Undecane	5.93	5416
Decane, 3,8-dimethyl-	6.63	1993
Undecane, 3-methyl-	6.69	1433
Dodecane	6.95	8396
Undecane, 3,6-dimethyl-	7.08	3787
Cyclohexane, (4-methylpentyl)-	7.18	2262
Dodecane, 4-methyl-	7.44	1612
Undecane, 2,10-dimethyl-	7.48	1544
Naphthalene, 1-methyl-	7.50	1440
Nonane, 3-methyl-	7.56	3870
Tridecane	7.74	8172
Cyclotetradecane	7.78	1178
Naphthalene, 2-ethyl-	8.12	3131
Naphthalene, 1,6-dimethyl-	8.19	2100
Naphthalene, 1,6-dimethyl-	8.29	4723
Tetradecane	8.43	8221
Naphthalene, 2,6-dimethyl-	8.49	349
Cyclohexane, octyl-	8.67	2590
Cyclononane, 1,1,4,4,7,7-hexamethyl-	8.80	1162
Dodecane, 2,6,11-trimethyl-	8.83	2571
Naphthalene, 1,6,7-trimethyl-	8.98	1058
Naphthalene, 1,6,7-trimethyl-	9.00	1130
Pentadecane	9.05	4338
Naphthalene, 1,4,6-trimethyl-	9.09	721
Naphthalene, 1,4,6-trimethyl-	9.19	1026
Hexadecane	9.63	2262

**Jones Environmental Laboratory**

### SVOCs - Tentatively Identified Compounds (TICs)

**Job number:** 11/4779

**Method**      **TM16/PM8**

**Sample number:** 55

**Sample identity:** MPS-SB-18

**Sample depth:** 0.5

**Sample Type:** Soil

**Units:** ug/kg

**note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.**

[illegible]



## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

### SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C

Asbestos screens where requested will be undertaken by a UKAS accredited laboratory.

### WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples. All samples are treated as groundwaters and analysis performed on settled samples unless we are instructed otherwise.

### DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

*The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:*

\$	Sample temperature on receipt considered inappropriate for analysis requested.
^	Samples exceeding recommended holding times.
&	Samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials).
~	No sampling date given, unable to confirm if samples are with acceptable holding times.

### SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130%. Results are not surrogate corrected.

### AQCs

Where AQC's fall outside UKAS/MCERTS criteria analysis is repeated if possible.

### NOTE

Data is only accredited when all the requirements of our Quality System have been met. In certain circumstances where the requirements have not been met, the laboratory may issue the data in its final report if it believes that the validity of the data has not been compromised but will remove the accreditation. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

**ABBREVIATIONS and ACRONYMS USED**

#	UKAS accredited.
M	MCERTS accredited.
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
SS	Calibrated against a single substance.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
W	Results expressed on as received basis.
+	Accreditation has been removed from this result see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
DR	Dilution required.

[illegible]



## Jones Environmental Laboratory

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No.4225

<b>Attention :</b>	Michael Hazlehurst
<b>Date :</b>	6th July, 2011
<b>Your reference :</b>	UK22-14873
<b>Our reference :</b>	Test Report 11/4779 Batch 3
<b>Location :</b>	MPS
<b>Date samples received :</b>	28th June, 2011
<b>Status :</b>	Final report
<b>Issue :</b>	1

Fourteen samples were received for analysis on 28th June, 2011, which was completed on 6th July 2011. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**J W Farrell- Jones CChem FRSC**  
**Chartered Chemist**

# Jones Environmental Laboratory

**Client Name:** Environ

**Report : Solid**

**Reference:** UK22-14873

**Location:** MPS

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

**Contact:** Michael Hazlehurst

**JE Job No.:** 11/4779

J E Sample No.	84-85	86-87	88-89	90-91	92-93	94-95	96-98	99-100	101-103	104-105	Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-22	MPS-SB-22	MPS-SB-23	MPS-SB-23	MPS-SB-25	MPS-SB-25	MPS-SB-27	MPS-SB-27	MPS-SB-28	MPS-SB-28			
Depth	2.8-2.85	18.09-18.11	1.7-1.8	18.7-18.77	0.5-0.6	25.5-25.8	0.4-0.5	2.3-2.5	0.3-0.4	2.3-2.5			
COC No / misc													
Containers	V	V	V	V	V	V	V B	V	V B	V			
Sample Date	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	23/06/2011	25/06/2011	27/06/2011			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	3	3	3	3	3	3	3	3	3	3			
Date of Receipt	28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011	LOD	Units	Method No.
Antimony	<1	<1	<1	<1	1	<1	<1	<1	2	<1	<1	mg/kg	TM30/PM15
Arsenic #	1.3	1.8	1.4	2.4	4.1	<0.5	2.9	1.8	5.8	2.4	<0.5	mg/kg	TM30/PM15
Cadmium #	0.3	0.6	0.3	0.2	0.5	0.4	0.4	0.3	0.3	0.3	<0.1	mg/kg	TM30/PM15
Chromium #	15.9	14.6	13.8	15.7	22.0	13.6	16.9	14.7	15.8	17.2	<0.5	mg/kg	TM30/PM15
Cobalt #	1.3	1.0	0.8	0.8	1.8	0.6	2.1	1.0	2.0	1.4	<0.5	mg/kg	TM30/PM15
Copper #	9	6	9	3	5	2	16	4	15	7	<1	mg/kg	TM30/PM15
Lead #	8	<5	<5	<5	<5	<5	19	<5	40	8	<5	mg/kg	TM30/PM15
Manganese #	46	38	26	43	34	38	66	43	102	63	<1	mg/kg	TM30/PM15
Mercury #	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	<0.1	mg/kg	TM30/PM15
Nickel #	10.6	14.1	10.2	8.1	15.3	4.5	16.5	9.8	10.2	11.8	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Thallium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Tin	<1	<1	1	<1	<1	<1	1	<1	<1	<1	<1	mg/kg	TM30/PM15
Total Sulphate	5221	1900	1188	957	1029	799	1419	1376	2281	1291	<50	mg/kg	TM50/PM15
Vanadium	12	10	10	11	23	8	15	9	13	10	<1	mg/kg	TM30/PM15
Zinc #	31	27	23	23	34	16	38	19	38	22	<5	mg/kg	TM30/PM15
<b>PAH MS</b>													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.14	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.23	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	0.18	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	0.16	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	0.15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.31	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.14	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.16	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.16	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.7	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.09	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	106	108	102	108	103	102	111	108	110	127	<0	%	TM4/PM8
VOC TICs	-	-	-	-	-	-	ND	-	-	ND		None	TM15/PM10
SVOC TICs	-	-	-	-	-	-	ND	-	-	ND		None	TM10/PM8
EPH >C8-C10 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	TM5/PM8
EPH >C10-C20 #	<10	<10	<10	<10	<10	<10	<10	<10	44	<10	<10	mg/kg	TM5/PM8

**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

# **Jones Environmental Laboratory**

**Client Name:** Environ

**Report : Solid**

**Reference:** UK22-14873

**Location:** MPS

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

**Contact:** Michael Hazlehurst

**JE Job No.:** 11/4779

J E Sample No.	106-108	109-110	111-112	113-114							Please see attached notes for all abbreviations and acronyms			
Sample ID	MPS-SB-29	MPS-SB-29	MPS-SB-26	MPS-SB-26										
Depth	0.3-0.5	1.8-2.0	0.4-0.5	20.4-20.5										
COC No / misc														
Containers	V B	V	V	V										
Sample Date	27/06/2011	27/06/2011	25/06/2011	25/06/2011										
Sample Type	Soil	Soil	Soil	Soil										
Batch Number	3	3	3	3										
Date of Receipt	28/06/2011	28/06/2011	28/06/2011	28/06/2011								LOD	Units	Method No.
Antimony	<1	<1	1	<1							<1	mg/kg	TM30/PM15	
Arsenic #	2.2	2.5	3.5	1.4							<0.5	mg/kg	TM30/PM15	
Cadmium #	0.3	0.2	0.6	0.3							<0.1	mg/kg	TM30/PM15	
Chromium #	13.9	18.1	22.1	16.8							<0.5	mg/kg	TM30/PM15	
Cobalt #	1.1	1.0	1.5	0.8							<0.5	mg/kg	TM30/PM15	
Copper #	9	7	8	10							<1	mg/kg	TM30/PM15	
Lead #	10	<5	<5	<5							<5	mg/kg	TM30/PM15	
Manganese #	46	46	44	28							<1	mg/kg	TM30/PM15	
Mercury #	0.5	0.4	0.5	0.4							<0.1	mg/kg	TM30/PM15	
Nickel #	11.3	14.9	23.6	17.5							<0.7	mg/kg	TM30/PM15	
Selenium #	<1	<1	<1	<1							<1	mg/kg	TM30/PM15	
Thallium	<1	<1	<1	<1							<1	mg/kg	TM30/PM15	
Tin	<1	<1	<1	<1							<1	mg/kg	TM30/PM15	
Total Sulphate	816	700	792	758							<50	mg/kg	TM50/PM15	
Vanadium	15	17	25	14							<1	mg/kg	TM30/PM15	
Zinc #	32	25	39	31							<5	mg/kg	TM30/PM15	
<b>PAH MS</b>														
Naphthalene #	0.08	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
Acenaphthylene	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8	
Acenaphthene #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8	
Fluorene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
Phenanthrene #	0.12	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8	
Anthracene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
Fluoranthene #	0.20	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8	
Pyrene #	0.20	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8	
Benz(a)anthracene #	0.29	<0.06	<0.06	<0.06							<0.06	mg/kg	TM4/PM8	
Chrysene #	0.21	<0.02	<0.02	<0.02							<0.02	mg/kg	TM4/PM8	
Benzo(bk)fluoranthene #	0.31	<0.07	<0.07	<0.07							<0.07	mg/kg	TM4/PM8	
Benzo(a)pyrene #	0.17	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
Indeno(123cd)pyrene #	0.13	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
Dibenzo(ah)anthracene #	0.06	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
Benzo(ghi)perylene #	0.17	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8	
PAH 16 Total	1.9	<0.6	<0.6	<0.6							<0.6	mg/kg	TM4/PM8	
Benzo(b)fluoranthene	0.22	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8	
Benzo(k)fluoranthene	0.09	<0.02	<0.02	<0.02							<0.02	mg/kg	TM4/PM8	
PAH Surrogate % Recovery	105	109	115	123							<0	%	TM4/PM8	
VOC TICs	-	ND	-	-								None	TM15/PM10	
SVOC TICs	-	ND	-	-								None	TM10/PM8	
EPH >C8-C10 #	<5	<5	<5	<5							<5	mg/kg	TM5/PM8	
EPH >C10-C20 #	<10	<10	<10	<10							<10	mg/kg	TM5/PM8	

