

Condition Report in Support of Environmental Permit No. JP3333LV Full Surrender.

Barry Power Station, Vale of Glamorgan

Prepared for

Centrica Barry Ltd

Barry Power Station

Sully Moors Road

Sully

CF64 5YU

Prepared by

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Barry Power Station, Vale of Glamorgan

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Client Details: Barry Power Station
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Unless otherwise stated in this Report, the assessments made assume that the site and facilities will continue to be used for their current purpose without significant change. The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested. Information obtained from third parties has not been independently verified by Geosyntec, unless otherwise stated in the Report.

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Appendix K	<p>HRSG Blow-Down Sump</p> <p><i>Letter Report for the Environmental Sampling of the HRSG Blow-Down Sump at Centrica Barry Power Station, Barry, Vale of Glamorgan, Report Ref:0127-031/PJP/JDWW, June 2011, FCG</i></p>

Response to EA Queries in Relation to the Environmental Sampling of the HRSG Blow-Down Sump at Centrica Barry Power Station, Barry, Vale of Glamorgan, Report Ref:0127-031/JDWW, June 2011, FCG

1 INTRODUCTION & SITE DETAILS

1.1 INTRODUCTION

Geosyntec Consultants ('Geosyntec') was retained by Centrica Barry Ltd ('Centrica') to complete an Environmental Permit Site Condition Report (SCR) for the Barry Power Station in the Vale of Glamorgan, to support a full surrender of the Environmental Permit for the facility (EPR/ JP3333LV). The permit is to be fully surrendered.

The environmental SCR work, which occurred prior to installation decommissioning and demolition comprised a soil and groundwater sampling exercise and preparation of this Environmental Permit Site Condition Report, in accordance with the H5 SCR guidance (Applicants Version 3.0 April 2013).

Sections 1 - 3 were completed using information from the permit application stage (Appendix H and I); Sections 4 - 7 were maintained during the permit lifetime of the Installation (2007 to 2019); and Sections 8 - 10 were required to be completed as part of this application to surrender the environmental permit for the Installation. Only summaries of Sections 1-7 are provided herein, and the reader is referred to the original documentation appended to this report for further detail. An overview of the Environmental Permit Site Condition Reporting structure is presented below.

Environmental Permit Site Condition Report		
Permit Application Stage <i>(Completed 2006)</i>	Section 1	Introduction & Site Details
	Section 2	Condition of the Land at Permit Issue
	Section 3	Permitted Activities
Operational Phase	Section 4	Changes to Activity
	Section 5	Measures Taken to Protect the Land
	Section 6	Pollution Incidents that may have had an Impact on Land and their Remediation
	Section 7	Soil Gas & Water Quality Monitoring
Permit Surrender Application Stage <i>(Current Stage)</i>	Section 8	Decommissioning & Removal of Pollution Risk
	Section 9	Reference Data & Remediation
	Section 10	Statement of the Site Condition

The overall purpose of this surrender SCR is to allow the Operator (Centrica) to demonstrate to the EA that the condition of the land is in a satisfactory state and that environmental receptors have been protected throughout the operational period of the installation. This is to be achieved through an assessment of the site's environmental performance during the period of the permit.

1.2 SITE DETAILS

Name of the Applicant	Centrica Barry Ltd
Activity Address	Centrica Barry Ltd Barry Power Station, Sully Moors Road, Sully, CF64 5YU
National Grid Reference	ST 14550 68500
Document reference and dates for Site Condition Report at permit application and surrender	PPC Permit Application Site Report, Centrica, Barry Power Station. January 2006, RSK (Appendix H) Condition Report in Support of Environmental Permit No. JP3333LV Full Surrender, Centrica, Barry Power Station, May 2019, Geosyntec (This Report)
Document references for site plans (including location and boundaries)	The total site area is as per original Application Site Report. The site location boundaries and installation details are illustrated by Figure A2 in Appendix A to this report.

2 CONDITION OF THE LAND AT PERMIT ISSUE

<p>Environmental setting including:</p> <ul style="list-style-type: none"> ▪ Geology ▪ Hydrogeology ▪ Surface waters 	<p>The site covers an area of 1.7 Ha. The facility is a Combined Cycle Gas Turbine (CCGT) power station, rated at 230 MW.</p> <p>The installation receives natural gas, which is then compressed and combusted to drive the first cycle turbine, with the output heat from the flue gas driving a second cycle steam turbine. The primary fuel used is natural gas, with secondary chemicals used onsite including: diesel, heavy lubricant oils, water treatment chemicals (sulphuric acid and caustic) and boiler treatment chemicals (oxygen scavenger and amine).</p> <p>The site is situated on flat, low-lying ground, surrounded by a mixture of operational and dis-used industrial sites. There are no immediate residential neighbours. The site is identified to be at risk of flooding from the Cadoxton River and Sully Brook.</p> <p>Made Ground at the site was recorded as a granular crushed gravel of predominantly brick and concrete in a sandy matrix, grading to a re-worked clay at depth. Made Ground was recorded as between 0.7 to 2.2m thick. Superficial deposits of Estuarine Alluvium were recorded directly underlying the Made Ground to between 4 and 6.5 m below ground level (bgl). This unit was described as a firm to very soft grey brown silty clay, with a higher silt content below 2 to 2.50 m</p>
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	<p>bgl. Interbeds of clayey sand were noted towards the eastern end of the site. The Triassic Mercia Mudstone Group with Marginal Facies forms the rockhead recorded between 4.5 to 5.8 m bgl.</p> <p>Groundwater was noted as being present in two systems below the site:</p> <ul style="list-style-type: none"> • Localised perched shallow groundwater system in the Made Ground • Shallow groundwater regime in the Estuarine Alluvium. <p>Shallow groundwater in the Estuarine Alluvium was interpreted to flow radially outwards from an east-west trending ridge, central to the site. It is likely that the interpreted flow regime is due to shallow groundwater discharging to surface water courses to the north (unnamed drainage channel) and south (Sully Brook) of the site.</p> <p>In addition to the above-mentioned surface water features, other nearby surface water features include the Cadoxton River approximately 200m west of the site.</p>
Pollution history including:	
<ul style="list-style-type: none"> • Pollution incidents that may have affected land; 	<p>At the time of the RSK Permit Application Site Report (2006), Appendix H, there was no evidence or records of previous pollution incidents or discrepancies in stock control at the site.</p> <p>At the time of permit application there was no record of pollution incidents relating to permitted activities at the site.</p>
<ul style="list-style-type: none"> • Historical land-uses and associated contaminants; 	<p>The site was a greenfield site used or agricultural until it was developed as part of an air-force barracks in World War II. In the 1950s until the late 1970s, the site formed part of a larger BP Chemicals works. This is understood to have produced poly vinyl chloride (PVC). Raw products associated with PVC manufacture include chlorine (potentially incorporating condensed metallic mercury) and ethene,. A vinyl Chloride Monomer (VCM) plant was located on the subject site. This used ethene and chlorine as raw materials to produce ethylene dichloride (EDC) as an intermediate product. EDC was then thermally cracked to produce VCM with hydrogen chloride.</p> <p>Various hydrocarbons, additives including phthalates, mercury and vinyl chloride are considered to be the key potential contaminants associated with historical operations at the site.</p>

<ul style="list-style-type: none"> Any visual/olfactory evidence of existing contamination, and; 	<p>The 2007 baseline ground investigation identified hydrocarbon staining and “hydrocarbon odour with slight solvent odour” in Made Ground” at BPS-BH7 1 to 1.9m bgl. Slight hydrocarbon odours and staining were identified at BPS-BH12 and BPS-BH13 0.3 to 0.35m bgl in Made Ground.</p>
<ul style="list-style-type: none"> Evidence of damage to pollution prevention measures. 	<p>There was no evidence of damage to pollution prevention measures at the time of permit issue.</p>
<p>Evidence of historical contamination, for example, historical site investigation, assessment, remediation and verification reports (where available).</p>	<p>There is no evidence of historical contamination at the site related to contaminants of concern in the environmental permit.</p>
<p>Baseline soil and groundwater reference data</p>	<p>Ford Consulting Group (FCG – now Geosyntec) undertook the baseline data collection exercise stipulated by the SPMP design (Appendix H). Soil and groundwater data was obtained in April 2007. As set out in the SPMP First Phase Report (Appendix I):</p> <ul style="list-style-type: none"> 1 No. borehole was drilled (BPS-BH7) to up to 2.5m bgl installed with a well in Made Ground 6 No. boreholes were drilled (BPS-BH1, BPS-BH2A, BPS-BH4, BPS-BH5, BPS-BH6, BPS-BH9) to up to 5.5m bgl installed with a well in superficial deposits 1 No borehole was drilled (BPS-BH10) to 5.4m bgl and was not installed 2 No. boreholes were drilled (BPS-BH2B, BPS-BH4B) to up to 9.5m bgl and installed with a well in rock; 5 No. hand pits were excavated (BPS-BH3, BPS-BH8, BPS-BH11, BPS-BH12, BPS-BH13) to up to 1m bgl <p>Drilling was undertaken using a track mounted hollow stem auger rotary rig.</p> <p>Soil samples were taken from the top 5m from within the Made Ground and superficial deposits (for all location except BPS-BH2B, BPS-BH4, NPS-BH8 and BPS-BH11) and were submitted for a range of speciated total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), sulphate, chloride and pH as detailed in Appendix D.</p> <p>Groundwater samples were taken from all installed wells plus previously existing wells (BPS-BHA1, BPS-BHA2, BPS-BHB1, BPS-BHB2). Groundwater</p>

	<p>samples were submitted for analysis of TPH, PAHs, PCBs, sulphate, chloride and pH. During sampling, in-situ hydro-chemical parameters (pH, Redox, electrical conductivity, and temperature) were recorded.</p> <p>No surface water sampling was undertaken.</p> <p>For a more detailed account please refer to FCG First Phase Report (included in Appendix I).</p> <p>Laboratory certificates for soil and groundwater baseline reference data are provided in Appendix G.</p>
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3 PERMITTED ACTIVITIES

Permitted Activities	<p>Combustion Activities > 50 MW_{th}, Part A (1)</p> <p>Associated Activities:</p> <ul style="list-style-type: none"> • Raw materials handling and storage • Waste handling and storage • Stream turbine operation • Heat recovery/ HRSG operation • Water treatment facilities • Miscellaneous utility systems
Non-Permitted Activities Undertaken	None
<p>Document References for:</p> <ul style="list-style-type: none"> • Plan showing activity layout, and; • Environmental Risk Assessment. 	<p>The design SPMP divided the site into 3 No. zones (Zone 1 to Zone 3) based on the activities undertaken and the potential for contaminated land. The zonation of the site is described below and illustrated by Figure 3 in Appendix A.</p> <ul style="list-style-type: none"> • Zone 1 - Gas Oil Storage, distribution and other oil uses (covering lube oils, diesel and waste oil storage, emergency diesel generator and diesel firewater pumps). The zone also includes the engineering oil store; • Zone 2 - Water Treatment Chemicals, Storage, Transfer and Use; and • Zone 3 - All remaining storage locations across the installation.

4 CHANGES TO THE ACTIVITY

Have there been any changes to the activity boundary?	No
Have there been any changes to the permitted activities?	<p>The installation's Environmental Permit (EPR/JP3333LV) was most recently varied in December 2012, to permit open-cycle generation; which was required by the site to achieve the faster start-up times associated with STOR operation. No changes to infrastructure or hazardous containment inventory were required for the site to generate electricity in open-cycle, and as required, it continued to generate in combined-cycle mode as well.</p>
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	No

5 MEASURES TAKEN TO PROTECT LAND

Containment Infrastructure & Monitoring Programme

An infrastructure monitoring programme for all aspects of the installation containment infrastructure relating to the storage and use of bulk hazardous materials was recommended in the RSK SPMP design report.

The 2015 Geosyntec SPMP Review report (**Appendix J**) recommended regular CCTV inspections of the site drainage network and routine visual inspections, detailed external inspections and ultrasonic thickness testing of the Bulk Caustic Soda Tank. External inspection of tanks and vessels takes place every 12 months, with internal inspections taking place every 84 months (last one in 2016). A weekly inspection of transformer bunds is undertaken. Bund integrity tests were last undertaken in 2011 and thickness tests last undertaken in 2013. A CCTV drain survey was undertaken in 2019, which showed no changes to the system. Further inspections of the Bulk Caustic Soda Tank were planned for 2018, however due to the likelihood of plant closure chemical stocks were reduced and no further inspections carried out.

The updated infrastructure monitoring programme is included in **Appendix F**.

6 POLLUTION INCIDENTS THAT MAY HAVE HAD AN IMPACT ON LAND & THEIR REMEDIATION

The following environmental incidents were identified during the review, which have occurred at the site since the SPMP design reference data collection (2007):

- The release of 550 litres of glycol water coolant (50%:50%), in October 2009 from the gas compressor building. The incident was caused by the failure of a pressure release valve and the liquid was lost to an area of gravel surfaced ground. The remainder of the coolant was drained from the compressor. Representative soil and groundwater samples were taken by FCG in October 2009 and reported glycol concentrations below method detection limits. The area was excavated down to the old foundation slab, and arisings disposed of off-site as a precaution. Glycol compounds are known to degrade rapidly in the subsurface. The incident was reported to the Environment Agency which classified it as a 'category 2 – minor incident'. No further action was taken by the regulator.
- A breach in a redundant drain line close to the HRSG sump. This issue had been identified a short time before the 2011 site audit. The HRSG sump receives boiler water blowdown that was potentially contaminated by dilute water treatment chemicals (oxygen scavengers). The concentrations of water treatment chemicals in any leaked blowdown water was likely to be very low. Moreover, the local groundwater was higher than the water level within the sump, which should preclude any loss off blowdown water. As a precautionary measure, FCG undertook soil sampling from an excavation adjacent to the sump that had been dug to complete repairs to the broken drain line. On the basis of the soil analysis data, it was concluded that the drain breach did not have any adverse impact on the quality of soils around the sump and no further investigation or corrective action was recommended.
- On 16th January 2013 a vehicle oil spill occurred. Whilst a contractor was reversing a vehicle, the vehicle sump struck a kerb. This action caused the drain plug to be sheared off the sump resulting in the sump contents leaking out onto the roadway. An emergency spill kit was deployed, and the spillage cleaned up. Since this time the curb stones have been painted to highlight changes of height.

In addition to the above, minor oil spills and leaks have occurred at the site that were contained in bunds or contained without impact on land. On-going leaks from the Service Water Tank and the Firewater System pipework have occurred since April 2013 and November 2014 respectively. The service water tank was repaired in April 2015 but has since failed again. There is an approximate loss of 3m³/ day of water. Natural Resources Wales have been informed of the status of Service Water Tank.

No clean-up is required of the water leaks.

Details of HSRG sump breach is given in **Appendix L** and records of other Environmental Incidents are in **Appendix K**.

7 **SOIL GAS & WATER QUALITY MONITORING**

As per the site's SPMP Design, no environmental monitoring was required by the installation.

8 **DECOMMISSIONING & REMOVAL OF POLLUTION RISK**

Gas was disconnected from the site at the start of April 2019 and power was disconnected from the site in week commencing 22nd April 2019. There is currently no foul water drainage from site.

All tanks and their contents will be emptied and removed by the demolition contractor. Demolition of the site is expected to commence between June and July 2019.

9 **REFERENCE DATA & REMEDIATION (WHERE RELEVANT)**

Environmental Monitoring Infrastructure & SPMP Requirements

No environmental monitoring was required at the site.

Comparison of Baseline and Surrender Soil and Groundwater Reference Data

The SPMP first phase report (Appendix I) identified that:

- The installation is considered to present a very low risk of future contamination to soil and groundwater due to the preventative measures in place; and
- Both the history of the site, and the results of this reference data collection exercise have identified low levels of existing contamination; and as such are unlikely to pose a risk in the future if current site infrastructure is maintained.

On the basis of the information provided in Section 6, no significant pollution incidents are understood to have occurred during the period of the permit that would be expected to materially increase the contamination in soil and groundwater at the site. In addition, Section 5 indicates that site infrastructure has been well maintained. Therefore, there is considered to be a very low risk of contamination in the soil and groundwater beneath the site that is related to the permitted site operations. Hence no additional soil and groundwater sampling is considered necessary for the permit surrender application.

10 **STATEMENT OF SITE CONDITION**

Based on the information provided within Sections 3 to 9 and that appended to this surrender SCR, we can confirm that the permitted installation activities have stopped and that at the outset of demolition and site clearance activities, the land is in a satisfactory condition.

oo0oo

Respectfully submitted

On behalf of **Geosyntec Consultants Ltd**



Dr Gareth Barns

Project Professional



Mr Jim Wragg

Senior Principal

Appendix A

Figures and Plans



Site Location Map

Sully Moors Road, Barry

GCU0127045

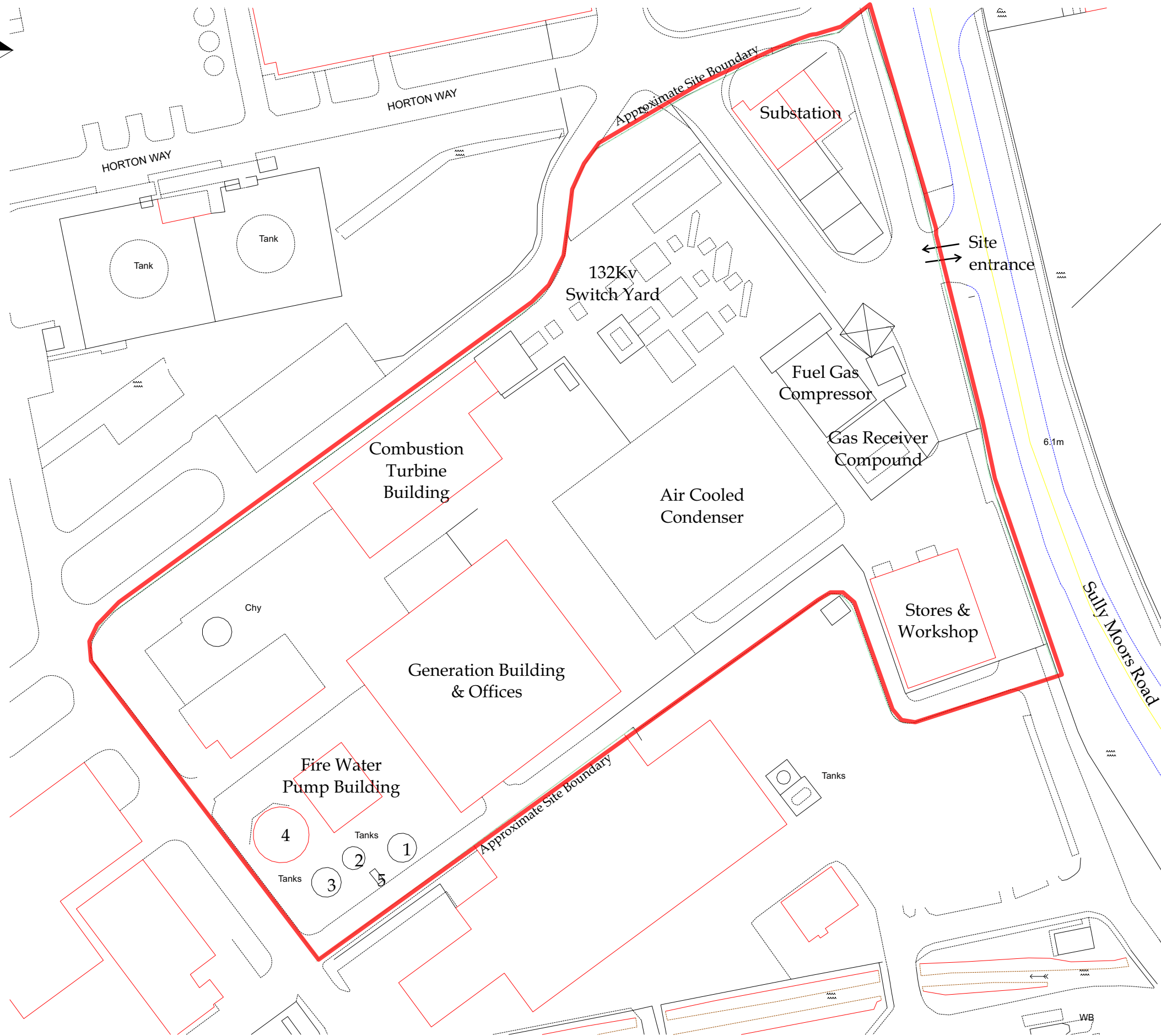
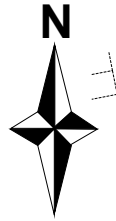
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consultants

**Centrica
Energy**

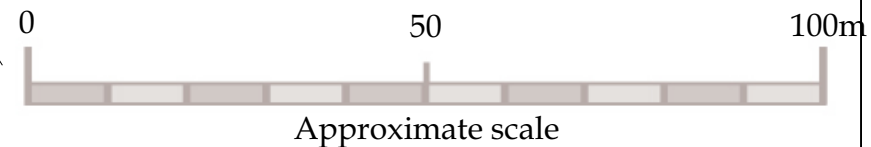
**Figure
1**


Delph, UK

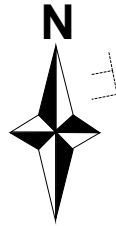
April 2019



- Key
- 1 - Site effluent tank
 - 2 - Demineralised water storage tank
 - 3 - Neutralisation tank
 - 4 - Fire water storage tank
 - 5 - BP pumphouse (Wet shed)



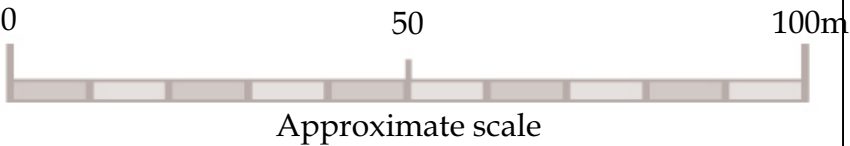
Site Layout Plan		
Sully Moors Road, Barry	GCU0127045	
	Centrica Energy	Figure 2
	Delph, UK	
	April 2019	



Legend

- Shallow Groundwater Sampling Location (Pre-2007)
- Soil Sampling Location (2007)
- Shallow Groundwater and Soil Sampling Location (2007)

Zone 1 - Diesel & oil storage & distribution
Zone 2 - Water treatment chemicals storage & use
Zone 3 - All other storage locations
Excluded



Site Zoning and Monitoring Locations		
Sully Moors Road, Barry	GCU0127045	
Geosyntec consultants	Centrica Energy	Figure 3
Delph, UK	April 2019	







Appendix B
2007 Borehole Logs













APPENDIX B

KEY TO BOREHOLE LOG RECORDS

Well Construction Details

-  Filter gravel (1.0-1.8mm)
-  Bentonite
-  HDPE 63mm or 32mm OD Screen (Slot size 0.6mm)
-  HDPE 63mm OD Plain Casing
-  PVC screw top well cap
-  Concrete reinstatement

Soil/Rock Types

-  MADE GROUND
-  CLAY
-  SILT
-  SAND
-  SAND & GRAVEL
-  GRAVEL
-  SANDSTONE
-  MUDSTONE
-  COAL SEAM
-  Limestone

Sample Types

-  Disturbed
-  Undisturbed

Groundwater

- ▼ Groundwater Table
- ▼P Perched Groundwater Table

Soil Vapour

- Photo Ionisation Detector limit 2999ppm
- * Headspace Analysis
- # Downhole measurement



Borehole Log

Borehole No.	BPS-BH1	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hollow Stem Auger
Date	23/04/2007	Total Depth	5.4m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.10m					
	MADE GROUND: Concrete		0.20m					
	MADE GROUND: Dense gravel and cobbles of angular concrete with black ash sand		0.70m					
1.0	Soft to firm grey slightly silty CLAY with brown mottles. At 0.9m becoming firm to stiff.						Sample SO-BPSBH1 0.90-1.10m	
							Sample SO-BPSBH1 1.45-1.55m	
2.0	At 1.8m becoming firm with some light grey and orange brown mottles.						Sample SO-BPSBH1 1.85-1.95m	
3.0	Soft grey with black mottles silty CLAY		2.50m					
	At 3.2-3.3m sandy							
4.0							Sample SO-BPSBH1 4.00-4.10m	
	At 4.5-4.7m dark grey							
5.0								
	Borehole completed at 5.4m		5.40m					
6.0								
7.0								
8.0								

Notes: Borehole located in parking area to the north of the workshop & stores building
Reference Point - Casing Top
Reference Point Elevation 6.029 (mASD)



Borehole Log

Borehole No.	BPS-BH2A	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hollow Stem Auger
Date	19/04/2007	Total Depth	5.5m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.20m			*0ppm	Sample SO-BPSBH2A 0.25-0.35m	
	MADE GROUND: Dense black sandy gravel of ash and clinker with brick fragments and patches of clay.		0.80m					
1.0	MADE GROUND: Soft grey brown clayey sand.		0.90m			*0ppm	Sample SO-BPSBH2A 1.00-1.10m	
	Soft to firm brown and grey mottled slightly silty CLAY.						Becoming damp	
2.0	At 1.8m becoming with dark brown sandy layers.					*0ppm	Sample SO-BPSBH2A 1.65-1.75m	
	At 2.1m becoming grey slightly silty CLAY							
	At 2.5m becoming with rare sandy partings					*0ppm	Sample SO-BPSBH2A 2.50-2.60m	
3.0								
4.0	Soft to firm reddish brown silty CLAY with some residual mudstone fabric (Highly weathered bedrock)		4.00m			*0ppm	Becoming wet	
							Sample SO-BPSBH2A 4.10-4.20m	
5.0			5.30m			*0ppm		
	Weak grey green SILTSTONE (highly weathered)		5.50m					
6.0	Borehole completed at 5.5m							
7.0								
8.0								

Notes: Borehole located on gravelled surface in the 132KV switch Yard and fitted with upstanding cover

Reference Point - Casing top

Reference Point Elevation 6.256 (mASD)



Borehole No.	BPS-BH2B	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	23/04/2007	Total Depth	9.5m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

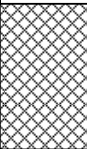

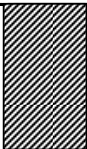
Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.15m					
1.0	MADE GROUND: Dense black sandy gravel of ash and clinker with brick fragments and patches of clay. Soft to firm brown and grey mottled slightly silty CLAY.		0.90m				Becoming damp	
2.0								
3.0								
4.0			4.00m				Becoming wet	
5.0			5.30m					
6.0	Soft to firm reddish brown silty CLAY with some residual mudstone fabric (Highly weathered bedrock) Reddish brown silty highly weathered MUDSTONE.		5.60m 5.80m					
7.0								
8.0	Light Grey LIMESTONE		7.50m					
9.0								
10.0	Borehole completed at 9.50m		9.50m					

Notes: Borehole located on gravelled surface in the 132KV switch Yard and fitted with upstanding cover
 Unconsolidated soils drilled using solid stem auger. Cased to bedrock and drilled with air flush DTH
 Reference Point - Casing top
 Reference Point Elevation 6.281 (mASD)



Borehole Log

Borehole No.	BPS-BH3	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	23/04/2007	Total Depth	1.00m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Dense reddish brown sandy angular gravel and cobbles of limestone with some concrete fragments and sandy matrix					*0ppm	Sample SO-BPSBH3 0.30-0.40m	
1.0	At 0.9m becoming with much concrete cobbles Obstruction at 1.0m borehole abandoned		1.00m					
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located beneath the ACC

Reference Point - Ground level

Reference Point Elevation 6.664 (mASD)

Three starter pits attempted at this location none could be extended beyond the Made Ground. Risks posed to underground utilities precluded drilling at this location without first securing a hand dig to natural ground.



Borehole Log

Borehole No.	BPS-BH4A	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	25/04/2007	Total Depth	3.7m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.16m			*0ppm		
	MADE GROUND: Dense reddish brown sandy gravel of angular limestone							
1.0	MADE GROUND: Concrete		0.80m					
	MADE GROUND: Black ashy gravel		1.15m					
	Soft to firm dark grey slightly silty CLAY		1.25m			*0ppm	Wet at 1.15m - 1.25m	
2.0	At 1.5m becoming brown with grey mottles						Damp	
	At 2.2m becoming grey with black mottles							
3.0				▼		*0ppm		
4.0	Borehole completed at 3.7m							
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on asphalted access roadway in the north west corner of the site
Reference Point - Casing top
Reference Point Elevation 6.735 (mASD)
Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole No.	BPS-BH4B	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	24-25/04/2007	Total Depth	9.0m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND:Asphalt		0.10m					
	MADE GROUND:Concrete		0.20m					
	MADE GROUND: Dense sand & gravel		0.30m					
	MADE GROUND:Concrete		0.90m					
1.0	MADE GROUND: Loose black and brown ashy gravel and clinker		1.10m				Wet - malodorous, rotting vegetation odour	
	MADE GROUND: Soft dark grey clay with gravel and cobbles of brick & concrete		1.40m			*0ppm	SO-BPSBH4B 1.20-1.40m	
2.0	Soft to firm grey and brown mottled slightly silty to silty CLAY							
	At 2.0m becoming grey with black mottles					*0ppm	Sample SO-BPSBH4B 2.20-2.30m	
3.0								
	At 3.0m becoming very silty					*0ppm	Sample SO-BPSBH4B 3.10-3.20m	
4.0								
						*0ppm	Becoming wet, Sample SO-BPSBH4B 4.10-4.20m	
5.0	Reddish brown silty highly weathered MUDSTONE.		4.50m					
6.0								
7.0								
	Light Grey LIMESTONE		7.20m					
8.0								
9.0	Borehole completed at 9.00m							
10.0								

Notes: Borehole located on asphalted access roadway in the north west corner of the site
 Unconsolidated soils drilled using solid stem auger. Cased to bedrock and drilled with air flush DTH
 Reference Point - Casing top
 Reference Point Elevation 6.229 (mASD)



Borehole Log

Borehole No.	BPS-BH5	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	25/04/2007	Total Depth	5.3m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.10m					
	MADE GROUND: Dense reddish grey sandy gravel. Gravel of angular limestone		0.8-0.9m					
1.0	MADE GROUND: Concrete		0.9-1.0m					
	MADE GROUND: Grey sandy gravel		1.0-1.1m					
	MADE GROUND: Concrete		1.1-1.2m					
	MADE GROUND: Grey sandy gravel							
2.0	Soft to firm light to dark grey silty slightly sandy CLAY. At 1.5m becoming with brown sandy pockets.							
3.0								
4.0	Soft to firm reddish brown silty CLAY with some residual mudstone fabric (Highly weathered bedrock)		4.00m					
5.0								
	Borehole completed at 5.3m		5.30m					
6.0								
7.0								
8.0								

Notes: Borehole located on asphalted access roadway adjacent to the western site boundary

Reference Point - Casing top

Reference Point Elevation 5.952 (mASD)

Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole Log

Borehole No.	BPS-BH6	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	26/04/2007	Total Depth	4.80m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.40m					
	MADE GROUND: Concrete		0.50m				Wet returns	
	MADE GROUND: Brown sand & gravel		0.60m				Sample SO-BPSBH6 1.10-1.20m	
1.0	MADE GROUND: Firm grey gravelly clay		0.80m				Damp returns	
	Soft to firm grey with brown mottles slightly silty CLAY.					*0ppm		
2.0						*0ppm	Sample SO-BPSBH6 2.10-2.20m	
3.0	At 3.0m becoming with occasional sandy partings and black mottles					*0ppm	Sample SO-BPSBH6 3.10-3.20m	
	At 3.5m becoming very soft, silty and occasionally sandy.						Wet returns	
4.0						*0ppm	Sample SO-BPSBH6 4.10-4.20m	
5.0	Borehole completed at 4.80m							
6.0								
7.0								
8.0								

Notes: Borehole located on gravelled surface adjacent to the Wet Shed (Upstanding cover installed)

Reference Point - Casing Top

Reference Point Elevation 6.932 (mASD)

Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole Log

Borehole No.	BPS-BH7	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	26/04/2007	Total Depth	2.5m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.30m	▼				
1.0	MADE GROUND: Orangy brown sandy subangular limestone gravel		0.90m					
	MADE GROUND: Concrete fragments		1.00m					
	MADE GROUND: soft to firm dark grey to black silty clay with some gravel.					*0ppm	Sample SO-BPSBH7 1.00-1.10m Strong Hydrocarbon and slight solvent odour at 1.00-1.90m	
2.0	Obstruction at 1.9m driven to 2.5m no returns					*0ppm		
3.0	Borehole completed at 2.5m							
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on gravel surface adjacent to the emergency diesel generator. Upstanding cover.