**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

**Report : Solid**

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms



**Client Name:** Environ  
**Reference:** UK22-14873  
**Location:** MPS  
**Contact:** Michael Hazlehurst  
**JE Job No.:** 11/4779

SVOC Report : Solid

J E Sample No.	96-98	104-105	109-110								Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-27	MPS-SB-28	MPS-SB-29										
Depth	0.4-0.5	2.3-2.5	1.8-2.0										
COC No / misc													
Containers	V B	V	V										
Sample Date	23/06/2011	27/06/2011	27/06/2011										
Sample Type	Soil	Soil	Soil										
Batch Number	3	3	3										
Date of Receipt	28/06/2011	28/06/2011	28/06/2011								LOD	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10	<10								<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
2,4-Dichlorophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10								<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10								<10	ug/kg	TM16/PM8
Phenol	<10	<10	<10								<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene	<10	<10	<10								<10	ug/kg	TM16/PM8
2-Methylnaphthalene	<10	<10	<10								<10	ug/kg	TM16/PM8
Naphthalene	<10	<10	<10								<10	ug/kg	TM16/PM8
Acenaphthylene	<10	<10	<10								<10	ug/kg	TM16/PM8
Acenaphthene	<10	<10	<10								<10	ug/kg	TM16/PM8
Fluorene	<10	<10	<10								<10	ug/kg	TM16/PM8
Phenanthrene	<10	<10	<10								<10	ug/kg	TM16/PM8
Anthracene	<10	<10	<10								<10	ug/kg	TM16/PM8
Fluoranthene	<10	<10	<10								<10	ug/kg	TM16/PM8
Pyrene	<10	<10	<10								<10	ug/kg	TM16/PM8
Benz(a)anthracene	<10	<10	<10								<10	ug/kg	TM16/PM8
Chrysene	<10	<10	<10								<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	<10	<10	<10								<10	ug/kg	TM16/PM8
Benzo(a)pyrene	<10	<10	<10								<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	<10	<10	<10								<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	<10	<10	<10								<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	<10	<10	<10								<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<10	<10	<10								<10	ug/kg	TM16/PM8
Butylbenzyl phthalate	<10	<10	<10								<10	ug/kg	TM16/PM8
Di-n-butyl phthalate	<10	<10	<10								<10	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<10	<10	<10								<10	ug/kg	TM16/PM8
Diethyl phthalate	<10	<10	<10								<10	ug/kg	TM16/PM8
Dimethyl phthalate	<10	<10	<10								<10	ug/kg	TM16/PM8

***Client Name:*** Environ  
***Reference:*** UK22-14873  
***Location:*** MPS  
***Contact:*** Michael Hazlehurst  
***JE Job No.:*** 11/4779

**SVOC Report : Solid**

[illegible]

Client Name: Environ

VOC Report : Solid

Reference: UK22-14873

Location: MPS

Contact: Michael Hazlehurst

JE Job No.: 11/4779

J E Sample No.	96-98	104-105	109-110								Please see attached notes for all abbreviations and acronyms		
Sample ID	MPS-SB-27	MPS-SB-28	MPS-SB-29										
Depth	0.4-0.5	2.3-2.5	1.8-2.0										
COC No / misc													
Containers	V B	V	V										
Sample Date	23/06/2011	27/06/2011	27/06/2011										
Sample Type	Soil	Soil	Soil										
Batch Number	3	3	3								LOD	Units	Method No.
Date of Receipt	28/06/2011	28/06/2011	28/06/2011										
<b>VOC MS</b>													
Dichlorodifluoromethane	<2 <sup>SV</sup>	<2	<2								<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether <sup>#</sup>	<2 <sup>SV</sup>	<2	6								<2	ug/kg	TM15/PM10
Chloromethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Vinyl Chloride	<2 <sup>SV</sup>	<2	<2								<2	ug/kg	TM15/PM10
Bromomethane	<1 <sup>SV</sup>	<1	<1								<1	ug/kg	TM15/PM10
Chloroethane <sup>#</sup>	<2 <sup>SV</sup>	<2	<2								<2	ug/kg	TM15/PM10
Trichlorofluoromethane <sup>#</sup>	<2 <sup>SV</sup>	<2	<2								<2	ug/kg	TM15/PM10
1,1-Dichloroethene <sup>#</sup>	<6 <sup>SV</sup>	<6	<6								<6	ug/kg	TM15/PM10
Dichloromethane <sup>#</sup>	35 <sup>SV</sup>	24	15								<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,1-Dichloroethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
Bromochloromethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Chloroform <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,1-Dichloropropene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Carbon tetrachloride <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
1,2-Dichloroethane <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
Benzene <sup>#</sup>	25 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Trichloroethene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,2-Dichloropropane <sup>#</sup>	<6 <sup>SV</sup>	<6	<6								<6	ug/kg	TM15/PM10
Dibromomethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Bromodichloromethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
Toluene <sup>#</sup>	19 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Tetrachloroethene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,3-Dichloropropane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Dibromochloromethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,2-Dibromoethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Chlorobenzene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Ethylbenzene <sup>#</sup>	4 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
p/m-Xylene <sup>#</sup>	45 <sup>SV</sup>	<6	<6								<6	ug/kg	TM15/PM10
o-Xylene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Styrene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Bromoform <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Isopropylbenzene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
Bromobenzene	<2 <sup>SV</sup>	<2	<2								<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
Propylbenzene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene <sup>#</sup>	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3 <sup>SV</sup>	<3	<3								<3	ug/kg	TM15/PM10
tert-Butylbenzene <sup>#</sup>	<5 <sup>SV</sup>	<5	<5								<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene <sup>#</sup>	13 <sup>SV</sup>	<6	<6								<6	ug/kg	TM15/PM10
sec-Butylbenzene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
4-Isopropyltoluene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
n-Butylbenzene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane <sup>#</sup>	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene <sup>#</sup>	<7 <sup>SV</sup>	<7	<7								<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4 <sup>SV</sup>	<4	<4								<4	ug/kg	TM15/PM10
Naphthalene	<27 <sup>SV</sup>	<27	<27								<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene <sup>#</sup>	<7 <sup>SV</sup>	<7	<7								<7	ug/kg	TM15/PM10

## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

### SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C

Asbestos screens where requested will be undertaken by a UKAS accredited laboratory.

### WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples. All samples are treated as groundwaters and analysis performed on settled samples unless we are instructed otherwise.

### DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

*The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:*

\$	Sample temperature on receipt considered inappropriate for analysis requested.
^	Samples exceeding recommended holding times.
&	Samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials).
~	No sampling date given, unable to confirm if samples are with acceptable holding times.

### SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130%. Results are not surrogate corrected.

### AQCs

Where AQC's fall outside UKAS/MCERTS criteria analysis is repeated if possible.

### NOTE

Data is only accredited when all the requirements of our Quality System have been met. In certain circumstances where the requirements have not been met, the laboratory may issue the data in its final report if it believes that the validity of the data has not been compromised but will remove the accreditation. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

## ABBREVIATIONS and ACRONYMS USED

#	UKAS accredited.
M	MCERTS accredited.
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
SS	Calibrated against a single substance.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
W	Results expressed on as received basis.
+	Accreditation has been removed from this result see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
DR	Dilution required.

[illegible]

## **Annex E: ENVIRON Generic Assessment Criteria**

	ENVIRON GAC (Commercial)	
		Units
<b>Metals</b>		
Antimony	7,550	mg/kg
Arsenic	635	mg/kg
Cadmium	230	mg/kg
Chromium	35	mg/kg
Cobalt	NG	mg/kg
Copper	71,700	mg/kg
Lead	750	mg/kg
Manganese	NG	mg/kg
Mercury	3,640	mg/kg
Nickel	1,790	mg/kg
Selenium	13,000	mg/kg
Thallium	NG	mg/kg
Tin	NG	mg/kg
Vanadium	3,160	mg/kg
Zinc	665,000	mg/kg
<b>Others</b>		
Asbestos Screen	N/A	None
pH	N/A	pH units
Sulphide	N/A	mg/kg
Total Sulphate	N/A	mg/kg
Fraction Organic Carbon	N/A	None
<b>PAHs</b>		
Naphthalene	75	mg/kg
Acenaphthylene	162	mg/kg
Acenaphthene	56.7	mg/kg
Fluorene	160	mg/kg
Phenanthrene	21,900	mg/kg
Anthracene	522,000	mg/kg
Fluoranthene	22,600	mg/kg
Pyrene	54,300	mg/kg
Benz(a)anthracene	91	mg/kg
Chrysene	140.0	mg/kg
Benzo(bk)fluoranthene	102	mg/kg
Benzo(a)pyrene	14	mg/kg
Indeno(123cd)pyrene	61.0	mg/kg
Dibenzo(ah)anthracene	13	mg/kg
Benzo(ghi)perylene	658	mg/kg
PAH 16 Total	NG	mg/kg
Benzo(b)fluoranthene	102	mg/kg
Benzo(k)fluoranthene	143	mg/kg
<b>Hydrocarbons</b>		
EPH >C8-C10	N/A	mg/kg
EPH >C10-C20	N/A	mg/kg
EPH >C20-C30	N/A	mg/kg
EPH >C30-C40	N/A	mg/kg
EPH >C8-C40	5,000	mg/kg
<b>PCBs</b>		
PCB 28	0.24	mg/kg
PCB 52	0.24	mg/kg
PCB 101	0.24	mg/kg
PCB 118	0.24	mg/kg
PCB 138	0.24	mg/kg
PCB 153	0.24	mg/kg
PCB 180	0.24	mg/kg
Total 7 PCBs	NG	mg/kg