Reference Point - Casing Top

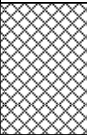
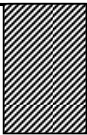
Reference Point Elevation 7.426 (mASD)

Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole Log

Borehole No.	BPS-BH8	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	19/04/2007	Total Depth	0.90m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Dense reddish brown sandy angular gravel and cobbles of limestone with some concrete fragments and sandy matrix		0.90m			*0ppm		
1.0	At 0.5m becoming with much concrete cobbles Concrete obstruction at 0.9m borehole abandoned							
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located beneath the ACC

Reference Point - Ground level

Reference Point Elevation 6.459 (mASD)

Five starter pits attempted at this location none could be extended beyond the Made Ground. Risks posed to underground utilities precluded drilling at this location without first securing a hand dig to natural ground.

For SPMP purposes, replaced by hand excavated samples at locations BPS-BH12 & 13



Borehole Log

Borehole No.	BPS-BH11	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	24/04/2007	Total Depth	0.80m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.20m					
	MADE GROUND: Orangy brown dense sand & limestone gravel		0.45m					
	MADE GROUND: Concrete		0.55m					
1.0	MADE GROUND: Orangy brown dense sand & gravel with concrete fragementts		0.80m			*0ppm		
	Concrete obstruction at 0.8m borehole abandoned							
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located in asphalt surfaced yard to the north of the ACC

Reference Point - Ground level


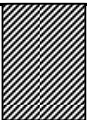
Reference Point Elevation 6.887 (mASD)

Two starter pits attempted at this location none could be extended beyond the Made Ground. Risks posed to underground utilities precluded drilling at this location without first securing a hand dig to natural ground.



Borehole Log

Borehole No.	BPS-BH12	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	24/04/2007	Total Depth	0.35m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA



Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.30m			*0ppm	Sample SO-BPSBH12 0.30-0.35m Slight hydrocarbon staining and odour	
1.0	MADE GROUND: Reddish brown sand and gravel with patches of stiff clay Borehole completed at 0.35m							
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on a gravelled strip adjacent to the gas compressor slab
Reference Point - Ground level
Reference Point Elevation 6.464 (mASD)
This location was used as a partial replacement for BPS-BH8



Borehole Log

Borehole No.	BPS-BH13	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	24/04/2007	Total Depth	0.35m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.30m			*0ppm	Sample SO-BPSBH13 0.30-0.35m Slight hydrocarbon staining and odour	
1.0	MADE GROUND: Reddish brown sand and gravel. Borehole completed at 0.35m							
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on a gravelled strip adjacent to the gas compressor slab
Reference Point - Ground level
Reference Point Elevation 6.394 (mASD)
This location was used as a partial replacement for BPS-BH8

Appendix C
Excavation and Sampling Protocol
2007



STANDARD INVESTIGATION & SAMPLING PROTOCOLS

The main objective of environmental sampling is to collect samples so that representative and repeatable chemical analyses may be obtained for each sample. The following environmental method statements are designed to enable the collection of soil and groundwater samples in a manner that will allow this:

- MS1: Borehole Drilling by Auger
- MS2: Soil Sampling
- MS3: Monitoring Well Installation
- MS4: Groundwater Sampling

ADDITIONAL INFORMATION

Guidance providing standard methods of sampling at potentially contaminated sites includes:

- BS 5930:1999 **“Code of Practice for Site Investigations”**
- BS 10175:2001 **“Code of Practice for the Investigation of Potentially Contaminated Sites”**
- BS ISO 5667-18 : 2001 **“Water Quality Sampling - Guidance on Sampling of Groundwater at Contaminated Sites”**
- Neal Wilson (1995) **“Soil and Groundwater Sampling”**

BS 10175:2001 guidance is applicable to the investigation of all potentially contaminated sites. It provides a framework around activities such as setting investigation objectives and strategy, designing the investigation scope of works, sampling and on-site testing, laboratory analysis and data reporting. This, along with BS 5750:1999, are considered key documents that underpin the protocols presented herein.



ENVIRONMENTAL METHOD STATEMENT MS1: BOREHOLE DRILLING BY AUGER

The borehole drilling and installation process can be split into 3 stages, as follows:

Concrete Coring &/ or Inspection Pit Excavation

The aim of coring is to simply remove a concrete/tarmac core where hard standing is present to allow direct access to the soils. A small electrical or pneumatic powered unit is anchored next to the drilling location and the diamond-tipped, water flushed, coring barrel is slowly lowered until the base of the hard standing is reached. The barrel is then removed and the core is lifted out. In some cases, where proposed drilling locations are potentially close to underground services a hand dug inspection pit (to a nominal depth of 1m) may be required. This can be done using a range of non-mechanical hand tools, e.g. trowels, spades, spoons, to reach the desired depth where drilling can commence.

Drilling

A track mounted rotary flight auger drilling rig is used to advance boreholes at a diameter of up to 145mm.

Soil samples should be collected as the borehole is progressed in accordance with the procedure described in Environmental Method Statement MS2. When the total required depth is achieved, the shell and final cuttings are removed which should leave a clean, temporarily cased borehole.

Borehole completion

Where a monitoring well is required, this is then installed in accordance with the procedure outlined in Environmental Method Statement MS3. If no installation is needed, then the borehole should be backfilled using bentonite or and the hard standing surface repaired as required. It is acceptable to backfill a borehole with the drilling returns provided they were not grossly contaminated and can be compacted sufficiently. It is noted that all boreholes should be accurately located on a site plan which should be included with any report that is completed.



ENVIRONMENTAL METHOD STATEMENT MS2: SOIL SAMPLING

In addition to selecting appropriate techniques a prime consideration of any sampling programme is to take all appropriate and practical steps to ensure the chemical integrity of the sample is maintained and that "foreign" chemicals are not added or chemicals present in the sample lost.

One potential source for the addition of foreign chemicals to a sample is by the use of sampling equipment which contains; or includes chemical residues from the previous sampling event. To ensure the integrity of the sample being collected all foreign chemical residues have to be removed from the sampling equipment. This can be done by a variety of methods, which essentially involves the thorough cleaning of reusable equipment and the single use of disposable equipment.

Before commencing drilling works, the soil sampling equipment and materials should be laid out close to the sampling location, on clean plastic sheeting to prevent direct contact with the ground surface if this is potentially contaminated. The sampler should collect regular samples of soil cuttings recovered from the borehole as it is progressed, so they can:

- Record details of the geological strata encountered in accordance with BS5930;
- Observe and record any visual or olfactory indications of contamination impacts, such as stains and odours;
- Where appropriate, undertake on site screening analyses of soil samples such as headspace analysis for Volatile Organic Compounds (VOCs)

The sampler should also record any observations of groundwater ingress, e. g. damp soils or water strikes, however small or localised. The selection of individual samples to be retained for laboratory analysis will be dependent upon consideration of the following main factors:

- The results of appropriate screening tests or observations of contamination indicators such as staining and odours;
- Changes in geological strata
- The position of the water table
- The physio-chemical properties of potential chemicals of concern, and hence their likely fate and transport in the subsurface;
- The objectives of the sampling exercise (e.g. shallow soils only, depth profiling, saturated soils, etc).

Undisturbed samples (where possible) should be collected by use of pre-cleaned sampling equipment such as U100 tubes (cohesive soils) and split spoon samplers (non cohesive soils). Where disturbance of the soil matrix is less critical, it may be possible to obtain samples from the drilling auger as it is retrieved from the borehole.

Once a sample location has been specified the sample should be taken with minimal disturbance to the soil matrix to prevent loss of volatiles. Sub-samples for chemical testing should be placed in laboratory supplied bottles using clean equipment, such as a stainless steel putty knife, whilst wearing new disposable latex or nitrile surgical gloves. Take care to fill sample containers, leaving minimal headspace (specifically for VOC related samples) and immediately cover the top of the jars and tightly screw on the lid. Label the jars and store in a cool box or refrigerator. Complete a Chain of Custody form once each borehole has been completed or once a sufficiently large batch of samples has been collected to require



dispatch to the laboratory. Consider use of QA:QC samples such as duplicates (10% of samples) and field blanks such as trip and field equipment rinse water blanks.

All sampling equipment in contact with soils must be decontaminated between each sample. This should be done by thoroughly wiping equipment that contacts the soil sample and by using detergent wash and clean water rinse (allowed to air dry where possible) as needed. Persistent soil residues should be removed using a clean scrubbing brush if necessary and then final rinsed.



ENVIRONMENTAL METHOD STATEMENT MS3: MONITORING WELL INSTALLATION

Upon completion of the drilling, where a monitoring well is required the well screen and casing is installed. Its design is based on the geological succession encountered, and the depth of the groundwater. In designing a monitoring well it is important to minimise the potential for introducing a short circuit between two water bearing horizons. An installed monitoring well should typically comprise approximately 0.6mm machine slotted screen (slot aperture ~0.6mm) and plain HDPE pipe of 50mm internal diameter. The screen is surrounded by a gravel filter pack and the monitoring well annulus filled to near surface using a bentonite pellet based seal. The slotted casing is typically installed at the base of the well, extending above the water table, with the plain casing at the top. The slotted section should be covered with a HDPE or PE filter sock (geomembrane) to enhance the retention of fines.

The ends of the casing are secured using water tight caps (bottom cap should be screw threaded). The annulus surrounding the casing is then filled by a gravel pack so that where possible it extends 0.2-0.3m higher than the top of the slotted section of the casing. The gravel pack should comprise of clean inert graded material appropriate to act as a filter and minimise the ingress of the fine soils into the well screen (1-4mm diameter washed and graded quartz based gravel recommended). Gravel pack or bentonite is introduced to the annulus slowly with the temporary drill casing gradually lifted from the borehole as it progresses. This should allow the gravel or bentonite to gravity fall down and fill the entire annulus whilst preventing bridging or collapse of the borehole around the monitoring well. After the well is sealed, an appropriate monitoring well cover is concreted in place and the hard standing is then repaired to the required standard.

After installation, the well is developed. This is done to remove any water that was added during the drilling process and to internally develop the gravel and filter pack designed to minimise future 'silting up', increasing the life of the well. Well development should involve the removal of at least 10 well volumes of water if possible (this may not be possible due to the likelihood of the wells drying up), using a bailer to both surge the well and remove groundwater. The aim is to remove as much suspended/mobile fines as possible whereby the purged groundwater becomes relatively sediment free by the end of the well development exercise. On completion of the monitoring well all equipment used should be decontaminated using clean detergent water, followed by a clean water rinse before moving onto the next location.



ENVIRONMENTAL METHOD STATEMENT MS4: GROUNDWATER SAMPLING

There are three main tasks required to complete the groundwater sampling from on-site monitoring wells as follows.

Water level monitoring

Once all wells have been installed, developed and left to equilibrate (for at least one week) a water level monitoring round should be completed prior to the sampling round. This should include existing wells and new wells as required. Initially check each well for signs of damage and undertake or programme repair if required. Particular attention should be paid to ensuring that the well head prevents ingress of surface water due to damaged or missing caps, etc.

An interface probe should be used to measure the depth of the groundwater and the thickness of any Non-Aqueous Phase Liquids (NAPLs) if present. The base of the well should also be tested in case Dense NAPL (DNAPL) is present. All such data should be tabulated and submitted as part of the project deliverable. Note that slowly lowering and rewinding the probe (do this at least twice) to measure the thickness of NAPLs increases the accuracy of the reading. The validity of groundwater sample organic analysis results from monitoring wells containing free phase product may be impaired due to the difficulty of ensuring that no free product is entrained by the sampling equipment. As such it is critical to understand if it is present, so as to modify the sampling strategy as necessary and interpret the analytical results accordingly.

Decontaminate the interface probe and line between wells using clean water (and detergent water mix if necessary) to help prevent cross contamination. Once the groundwater level has been established, calculate monitoring well specific purging volumes using measurements of the height of the water column and the well diameter. The depth of each monitoring well should be compared to drilled depth so as to estimate the degree of silting up at the base of each monitoring well.

Purging

Where known (from previous monitoring round data or drilling evidence if new wells), sampling should be carried out from the potentially least to most contaminated well. Purge using dedicated disposable or appropriately decontaminated equipment. Each well should be purged of a minimum of 3 borehole volumes. Further, if requested well purging should continue until the field measured parameters such as groundwater pH, temperature and electrical conductivity appear to have stabilised. If the well becomes dry before the purge volume is reached, then leave the well to recharge and repeat the process. Allow the well to recharge until sufficient water is available to allow sampling to proceed. Purge waters should be collected into sealable containers when expecting high levels of contamination or into buckets which can be later emptied on open ground close to the well in areas of lower contamination (presuming there to be no excessive surface pooling of water and no possibility of uncontrolled entry into drains). Purging should be carried out by either:

- Bailer – using a dedicated weighted HDPE bailer and line. Lower the bailer to below the surface of the water and allow the bailer to take up slack on the line. Tug the line to ensure a basal valve closes and then remove the bailer from the well. Empty into an appropriate graduated receptacle (e.g., 10 litres graduated bucket).
- Inertial pumping system - using dedicated HDPE tubing and a decontaminated reusable stainless steel foot-valve. Lower the tubing (with the valve attached) into the well until the valve is submerged. Repeatedly raise and lower the tube in a short rhythm to bring the water to the surface and empty into receptacle, as above.



- Peristaltic pump – using dedicated PE tubing. A battery powered motor controls the squeezing and releasing of flexible tubing causing a vacuum that draws the water out of the well. This method may also be combined with the use of a Flow Through Cell to facilitate more accurate (and continuous) measurements of well head parameters.

Sampling

Groundwater sampling should take place immediately after purging has finished preferably using a dedicated HDPE (PE) bailer and slow flow sampling tap. If purging was carried out with a bailer, it is possible to use the same bailer to sample the well. A fresh pair of nitrile gloves should be worn for the sampling exercise and between wells to prevent cross contamination.

A sub-sample for on-site final measurement of pH, electric conductivity and temperature should be taken, followed by the samples in order of likely parameter sensitivity, with care being taken to gently decant the sample into its receptacle to minimise disturbance. This is especially true of Volatile Organic Compounds (VOCs), where the glass vial should be filled to the top, and a meniscus formed. After the vial is sealed invert it and give it a light tap to check for air bubbles, refilling if any bubbles are found. Sample bottles for non-volatile analytes should be filled, or to a minimum volume as specified by the laboratory. Samples requiring filtration should be collected on-site using dedicated 0.45µm filters and transferred to plastic bottles, with preservative as supplied by the laboratory.

Label each sample bottle and enter the details onto a chain of custody form. The samples should be stored and packed carefully in a cool box with protective padding and ice packs. Where samples are being stored for extended periods, e.g. overnight; they should be stored in a dedicated refrigerator if possible and certainly not in a refrigerator that contains chemicals (such as may be the case for a site laboratory fridge). A trip bank sample should be arranged to be used where site samples are expected to have to be stored in non ideal conditions at the site. Samples should be dispatched to the laboratory on an approximately daily basis using an overnight courier (sent pm to arrive am next day). They must be packed in sealed cool boxes containing ice packs and insulated packing material, under strict chain of custody procedures (one copy of chain of custody form to be retained by the sampler).

After sampling has finished, each well should be sealed and secured properly to prevent deterioration and the area around the well left in a safe and tidy condition.

Appendix D

Soil and Groundwater Sample Inventory

Table D1 – Soil SPMP Sample Analytical Inventories at 2007 Baseline

*Table D2 – Groundwater SPMP Sample Analytical Inventories at 2007
Baseline*

Table D3 – Well Details

Table D4 – Well Parameters at 2007 Baseline

Table D1
Soil Sample Inventory

2007 SPMP Baseline								
	Borehole	Sample Code	Date Samples Taken	Speciated TPH (CWG)	PAHs	Sulphate	Chloride	pH
Soil Analysis	BPS-BH1	SO-BPSBH1 0.90-1.10m	23/04/2007	x	x	x	x	x
		SO-BPSBH1 1.45-1.55m		x	x			
		SO-BPSBH1 1.85-1.95m		x	x	x	x	x
		SO-BPSBH1 4.00-4.10m		x	x			
	BPS-BH2A	SO-BPSBH2A 0.25-0.35m	19/04/2007	x	x			x
		SO-BPSBH2A 1.00-1.10m		x	x			
		SO-BPSBH2A 1.65-1.75m		x	x			
		SO-BPSBH2A 2.50-2.60m		x	x			
		SO-BPSBH2A 4.10-4.20m						x
	BPS-BH3	SO-BPSBH3 0.30-0.40m	23/04/2007	x	x	x	x	x
	BPS-BH4B	SO-BPSBH4B 1.20-1.40m	24/04/2007	x	x			x
		SO-BPSBH4B 2.20-2.30m		x	x			x
		SO-BPSBH4B 3.10-3.20m		x	x			
		SO-BPSBH4B 4.10-4.20m		x	x			
	BPS-BH5	SO-BPSBH5 1.50-1.60m	25/04/2007	x	x			x
		SO-BPSBH5 2.50-2.60m		x	x			x
		SO-BPSBH5 3.50-3.60m		x	x			
		SO-BPSBH5 4.50-4.60m		x	x			
	BPS-BH6	SO-BPSBH6 1.10-1.20m	26/04/2007	x	x			x
		SO-BPSBH6 2.10-2.20m		x	x			x
		SO-BPSBH6 3.10-3.20m		x	x			x
		SO-BPSBH6 4.10-4.20m		x	x			x
	BPS-BH7	SO-BPSBH7 1.00-1.10m	26/04/2007	x	x			x
	BPS-BH12	SO-BPSBH12 0.30-0.35m	19/04/2007	x	x			
	BPS-BH13	SO-BPSBH13 0.30-0.35m	19/04/2007	x	x			
Total Number of Samples: 29								
Notes:								
TPH (CWG) - Total Petroleum Hydrocarbon Criteria Working Group, inc BTEX								
VOCs - Volatile Organic Compounds								
SVOCs - Semi Volatile Organic Compounds including PAHs								
PCBs - Poly Chlorinated Biphenyls								
Metals - Includes As, Ba, Be, B, Cd, Cr ,Cu, Pb, Ni, Se, V and Hg.								
Sulphate - Total and water soluble								

Table D2 -
Groundwater Sample Inventory

2007 SPMP Baseline								
	Well Name	Sample Code	Date Samples Taken	Speciated TPH (CWG)	PAHs	Sulphate	Chloride	pH
Groundwater Analysis	BPS-BH1	GW-BPS BH1- 01	25/04/2007	x	x	x	x	x
	BPS-BH2A	GW-BPS BH2A- 01	25/09/2007	x	x	x	x	x
	BPS-BH4A	GW-BPS BH4A- 01	26/04/2007	x	x	x	x	x
	BPS-BH5	GW-BPS BH5- 01	26/04/2007	x	x	x	x	x
	BPS-BH6	GW-BPS BH6- 01	27/04/2007	x	x	x	x	x
	BPS-BH7	GW-BPS BH7- 01	27/04/2007	x	x	x	x	x
	BPS-BHB1	GW-BPS BHB1- 01	24/04/2007	x	x	x	x	x
Total Number of Samples: 13								
GW-BPS BH2C was a duplicate sample for GW-BPS BH2B- 01								
Notes:								
TPH (CWG) - Total Petroleum Hydrocarbon Criteria Working Group								
VOCs - Volatile Organic Compounds								
SVOCs - Semi Volatile Organic Compounds including PAHs								
Metals - Includes As, Ba, Be, B, Cd, Cr ,Cu, Pb, Ni, Se, V and Hg.								
Sulphate - Soluble								

**Table D3
Monitor Well Details**

Well Name	Total Depth (m)	Screen Interval (mbgl)	Casing Top (mASD)	Cover Top Elevation (mASD)	Casing Material	Cover Type	Casing Diameter (mm)
BPS-BH1	5.206	1.0-5.2	6.029	6.076	HDPE	Flush	50
BPS-BH2A	5.004	1.0-5.0	6.256	6.28	HDPE	Up Standing	50
BPS-BH4A	3.696	1.0-3.7	6.735	6.753	HDPE	Flush	50
BPS-BH5	5.275	1.3-5.3	5.952	5.964	HDPE	Flush	50
BPS-BH6	4.894	0.9-4.9	6.932	6.95	HDPE	Up Standing	50
BPS-BH7	2.467	1.0-2.5	7.426	7.44	HDPE	Up Standing	50
BPS-BHA1	2.198	Unknown	6.036	6.056	PVC	Flush	50
BPS-BHB1	3.09	Unknown	6.029	6.059	PVC	Flush	50

mbgl - Metres below ground level

mASD - Meters Above Site Datum

Table D4 - Well Parameters

2007 SPMP Baseline											
Well Name	DTGW (mbct)	~DTB (mbct)	Reference point Elevation (mAD)	GW Elevation (mAD)	Purge Volume (L)	Field Redox (mV)		EC (µS/cm)	T (°C)	pH	Field Observations
BPS-BH1	3.175	5.206	6.029	2.854	19	90		>3999	12.1	7.00	
BPS-BH2A	2.587	5.004	6.256	3.669	48	78		749	11.7	7.09	
BPS-BH4A	2.916	3.696	6.735	3.819	18	-5		717	12.4	8.78	
BPS-BH5	1.857	5.275	5.952	4.095	16	-125		578	14.5	7.44	Very slow recovery after purging
BPS-BH6	1.981	4.894	6.932	4.951	18	54		454	12.8	7.54	
BPS-BH7	2.091	2.467	7.426	5.335	5	-29		864	13.1	11.7	Very limited water depth in the installation
BPS-BHA1	1.167	2.198	6.036	4.869	2	-56		2258	14	6.35	Very slow recovery after purging
BPS-BHB1	1.227	3.09	6.029	4.802	5	-146		3592	13	6.89	Very slow recovery after purging
Notes: >3999 - recorded conductivity value greater than maximum range of the meter. mASD - Metres Above Site Datum mbct - Metres below Casing top. DTGW - Depth to Groundwater DTB - Depth to Base GW -Groundwater EC - Electrical Conductivity											

Appendix E

Quality Assurance & Quality Control, Analytical Protocols & Laboratory Accreditation

C1 - LABORATORY ACCREDITATION (ALCONTROL GEOCHEM, CHESTER)

WATERS & LEACHATES				
Analysis	Method	MDL µg/l	UKAS	MCERTS
Petroleum Hydrocarbons				
EPH (Formerly DRO) by GC-FID (C10-40)	GC-FID following solvent extraction, inc traces and interpretation	10	yes	NA
EPH (C10-40) and C10-16,16-24,24-40	As above	10	yes	NA
TPH - WCG (C5-35) based on TNRCC method 1006	GC-FID - aliphatic/aromatic split, two separate runs. Includes BTEX/MTBE	10	yes	NA
Semi - Volatile Organic Compounds (SVOCs)				
SVOCs target list Inc PAHs (one extraction only)	Determination of Semivolatile Organic Compounds by GC-MS	1	NA	NA
Inorganics & Metals				
Chloride	Spectrophotometric analysis	1mg/l	yes	NA
pH	pH meter	0.01pH units	yes	NA
Sulphate	Spectrophotometric	3mg/l	yes	NA
Notes: UKAS - yes* - accepted by UKAS in June 2003, awaiting certificate MCERTS - NA - not applicable to water or leachate analysis				

C2 - LABORATORY ACCREDITATION (ALCONTROL GEOCHEM, CHESTER)

SOILS				
Analysis	Method	MDL mg/kg	UKAS	MCERTS
Petroleum Hydrocarbons				
EPH (Formerly DRO) by GC-FID (C10-40)	GC-FID following solvent extraction, inc traces and interpretation	1	yes	yes
EPH (C10-40) and C10-12,12-16,16-21,21-40	As above	1	yes	yes
TPH - CWG (C5-35)	GC-FID - aliphatic/aromatic split, two separate runs, and carbon banded. Includes BTEX/MTBE	0.1	yes	yes
Semi - Volatile Organic Compounds (SVOCs)				
PAH16-MS	PAH 16 Speciated (Naphthalene (10), Chrysene (10), Benzo(b)fluoranthene (16), Benzo(k)fluoranthene (25), Benzo(a)pyrene (12), Indeno(123cd)pyrene (11), Dibenzo(ah)anthracene (8), Benzo(ghi)perylene (10), Acenaphthylene (5), Acenaphthene (14), Fluorene (12), Phenanthrene (21), Anthracene (9), Fluoranthene (25), Pyrene (22), Benz(a)anthracene (12)	See brackets (mg/kg)	yes	yes
Inorganics & Metals				
Chloride	Spectrophotometric analysis	5	yes	p
pH	pH meter	0.01pH Units	yes	NA
Sulphate (water Soluble)	Spectrophotometric	3	yes	p
Notes: UKAS - yes - accepted by UKAS in June 2003, awaiting certificate MCERTS - p - pending MCERTS - NA - not applicable				

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

Copy



TESTING LABORATORY
No. 1291

ALcontrol Laboratories

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005
General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.org.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.



Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date
16 August 1993

This certificate issued on
02 January 2007

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and persons

Appendix F

Updated Infrastructure Monitoring Programme (2018) and Barry Environmental Incidents

Appendix K:
Updated Infrastructure Monitoring Programme (2018)

SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required	2018 Pre-Decomissioning Update
	Further Action Required												
7	2	Bulk Caustic Solution Tank	Stainless Steel	50% w/ w caustic solution	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bundled area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Consider implementing elements of the RWE Bulk Storage Installations guidance (TECH/PROC/011 Part 2) to enable routine visual inspections, detailed external inspections and ultrasonic thickness testing.	An internal inspection of the tank was carried out in 2011 in accordance with the RWE technical procedure P0110200 which showed no defects in the tank structure, further inspections were planned in 2018 however due to the likelihood of plant closure chemical stocks were reduced and no further inspections carried out
7	2	Bulk Caustic Solution Tank - Transfer pipework	Lined stainless steel	50% w/ w caustic solution	N/A	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Caustic solution is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Caustic Pump Oil Change' AOP024, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Consider implementing elements of the RWE Bulk Storage Installations guidance (TECH/PROC/011 Part 2) to enable routine visual inspections, detailed external inspections and ultrasonic thickness testing.	
No above ground infrastructure	3	Site drainage system - Pipes	Various	Oilly Water	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	None	Approved Operating Procedures (AOP) 'Monitor and Maintain Surface and Storm Water Drain Quality' AOP051, Issue 1		Regular CCTV Survey inspections of the drainage network.	Inspection notification and maintenance records (corrective and preventative) managed by the SAP management system.	Carry out more regular CCTV inspections of the site drainage network.	A drain survey was carried out in 2018 which showed no changes to the drainage system
19	3	Transformers	Carbon steel	Transforme r oil	N/A	Concrete bund with drain (normally isolated) routed to oil/water separator. Discharge via manually operated valve	Remote monitoring from control room Routine checks once per shift	Approved Operating Procedures (AOP) 'Check CT/ST/ AUX Transformer Bund Levels and Isolation Valves' AOP047, Issue 1		Routine visual inspections carried out weekly	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	The loss of insulating oil loss from the 3-phase gaskets of the GT&ST transformers which was observed as a seepage during the 2011 review, persists at a similar rate. It is recommended that the leak continues to be monitored, and practicallably managed.	The oil was fully contained within the transformer bund and therefore no escape to ground was likely.
	No Further Action Required												
1	1	Auxillary (Emergency) Diesel Generator Tank	Steel	Diesel	1.5m3	Concrete hardstanding sloping towards surface water/oil drain and route spillage to surface water ditch via Penstock valve	Diesel storage tank equipped with high level transmitter and local level indication. Activity continuously supervised	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
2	1	Diesel Storage Tank	Steel	Diesel	approx. 2.6m3	Concrete bund. Overflow from tank flows into the bundled area.	Diesel storage tank equipped with high level transmitter and local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection. Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
2	1	Diesel Storage - Transfer Pipework	Steel	Diesel	~ 60 litres	Concrete bund.	Low-level alarm on tank. Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection. Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
3	1	CT Lube Oil Reservoir - Drum	Steel	CT Lube Oil	200 litres	Bund	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1 Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
3	1	CT Lube Oil Reservoir - Tank	Steel	CT Lube Oil	18m3 litres max (9m3 litres working volume)	Impervious building floor of CT building and bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
3	1	CT Lube Oil Reservoir - Transfer Pipework	Steel	CT Lube Oil	9m3 litres working volume (max)	Impervious building floor of CT building and bund	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
4	1	ST Lube Oil Reservoir - Drum	Steel	ST Lube Oil	200 litres	Metal bund	Transfer and filling operation performed manually and under continuous supervision	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
4	1	ST Lube Oil Reservoir - Tank	Steel	ST Lube Oil	11m3 (5.5m3 working)	Concrete bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	

Appendix K:
Updated Infrastructure Monitoring Programme (2018)

SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required	2018 Pre-Decommissioning Update
4	1	ST Lube Oil Reservoir - Transfer Pipework	Steel	ST Lube Oil	5.5m3 (working)	Double-walled pipe	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
5	1	Oil Stores - Drums/IBC	Metal/ plastic	Turbine lube, transforme r and waste oils	8 x 200-litre 15 x 25-litre 900 litre waste oil IBC	Locked container unit with spill trays	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
6	1	Fire/ Miscellaneous Pumps Unloading Area - Tanker	Steel	Diesel	15m3	Concrete hardstanding sloping towards surface water/oil drain and routing spillage to surface water ditch via Penstock valve	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
6	1	Fire/ Miscellaneous Pumps Building - Day Tank	Steel	Diesel	800 litre	Concrete bund	Local level indication. Low- level alarm and level switch Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
6	1	Fire/ Miscellaneous Pumps Building - Pump	Steel	Diesel	N/A	Impervious building floor sloping towards oily drain routed to oil/ water separator	Local level indication. Low- level alarm and level switch Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Visual inspection twice a day. Weekly testing of pumps for 30min	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
2	1	Mobile Diesel Bowser	Steel	Diesel	1m3	Double-skinned tank	Routine checks once per shift	Approved Operating Procedures (AOP) 'Using the Mobile Diesel Bowser' AOP048, Issue 1		Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
7	2	Bulk Sulphuric Acid Tank Unloading Area - Tanker	N/A	98% w/ w sulphuric acid	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
7	2	Bulk Sulphuric Acid Tank	Stainless Steel	98% w/ w sulphuric acid	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bundled area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	HSE Guidance - Bulk Storage of Acids HSG235	Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
7	2	Bulk Sulphuric Acid Tank - Transfer pipework	Lined stainless steel	98% w/ w sulphuric acid	15 litres	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Acid is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Acid Pump Oil Change' AOP025, Issue 1		Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
7	2	Bulk Caustic Solution Tank Unloading Area - Tanker	N/A	50% w/ w caustic solution	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
8	2	Boiler Feed/ CCCW Pump Building - IBC	Stainless Steel	Nalco Elimin-Ox (oxygen scavenger); Amine; phosphates ; potassium hydroxide	1 m3 stainless steel IBC containter for eacg chemical (4 m3 in total)	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with 'Daily Steam Turbine and Gas Turbine Plant Checks' sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	

Appendix K: Updated Infrastructure Monitoring Programme (2018)													
SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required	2018 Pre-Decomissioning Update
8	2	Boiler Feed/ CCCW Pump Building - pipework	Stainless Steel	Nalco Elimin-Ox (oxygen scavenger); Amine; phosphates ; potassium hydroxide	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
9	2	Generation Building - IBC	Stainless Steel	Amine and Nalco Elimin-Ox (oxygen scavenger)	1 m3 stainless steel IBC containter for eacg chemical (2 m3 in total)	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers; PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
9	2	Generation Building - pipework	Stainless Steel	Amine and Nalco Elimin-Ox (oxygen scavenger)	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
10	3	Air Cooled Condensers	Carbon steel	Engineerin g oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Oil pressure indication and low oil pressure alarm Routine checks once per shift	Approved Operating Procedures (AOP) 'Air-Cooled Condenser Fan Oil Change' AOP006, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
11	3	Gas Compressor	Carbon steel	Engineerin g oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	

Appendix K:
Updated Infrastructure Monitoring Programme (2018)

SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required	2018 Pre-Decomissioning Update
12	3	Site drainage system - Oil separator/ coalescers	GRP	Oilly Water	8000 litre	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Continuous oil-in-water analyser and high oil-in-water alarm. High-level and low-level switches, indicators and alarms and automatic closure device.	Approved Operating Procedures (AOP) 'Oil/Water Separator Alarms and Manual Emptying' AOP052, Issue 1	Maintained in accordance with manufacturers instructions; PPG18 - Managing Firewater and Major Spillages and PPG3 - Use and Design of Oil Separators	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
13	3	Neutralisation Tank	Steel	Water treatment plant effluent	300m3	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
14	3	Effluent Tank	Steel	Waste effluent	300m3	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
15	3	Solid Waste Skips	Metal	Wood, metal, general waste		Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG11 - Preventing Pollution from Industrial Sites	Not required for the SPMP (no significant risk of ground or groundwater contamination)	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
16	3	Liquid Waste - IBC	Steel	CT blade wash effluent	1m3	Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
17	3	Batteries	Plastic	Battery electrolyte	10kg	Acid resistant floor graded towards chemical drain and lip at entrance	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
18	3	Turbine (off-line) washwater effluent - IBC	Steel	CT wash residue	1 m ³	Mobile bund located within the CT building	Tank level gauge Routine checks once per shift	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	
18	3	Turbine washwater effluent tank (off-line) - Tanker	N/A	CT wash residue	N/A	Impervious building floor of CT building would divert loss into surface water/oil drain close to EDG. Valves are configured to route spillage to surface water ditch via Penstock valve	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 2		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.	

Date of Event	Specific Location	Where Exactly	Event Description	Pollutant entered drains or land	Immediate Remedial Actions Taken	Investigation Findings	Lessons Learned	Date Investigation Completed
16-Jan-13	Car park / roadways	Overflow car park	Migrated Data, Original ID 146848 Original SubType: Land Description: Vehicle oil spill: whilst contractor reversing vehicle, vehicle sump struck kerb. This action caused the drain plug to be sheared off the sump resulting in the sump contents leaking out onto the roadway.	release to roadway	Driver immediately informed security and main control room. Emergency spill kit deployed and placed around spillage. Vehicle left in position until recovery vehicle arrived to remove. Once vehicle removed from site, spillage cleaned and area returned to pre spill condition.	InvestigationFindings: Van caught engine sump on curb whilst reversing out of Visitor car parking areaThe step change in curb height isn't clearly identified. When the contractor reversed out of his parking space, he caught the Engine sump on the high part of the curb. This resulted in shearing off the sump plug. Causation:	Curb stones to be painted in order to highlight the change in height. Traffic cone to be placed on section of change.	13-Sep-11
01-Jul-12	Steam Turbine hall	Ground level	Migrated Data, Original ID 137096 Original SubType: Land Description: Portable oil bund containing oil filled gearbox side had collapsed.	No Release	Re-secured bund walls.	InvestigationFindings: The portable bund is of the Pig design, this bund is portable and flat packed for easy storage when not in use. To assemble the bund, it's firstly laid out and then the sides are locked into place with spars. It appears that when the bund was examined, several spars had moved from the original set up position. The movement of the spars resulted in the remaining spars being unable to support the side bund wall. Hence, the bund wall was seen in a collapsed position. [Historical Causations] 1.Direct cause --> 1.2.Unsafe conditions --> 1.2.4.Protective Defences -> 1.2.4.2.Defective guards/protective devices Causation:	Awareness raised with both Operations team and Maintenance team ref the correct assembly and periodic check required on this type of bund. This is a requirement to maintain the bund integrity.	05-Jul-12
25-Oct-11	Steam Turbine hall	Air Compressors	Migrated Data, Original ID 124481 Original SubType: Land Description: Leak of oil from equipment, oil covered area around air compressor 1A. No oil entered drains.	contained in building	Turn on Stanby compressor and isolate leaking unit.	InvestigationFindings: Oil pipe contained within the Air Compressor enclosure had failed allowing partial release of cooling/lubricating oil. [Historical Causations] 1.Direct cause --> 1.2.Unsafe conditions --> 1.2.3.Tools & Equipment Condition --> 1.2.3.1.Defective tool or equipment (defect unknown to user) Causation: InvestigationFindings: Filter bowl larger capacity greater than the plastic container	Oil pipe contained within the Air Compressor enclosure had failed allowing partial release of cooling/lubricating oil. Plant item was taken out of service and defective part replaced. Similar parts on same machine and standby unit were checked and approved.	18-Dec-11
03-Aug-10	Gas turbine hall	CT Gen Lift Oil Pump	Migrated Data, Original ID 103863 Original SubType: Land Description: CT Gen Lift Oil Pump filter removed and residual contents of filter bowl and pipework greater than prepared plastic contaier. Oil spilled onto motor / pump unit.	contained in building	Spill contained to motor/pump drip tray and immediate plynth. Drip tray emptied to waste oil tank and absorbant cloths used to collect and clean remains.	[Historical Causations] 2.Indirect cause --> 2.2.Execution Factors --> 2.2.1.Engineering / Design --> 2.2.1.3.Improper materials used, specified Causation:	Sufficient capacity of plastic container needed to drain the filter bowl in future	04-Oct-10
18-Jul-10	Steam Turbine hall	ST oil tank bund	Migrated Data, Original ID 102864 Original SubType: Land Description: Tim Barker and Stephen Kimpton were checking the ST oil strainers for debris. Upon completion of the job Tim Barker requested that the system be put back into service, which resulted in an oil leak. This was due to a drain valve not being closed prior to starting the pumps. The pumps were shut down and the valve was closed. Approx 50 litres of oil was spilled into the ST oil tank bund, subsequently cleaned up by Tim Barker and Stephen Kimpton.	contained in building	Sytsem isolated and spill cleaned.	InvestigationFindings: Drain valve not closed prior to starting pumps - procedure either not followed or not clear. [Historical Causations] 1.Direct cause --> 1.1.Unsafe acts --> 1.1.3.Procedures implementation --> 1.1.3.2.Safety Standards/ Procedures/ Guidelines/Operating Specifications not followed Causation:	No environmental impact. Investigation complete	30-Jul-10
17-Oct-09	Gas Compressor Building	Fuel gas compressor cor	Migrated Data, Original ID 101223 Original SubType: Land Description: Release of coolant containing Ethylene Glycol. First estimates of 800L lost onto gravel/stone areas. Environment Agency informed - Schedule 6 notification submitted.	release to gravel	Valves closed to prevent further spill.	InvestigationFindings: Remainder of coolant drained - approx 1200l recovered. Soil and stones removed from area where coolant had spilt onto them. [Historical Causations] 1.Direct cause --> 1.1.Unsafe acts --> 1.1.1.Individual behaviour/attitude --> 1.1.1.1.Poor decision making or lack of judgement 1.Direct cause --> 1.2.Unsafe conditions --> 1.2.2.Process Hazards --> 1.2.2.4.Inadequate isolation of process or equipment Causation:	Soil samples sent for analysis and results forwarded to the EA. Sample results indicate no environmental impact but EA have asked for further information before deciding on categorisation of incident.	07-Feb-11

Appendix G

Laboratory Certificates for 2007 Baseline SPMP Reference Data

ALcontrol Geochem Analytical Services

Sample Descriptions

Job Number: 07/07209/02/01
Client: Ford Consulting Group Ltd
Client Ref : 00127-004

Grain sizes
<0.063mm Very Fine
0.1mm - 0.063mm Fine
0.1mm - 2mm Medium
2mm - 10mm Coarse
>10mm Very Coarse

Sample Identity	Depth (m)	Colour	Grain Size	Description	Batch
SO - BPS - BH4B	1.2-1.4	Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH4B	2.2-2.3	Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH4B	3.1-3.2	Grey	<0.063mm	Clay	2
SO - BPS - BH4B	4.1-4.2	Dark Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH5	1.5-1.6	Grey	<0.063mm	Clay	2
SO - BPS - BH5	2.5-2.6	Dark Grey	<0.063mm	Clay	2
SO - BPS - BH5	3.5-3.6	Grey	<0.063mm	Clay	2
SO - BPS - BH5	4.5-4.6	Grey	<0.063mm	Clay	2
SO - BPS - BH6	1.1-1.2	Dark Grey	<0.063mm	Clay	2
SO - BPS - BH6	2.1-2.2	Light Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH6	3.1-3.2	Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH6	4.1-4.2	Grey	<0.063mm	Clay	2
SO - BPS - BH7	1.0-1.1	Grey	<0.063mm	Clay with some Stones	2
SO - BPS BH1	0.9-1.1	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH1	1.45-1.55	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH1	1.8-1.95	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH1	4.0-4.1	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	0.25-0.35	Black	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	1.0-1.1	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	1.65-1.75	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	2.5-2.6	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	4.1-4.2	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH3	0.3-0.4	Red	0.1mm - 2mm	Gravel with some Stones	1
SO - BPS BH9	0.4-0.5	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH9	1.1-1.2	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH10	0.45-0.50	Black	0.1mm - 2mm	Sand with some Stones	1
SO - BPS BH10	0.95-1.0	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH12	0.3-0.35	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH13	0.3-0.35	Brown	0.1mm - 2mm	Clay with some Stones	1

* These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials-whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

¹ Sample Description supplied by client

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	Method Code	LoD/Units
Depth (m)	1.2-1.4	2.2-2.3	3.1-3.2	4.1-4.2	1.5-1.6	1.5-1.6	2.5-2.6	2.5-2.6	3.5-3.6		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	24.04.07	24.04.07	24.04.07	24.04.07	25.04.07	24.04.07	25.04.07	25.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	42-45	46-48,79	49-50	51,80	53	52,54-55	57	56,58	59-60		
GRO (C4-C12)	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
MTBE	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Benzene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Toluene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Ethyl benzene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
m & p Xylene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
o Xylene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Aliphatics C5-C6	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C6-C8	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C8-C10	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C10-C12	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C12-C16	5600	<100	<100	<100	-	2000	-	<100	<100	TM173 [#]	<100 ug/kg
Aliphatics >C16-C21	9300	<100	<100	<100	-	7700	-	<100	<100	TM173 [#]	<100 ug/kg
Aliphatics >C21-C35	56000	<100	<100	3700	-	9100	-	<100	<100	TM173 [#]	<100 ug/kg
Total Aliphatics C5-C35	70000	<100	<100	3700	-	19000	-	<100	<100	TM61/89	<100 ug/kg
Aromatics C6-C7	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Aromatics >C7-C8	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Aromatics >EC8-EC10	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aromatics >EC10-EC12	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aromatics >EC12-EC16	<100	<100	<100	<100	-	200	-	<100	<100	TM173 [#]	<100 ug/kg
Aromatics >EC16-EC21	<100	<100	<100	<100	-	200	-	<100	<100	TM173 [#]	<100 ug/kg
Aromatics >EC21-EC35	2000	1300	<100	2700	-	1000	-	<100	<100	TM173 [#]	<100 ug/kg
Total Aromatics C6-C35	2000	1300	<100	2700	-	1400	-	<100	<100	TM61/89	<100 ug/kg
TPH (Aliphatics and Aromatics C5-C35)	72000	1300	<100	6400	-	20000	-	<100	<100	TM61/89	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

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Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	Method Code	LoD/Units
Depth (m)	1.2-1.4	2.2-2.3	3.1-3.2	4.1-4.2	1.5-1.6	1.5-1.6	2.5-2.6	2.5-2.6	3.5-3.6		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	24.04.07	24.04.07	24.04.07	24.04.07	25.04.07	24.04.07	25.04.07	25.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	42-45	46-48,79	49-50	51,80	53	52,54-55	57	56,58	59-60		
Phenols											
2-Chlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Methylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Nitrophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4-Dichlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4-Dimethylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4,5-Trichlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4,6-Trichlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Chloro-3-methylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Methylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Nitrophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Pentachlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Phenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Methylnaphthalene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Acenaphthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Acenaphthylene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Anthracene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(a)anthracene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(a)pyrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(b)fluoranthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(ghi)perylene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(k)fluoranthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Chrysene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Fluoranthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Fluorene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Naphthalene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	Method Code	LoD/Units
Depth (m)	1.2-1.4	2.2-2.3	3.1-3.2	4.1-4.2	1.5-1.6	1.5-1.6	2.5-2.6	2.5-2.6	3.5-3.6		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	24.04.07	24.04.07	24.04.07	24.04.07	25.04.07	24.04.07	25.04.07	25.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	42-45	46-48,79	49-50	51,80	53	52,54-55	57	56,58	59-60		
PAHs (cont)											
Phenanthrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Pyrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Butylbenzyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Di-n-butyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Di-n-Octyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Diethyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Dimethyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
1,3-Dichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
1,4-Dichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Nitroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4-Dinitrotoluene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,6-Dinitrotoluene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
3-Nitroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Bromophenylphenylether	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Chloroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Chlorophenylphenylether	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Nitroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Azobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Carbazole	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Dibenzofuran	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Hexachlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