	ENVIRON GAC (Commercial)	
<b>SVOCs</b>		
2-Chlorophenol	3590	mg/kg
2-Methylphenol	14200	mg/kg
2-Nitrophenol	910.5972844	mg/kg
2,4-Dichlorophenol	3530	mg/kg
2,4-Dimethylphenol	1330	mg/kg
2,4,5-Trichlorophenol	2300	mg/kg
2,4,6-Trichlorophenol	848	mg/kg
4-Chloro-3-methylphenol	8333.156	mg/kg
4-Methylphenol	25800	mg/kg
4-Nitrophenol	1000	mg/kg
Pentachlorophenol	1230	mg/kg
Phenol	3200	mg/kg
2-Chloronaphthalene	113	mg/kg
2-Methylnaphthalene	7148.11124	mg/kg
Bis(2-ethyl-hexyl) phthalate	85400	mg/kg
Butylbenzyl phthalate	942000	mg/kg
Di-n-butyl phthalate	12.9	mg/kg
Di-n-Octyl phthalate	89100	mg/kg
Diethyl phthalate	109	mg/kg
Dimethyl phthalate	275	mg/kg
1,2-Dichlorobenzene	562	mg/kg
1,2,4-Trichlorobenzene	123	mg/kg
1,3-Dichlorobenzene	177	mg/kg
1,4-Dichlorobenzene	221	mg/kg
2-Nitroaniline	651.305	mg/kg
2,4-Dinitrotoluene	3750	mg/kg
2,6-Dinitrotoluene	1860	mg/kg
3-Nitroaniline	200	mg/kg
4-Bromophenylphenylether	0.9827873	mg/kg
4-Chloroaniline	2300	mg/kg
4-Chlorophenylphenylether	0.37833	mg/kg
4-Nitroaniline	170	mg/kg
Azobenzene	151.511	mg/kg
Bis(2-chloro-ethoxy)methane	1.301749	mg/kg
Bis(2-chloro-ethyl)ether	0.2736435	mg/kg
Carbazole	897	mg/kg
Dibenzofuran	6666.492	mg/kg
Hexachlorobenzene	0.199	mg/kg
Hexachlorobutadiene	17.6	mg/kg
Hexachlorocyclopentadiene	1.0913	mg/kg
Hexachloroethane	8.13	mg/kg
Isophorone	887.232	mg/kg
N-nitrosodi-n-propylamine	1.90493	mg/kg
Nitrobenzene	131.262	mg/kg

	ENVIRON GAC (Commercial)	
<b>VOCs</b>		
Dichlorodifluoromethane	1500	mg/kg
Methyl Tertiary Butyl Ether	4020	mg/kg
Chloromethane	0.593	mg/kg
Vinyl Chloride	0.04033	mg/kg
Bromomethane	27.046	mg/kg
Chloroethane	567	mg/kg
Trichlorofluoromethane	2200	mg/kg
1,1-Dichloroethene	15.4	mg/kg
Dichloromethane	399	mg/kg
trans-1-2-Dichloroethene	12.3	mg/kg
1,1-Dichloroethane	148	mg/kg
cis-1-2-Dichloroethene	7.74	mg/kg
2,2-Dichloropropane	20.46	mg/kg
Bromochloromethane	1.1	mg/kg
Chloroform	57.3	mg/kg
1,1,1-Trichloroethane	391.511	mg/kg
1,1-Dichloropropene	12.853	mg/kg
Carbon tetrachloride	1.74	mg/kg
1,2-Dichloroethane	0.356	mg/kg
Benzene	15.826	mg/kg
Trichloroethene	6.611	mg/kg
1,2-Dichloropropane	1.72	mg/kg
Dibromomethane		mg/kg
Bromodichloromethane	1.1	mg/kg
cis-1-3-Dichloropropene	19.358	mg/kg
Toluene	835	mg/kg
trans-1-3-Dichloropropene	12.853	mg/kg
1,1,2-Trichloroethane	51.1	mg/kg
Tetrachloroethene	72.2	mg/kg
1,3-Dichloropropane	12.853	mg/kg
Dibromochloromethane	264	mg/kg
1,2-Dibromoethane		mg/kg
Chlorobenzene	32.8	mg/kg
1,1,1,2-Tetrachloroethane	62.718	mg/kg
Ethylbenzene	508	mg/kg
p/m-Xylene	564	mg/kg
o-Xylene	467	mg/kg
Styrene	607	mg/kg
Bromoform	417	mg/kg
Isopropylbenzene	753	mg/kg
1,1,2,2-Tetrachloroethane	156	mg/kg
Bromobenzene	53.7	mg/kg
1,2,3-Trichloropropane	3.1434	mg/kg
Propylbenzene	399	mg/kg
2-Chlorotoluene	1.42	mg/kg
1,3,5-Trimethylbenzene	12.7	mg/kg
4-Chlorotoluene	1.418	mg/kg
tert-Butylbenzene	440	mg/kg
1,2,4-Trimethylbenzene	22.9	mg/kg
sec-Butylbenzene	1300	mg/kg
4-Isopropyltoluene	388	mg/kg
1,3-Dichlorobenzene	17.7	mg/kg
1,4-Dichlorobenzene	221	mg/kg
n-Butylbenzene	430	mg/kg
1,2-Dichlorobenzene	562	mg/kg
1,2-Dibromo-3-chloropropane	1.037	mg/kg
1,2,4-Trichlorobenzene	123	mg/kg
Hexachlorobutadiene	17.6	mg/kg
1,2,3-Trichlorobenzene	56.8	mg/kg



## **Annex F: MPS Environmental Monitoring Procedures (Prepared by Enemalta)**

F1 Environmental Monitoring

F2 Environmental Aspects Register – Direct

F3 Environmental Aspects Register - Indirect

Environmental aspect	Type of monitoring/ surveillance	Frequency	Data source	Responsible for the implementation	Responsible for the evaluation of Check	Recording form	Notes
Oil rags, wastes contaminated with oils	Visual inspection	once a week	Waste management checklist	Enemalta employee (Users)	Waste site coordinator	Checklist	Ensuring that contaminated waste is disposed in the appropriate containers at collection point
Oil rags, wastes contaminated with oils	Visual inspection	once a week	Waste management checklist	Cleaner	Waste site coordinator	Checklist	Contaminated waste in designed areas are collected by cleaners and disposed in the appropriate collecting facility
Oil rags, wastes contaminated with oils	Visual inspection	Variable	MEPA Waste Consignment Permit application & Waste Consignment Note	Waste carrier (contractor)	Waste site coordinator	MEPA Waste Consignment Permit application & Waste Consignment Note	Obligated to have approval from MEPA for disposal as per IPPC permit obligation 2.8.2.16 -- Collecting of contaminated waste from facility
Empty chemical cans (lubricant aerosol cans, 1000L chemical cans waste, 40Gallon chemical can waste etc)	Visual inspection	once a week	Waste management checklist	Enemalta employee (Users)	Waste site coordinator	Checklist	Obligated to have approval from MEPA for disposal as per IPPC permit obligation 2.8.2.16 -- Ensuring that empty cans are disposed in the appropriate facility
Waste from sea water filtration	Visual inspection	Daily	Waste management checklist	Handy man and Heavy plant driver	Waste site coordinator	Checklist	Waste from sea water filtration is emptied in an appropriate skip. This will be disposed of as mixed waste.
Office Waste	Visual inspection	Weekly	Waste management checklist	Day duty administration cleaners	Waste site coordinator	Checklist	Office waste is being segregated into paper, plastic and mixed waste
General waste-Hazardous and Non-Hazardous	Visual inspection	Weekly	Waste management checklist	Waste site coordinator	Waste site coordinator	Checklist	No storage of waste is permitted for a period exceeding 12 months. Certificates kept on record and made available for inspection for a period of at least 5 years from date of their issue -- Segregation and storage in designated areas protected, as may be appropriate, against spillage, leachate run-off and accidental damage, where applicable, as per IPPC permit obligations 2.8.2.2/3/7/8/9/10/11/27
General waste - Non-hazardous	Contractor waste transfer note	Quarterly	Enemalta Waste Register	Waste site coordinator	Regulatory office staff	Register	Quarterly reporting according to IPPC template S3.1 -- Transfer of waste-reporting
General waste - Non-hazardous	Contractor waste transfer note	Annually	Enemalta Waste Register	Waste site coordinator	Regulatory office staff	Register	Annual reporting according to IPPC template S2.1 -- Transfer of waste-reporting
General waste - Hazardous	MEPA Waste Consignment Permit application & Waste Consignment Note	Quarterly	Enemalta Waste Register	Waste site coordinator	RAO	Register	Quarterly reporting according to IPPC template S3.1 -- Transfer of waste-reporting
General waste - Hazardous	MEPA Waste Consignment Permit application & Waste Consignment Note	Annually	Enemalta Waste Register	Waste site coordinator	RAO	Register	Annual reporting according to IPPC template S2.1 -- Transfer of waste-reporting
Bunds of hazardous waste areas	Visual inspection	Monthly	Bund checklist	Waste site coordinator	RAO	Checklist	Bund containment condition/s
Scrap decommissioned equipment, if any	Visual inspection	yearly	Waste management checklist	Waste site coordinator	Waste site coordinator	Checklist	Obligated to have approval from MEPA for disposal as per IPPC obligation 2.8.2.27
Waste Oils	Visual inspection	Monthly	Waste management checklist	Waste site coordinator	RAO	Checklist	Obligated to have approval from MEPA for disposal as per IPPC permit obligation 2.8.2.11/15 -- Segregation, storage & containment
Waste batteries	Visual inspection	Monthly	Waste management checklist	Waste site coordinator	RAO	Checklist	Obligated to have approval from MEPA for disposal as per IPPC permit obligation 2.8.2.16 -- Segregation and storage in designated areas protected, as may be appropriate, against spillage, leachate run-off and accidental damage.
Waste packaging materials	Visual inspection	Monthly	Waste management checklist	Waste site coordinator	RAO	Checklist	Segregation & storage as per IPPC permit obligation 2.8.2.8.
Waste electrical & electronic equipment	Visual inspection	Monthly	Waste management checklist	Waste site coordinator	RAO	Checklist	Obligated to have approval from MEPA for disposal as per IPPC permit obligation 2.8.2.16 -- Segregation, storage & containment
Fly ash from precipitators	Visual inspection	Daily	Weekly waste management checklist	Waste site coordinator	RAO	Checklist	Segregation, storage & containment. IPPC obligation 2.8.2.6

Environmental aspect	Type of monitoring/ surveillance	Frequency	Data source	Responsible for the implementation	Responsible for the evaluation of Check	Recording form	Notes
Fuel Spills	period check of the interceptor outlets	Daily	Visual inspection of boom	Shift Engineer	Station Manager	Log Sheet	
Fuel Spills	Visual check	Annual	Checklist	Station manager	Station Manager	Checklist	Check of spill response equipment
Spills due to transfer of fuels (ship to tank farm)	pipeline testing	Every 3 years	3rd party Inspection report & certification	Third Party Inspector	Asistant Manager	Inspection report & certification	Pipeline testing (IPPC obligation 2.5.8.5)
Spills due to transfer of fuels (interceptors check - daily)	Visual inspection of interceptor	Daily	Log Sheet	Evaporator's operator	Extension engineer	Auxiliaries Logsheets	Period check of interceptors' outlets (IPPC clause 2.5.7.2)
Spills due to transfer of fuels (interceptors check - monthly)	Visual inspection of interceptor	Monthly	Log Sheet	Maintenance Engineer	Asistant Manager Maintenance (MPS)	Log Sheet stored at STO C shift	Period check of interceptors (IPPC clause 2.5.8.14)
Spills due to transfer of fuels (interceptors certification)	inspection of interceptors by an accredited auditor (IPPC 2.5.8.15)	Every 3 years	Third party inspection	Maintenance Engineer	Third party civil Engineer	Inspection report & certification as per IPPC template S2.11 obligations	see IPPC permit S2.11 & as amended in MEPA correspondence dated 28th August 2009
Surface water discharge	checks for visible oil layers and contaminations	Daily	Visual inspection	Evaporator's operator	Extension engineer	Log Sheet	
Spills due to transfer of fuels, oils, chemicals etc, except uncontaminated water (site above-ground pipelines)	checks for leakages from pipes, pumps, valves & flanges	weekly	Visual inspection	Operations Engineer	Asistant Manager Maintenance (MPS)	log Sheet	weekly inspections required by IPPC obligation 2.5.8.10.
Spills due to transfer of fuels, oils, etc, except uncontaminated water (site above-ground pipelines)	checks for leakages from pipes, pumps, valves & flanges	Every 3 years	Third party inspection	Maintenance Engineer	Asistant Manager Maintenance (MPS)	Inspection report & certification as per IPPC template S2.11 obligations	see IPPC permit S2.11 & as amended in MEPA correspondence dated 28th August 2009
Water discharge from FO tank bund walls	Identification of any cracks or faults; containment of rainwater during episodes of rain; presence of any drain holes; presence of any damp patches which would need to be sealed with waterproof cement.	weekly	Visual inspection of walls or floors	Operations engineer	Station Manager	Bund wall inspection form	reporting of faults and remedial actions
Water discharge from tank bunds	bund wall visual inspection (as per MEPA IPPC letter 14th November 2009)	Annually	Certification of bund walls by third parties (warranted civil engineer)	Maintenance Engineer	Asistant Manager Maintenance (MPS)	Report and certification	as per MEPA revised template Annex I, Updated S2.11
Sea water discharge - dem plant neutralizing pit	Laboratory personnel to perform analysis on ph of pit	Daily	Laboratory mobile ph meter	Chemist	Senior Chemist	Daily lab report	Report found on Server on Enedomain/Enedata/ generation/laboratory/neutralizing pits
Sea water discharge from dem plant neutralizing pit walls	Maintenance to ascertain no cracks present in walls	Annually	Certification	Maintenance Engineer	Asistant Manager Generation	Report	
Sea water outlet discharge - Presence of ClO <sub>2</sub>	Laboratory personnel perform analysis on sea water outlet	weekly	Internal Laboratory	Chemist	Senior Chemist		Report found on Server on Enedomain/Enedata/generation/laboratory/ClO2
Sea water discharge from outlets	temperature and pH analysis	Quarterly	Report of third party laboratory accredited to ISO 17025: 2005	Chemist	Senior Chemist	Report and certification	as per MEPA ELVs in IPPC permit page 104, Schedule 7
Sea water discharge from outlets	Tests for: BOD5, COD, Total Nitrogen, Total Phosphorus, AOX, ClO <sub>2</sub> , Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Tin, Vanadium, Zinc, PCBs, Petroleum Hydrocarbons, Tributyltin compounds, total suspended solids.	Quarterly	Report of third party laboratory accredited to ISO 17025: 2005	Chemist	Senior Chemist	Report and certification as per IPPC permit template S2.7& S3.3 obligations	as per MEPA ELVs in IPPC permit page 104, Schedule 7

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Electricity consumption in used in station units	Manual Reading of electricity meters	Monthly	Electricity Meters	Operations Engineers	Station Manager	System Generation Figures	
Electricity consumption of administration block	Manual Reading of electricity meters	Monthly	Electricity Meters	Maintenance Engineer	RAO	System Generation Figures	
Total Annual Energy Consumption (from electricity & other sources)	Manual Reading of electricity meters	Annual	Electricity Meters	Operations Engineers	Station Manager	Annual Environmental Report, as per template in IPPC permit Schedule 2.3.1, Annual Summary	

Approved

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MPS Station Manager

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Fuel Analysis for HFO	Chemical/physical analysis of the most important parameters, especially % Sulphur not exceeding 1.0%	Each consignment	Fuel Quality Certificate	Fuel Procurement Committee	Station Manager	Fuel Quality Certificate in compliance with IPPC permit Table 2.2.1.1	see IPPC permit obligations from 2.2.1.8 to 2.2.1.13
Fuel Analysis for Diesels	Chemical/physical analysis of the most important parameters, especially % Sulphur not exceeding 0.1%	Each consignment	Fuel Quality Certificate	Fuel Procurement Committee	Station Manager	Fuel Quality Certificate in compliance with IPPC permit obligations 2.2.1.12 to 2.2.1.13	see IPPC permit obligations from 2.2.1.8 to 2.2.1.13
Fuel Consumption for HFO	Mass of fuel consumed	Daily	Tank Gauge	Operations Engineer	Station Manager	Fuel Recording Logsheet	Mass of fuel consumed per plant required for IPPC annual consumptions are detailed in Schedule 2.
Fuel Consumption for Diesel	Mass of fuel consumed	Daily	Tank Gauge	Generation Officer	Station Manager	Fuel Recording Logsheet	Mass of fuel consumed per plant required for IPPC annual consumptions are detailed in Schedule 2.
Interruption of supply of low-sulphur HFO	Reporting of occurrence to MEPA	On occurrence	Log book	Station Manager	Station Manager	Log book	Required by MEPA as per obligation 2.2.12

Environmental aspect	Type of monitoring/ surveillance	Frequency	Data source	Responsible for the implementation	Responsible for the evaluation of Check	Recording form	Notes
Procurement of chemicals	REACH & CLP compliance	Prior every purchase order	SDS & Enemalta's <i>Procurement of Chemicals: General requirements</i> document	Officer making the order	Immediate superior to officer for endorsement & check for endorsement by Procurement officer	Enemalta purchase order forms	
Procurement of Chemicals	Health & Safety Risks checks	Prior every purchase order	SDS & Enemalta's <i>Procurement of Chemicals: General requirements</i> document	Officer making the order	Immediate superior to officer for endorsement & check for endorsement by Procurement officer	Enemalta purchase order forms	
Storage of Chemicals	Visual inspection of segregation of chemicals & chemical storage bunds/ pits/ trays	Annually	SDS documents	Officer responsible for storage of chemicals	Immediate superior to officer responsible for storage of chemicals	Dangerous Chemical Control & Monitoring Form	As per IPPC obligation 2.8.2.26 & SOP MPS: Chemical Procurement, Storage & Handling - in preparation
Consumption of dangerous chemicals	Quantity checks	Annually	Stores invoices	Station Manager	Chemist	Report	
Consumption of dangerous chemicals	Quality Checks	Annually	MSDS	Station Manager	Chemist	Report	

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Asbestos & Airborne Asbestos Fibres	Inspection of condition of asbestos & airborne asbestos fibre concentrations in sites where asbestos is present	Annual	Third party report	Maintenance Engineer	Assistant Manager Maintenance	Certification	Max airborne concentration of asbestos of 0.1 fibres/cm <sup>3</sup> as an 8- hr time-weighted average (TWA)

Environmental aspect	Type of monitoring/ surveillance	Frequency	Data source	Responsible for the implementation	Responsible for the evaluation of Check	Recording form	Notes
SF6 leakage	Inspection of Switch gear	Daily Every Shift***	Pressure gauge	Generation Officer	Operations Engineer	MPS 8.1	
SF6 leakage	Alarm check for pressure gauges	Annually	SF6 Pressure Gauge	Maintenance Engineer	Assistant Manager Maintenance	Verification of SF6 Alarms and Gauges Form	
SF6 leakage	SF6 Gas Consumption	Annually	Weight of SF6 gas cylinders	Maintenance Engineer	RAO	SF6 Report to MRA	

*** Minimum legal obligations:
≤3kg: checks every 12 months
≤30kg: checks every 6 months
≤300kg: checks every 3 months



<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Electro magnetic pollution from switchgears and transformers	E.M Level reading from appropriate instrument	Annually	Report from maintenance engineer	Maintenance Engineer	Assistant Manager Maintenance	Report and certification	Measurements are checked against "action" & "exposure" limit values as stipulated by EU Regulation

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Ozone depleting gases from air-conditioning units	Inspection of pressure to determine leaks	Annually (when exceeding 3 Kg of refrigerant)	Pressure gauge	Maintenance Engineer	Station Manager	Fault list (In case of fault) & Log sheet in logbook	A logbook is required by law (LN 145 of 2007, reg. 5 & 7) for the checks to be carried out
GHG in conditioning units	Inspection of pressure to determine leaks	Annually*** (when exceeding 3 Kg of refrigerant)	Pressure gauge	Maintenance Engineer	Station Manager	Fault list	

*** Minimum legal obligations:	
≤3kg:	checks every 12 months
≤30kg:	checks every 6 months
≤300kg:	checks every 3 months

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Noise & Vibration	Noise analysis - peak points at specific locations	Annual	Report from third party surveyor	RAO	Regulatory Office	Report from third party surveyor	As per IPPC obligation in section 2.11 & Schedule 2, S2.8

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Extinguisher Control	Visual and weighing	6 monthly	Gauge and scale	Shift Leader Fire section	Head Health & Safety	Label and Fire section checklist for each site	
Fire Alarms	Functional test	Annual	Panel, Detector tester	Shift Leader Fire section	Head Health & Safety	Checklist for each site	
Fire Deluge	Functional	Monthly	Testing	Generatioon Officer	Operations Engineer	Checklist for each site	
Fire Deluge	Functional	Annual	Testing	Shift Leader Fire section	Head Health & Safety	Checklist for each site	
Hydrants & equipment	Functional	6 monthly	Testing	Shift Leader Fire section	Head Health & Safety	Checklist for each site	
Foam	Functional	Annual	Testing	Shift Leader Fire section	Head Health & Safety	Checklist for each site	
CO2 fixed systems	Functional	Annual	Testing	Shift Leader Fire section	Head Health & Safety	Checklist for each site	
CO2 fixed systems	Visual	Monthly	Visual	ERT Team Leader	ERT Team Leader	Fire testing Log sheets	

Environmental aspect	Type of monitoring/ surveillance	Frequency	Data source	Responsible for the implementation	Responsible for the evaluation of Check	Recording form	Notes
CO2 Production	CO2 Production calculation	Monthly	System Database	Manager Generation	RAO	System Generation Figures report	
CO2 Production	Third part body verification	Yearly	Verified Enemalta annual report	RAO	Third party body	Verified Enemalta report & third party body report	Reporting as per legal obligations & guidelines (referred to also in IPPC Permit, section 6): Directive 2003/87/EC of 13th October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, its transposition in Maltese law LN140 of 2005 , and whenever applicable, uses guidelines for the monitoring and reporting of greenhouse gas emissions established in Commission Decision 2007/589/EC of 18 July 2007.