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ISO 17025 accredited

M MCERTS accredited

* Subcontracted test

» Shown on prev. report

Matrix: SOLID

Location: RFQ South Wales

Client Contact: Peter Dunn

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH5	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	Method Code	LoD/Units
Depth (m)	4.5-4.6	1.1-1.2	1.1-1.2	2.1-2.2	3.1-3.2	3.1-3.2	3.1-3.2	4.1-4.2	4.1-4.2		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	25.04.07	24.04.07	26.04.07	26.04.07	24.04.07	25.04.07	26.04.07	24.04.07	26.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	61-62	81	63-65	66-69	71	70	72	73,82	74		
Phenols											
2-Chlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Methylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Nitrophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4-Dichlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4-Dimethylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4,5-Trichlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4,6-Trichlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Chloro-3-methylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Methylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Nitrophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Pentachlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Phenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Methylnaphthalene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Acenaphthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Acenaphthylene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Anthracene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(a)anthracene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(a)pyrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(b)fluoranthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(ghi)perylene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(k)fluoranthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Chrysene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Fluoranthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Fluorene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Naphthalene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH5	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	Method Code	LoD/Units
Depth (m)	4.5-4.6	1.1-1.2	1.1-1.2	2.1-2.2	3.1-3.2	3.1-3.2	3.1-3.2	4.1-4.2	4.1-4.2		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	25.04.07	24.04.07	26.04.07	26.04.07	24.04.07	25.04.07	26.04.07	24.04.07	26.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	61-62	81	63-65	66-69	71	70	72	73,82	74		
PAHs (cont)											
Phenanthrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Pyrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Butylbenzyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Di-n-butyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Di-n-Octyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Diethyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Dimethyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
1,3-Dichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
1,4-Dichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Nitroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4-Dinitrotoluene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,6-Dinitrotoluene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
3-Nitroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Bromophenylphenylether	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Chloroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Chlorophenylphenylether	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Nitroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Azobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Carbazole	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Dibenzofuran	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Hexachlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

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» Shown on prev. report

Client Contact: Peter Dunn

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH7	SO - BPS - BH7	SO - BPS - BH1	SO - BPS - BH1	SO - BPS - BH1	SO - BPS - BH1	SO - BPS - BH2A	SO - BPS - BH2A	SO - BPS - BH2A	Method Code	LoD/Units
Depth (m)	1.0-1.1	1.0-1.1	0.9-1.1	1.45-1.55	1.8-1.95	4.0-4.1	0.25-0.35	1.0-1.1	1.65-1.75		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	26.04.07	23.04.07	23.04.07	23.04.07	23.04.07	19.04.07	19.04.07	19.04.07		
Sample Received Date	28.04.07	28.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	2	2	1	1	1	1	1	1	1		
Sample Number(s)	78	75-77	1-4	5-6	7-10	11-12	13-16	17-18	19-20		
SVOC by GCMS											
Phenols											
2-Chlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Methylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Nitrophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4-Dichlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4-Dimethylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4,5-Trichlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4,6-Trichlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Chloro-3-methylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Methylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Nitrophenol	-	<100	<100	<100	<100	<100	<200	<100	<100	TM157	<100 ug/kg
Pentachlorophenol	-	<100	<100	<100	<100	<100	<200	<100	<100	TM157	<100 ug/kg
Phenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Methylnaphthalene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Acenaphthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Acenaphthylene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Anthracene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(a)anthracene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(a)pyrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(b)fluoranthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(ghi)perylene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(k)fluoranthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Chrysene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Fluoranthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Fluorene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH7	SO - BPS - BH7	SO - BPS BH1	SO - BPS BH1	SO - BPS BH1	SO - BPS BH1	SO - BPS BH2A	SO - BPS BH2A	SO - BPS BH2A	Method Code	LoD/Units
Depth (m)	1.0-1.1	1.0-1.1	0.9-1.1	1.45-1.55	1.8-1.95	4.0-4.1	0.25-0.35	1.0-1.1	1.65-1.75		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	26.04.07	23.04.07	23.04.07	23.04.07	23.04.07	19.04.07	19.04.07	19.04.07		
Sample Received Date	28.04.07	28.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	2	2	1	1	1	1	1	1	1		
Sample Number(s)	78	75-77	1-4	5-6	7-10	11-12	13-16	17-18	19-20		
PAHs (cont)											
Naphthalene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Phenanthrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Pyrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	-	2400	<100	160	<100	<100	180000	400	<100	TM157	<100 ug/kg
Butylbenzyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Di-n-butyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Di-n-Octyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Diethyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Dimethyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
1,3-Dichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
1,4-Dichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Nitroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4-Dinitrotoluene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,6-Dinitrotoluene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
3-Nitroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Bromophenylphenylether	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Chloroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Chlorophenylphenylether	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Nitroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Azobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Carbazole	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Dibenzofuran	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

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» Shown on prev. report

Client Contact: Peter Dunn

[illegible]

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS BH2A	SO - BPS BH2A	SO - BPS BH3	SO - BPS BH9	SO - BPS BH9	SO - BPS BH10	SO - BPS BH10	SO - BPS BH12	SO - BPS BH13	Method Code	LoD/Units
Depth (m)	2.5-2.6	4.1-4.2	0.3-0.4	0.4-0.5	1.1-1.2	0.45-0.50	0.95-1.0	0.3-0.35	0.3-0.35		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	19.04.07	19.04.07	23.04.07	18.04.07	18.04.07	18.04.07	18.04.07	19.04.07	19.04.07		
Sample Received Date	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	21-22	23-24	25-28	29-30	31-32	33-34	35-36	37-38	39-40		
SVOC by GCMS											
Phenols											
2-Chlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Methylphenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Nitrophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4-Dichlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4-Dimethylphenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4,5-Trichlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4,6-Trichlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Chloro-3-methylphenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Methylphenol	<100	-	<100	<100	<100	<100	<100	180	<100	TM157	<100 ug/kg
4-Nitrophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Pentachlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Phenol	<100	-	<100	<100	<100	<100	<100	2900	810	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Methylnaphthalene	<100	-	<100	150	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Acenaphthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Acenaphthylene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Anthracene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(a)anthracene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(a)pyrene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(b)fluoranthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(ghi)perylene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(k)fluoranthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Chrysene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Fluoranthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Fluorene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS BH2A	SO - BPS BH2A	SO - BPS BH3	SO - BPS BH9	SO - BPS BH9	SO - BPS BH10	SO - BPS BH10	SO - BPS BH12	SO - BPS BH13	Method Code	LoD/Units
Depth (m)	2.5-2.6	4.1-4.2	0.3-0.4	0.4-0.5	1.1-1.2	0.45-0.50	0.95-1.0	0.3-0.35	0.3-0.35		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	19.04.07	19.04.07	23.04.07	18.04.07	18.04.07	18.04.07	18.04.07	19.04.07	19.04.07		
Sample Received Date	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	21-22	23-24	25-28	29-30	31-32	33-34	35-36	37-38	39-40		
PAHs (cont)											
Naphthalene	<100	-	<100	270	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Phenanthrene	<100	-	<100	140	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Pyrene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	<100	-	<100	130	<100	<100	<100	5400	6800	TM157	<100 ug/kg
Butylbenzyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Di-n-butyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Di-n-Octyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Diethyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Dimethyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
1,3-Dichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
1,4-Dichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Nitroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4-Dinitrotoluene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,6-Dinitrotoluene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
3-Nitroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Bromophenylphenylether	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Chloroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Chlorophenylphenylether	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Nitroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Azobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Carbazole	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Dibenzofuran	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

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» Shown on prev. report

Client Contact: Peter Dunn

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: LIQUID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	GW - BPS BH1 - 01	GW - BPS BH1 - 01	GW - BPS BH5 - 01	GW - BPS BH5 - 01	GW - BPS BH9 - 01	GW - BPS - BHB1 - 01				Method Code	LoD/Units
Depth (m)	-	-	-	-	-	-					
Sample Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID					
Sampled Date	25.04.07	27.04.07	25.04.07	26.04.07	24.04.07	25.04.07					
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07					
Batch	2	2	2	2	2	2					
Sample Number(s)	85-88	89	121	119-120,122-123	124-129	137-141					
PAHs											
2-Chloronaphthalene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
2-Methylnaphthalene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Acenaphthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Acenaphthylene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Anthracene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(a)anthracene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(a)pyrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(b)fluoranthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(ghi)perylene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(k)fluoranthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Chrysene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Dibenzo(a,h)anthracene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Fluoranthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Fluorene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Indeno(1,2,3-cd)pyrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Naphthalene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Phenanthrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Pyrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Phthalates											
Bis(2-ethylhexyl) phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Butylbenzyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Di-n-butyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Di-n-Octyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Diethyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Dimethyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Other Semi-volatiles											
1,2-Dichlorobenzene	<1	-	-	<1	<1	2				TM143	<1 ug/l
1,2,4-Trichlorobenzene	<1	-	-	<1	<1	<1				TM143	<1 ug/l

Date 20.06.2007

ALcontrol Geochem Analytical Services

Table Of Results - Appendix

Job Number: 07/07209/02/01
Client: Ford Consulting Group Ltd
Client Ref. No.: 00127-004

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample ¹	Surrogate Corrected
TM070	Modified: US EPA Method 8250 & 625	Determination of Total Polychlorinated Biphenyls (PCB's) as Aroclor 1254 and the ICE 7 Congeners by GC-MS	✓		DRY	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)			WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓		WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓	✓	WET	
TM097	Modified: US EPA Method 325.1 & 325.2	Determination of Chloride using the Kone Analyser	✓		NA	
TM097	Modified: US EPA Method 325.1 & 325.2	Determination of Chloride using the Kone Analyser	✓	✓	DRY	
TM098	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Sulphate using the Kone Analyser	✓		NA	
TM098	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Sulphate using the Kone Analyser	✓	✓	DRY	
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS	✓		WET	
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS	✓	✓	WET	
TM127	Method 3112B, AWWA/APHA, 20th Ed., 1999	The Determination of Trace Level Mercury in Aqueous Media and Soil Extracts by Atomic Absorption Spectroscopy	✓		NA	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer			DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓		DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓	✓	DRY	

¹ Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. **NA** = not applicable.

ALcontrol Geochem Analytical Services

Table Of Results - Appendix

Job Number: 07/07209/02/01
Client: Ford Consulting Group Ltd
Client Ref. No.: 00127-004

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample ¹	Surrogate Corrected
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓		NA	
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓	✓	WET	
TM143	Modified: US EPA Method 8270C	Determination of Semivolatile Organic Compounds by GC-MS			NA	
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS	✓		NA	
TM157		Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone			WET	
TM173		Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID	✓		DRY	
TM174		Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID			NA	
TM61/89		see TM061 and TM089 for details			WET	

¹ Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. **NA** = not applicable.

ALcontrol Geochem Analytical Services Table Of Results - Appendix

Job Number: 07/07209/02/01
Client: Ford Consulting Group Ltd
Client Ref. No.: 00127-004

Summary of Coolbox temperatures

[illegible]

Appendix H
SPMP Design Report
Permit Application Site Report

**DESIGN OF A
SITE PROTECTION AND MONITORING PROGRAMME
FOR BARRY POWER STATION,
CENTRICA ENERGY**

REQUIRING REFERENCE DATA TO BE COLLECTED

Barry Power Station

Centrica Energy

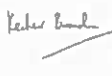
May 2007



RSK GENERAL NOTES

Project No: 100071/12
Title: Site Protection and Monitoring Plan
Client: Centrica Energy
Issue Date: 17/05/07
Issuing Office: Hemel Hempstead

Authorised by:  Project Author Date: 17/05/07

Authorised by:  Project QA Rep Date: 17/05/07

RSK Environment Ltd (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. RSK can accept no responsibility for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the Quality Management System of RSK Environment Ltd.

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Appendix D - Quality Assurance and Quality Control

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Executive Summary

This document represents the design Site Protection and Monitoring Programme (SPMP) for Barry Power Station submitted to the Environment Agency in pursuance of Condition 2.8 of the Permit No. JP3333LV (the "Permit") authorising the operation of Barry Power Station (the "installation"). This design document is required to be submitted to the Agency within 2 months of the date of issue of the Permit.

An intrusive investigation is required to be undertaken to characterise substances identified as being potentially present in, on, or under the ground in the Application Site Report (the "ASR") submitted with the Permit Application. This document contains the scope of those investigations to collect Reference Data and should be read in conjunction with the ASR for the installation.

No ongoing Environmental Monitoring Programme for the installation is currently proposed, however following collection of reference data for the site, any recommendations for changes to the Site Protection and Monitoring Programme will be incorporated into the SPMP subject to the agreement, in writing, of the Environment Agency.

The testing, inspection and maintenance programme for pollution prevention infrastructure at the site (the Infrastructure Monitoring Programme) has been designed as detailed in Section 4.4 and Appendix E.

INTRODUCTION

Centrica Energy commissioned RSK in September 2006 to design the Site Protection and Monitoring Programme (SPMP) for the Barry Power Station.

The PPC permit application for the site was submitted in February 2006 (Ref. 1). This was accompanied by the ASR (Ref. 2), which was prepared by RSK in accordance with the EA Technical Guidance H7 on site reports (Ref. 3).

This document represents the design SPMP and has been prepared in accordance with the EA Technical Guidance H7 (Ref. 3) and associated reporting templates.

1.1 Site Location

The installation is located in South Wales in the Vale of Glamorgan to the south east of the town of Barry on Sully Moors Road (Barry, CF64 5YU) and occupies an area of approximately 1.7 hectares. The centre of the site is at National Grid Reference 314550 168500. The installation boundary and site location are illustrated in Figures 1 and 2 of the ASR respectively.

The site is located on the eastern edge of the Barry Chemical Works complex with a short frontage to Sully Moors Road (B4276) approximately 1km to the west of Sully and 3km to the east of Barry. To the north and west is an extensive INEOS Vinyls chemical works and to the south, Hexion Chemicals Ltd and a disused industrial site. DOW Corning and Zeon Rubber lie to the west. The land on the opposite side of Sully Moors Road is zoned for industry, but apart from the frontage is undeveloped. Beyond this is an area of low-lying open country.

1.2 Details of Installation

The site was used for the construction of the CCGT plant by AES Corporation in 1997 and acquired by Centrica in July 2003, having been derelict from the late 1970s. Prior to this, the land was a part of the BP Chemical site constructed during the 1950s.

The layout of the site consists of the following main areas:

- Combustion Turbine (CT) building;
- Air Cooled Condenser (ACC);
- Gas Compressor Compound for the incoming gas supply;
- Tank area (service water tank, demineralised water tank, neutralising tank, sewage, oil/water separator and effluent water tank);
- 132kV Switchyard;
- Generation Building;
- Fire/Miscellaneous Pumps Building;

- Emergency Diesel Generator (EDG);
- Auxiliary Boiler and associated plant;
- Boiler Feed Pump Building; and
- Workshop.

A full description of the installation is provided in the PPC application.

2.0 Objectives

The objectives of this report are:

- To design investigations to collect Reference Data for the installation by:
 - ◆ Obtaining sufficient information with respect to the site to allow the refinement of the Conceptual Site Model of the site and its surroundings.
 - ◆ Designing a robust and adequate intrusive investigation, which would allow the collection of Reference Data for the Installation.
- To design a monitoring programme for the installation to:
 - ◆ Monitor the effectiveness of pollution prevention infrastructure and provide early warning of any release of polluting substances to ground or groundwater.
 - ◆ To collect data on the condition of the ground at the installation to assist in the permit surrender process.
- To review and if necessary amend the inspection, testing and maintenance programme for pollution prevention infrastructure at the installation to ensure their continued integrity.