<i><b>Environmental aspect</b></i>	<i><b>Type of monitoring/ surveillance</b></i>	<i><b>Frequency</b></i>	<i><b>Data source</b></i>	<i><b>Responsible for the implementation</b></i>	<i><b>Responsible for the evaluation of Check</b></i>	<i><b>Recording form</b></i>	<i><b>Notes</b></i>
Town water consumption in station for daily needs (excluding plant)	Manual Reading of water services meters	Monthly	Water Services Meters	Maintenance Engineer	RAO	Annual Environmental Report	As required by IPPC permit (S2.3.1 - Annual Summary)

<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
Oil spills from transformers	Visual inspection of transformer bund area	Daily	Visual Check & Report as fault in case of leak	Generation Officer	Operations Engineer	Fault list (in case of leak)	As per IPPC obligation 2.10
Oil spills from transformers	In house inspection of bund wall	Every 3 years	Maintenance engineer report	Maintenance Engineer	Assistant Manager Maintenance	Report	As per IPPC obligation 2.10
Chemical spills from chemical dosing containment trays	In house inspection of chemical storage bund walls and local dosing containment trays	Weekly	Visual Check	Operations Engineer	Operations Engineer	Fault list (in case of leak)	As per IPPC obligation 2.10
Fuel Spill	Visual inspection of fuel tanks, pipelines and storage areas	Weekly	Visual Check & Report as fault in case of leak	Generation Officer	Operations Engineer	Fault list (in case of leak)	Emergency plan

Environmental aspect	Type of monitoring/ surveillance	Frequency	Data source	Responsible for the implementation	Responsible for the evaluation of Check	Recording form	Notes
Air Emissions From Stacks	Analysis of SO <sub>2</sub> ; NO <sub>x</sub> ; CO; Particulates - concentrations	Continuous - hourly & monthly statistical analysis values	Air Emissions Monitoring Equipment	Manager Generation - Maintenance Section	Regulatory Office	Report generated by Monitoring equipment, in line with IPPC Schedule 3	Results are presented as per IPPC permit template forms in Schedule 3, section S3.2
Air Emissions From Stacks	Analysis of SO <sub>2</sub> ; NO <sub>x</sub> ; Particulates - loads	annually	Air Emissions Monitoring Equipment	Manager Generation - Maintenance Section	Regulatory Office	annual report, IPPC Schedule 2	Results are presented as per IPPC permit template forms in Schedule 2, section S2.4.1
Air Emissions From Stacks	Load of Ni & V	annually	Fuel quality certificates	Manager Generation	Regulatory Office	annual report, IPPC Schedule 2	Results are presented as per IPPC permit template form, Schedule 2, section S2.4.3.2
Air Emissions From Stacks	Heavy Metals	6 monthly	Spot sampling & testing by a third party analysts	Manager Generation	Regulatory Office	Report generated by third party analysts	Results are presented as per IPPC permit template forms, Schedule 2, section S2.4.1.4
Air Emissions From Stacks	Dioxins & Furans (PCDDs & PCDFs)	1 off after 6 months from IPPC permit issue	Spot sampling & testing by a third party analysts	Manager Generation	Regulatory Office	Report generated by third party analysts	Results are presented as per IPPC permit template forms, Schedule 2, section S2.4.1.3
Air Emissions From Stacks	PAHs	annually	Spot sampling & testing by a third party analysts	Manager Generation	Regulatory Office	Report generated by third party analysts	Results are presented as per IPPC permit template forms, Schedule 2, section S2.4.1.5
Air Emissions From Stacks	Annual Surveillance Tests (AST)	annually	third party Annual Surveillance Tests (AST) reports	Maintenance Engineer	Assistant Manager Maintenance	third party Annual Surveillance Tests (AST) reports	IPPC obligation 2.2.11
Air dispersion around installation	Wind air speed & direction continuous logging	continuous monitoring	weather station	Manager Generation - Maintenance Section	RAO	Report generated by Monitoring equipment	Results are presented as per IPPC permit template form, Schedule 2, section S2.6
Operation of precipitators of Blrs 6, 7 & 8	Visual check of precipitator board & voltage meter	daily	Volt meter	Generation Officer	Operations Engineer	Daily log sheet	
Operation of precipitators of Blrs 6, 7 & 8	Load of dust collection	Annually	dust bag/s	Operations Engineer	Asst Manager Generation	Daily log sheet	Annual load of fly ash collection to be reported, together with disposal/ recovery details
Emissions from vehicle fleet	Overall fuel consumption	monthly	fuel issue chits	Operations Manager (transport)	Regulatory Office	fuel consumption log	



<i>Environmental aspect</i>	<i>Type of monitoring/ surveillance</i>	<i>Frequency</i>	<i>Data source</i>	<i>Responsible for the implementation</i>	<i>Responsible for the evaluation of Check</i>	<i>Recording form</i>	<i>Notes</i>
environmental improvement program	checking the status of actions of the environmental improvement program	as per improvement programme monitoring requirements	Improvement program status Report	Environmental coordinator	RAO	Improvement program status Report	

<b>Environmental aspect</b>	<b>Type of monitoring/ surveillance</b>	<b>Frequency</b>	<b>Data source</b>	<b>Responsible for the implementation</b>	<b>Responsible for the evaluation of Check</b>	<b>Recording form</b>	<b>Notes</b>
Material/ equipment supplies	visual checks against contract obligations	every consignment	Contract document	Stores Manager	Station Manager	goods consignment/ delivery form	
Engineering services	engineering contract obligations	every service	Engineering warrant/s & contract document	Assistant Manager (Maintenance or Operations)	Station Manager	service delivery notice	
Laboratory services	testing standards & accreditation	every service	Contract document	Assistant Manager (Maintenance or Operations)	Station Manager	service delivery notice	
Waste disposal / recovery	waste carrier permit	every collection	Waste consignment permit/ prenotification forms	Waste site coordinator	Waste site coordinator	waste register	
Waste disposal / recovery	waste management facility permit (consignee permit)	every collection	Waste consignment permit/ prenotification forms	Waste site coordinator	Waste site coordinator	waste register	

Environmental aspects	Environmental impacts	Activities, process	Data and information; evaluation criteria	N/A/E	Notes, comments, useful information	Improvement opportunities	Evaluation criteria							accidents (frequency x severity)	TOTAL	S/NS	Expected EMS reactions			
							Legal requirements	Interested parties concern	Relevance and vulnerability	Improvements opportunities	Availability of data	TOTAL	S/NS				Procedures	Training	Monitoring	Improvements
Fuel Consumption	Resource Depletion & Air pollution	Burning of fuel to produce electrical energy. Calculation of fuel used and plant thermal efficiency	Competent Person: Station Manager 1. Legal requirement: None 2. Concern: 3rd party concern, government, MEPA 3. Relevance and vulnerability : Emissions and generation of CO2 depend on the amount of fuel burnt 4. Possibility of improvement: Yes 5.Availability of data: Plant Generation report	N	<a href="#">Refer to Annual Trends Environmental Report : Venedomain/Venedata/SectionData/EMSReports/Annual Trends Environmental Report</a>	Installation of new plant at Delimara which is more efficient and hence gives the same output for a reduced fuel consumption Installation of Interconnector Cable to Sicily	1	3	4	3	1	12	S						Fuel consumption is measured and recorded. Generation report shows the fuel consumed per boiler. Efficiencies of boiler and turbine are continuously measured to keep each boiler and/or turbine operating with the highest efficiency possible	Purchasing of fuel which has a weighted average sulphur content of 0.7; Closing down of Marsa Power Station; Transfer of load to Delimara Power Station; Installation of Interconnector cable to Sicily; Installation of new diesel plant at Delimara
Electric Energy Consumption	Global warming & Air Emissions	Electricity consumption used in plant (Units used in plant) to drive pumps, machinery, lightning in plant	Competent Person: Station Manager 1. Legal requirement: None 2.Concern: 3rd party concern MEPA, NGOs 3. Relevance and vulnerability: Energy needed to drive the plant machinery is quite substantial 4 Possibility of improvement: No 5. Availability of data: Units used in plant records and generation report	N	<a href="#">Refer to Annual Trends Environmental Report : Venedomain/Venedata/SectionData/EMSReports/Annual Trends Environmental Report</a>		1	3	3	3	1	11	S						Units used in plant in Kwh are measured daily and recorded	Installation of energy saving motors ; Solar water heaters for workshops; Possibility of lowering temperature of fuel tanks; Replacement of Neon tubes typeT8 with typeT5
		Electricity consumption used in administration building and offices	Competent Person: Station Manager 1. Legal requirement: None 2.Concern Enemalta itself is concerned with respect to energy units consumed in administration building and offices 3. Relevance and vulnerability: Consumption is reasonable 4 Possibility of improvement: No 5. Availability of data: Electricity meter readings	N	<a href="#">Refer to Annual Trends Environmental Report : Venedomain/Venedata/SectionData/EMSReports/Annual Trends Environmental Report</a>	Energy audits will be carried out if energy consumption readings are high to identify those areas with high consumption. Energy saving equipment will be installed especially for areas with high consumption.	1	1	3	3	1	9	S						Electricity meter reading is recorded every month and the monthly electricity consumption is calculated.	Fixing of Solar film to window panes Installation of PIR in washrooms
Water Consumption	Resource Depletion	Domestic use in administration buildings and offices and workshops	Competent Person: Station Manager 1. Legal requirement: None 2. Concern: Enemalta itself is concerned with respect to water consumption in administration building and offices 3. Relevance and vulnerability: Consumption is reasonable 4. Possibility of improvement: Yes 5. Availability of data: Water meter readings	N		Installation of Water saving equipment is being considered if results show that these are feasible.	1	1	3	3	1	9	S						Water meter reading is recorded every month and the monthly consumption is being plotted and the trend for water consumption is being analysed	Use of water containers in water cisterns to reduce water volume ; Low flow shower heads to be used in showers
Consumption of dangerous chemicals	Chemical consumption	Chemicals used for general maintenance	Competent Persons: Maintenance Engineers (Mechanical) 1. Legal requirement: None 2. Concern: Economical concern as regards to expenditure for chemicals 3. Relevance and vulnerability: Releases to the environment is proportional to consumption 4. Possibility of improvement: Reduce consumption or use alternatives less dangerous chemicals 5. Availability of data : issues of chemicals from a specified category over a defined period of time from SAP	N			1	1	2	2	1	7	NS							
		Chemical dosing for plant operations - treatment for boiler water pH and antifouling	Normal Conditions Competent Person: Operations Engineers 1. Legal requirement: None 2. Concern: Economical concern as regards to expenditure for chemicals 3. Relevance and vulnerability: Releases to the environment are proportional to consumption 4. Possibility of improvement: Reduce consumption or use alternatives less dangerous chemicals 5. Availability of data: Yes - issues of chemicals from a specified category over a defined period of time can be extracted from SAP Emergency Conditions Frequency of occurrence Remote probably never Severity Moderate impact	N/E			1	1	2	2	1	7	NS	1x3	3	NS	Dosing for is performed as follows: Operator pours the amount of chemical as indicated by the analyst in a tank and is diluted with water. This mix is pumped inside each boiler by means of a pump. A bag of TSP is stored inside a bin next to these dosing pump (brought on site by means of a fork lifter) while the exact amount of caustic dosed is brought daily from DM plant by operator. This procedure is repeated for each boiler. More or less the same procedure apply for MgO dosing. If losses occur in tubes, more chemicals need to be dosed into the boiler (Emergency)		Quantity of chemicals (kgs or ltrs) issued from stores on a 3 monthly period	
		Chemical dosing for plant operations - turbine antifouling	Competent Person: Operations Engineers 1. Legal requirement: None 2. Concern: Economical concern as regards to expenditure for chemicals 3. Relevance and vulnerability: Releases to the environment is proportional to consumption 4. Possibility of improvement: Reduce consumption or use alternatives less dangerous chemicals 5. Availability of data: Yes issues of chemicals from a specified category over a defined period of time can be issued from SAP	N			1	1	2	2	1	7	NS						Quantity of chemicals (kgs or ltrs) issued from stores on a 3 monthly period	
Atmospheric Emissions	Air pollution	Stack Emissions (Particulates, SOx, NOx)	Normal Conditions Competent Person: Operations Engineer & Maintenance Engineer (Electrical) 1. Legal requirements: IPPC, NEC 2. Concern: MEPA- authority-3rd party concern 3. Relevance and vulnerability: Extremely vulnerable may create significant environmental impacts 4.Possibility of improvements: Yes 5. Availability of Data: CEMS reports Emergency Conditions Frequency of occurrence: Once in a lifetime of the plant Severity: Significant environmental damage	N/E			3	3	4	3	1	14	S	2x4	8	S	Quality of fuel is monitored through suppliers' fuel quality certificates. These results are then verified by a 3rd party. MPS is bound by a limited use of 20,000 hours since 1st January 2008. Legally we are obliged to monitor stack emission. This is done by means of a Continuous Emission Monitoring System. The stack emission is controlled by the type of fuel burnt and by the boiler operators. Air to fuel ratio is continually monitored by boiler operator.		Continuous Emission Monitoring system continuously monitors the levels of Particulates and CO, O2, NOx &SOx concentrations (mg/Nmc) in the flue gas at the stack. Records keeping and reporting to MEPA as per IPPC permit Automatic calibration of CEMS	Use of low Sulphur fuel; Installation of low NOx tips on burners; Installation of interconnector cable; Installation of new diesel plant at Delimara
		Emissions from welding and machinery (exhaust fumes, and particulates)	Competent Person: maintenance 1. Legal requirement: IPPC 2. Concern: No concern 3. Relevance and Vulnerability: Minor 4. Possibility of improvement: None 5. Availability of information: Qualitative information	N			2	1	1	1	2	7	NS							
Green house gas emissions	Global warming	Fuel combustion - CO2 emissions (affected also by combustion efficiency)	Competent Person: Operations Engineer & Boiler Operator 1. Legal requirement: IPPC, NAP 2. Concern: 3rd party concern, neighbours, authority, politicians, media 3. Relevance and vulnerability: Great resource consumption 4. Possibility of improvement: Yes Gradual shutdown of Marsa, Interconnector cable, new Delimara Extension 5. Availability of data: GHG Emissions Annual Verified Report	N	<a href="#">Refer to Annual Trends Environmental Report : Venedomain/Venedata/SectionData/EMSReports/Annual Environmental Report</a>		2	3	4	4	1	14	S				Procedure for monitoring and reporting GHG emissions as per GHG permits. O2 and CO in flue gas are continuously measured by the Continuous Emission Monitoring System (CEMS) Verification by 3rd party of CO2 emission data		Monitoring of CO2 gas generation through presence of O2 in flue gas . High level of CO2 (given by low O2 levels ) implies incomplete combustion, low outlet gas temperature, low final steam temp and black smoke. Fuel to air mix is controlled either automatically via plics or manually through ID and FD damper control by the boiler operator. Manually controlled boilers, give alarms to boiler operator when the emission level exceeds requirements and action is taken promptly to return within limits. CO2 emissions are also recorded by the CEMS. Reporting to MRA and to MEPA as per IPPC permit	Gradual closing down of Marsa Power station; Installation of Interconnector cable; New extension at Delimara





		Overflow of interceptors to the sea	Competent Person: Operations Engineer Frequency of occurrence: Unlikely but may happen once in a lifetime Severity: causes severe environmental damage	E		EA_Register_MPS_H-27-03-11-Direct EA power plant									2x4	8	S	Emergency plan for oil spills SOP MPS 6 Interceptor Inspection		Interceptor inspection checklist per shift	Installation of level gauges giving alarm when the set limit is exceeded
		Storm water runoff from contaminated areas	Competent Person: boiler operator/ waste site coordinator 1. Legal requirement: IPPC 2. Concern: 3rd party concern, MEPA - authority, local councils, NGOs 3. Relevance and vulnerability: Small pollution 4. Possibility of improvement: No 5. Availability of data: Yes checklists	A			2	3	2	2	1	10	S					SOP MPS 15 Fuel Line Testing SOP MPS 22 Waste Management SOP MPS 12 Chemical procurement, handling and storage		Weekly fuel lines and valves inspection checklist	
		Storm water runoff from uncontaminated areas	Competent Person: - 1. Legal requirement: IPPC 2. Concern: No concern 3. Relevance and vulnerability: Not Vulnerable 4. Possibility of improvement: No 5. Availability of data: Yes	A			2	1	1	1	1	6	NS								
		Discharge to sewer	Competent Person: Civil engineer 1. Legal requirement: IPPC 2. Concern: WSC 3rd party 3. Relevance and vulnerability: No concern 4. Possibility of improvement: No 5. Availability of data: Yes	N	Permit is issued from Water Services Corporation for the use of the main sewage system as per IPPC permit		2	1	1	1	1	6	NS								
Chemical spills	land/soil/water/sea pollution	Chemical spills during boiler/turbine dosing by operations	Emergency Conditions Frequency of occurrence: may happen more than once in a lifetime but many times less than once a year Severity: toxicity of chemicals involved is of medium severity and can cause damage to the environment and persons	E											2x3	6	S	SOP MPS 12 Chemical Procurement, storage and handling	Training in Chemical handling	Weekly monitoring checklist of chemical areas	
		Chemical spills during turbine cooling dosing	Emergency Conditions Frequency of occurrence: Extremely unlikely Severity: Moderate	E	Antifouling for turbine cooling water is done by means of Chlorine dioxide. This is generated in situ and quickly decomposes with time. However ClO2 is generated in situ under water by mixing sulphuric acid and biocaf. Both chemicals need to have adequate storage areas which are banded.	The resulting ClO2 in the outlet is analysed daily to calculate the dosing ratio of the constituent chemicals sulphuric acid and biocaf.									2x3	6	S	SOP MPS 12 Chemical Procurement, Storage and Handling	Training in Chemical handling	Weekly monitoring checklist of chemical areas	An alternative method which is more environmental friendly may be utilised
		Incorrect handling of chemicals during operations and general maintenance	Emergency Conditions frequency of occurrence: can happen once a year severity: moderate, can effect flora, fauna and humans	E											2x3	6	S	SOP MPS 12 Chemical Procurement; Storage and handling	Training in chemical handling		
Oil Spills	land/soil/water/sea pollution	Transfer of fuels from tanker to tank farm	Competent Person: Tank Area Operator Frequency of Occurrence: May happen once in a lifetime of installation Severity: Significant environmental damage	E	Pressure tests are carried out periodically on fuel unloading line.										2x4	8	S	SOP MPS 15 Fuel Line Testing Emergency plan for oil spills	Training in Emergency response		
		HFO or diesel oil storage (Tank farms)	Competent Person: Tank Area Operator Frequency of Occurrence: May happen once in a lifetime of installation Severity: May cause significant environmental damage	E											2x4	8	S	Emergency plan for oil spills	Training in Emergency response		
		Oil leakages from damaged or broken pipework and valves	Emergency condition: Frequency of occurrence: once in a lifetime of installation Severity: Significant damage which can cause serious environmental damage	E	Daily visual inspection of pipework Detailed weekly visual check Annual hydrostatic test										2x4	8	S	SOP 15 Fuel Line Testing Emergency plan for oil spills	Training in Emergency response Emergency drills		



[illegible]



## **Section 2 – Waste Management Plan**

Covering EP Conditions: 2.16.5.4





**RVA GROUP**

Specialist consulting engineering, safety and environmental management  
for decommissioning; decontamination; dismantling; demolition.

## **Enemalta Corporation**



**Marsa Power Station, Church Wharf, Marsa**

## **Waste Management Plan**



## DOCUMENT ISSUE/AMENDMENT CERTIFICATE

Date	Author	Checker	Revision	Amendment
22/08/2011	M Taylor	I Wharton	000	Draft
15/10/2011	M Taylor	I Wharton	001	Final

**ENEMALTA CORPORATION**  
**MARSA POWER STATION, CHURCH WHARF, MARSA**

**WASTE MANAGEMENT PLAN**

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<b>Client:</b>	Enemalta Corporation
<b>Person Drafting this SWMP:</b>	Mark Taylor
<b>Site Location:</b>	Marsa Power Station, Church Wharf, Marsa, HMR 01
<b>Description of Proposed Works:</b>	Waste Estimates for Demolition, Dismantling, Clearance of Process Plant structures, Buildings, Equipment, and Foundation Removal at Marsa Power Station to Support the Station Outline Decommissioning Plan
<b>Estimated Cost of Project:</b>	N/A for this version

### **Introduction**

This Site Waste Management Plan (SWMP) applies to all demolition activities for the Marsa Power Station (MPS).