3.0 Intrusive Investigations

The objectives of the intrusive investigation are:

- To collect data to reduce the uncertainties in the Conceptual Site Model presented as Section 6 of the Application Site Report (ASR) submitted with the permit application.
- To collect sufficient data on the potentially polluting substances identified in Table D2 of Appendix D of the ASR in order to set Reference Data for the site.

3.1 Investigation and Sampling Strategy

3.1.1 General

The site has been divided into a series of zones based upon the activity and contaminated land potential. These zones are shown on Figure 8 of the ASR and are delineated based on:

- **Zone 1:** Diesel and oil storage and distribution (covering diesel storage tanks, transformers, and emergency diesel generator. This also includes the engineering oil store and sub-surface oil/water collection sump)
- **Zone 2:** Water treatment chemicals storage, transfer and use
- **Zone 3:** All other storage locations.

The table below summarises the two pathways, which were found to present reasonable possibility of pollution occurring by the ASR. The intrusive works proposed to collect reference data are designed to target potentially hazardous substances within these areas. A repeat site reconnaissance was carried out by RSK in January 2007 to confirm the conclusions of the ASR and identify the appropriate scope for this design SPMP.

Potential Pollutant	Zone	Pathway
Diesel	1	Loss/leak from tanker/filling pipework during filling of the Emergency Diesel Generator (EDG) tank into nearby surface water drain
CT Lube Oil	1	Loss/leak from CT lube oil reservoir during filling, storage and transfer

Other areas of perceived risk that were considered include:

- Possible loss of materials during material transfers and manual handling;
- Loss/leak of Gas compressor engineering oils onto unmade ground during operation and maintenance

Summary of Proposed Scope of Works

The proposed scope of works in order to collect sufficient reference material for the installation has been summarised below:

- Sinking of 8 No. boreholes at targeted locations within the installation (The required borehole depth will depend upon the depth at which groundwater is encountered. Existing site data suggests that the boreholes may need to extend to approximately 3.00m bgl);
- In-situ testing, visual inspection and logging of the subsurface strata and the retrieval of representative soil samples for laboratory analysis;
- Chemical laboratory analysis of selected soil samples for speciated Total Petroleum Hydrocarbons (TPH), Polynuclear Aromatic Hydrocarbons (PAH), chlorides (to give a measure of the brackishness of the tidally influenced groundwater at the installation), pH and sulphates;
- Programme of groundwater baseline monitoring, to include:
 - Groundwater sampling of all viable new boreholes and for existing boreholes BHA and BHB;
 - Chemical analysis of all groundwater samples for speciated TPH and PAH, chlorides (to give a measure of the brackishness of the potentially tidally influenced groundwater at the installation), pH and sulphates; and
 - Surveying of monitoring well elevations to confirm the groundwater flow direction where possible.
- Preparation of a report detailing the Reference Data, any revisions to the Conceptual Site Model and any revised recommendations for further monitoring or works.

During the programme of works, the site management will have overall responsibility for the timely completion of the works, and for ensuring that the drilling contractor and analytical laboratory undertake their duties to the requisite standards, and in compliance with the requirements of the site's BMS.

Following a site induction the drilling contractor appointed will be responsible for safely undertaking the drilling and sampling work described by this document, and for working with other parties to ensure that samples are transferred to the laboratory according to the laboratory requirements.

The analytical laboratory undertaking sample analysis will be responsible for analysing the samples using appropriate Lower Reporting Levels and accredited laboratory procedures, and for returning analysis results to the site management in a timely manner.

It is expected that the programme of works will be completed and reported before September 2007.

3.1.2 Constraints on Investigations

No significant restrictions to the investigations are considered likely at the installation as a result of operational issues or time constraints. However, there may be space limitations due to the compact nature of the site and further ones as a result of underground services. Potential constraints that may impact upon the site investigation are described below.

Site Understanding

Historic borehole monitoring at site boundary locations has not identified any significantly elevated levels of contaminants associated with the operation of the power station.

The direction of shallow ground water flow is not currently known. However, it is likely to be in a southerly direction towards the Severn Estuary, although the presence of the drainage ditch flowing southwards towards Sully Brook may locally influence this, causing an easterly groundwater flow direction. Borehole and monitoring well locations have been selected to increase knowledge in this area.

Health & Safety and Access Restrictions

Potential constraints on the investigation will be assessed during the Health & Safety Risk Assessment and documented in the report. Health and Safety is of paramount importance in any site investigation and the following considerations may impose potential constraints:

- The site investigation will occur during the operation of the installation. Areas will only be investigated if it is safe to do so;
- Underground services (e.g. power cables, gas pipes): Boreholes will not be located close to known or suspected services;
- Potential access limitations due to the size of the drilling rig. In addition, access to active areas may not be feasible;
- The rig will not be operated in close proximity to overhead power lines;
- Potential site-specific requirements, for example, prohibited activities which may have an impact on the type of equipment and plant used or totally preclude their use; and
- If 'significant' contamination is encountered which could pose a health and safety risk over and above that already controlled and or sufficiently reduced by PPE, then the work will have to be suspended or abandoned in the area. However, work could re-commence once those risks have been adequately assessed and controlled.

As well as assessing and documenting the above, the assessment will also detail any Client or site specific site rules, detailed risk assessment/method statements, any permitting system, inductions or training prior to the site works commencing.

It is a legal requirement that workers are protected from risks presented by the working environment and the public and the environment also require protection.

Preventing Contaminant Migration (e.g. Monitoring Well Installation)

As the underlying strata has previously been found to contain groundwater which may be in hydraulic continuity with the surface water features in the vicinity, measures will be adopted in order to protect groundwater to limit the potential for creating preferential pathways for contaminant migration. These may include:

- Any section of a borehole not installed with a standpipe will be backfilled and 'sealed' with bentonite;
- The response zone (i.e. slotted section) of the monitoring wells will be installed to extend below the interface of the made Ground and natural strata. The annulus around the standpipe above the response zone (i.e. which is not slotted) will be backfilled and sealed with bentonite;
- No dual installations (e.g. a shallow and deep monitoring well within the same borehole) will be constructed; and
- Each installation shall be completed with a lockable water-tight cover (e.g. stop-cock cover) set in concrete to minimise the risk of damage or vandalism to the well or the ingress of surface water runoff into the well.

3.1.3 Soil Investigation and Sampling Techniques and Protocols

A specialist drilling contractor will be employed to undertake the borehole construction at the site.

Borehole drilling using a windowless driven tube sampler is one of the most commonly utilised site investigation methods, which enables both shallow and deep boreholes to be constructed with monitoring well installations (e.g. 50mm diameter). The technique is relatively accurate and reliable, for example, with respect to collecting soil samples from known depths (although some compression and limited soil mixing may occur) and for installing the standpipe and annulus backfill (as the borehole can be temporarily cased during construction). The casing technique, if used, will greatly limit the potential for downward contaminant migration.

Prior to any work commencing, all appointed sub-contractor personnel appointed will have to:

- Provide copies of their company safety policy, any relevant risk assessments and method statements pertaining to their work and details of any Quality Assurance procedures or systems;
- Provide details of any site personnel involved in the site works;
- Provide any relevant certificates (for example, insurance, servicing or calibration records or equivalent documentation) for any plant and equipment to be used (including any vehicles);
- Undertake any site-specific training, inductions or requirements of Centrica Energy;
- Read and agree to comply with the Environmental Consultant Health and Safety Risk Assessment;
- Particularly familiarise themselves with the emergency procedures, for example, details of the emergency services, methods of communication;
- Ensure that any procedures, equipment and plant used are compliant with the site specific requirements of Barry Power Station;

- Ensure that the appropriate personnel protective equipment (PPE) and clothing (as specified by the site and within the Health & Safety Risk Assessments) is available and will be used by all employees. Where appropriate, all PPE should have any relevant up to date certification and be 'in date' where appropriate.

The reference data collection will be completed by appropriately qualified, specialist contractors and consultants. The borehole construction will be directly supervised on a full time basis by a suitably qualified person, to manage the quality of the fieldwork and to oversee the H&S management of the works.

Trained professional staff will determine the new borehole locations, the in-situ testing and sampling sequence and log the soils encountered in accordance with BS5930. Disturbed samples will be collected from the drilling rig sampling tools by the drilling contractor and immediately passed to the onsite environmental engineer/scientist for labelling. In-situ sample headspace monitoring using a photo-ionising detector (PID) may be used to provide a qualitative estimation of potential hydrocarbon contamination and to target the soil samples for chemical analysis. After in-situ monitoring, all samples will be transferred to chilled cool boxes for temporary storage on site prior to submission to the analysis laboratory.

Sufficient samples will be taken for laboratory analysis and further retention should additional analyses be required. Disturbed soil samples will be taken at appropriate depths. At present it is expected that a sample will be taken within the upper 25cm, at 0.5m, at 1.5m, (approximate water table depth) and at around 2.5m within the natural clay, however precise sample depths will be determined during the borehole construction, depending on factors including, different ground conditions observed (such as a variation in or between the made ground and natural sediments) or if obvious visual or olfactory evidence of significant contamination is observed. The required borehole depth will depend upon the depth at which groundwater is encountered, however existing site data suggests that they may need to extend to approximately 3.00m bgl.

All soil samples will be placed in sealed, airtight containers, uniquely labelled and transported for subsequent chemical analysis or storage. Due to the proposed hydrocarbon chemical analysis, all soil samples will be collected using appropriate glass containers and will be transferred from site and to the laboratory in chilled cool boxes in order to aid sample preservation.

If the site is found to be significantly contaminated, to prevent the cross contamination of samples and ground between borehole locations, all equipment (e.g. casing, boring tools) will be decontaminated upon completion of each borehole. The Decontamination will occur over 'spill' trays (or similar) that will contain the runoff. The water will be analysed to determine the correct disposal route.

In addition to the above, it is important to consider environmental issues during intrusive site investigation works. Mitigation measures will be implemented to prevent contamination of soil and groundwater by the activities taking place on site. Such measures may include where appropriate:

- Adequate provision for disposal of waste arisings (including both soil and groundwater);

- A sample of the waste arisings should be sent for appropriate laboratory analysis prior to disposal;
- Provision of spill kits to deal with spills of fuel and/or contaminated waters;
- Provision of drain covers, drain plugs and oil-absorbent bunds (where appropriate) to contain potentially contaminated runoff waters;
- Suitable storage of all hazardous materials on site.

Quality, Health, Safety and Environmental Management

The intrusive site investigation (including sampling, sample handling and transport) will be undertaken in line with BS 5930:1999 (Code of Practice for Site Investigations), BS 10175:2001 (Code of Practice for the Investigation of Potentially Contaminated Land) and the Environment Agency R&D Technical Report P5-065/TR (Technical Aspects of Site Investigation). Relevant examples of technical procedures typically used are reproduced in Appendix B1. Please note that the list is not exhaustive, and as the geotechnical contractor has not yet been selected, the example forms are provided for the EA only, and are intended to be indicative. They may be replaced by similar procedures provided by the geotechnical contractor selected.

3.1.4 Groundwater Investigation and Sampling Techniques and Protocols

Groundwater quality will be assessed by the monitoring and sampling of borehole monitoring wells. The monitoring well installation construction is detailed in Section 3.1.2 and 3.1.3.

Groundwater sampling locations have been developed with reference to the Conceptual Site Model (CSM). The objective of groundwater and soil sampling will be to establish whether or not contamination is present within the groundwater beneath the installation.

The response zone of the well (depending on the encountered groundwater depth) will be located across the water table to facilitate LNAPL (Light Non Aqueous Phase Liquid) monitoring and sampling (if encountered).

After installation, monitoring wells will initially be developed using a pump, bailer or surge block to remove any materials or contaminants that might have entered the well during installation. This development also helps to 'settle' the granular screening material (filter pack) and enables free flow of liquids through the well screen. Development will continue until the water is visibly clean and/or of constant quality, for example in terms of its electrical conductivity. Typically at least 3 to 5 well volumes of water will be removed.

Prior to sampling, the depth of groundwater and LNAPL (if observed) will be established using a dip meter fitted with an oil interface probe. If oil or other immiscible liquids (LNAPLs) are present floating on the water, it can be nearly impossible to obtain a water sample that accurately represents the dissolved phase contamination. If LNAPL is present it is considered good practice to install a separate well with the screen located below the free plume zone so truly representative samples can be retrieved and an accurate picture of dissolved phase contamination achieved. Samples of the water would be collected (using a depth sampler or pump, for example, such as a peristaltic pump during low flow purging and sampling) and also a sample of the floating LNAPL layer for analysis.

The depth of the floating layer should be measured with an interface probe, although it is important to note that the thickness of a LNAPL floating in a borehole will be greater than the actual thickness of the layer in the aquifer due to the tendency for accumulation to occur in a borehole.

Samples of groundwater will be collected after allowing sufficient time for equilibrium to be reached following purging. This is typically after a period of at least 5-10 days. Where due to programme constraints this is not possible, samples will be taken after allowing the maximum possible time for equilibration.

It is proposed that wherever possible, all groundwater sampling is undertaken via the USEPA-approved low flow purging and sampling methodology, as described in USEPA guidance document entitled 'Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures, reference no. EPA/540/S-95/504. The main advantages of low-flow sampling are:

- The point of sampling will be based on the monitoring of in-situ parameters, which ensures that a 'representative' groundwater sample is collected without over purging which can potentially alter the sample characteristics;
- The groundwater sample is not significantly disturbed, thus limiting the loss of any volatile contaminants;
- The amount of sediment drawn into the sample is reduced. Suspended sediment can potentially influence the results of certain chemical analyses, e.g. hydrocarbon; and
- Each well will be micro purged, i.e. the installations will not require full purging (i.e. 3 well volumes) prior to sample collection, which will greatly limit the amount of purged water that will require disposal.

The main disadvantage of the low flow sampling technique is that it may not be suitable for deep wells (e.g. over 4-5m depending on geology) as the increased vacuum causes loss of volatiles. In these cases, alternative sampling techniques will have to be utilised (such as bailers), however existing data suggests that samples will be extracted from relatively shallow depths.

During low-flow sampling, groundwater will be monitored for in-situ parameters such as pH, temperature, electrical conductivity, dissolved oxygen and redox potential. Micro-purging should be undertaken at a flow rate less than was used for development of the well and greater than that proposed for sampling. It should continue until the in-situ parameters of the purged water have stabilized (e.g. until any two successive readings are within 10% of each other). However, please note that this may not always be possible, for example where there is very slow recharge into the monitoring well.

All groundwater samples will be placed in sealed, air-tight containers, which will be uniquely labelled and suitably stored prior to transfer to the analytical laboratory.

If low flow sampling is found not to be suitable (e.g. in wells deeper than 4-5m), samples may be taken by pump, bailer, depth sampler or similar device depending on the depth of the groundwater and the parameters to be determined (for further guidance see BS 6068-6.11). Disposable bailers

may be used to avoid cross-contamination but are not considered suitable for the sampling of hydrocarbon-impacted groundwater and will therefore not be used.

Quality, Health, Safety and Environmental Management

The groundwater investigation (including sampling, sample handling and transport) will be undertaken in line with BS 5930:1999 (Code of Practice for Site Investigations) BS 10175:2001 (Code of Practice for the Investigation of Potentially Contaminated Land) and the Environment Agency R&D Technical Report P5-065/TR (Technical Aspects of Site Investigation). Relevant examples of typical technical procedures routinely followed are reproduced in Appendix B2.