This station is situated at the Marsa end of the Grand Harbour. The original station ('A' Station) was built underground beneath Jesuits Hill and was commissioned in 1953. The overall capacity of the plant was 15 MW. Due to the increase in electricity demand, this station was expanded further to a final total capacity of 30 MW. The plant was made up of 5 steam units rated at 5 MW each and a gas turbine of a similar rating. The station was finally de-commissioned in 1993. In 1966, the first two units at 'B' Station were commissioned. There was further expansion of this station later on to meet the electrical load and currently this plant is made up of the following units.

Units	Commissioned
2 x 90 Ton/hr Steam Raising Boilers*	1966
2 x 10MW Steam Turbines and Generators	1966
2 x 120 Ton/hr Steam Raising Boilers	1970
2 x 30MW Steam Turbines and Generators	1970
1 x 130 Ton/hr Steam Raising Boiler	1982
1 x 30MW Steam Turbine and Generator**	1982

1 x 130 Ton/hr Steam Raising Boiler	1984
1 x 30MW Steam Turbines and Generator**()	1984
1 x 300 Ton/hr Steam Raising Boiler	1985
1 x 30MW Steam Turbine and Generator**()	1985
1 x 60MW Steam Turbine and Generator***()	1987
1 x 300 Ton/hr Steam Raising Boiler	1987
1 x 37MW Open Cycle Gas Turbine and Generator	1990

\* The steam generators were decommissioned in 1994 and 1999 respectively.

\*\* The steam turbines are refurbished plants, which were first commissioned in 1952 at Palermo in Sicily.

\*\*\* The steam turbine is a refurbished plant, which was first commissioned in 1954 at Little Barford in the UK. In 1996, this unit was refurbished again to extend its lifetime for a further 15 years.

() These units were run on coal between their respective commissioning date and 1995 when coal firing was stopped.

Total generation capacity of this station stands now at 267 MW. All the steam units presently burn 1% and 0.7% sulphur fuel oil and the gas turbine burns distillate fuel oil. The plant consists of six steam plants, comprising heavy fuel oil fired boilers and conventional steam turbines, and one open cycle diesel fired gas turbine

### **Terms of Reference**

The SWMP assumes that all decommissioning and decontamination work has been completed and that all chemicals and process material has been removed under the existing site operating and maintenance procedures.

It has been assumed, from the information gathered, that all the major structures are built directly off the rock strata therefore the foundation removal quantities only include for the ground slabs and up to the top 0.5m of the foundations. This is standard industry practice unless there is a defined future use of the site that requires the full removal of the foundations. Any remaining buried structures will need to be documented and recorded. This SWMP assumes that the quay structure remains.

### **Waste and the Waste Hierarchy**

Waste is defined in Article 1 (1) (a) of the Waste Framework Directive (2008/98/EC) and means.... "any substance or object ....which the holder discards or intends or is required to discard". All waste that falls within the scope of this definition will be recorded in the Site Waste Management Plan.

Waste is widely defined and includes excess unwanted materials, effluents, unwanted surplus substances arising from the application of any process and any substance or article which is broken, worn out, contaminated or otherwise damaged. Waste becomes controlled by legislation when it is discarded by the holder. Materials sold for re-use or re-cycling are still classified as waste and subject to all the statutory controls, including Duty of Care.

The European Commission Decision 2000/532/EC1 established a list of wastes. The list of waste has been used to determine what wastes are considered as hazardous waste. A substance or object has only been considered as waste if it conformed to the definition in regulation 4 of the Waste Regulations 2011 (L.N.184 of 2011).

All waste on MPS will be dealt with in accordance with the waste Duty of Care which is a legal requirement under regulation 12 of Waste Regulations 2011 (L.N.184 of 2011) and states that materials will be handled efficiently to minimise wastage and that all waste arising from the site will be managed appropriately.

The Waste Hierarchy has been applied when formulating this Site Waste Management Plan:

- Prevention
- Reuse
- Recycle
- Recovery
- Disposal

Where practical waste has been selected for reuse and recycling. Only when all other routes had been exhausted has waste been designated for landfill.

### **Waste Types**

The waste types that have been identified and documented in Table 1 for the Marsa Power Station are those which are expected to be produced during the demolition of the site. Table 2 further breaks these figures down into geographical areas (see Appendix A). This is to give greater knowledge and understanding of the site and to also allow for better detailed planning depending on demolition scheduling. Each identified waste has a European Waste Catalogue Code (EWC).

## **Waste Segregation**

The waste streams will be segregated along the lines of the waste item and not the code as some items share the same code but require different treatment/conditioning/disposal options. All waste will be segregated at the workplace or in a processing area and will then be stockpiled. Types of stockpiling can range from clearly labelled containers (bins, skips, buildings), to open fenced areas. The majority of any processing done on site will be solely to enable segregation and to aid transportation. The only exception to this will be materials to be re-cycled for use on site (see below). Therefore any treatment, conditioning, or recovery will be performed off-site either on Malta or abroad (see Table 1).

## **Processing, Transportation, and Disposal (Recovery)**

The concrete/brickwork will be re-cycled on site by utilising a mobile crushing machine to process it to an engineering grade fill, a typical example is crushed and sieved material of maximum size 75mm. This fill will be utilised to fill voids and hollows on the site.

All waste disposed off on Malta will be transported and disposed of by appropriate licensed entities as described in the Waste Regulations 2011 (L.N.184 of 2011). All waste to be shipped off the island will also follow the requirements of the regulations but will either be shipped from existing ports or for bulk material directly from the Marsa quay.

## **Definitions**

“Waste Holder” means “the producer of the waste or the natural or legal person who is in possession of it”. It rests, in the first place, with the producer or holder of a substance or object to decide whether it is being discarded and is waste.

“Carrier” means the person who collects and carries out the transport.

“Consignment note” means a note that is to accompany the consignment of hazardous or non-hazardous waste.

“Disposal” means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

“Non Hazardous Waste” means all waste that does not display one or more of the hazardous properties listed in Schedule 3 of the Waste Regulations 2011 (L.N.184 of 2011). Examples can include paper, plastic, wood, domestic waste, metal and glass.

“Hazardous Waste” means waste which displays one or more of the hazardous properties listed in Schedule 3 of the Waste Regulations 2011 (L.N.184 of 2011).

“Inert” means material of an insoluble mineral nature i.e. glass, concrete, brick, stone, tiles, ceramics, glass fibre material, some soils.

“Recovery” means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.

“Recycling” means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

“Re-use” means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

“Treatment” means recovery or disposal operations, including preparation prior to recovery or disposal.

“Waste Producer” means anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste.





## MPS Waste Totals

TABLE 1													
Type of material	Materials						Schedule 2 Coding	Reuse, Re-manufacturing, Recycling and Energy Recovery					Disposal/Carrier
	EWC Code	Estimates		Inert	Hazardous	Non-Hazardous		On-site Reuse and Recycling		Off-site Reuse, Recycling or Recovery			Specify the type of landfill and disposal company
		m <sup>3</sup>	Tonnes					Specify the process	Quantity	Specify the process	Quantity	Location	Specify the waste license carrier.
<b>Soft Strip</b>													
Glass	17 02 02	48		Y		Y	R5			Re-cycle	48	Abroad	
Plasterboard	17 08 02	329				Y	D1 R5			Re-cycle	329	Abroad	Otherwise Landfill Malta (e.g. Ghallis)
Suspended Ceilings (alumin. tiles, etc.) & Floor Tiles	17 09 04	266				Y	D1 R5			Re-cycle	266	Abroad	Otherwise Landfill Malta (e.g. Ghallis)
Timber (incl. furniture)	17 02 01	359				Y	R3			Re-cycle	359	Abroad	
Paper and Cardboard	20 01 01	40				Y	R3			Re-cycle	40	Abroad	



TABLE 1													
Type of material	Materials						Schedule 2 Coding	Reuse, Re-manufacturing, Recycling and Energy Recovery					Disposal/Carrier
	EWC Code	Estimates		Inert	Hazardous	Non-Hazardous		On-site Reuse and Recycling		Off-site Reuse, Recycling or Recovery			Specify the type of landfill and disposal company
		m <sup>3</sup>	Tonnes					Specify the process	Quantity	Specify the process	Quantity	Location	Specify the waste license carrier.
Lights	20 01 21*	88			Y		R3 R4			Re-cycle	88	Abroad	
Waste Electrical & Electronic Equipment	16 02 14	87				Y	R4			Recovery	87	Abroad	
<b>Demolition Waste</b>													
Cable	17 04 11		98			Y	R4			Recovery	98	Abroad	
Cable – Oil Filled	17 04 10*		2		Y		R4 R9			Recovery & Re-cycle	2	Abroad	
Transformer Oils	13 03 10*		184		Y		R9			Re-use	184	Abroad	
Waste Oils	13 02 08* 13 07 01*		100		Y		R9			Re-cycle & Re-use	100	Abroad	



TABLE 1													
Type of material	Materials						Schedule 2 Coding	Reuse, Re-manufacturing, Recycling and Energy Recovery					Disposal/Carrier
	EWC Code	Estimates		Inert	Hazardous	Non-Hazardous		On-site Reuse and Recycling		Off-site Reuse, Recycling or Recovery			Specify the type of landfill and disposal company
		m <sup>3</sup>	Tonnes					Specify the process	Quantity	Specify the process	Quantity	Location	Specify the waste license carrier.
Diesel	13 07 01*		1		Y		R9			Re-use	1	Abroad	
Batteries	16 06 01*	791 No.			Y		R4 R6			Re-cycle	791 No.	Abroad	
Acid	06 01 06*	2			Y		D9						Abroad
Insulation/Mineral wool	17 06 04	2218				Y	R5 D1			Re-cycle	2218	Abroad	Otherwise Landfill Malta (e.g. Ghallis)
Calcium Silicate	17 06 03*	60			Y		D1						Landfill Malta (e.g. Ghallis)
Ceramic Fibres	17 06 03*		0.2		Y		D1						Landfill Malta (e.g. Ghallis)
Refractory	16 11 06	117				Y	R5			Re-cycle	117	Abroad	
Ash and Coal Dust (Waste Hydrocarbon	10 01 04*	28			Y		D9						Abroad



TABLE 1													
Type of material	Materials						Schedule 2 Coding	Reuse, Re-manufacturing, Recycling and Energy Recovery					Disposal/Carrier
	EWC Code	Estimates		Inert	Hazardous	Non-Hazardous		On-site Reuse and Recycling		Off-site Reuse, Recycling or Recovery			Specify the type of landfill and disposal company
		m <sup>3</sup>	Tonnes					Specify the process	Quantity	Specify the process	Quantity	Location	Specify the waste license carrier.
Solids)													
Plastics	17 02 03	15				Y	R5			Re-cycle	15	Abroad	
Fibreglass	10 11 03	0		Y		Y	D1						Landfill Malta (e.g. Ghallis)
Galbestos (Robertson Metal Profile Sheeting)	17 06 05*		65		Y		D1						Abroad
Asbestos Cement Sheeting	17 06 05*		13		Y		D1						Abroad
Asbestos Insulation	17 06 01*	75			Y		D1						Abroad
Bitumen Coating	17 03 01*	13			Y		D1						Landfill Malta (e.g. Ghallis)



TABLE 1													
Type of material	Materials						Schedule 2 Coding	Reuse, Re-manufacturing, Recycling and Energy Recovery					Disposal/Carrier
	EWC Code	Estimates		Inert	Hazardous	Non-Hazardous		On-site Reuse and Recycling		Off-site Reuse, Recycling or Recovery			Specify the type of landfill and disposal company
		m <sup>3</sup>	Tonnes					Specify the process	Quantity	Specify the process	Quantity	Location	Specify the waste license carrier.
Stone	17 01 02	3154		Y		Y	R5			Recovery	3154	Malta	
Concrete/Brick work	17 01 07	13440		Y		Y	R5	Re-cycle (graded crush)	13440				
<b>Scrap Metal</b>													
Carbon Steel	17 04 05		16765			Y	R4			Recovery	16765	Abroad	
Stainless Steel	17 04 05		2			Y	R4			Recovery	2	Abroad	
Copper	17 04 01		253			Y	R4			Recovery	253	Abroad	
Aluminium Brass	17 04 01		328			Y	R4			Recovery	328	Abroad	
Aluminium	17 04 02		42			Y	R4			Recovery	42	Abroad	
Brass	17 04 01		7			Y	R4			Recovery	7	Abroad	



TABLE 1													
Type of material	Materials						Schedule 2 Coding	Reuse, Re-manufacturing, Recycling and Energy Recovery					Disposal/Carrier
	EWC Code	Estimates		Inert	Hazardous	Non-Hazardous		On-site Reuse and Recycling		Off-site Reuse, Recycling or Recovery			Specify the type of landfill and disposal company
		m <sup>3</sup>	Tonnes					Specify the process	Quantity	Specify the process	Quantity	Location	Specify the waste license carrier.
High Nickel Alloy	17 04 07		0.1			Y	R4			Recovery	0.1	Abroad	
<b>Foundations</b>													
Concrete	17 01 01	8970		Y		Y	R5	Re-cycle (graded crush)	8970				
Steel	17 04 05		95			Y	R4			Recovery	95	Abroad	
Tarmac	17 03 01*	4243			Y		R3			Re-cycle	4243	Abroad	



## MPS Area Totals

TABLE 2					
Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
<b>AREA 1</b>					
<b><i>Soft Strip</i></b>					
Glass	20		Y		Y
Plasterboard	160				Y
Suspended Ceilings & Floor Tiles	120				Y
Timber (incl furniture)	135				Y
Lights	30			Y	
Waste Electrical & Electronic Equipment	50				Y
<b><i>Demolition Waste</i></b>					
Cable		5			Y
Transformer Oils		1		Y	
Waste Oils		1		Y	
Insulation/Mineral wool	15				Y
Plastics	5				Y
Stone	825		Y		Y
Concrete/Brickwork/Porcelain	3150		Y		Y
<b><i>Scrap Metal</i></b>					
Carbon Steel		115			Y
<b><i>Foundations</i></b>					
Concrete	1100		Y		Y
Steel		10			Y
<b>AREA 2</b>					


**TABLE 2**

Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
<b><i>Soft Strip</i></b>					
Glass	1		Y		Y
Plasterboard	3				Y
Suspended Ceilings & Floor Tiles	3				Y
Timber (incl furniture)	4				Y
Lights	1			Y	
Waste Electrical & Electronic Equipment	1				Y
<b><i>Demolition Waste</i></b>					
Plastics	1				Y
Concrete/Brickwork/Porcelain	400		Y		Y
<b><i>Scrap Metal</i></b>					
Carbon Steel		10			Y
<b><i>Foundations</i></b>					
Concrete	200		Y		Y
Steel		2			Y
<b>AREA 3</b>					
<b><i>Soft Strip</i></b>					
Glass	8		Y		Y
Plasterboard	82				Y
Suspended Ceilings & Floor Tiles	80				Y
Timber (incl furniture)	106				Y
Lights	20			Y	
Waste Electrical & Electronic Equipment	8				Y




**TABLE 2**

Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
<b>Demolition Waste</b>					
Cable		30			Y
Cable – Oil Filled		2		Y	
Transformer Oils		66		Y	
Waste Oils		25		Y	
Batteries	122 No.			Y	
Insulation/Mineral wool	246				Y
Refractory	100				Y
Bitumen Coating	8			Y	
Asbestos Insulation	75			Y	
Galbestos (RMP)		35		Y	
Plastics	6				Y
Stone	520		Y		Y
Concrete/Brickwork/Porcelain	3800		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		3700			Y
Copper		72			Y
Aluminum Brass		120			Y
Aluminum		8			Y
<b>Foundations</b>					
Concrete	3000		Y		Y
Steel		30			Y
Tarmac	1900			Y	


**TABLE 2**

Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
<b>AREA 4</b>					
<b><i>Soft Strip</i></b>					
Glass	14		Y		Y
Plasterboard	30				Y
Suspended Ceilings & Floor Tiles	20				Y
Timber (incl furniture)	65				Y
Lights	20			Y	
Waste Electrical & Electronic Equipment	10				Y
<b><i>Demolition Waste</i></b>					
Cable		30			Y
Transformer Oils		64		Y	
Waste Oils		29		Y	
Batteries	300 No.			Y	
Acid	2			Y	
Insulation/Mineral wool	461				Y
Refractory	2				Y
Ash and Coal Dust (Waste Hydrocarbon Solids)	8			Y	
Bitumen Coating	5			Y	
Asbestos Cement Sheeting		13		Y	
Plastics	2				Y
Galbestos (RMP)		30		Y	
Stone	747		Y		Y



TABLE 2					
Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
Concrete/Brickwork/Porcelain	3010		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		4285			Y
Copper		98			Y
Aluminum Brass		145			Y
Aluminum		11			Y
<b>Foundations</b>					
Concrete	1020		Y		Y
Steel		5			Y
Tarmac	1130			Y	
<b>AREA 5</b>					
<b>Soft Strip</b>					
Glass	6		Y		Y
Plasterboard	42				Y
Suspended Ceilings & Floor Tiles	35				Y
Timber (incl furniture)	30				Y
Lights	10			Y	
Waste Electrical & Electronic Equipment	10				Y
<b>Demolition Waste</b>					
Cable		25			Y
Transformer Oils		29		Y	
Waste Oils		13		Y	
Diesel		1		Y	



**TABLE 2**

Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
Batteries	195 No.			Y	
Insulation/Mineral wool	675				Y
Calcium Silicate	30				
Refractory	15			Y	
Ash and Coal Dust (Waste Hydrocarbon Solids)	10			Y	
Plastics	1				Y
Stone	225		Y		Y
Concrete/Brickwork/Porcelain	2550		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		4510			Y
Copper		55			Y
Aluminum Brass		63			Y
Aluminum		10			Y
Brass		7			Y
<b>Foundations</b>					
Concrete	2130		Y		Y
Steel		40			Y
Tarmac	615			Y	
<b>AREA 6</b>					
<b>Soft Strip</b>					
Glass	3		Y		Y
Plasterboard	7				Y



TABLE 2					
Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
Suspended Ceilings & Floor Tiles	5				Y
Timber (incl furniture)	8				Y
Lights	5			Y	
Waste Electrical & Electronic Equipment	5				Y
<b>Demolition Waste</b>					
Cable		6			Y
Transformer Oils		14		Y	
Waste Oils		1		Y	
Batteries	174 No.			Y	
Insulation/Mineral wool	753				Y
Calcium Silicate	30				
Refractory	15			Y	
Ash and Coal Dust (Waste Hydrocarbon Solids)	10			Y	
Stone	10		Y		Y
Concrete/Brickwork/Porcelain	100		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		2870			Y
Stainless Steel		2			Y
Aluminum		13			Y
Copper		10			Y
<b>Foundations</b>					
Concrete	1000		Y		Y



TABLE 2					
Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
Steel		5			Y
Tarmac	310			Y	
<b>AREA 7</b>					
<b>Soft Strip</b>					
Plasterboard	1				Y
Timber (incl furniture)	1				Y
Lights	1			Y	
Waste Electrical & Electronic Equipment	1				Y
<b>Demolition Waste</b>					
Cable		1			Y
Transformer Oils		10		Y	
Waste Oils		8		Y	
Insulation/Mineral wool	18				Y
Ceramic Fibres		0.2		Y	
<b>Scrap Metal</b>					
Carbon Steel		198			Y
Copper		15			Y
High Nickel Alloy		0.1			Y
<b>Foundations</b>					
Concrete	65		Y		Y
Steel		0.5			Y
Tarmac	38			Y	
<b>AREA 8</b>					


**TABLE 2**

Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
<b>Demolition Waste</b>					
Insulation/Mineral wool	10				Y
Stone	22		Y		Y
Concrete/Brickwork/Porcelain	280		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		212			Y
<b>Foundations</b>					
Concrete	100		Y		Y
<b>AREA 9</b>					
<b>Demolition Waste</b>					
Lagging/Mineral wool	40				Y
Stone	720		Y		Y
Concrete/Brickwork/Porcelain	70		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		847			Y
<b>Foundations</b>					
Concrete	315		Y		Y
Steel		1			Y
<b>AREA 10</b>					
<b>Soft Strip</b>					
Glass	1		Y		Y
Plasterboard	4				Y
Suspended Ceilings & Floor Tiles	3				Y



TABLE 2					
Type of material	Materials				
	Estimates		Inert	Hazardous	Non-Hazardous
	m <sup>3</sup>	Tonnes			
Timber (incl furniture)	10				Y
Lights	1			Y	
Waste Electrical & Electronic Equipment	2				Y
<b>Demolition Waste</b>					
Cable		1			Y
Stone	85		Y		Y
Concrete/Brickwork/Porcelain	100		Y		Y
<b>Scrap Metal</b>					
Carbon Steel		18			Y
<b>Foundations</b>					
Concrete	40		Y		Y
Steel		1			Y
Tarmac	250			Y	





## APPENDIX A – MPS Area Plan