Please note that the list of procedures in appendix B1 and B2 is not exhaustive, and as the geotechnical contractor has not yet been selected, the example forms are provided for the EA only, and are intended to be indicative. They may be replaced by similar procedures provided by the geotechnical contractor selected.

All equipment utilised will be appropriately calibrated, serviced and will be in good working order.

Appropriate chain of custody forms will be used to document and record transmittal of all samples. The form used will depend on the laboratory undertaking the analysis work.

3.1.5 Soil-Gas and Vapour Investigation and Sampling Techniques and Protocols

Soil, gas and vapour monitoring is not considered relevant to the potential contaminants identified in the ASR and CSM. No soil gas and vapour monitoring is therefore proposed at the installation.

3.1.6 Surface Water Investigation and Sampling Techniques and Protocols

Surface water investigations are not considered relevant to the potential contaminants identified in the ASR and CSM. No surface water monitoring is therefore proposed at the installation.

3.1.7 Infrastructure Investigation and Sampling Techniques and Protocols

A detailed list of infrastructure at the plant is provided in Appendix E, however in general terms the infrastructure can be considered to comprise the following primary, secondary and tertiary containment:

- **Primary containment:** Tanks, drums or containers;
- **Secondary containment:** Bund or spill trays; and
- **Tertiary containment:** Hardstanding, kerbs, open surface water drainage system and penstock valve.

Large tanks are fitted with low level and high level tank alarms to prevent overfilling and subsequent release from the primary containment measure. Overfilling is also prevented by careful inventory control. The integrity of storage tanks is achieved by visual inspection. The environmental monitoring

proposed in this document will determine whether or not there have been any significant discharges to ground, and the ongoing infrastructure monitoring programme combined with adherence of site procedures will ensure that no future discharges occur.

Spill prevention measures are present on site and spill response is included in the site's environmental emergency response plan and the ISO14001 certified Business Management System (BMS). Procedures are therefore in place to ensure prompt response and clean up of any spills, which may occur. Plant personnel are trained in appropriate pollution prevention measures and spill response. Spill kits are available onsite. Additional procedures and training will be implemented in line with the improvement programme listed in Table S1.3 of the site PPC permit. Some of these improvements are detailed in section 4.4.

As part of the infrastructure monitoring programme, a visual inspection will be carried out on a regular basis to verify the integrity of above ground primary and secondary containment measures.

3.2 Sample Locations

Sample locations were chosen with reference to the sources, pathways and receptors identified within the Conceptual Site Model for the site detailed in Section 6 of the ASR. Groundwater samples will be taken from two existing borehole locations, and from eight new boreholes, which will be installed. Soil samples will be at each of the eight new borehole locations.

Sample locations were identified during site reconnaissance, and represent to within approximately 10m the point from which the samples will be collected. However, this is highly dependent on the presence of underground services and actual sample locations will be chosen to be as close to the point indicated as practicable, having due regard to health, safety and other practical considerations.

At the time when the new boreholes are sunk, their location will be recorded using a GPS device, which is typically capable of recording accuracies to within 1m. The locations of existing boreholes to be used will also be recorded in this way.

Proposed sample locations for the site are shown in Appendix A.

Discussion of the selection, justification and design for each sample location with respect to individual zones for the site are given in the following sections.

New sample locations have been referenced using the following classification system:

- All new sample locations will be prefixed BPS, indicating Barry Power Station, in order to avoid any potential confusion within Centrica Energy about which of their assets the results refer to.
- Following the BPS prefix will be a "-" and then the letters BH will be used to indicate that the sample method is a borehole.

- Finally, a sequential numerical digit will be utilised to uniquely identify the borehole.

Consequently, the eight new boreholes to be installed for the gathering of reference data will therefore be numbered BPS-BH1 to BPS-BH8. The nomenclature of two existing boreholes that will be used for the collection of groundwater samples is currently not known. However, these have currently been termed BPS-BHA and BPS-BHB to avoid confusion.

At all sample locations, the sample date and sample depth will be recorded on each sample container.

3.2.1 Zone 1

One sample location is proposed within Zone 1. In addition, sample locations within Zone 3 have been strategically located in order to detect any loss of materials stored in both Zone 1 and 2.

Sample Location BPS-BH7

This sample location has been selected on the basis that lies close to the Emergency Diesel Generator and its associated fuel tank. As the groundwater flow direction is currently unknown, this borehole will be sited as close as possible to the fuel tank.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a gravelled area, and it is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

3.2.2 Zone 2

No sample locations will be sited within Zone 2, since these areas are either on hardstanding, or within bunds, and it is considered that installation of a borehole in these areas would introduce a new potential pathway at the installation.

However, sample locations within Zone 3 have been strategically located in order to detect any loss of materials stored in both Zone 1 and 2.

3.2.3 Zone 3

Sample locations within Zone 3 have been strategically located in order to detect any loss of materials stored in both Zone 1 and 2. The proposed intrusive locations are as follows:

Sample Location BPS-BH1

This sample location has been selected on the basis that it lies close to the site's drainage outlet to the ditch along the eastern boundary of the site. This ditch may locally influence groundwater flow and is, therefore, potentially the furthest down gradient of all site operations.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a gravelled area and away from all site operational areas, and it is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Location BPS-BH2

This sample location has been selected on the basis that it lies close to the site's northern boundary, which will enable up-gradient monitoring if the groundwater flow is in a southerly direction towards the Severn Estuary.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination arising from the 132kV substation area, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a gravelled area, and it is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Location BPS-BH3

This sample location has been selected on the basis that it is in a central part of the site and lies beneath the Air Cooled Condensers.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a gravelled area, and it is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Location BPS-BH4

This sample location has been selected on the basis that lies close to the sites northern boundary, which will enable up-gradient monitoring if the groundwater flow is in a southerly direction towards the Severn Estuary.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a tarmacadam hardstanding area, through which coring will be required. It is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Location BPS-BH5

This sample location has been selected on the basis that it lies close to the sites western boundary, and will provide additional information to establish if the groundwater flow is in a southerly direction towards the Severn Estuary or if it is modified by the drainage ditch along the eastern boundary of the site.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a tarmacadam hardstanding area, through which coring will be required. It is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Location BPS-BH6

This sample location has been selected on the basis that it lies within an area used for historical storage tanks and adjacent to the on-site (but off-installation) wastewater drainage point that is used off-site at the neighbour's premises.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a gravelled area and it is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Location BPS-BH8

This sample location has been selected on the basis that it lies close to the Gas Compound, which has been identified as being of concern to the Environment Agency as a result of potentially contaminated surface water runoff from the concrete hardstanding in the area. This borehole, therefore, will provide an indication of the level of impact that this may be causing to the underlying subsurface materials and groundwater.

Analysis of soil and groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

The proposed sample location is located on a tarmacadam hardstanding area, through which coring will be required. It is considered that siting a borehole at this location will not introduce a new pathway for migration of potential pollutants.

Sample Locations BPS-BHA and BPS-BHB

These sample locations are already present on-site but outside the site's PPC boundary, as they are within a shared access road with the sites adjacent southerly neighbour. They were installed by this neighbour, however as yet the borehole records and installation details, together with previous monitoring results have not been identified. However, these two monitoring wells have been selected for sampling on the basis that they are potentially downstream of the installation if the groundwater flow is in a southerly direction towards the Severn Estuary.

Analysis of groundwater will be undertaken in order to identify any hydrocarbon contamination, together with sulphate and pH that may indicate if any acids have been lost prior to Centrica operations at the site. In addition, chlorides will be tested for to establish if the groundwater is brackish and affected by the tidal Severn Estuary. As the groundwater flow direction is currently only inferred to be to the south towards the Severn Estuary, this borehole location will provide further data to establish the flow direction.

3.3 Analytical Strategy

3.3.1 Justification of Analytical Suites

The analytical suite for each Zone was chosen by reviewing Table D2 of Appendix D of the ASR and is shown in Appendix C.

3.3.2 Justification of Analytical / Field Technique and Detection Limits

The analysis to be carried out and the Lower Reporting level (LRL) for each analytical technique are shown in Appendix C. As a general principle, the lowest commercially available LRL will be specified.

The following sections provide a justification for choosing a particular technique for a particular substance in a particular phase. The detection limits of a substance using that technique is justified with respect to expected background concentrations and likely pollutant distribution and concentration.

3.3.2.1 Gas oil (diesel)

At all sample locations, samples will be analysed for speciated TPH and speciated PAH. It is considered that these determinants are appropriate to the detection of gas oil (diesel), which was identified within the ASR as providing reasonable possibility of pollution.

Sample Analysis

A UKAS accredited laboratory will be used for the analysis of soils and groundwater. Speciated TPH and PAH analysis in soils will be MCERTS accredited.

Typical analytical techniques for the speciated TPH and PAH soil analysis are summarised below and reproduced in Appendix C:

The UKAS accredited speciated TPH analysis would be undertaken by GC/MS and GC/FID analysis to the following Lower Reporting Limits),

Soils -	VPH - <0.01mg/kg	GC/MS
	EPH - <0.1mg/kg	GC/FID
Waters -	VPH - <1µg/L	
	EPH - <5µg/L	

The UKAS accredited speciated PAH analysis would be undertaken by GC/MS analysis to the following Lower Reporting Limits,

Soils	<0.01mg/kg
Waters	<0.01µg/L

Since there are no government published TPH or PAH Soil Screening Values (SSV's) that are protective of human health and Controlled Waters, the justification for the above detection limits is that they are one of the 'lowest' possible detection limits that are readily commercially available without incurring excessive cost.

Interpretation of the potential results obtained is discussed in Section 4.5.

3.3.2.2 pH

pH analysis would be undertaken by a UKAS and MCERTS accredited laboratory using a pH meter to the LRL identified below.

Soil -	0.01pH units	pH meter
Water -	0.01pH units	pH meter

Interpretation of the potential results obtained is discussed in Section 4.5.

3.3.2.3 Sulphate

Sulphate analysis would be undertaken by a UKAS and MCERTS accredited laboratory using the methods and to the LRL identified below.

Soil -	Water Soluble	0.003g/l	Kone Analyser
	Acid Soluble	50mg/kg	ICP - OES
Water -		3mg/l	Kone Analyser

Interpretation of the potential results obtained is discussed in Section 4.5.

3.3.2.4 Chlorides

In order to obtain more information about the salinity, and hence the degree of tidal influence at the site, it is proposed to analyse all groundwater samples for chlorides. It should be noted however that there is no inference from the ASR or other information sources that site activities have led to elevated levels of chlorides.

The data gained from this analysis will be useful should any sample results record levels of other contaminants above the LRL, since their respective environmental impact will be calculated with reference to the category of the receiving water. Chloride analysis would be undertaken by a UKAS and MCERTS accredited laboratory to the LRL identified below.

Water -	1mg/l
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3.3.3 Laboratory Accreditation / Quality Assurance and Quality Control

3.3.3.1 Laboratory Accreditation

All laboratory analytical techniques undertaken for soil and groundwater will be within UKAS Accreditation, and MCERTS accreditation where available.

The required analytical certifications and Lower Reporting Limits are specified in Appendix C.

3.3.3.2 Quality Control

All analytical work will be undertaken by a UKAS / MCERTS accredited laboratory according to standard working instructions. All other work will be conducted within the quality control systems of the appointed contractor.

Appendix D1 contains examples of sampling and analytical quality assurance and quality control plans which would apply to the work undertaken. It should be noted however that as neither the geotechnical contractor or the analytical laboratory have yet been selected, the documentation in Appendix D1 is intended to be indicative of the standards which must be met by the contractors appointed to undertake the work, and is provided to represent indicative standards for the EA only.

4.0 Monitoring Programme

4.1 Objectives of the Monitoring Programme

4.1.1 Objectives of Environmental Monitoring Programme

No ongoing environmental monitoring is currently proposed at the installation under the SPMP as the installation is considered to present a very low risk of future contamination of ground and groundwater due to the preventative measures in place.

The requirements for an ongoing environmental monitoring programme will be reviewed should the collection of reference data reveal the presence of significant levels of contaminants within the soil or groundwater.

4.1.2 Objectives of Infrastructure Monitoring Programme

The objectives of the infrastructure monitoring programme are to:

- Ensure that through effective inspection and maintenance, adequate physical measures continue to be in place in order to prevent future contamination of ground or groundwater; and
- To prove the continued integrity of pollution prevention infrastructure at the installation.

4.2 Environmental Monitoring Infrastructure

As described in Section 4.1.1, no permanent environmental monitoring infrastructure is currently proposed at the installation as part of the SPMP.

4.3 Environmental Monitoring Programme

As described in Section 4.1.1, no ongoing environmental monitoring of soils and groundwater is currently proposed at the installation as part of the SPMP.

4.4 Infrastructure Monitoring Programme

Since the submission of the original PPC application, Barry Power Station has implemented a number of measures in order to increase the level of environmental protection at the site. The additions include:

1. Lining of the bunded acid and caustic unloading area with chemical resistant material and the raising of the manhole cover for the underlying oil/water separator to prevent seepage. A sump pump within the containment area has also been installed to allow drainage of accumulated rainwater into the chemical drains.
2. Installation of bunds around the CT lube oil reservoir and turbine wash storage area within the CT building.

3. Updating of BMS procedures (AOP 051 and AOP 052) to ensure affected surface water drains are covered and the penstock valve closed during material deliveries and training of plant personnel in the implementation of these.
4. A chemical resistant material has been used to line concrete bunds for caustic and sulphuric acid transfer pumps.
5. Water tests have been undertaken to determine the direction of fall for areas of hardstanding close to material inventories, confirming that potentially contaminated run-off/loss from any of the storage areas would be diverted and captured by the site's surface water drainage and interceptor system.

For the majority of the pollution prevention infrastructure identified in Appendix E, the existing programme for inspection, testing and maintenance meets the objectives identified within Section 4.1.2 above. It is however proposed that in order to further increase the level of environmental protection at the site, the following action is undertaken:

- Integrity testing of the oily water and effluent drains will also be carried out via CCTV camera survey to minimise the risk of leakages from these underground services

4.4.1 Personnel Issues

Personnel responsible for the inspection, testing and maintenance of pollution prevention infrastructure are to be trained to an appropriate level to ensure compliance with the Infrastructure Monitoring Programme. The infrastructure monitoring programme is considered to be an integral part of the site Business Management System and planned preventative maintenance regime. Roles and responsibilities within these systems are clearly defined, and have been described in section 2.3 of the PPC application.

4.5 Assessment and Reporting Procedures

4.5.1 Assessment Procedure

Once the reference data has been collected, the results will be evaluated as described below.

Since the Lower Reporting Limits have been selected to be as low as reasonably practical, no further action will be taken for any result falling below the LRL. Should any results exceed the LRL, they will either be compared to the EQS (for saltwater or freshwater depending on the chloride concentrations) where an applicable EQS exists, or subject to a further risk assessment to determine whether the environment is at risk from the concentrations measured. Where an EQS is exceeded, or the environment is found to be at risk, consideration will be given to additional investigations, and the SPMP strategy will be reviewed.

Since no on-going environmental monitoring is proposed at this stage, no additional data management procedures are proposed for environmental monitoring data.

All infrastructure assessment will be undertaken within the framework of the BMS or CMMS. Where any element of infrastructure is found to be in need of attention, a non-conformance will be raised following existing BMS procedures, and an appropriate corrective action will be required. This will also apply to the new or amended infrastructure inspections described in Section 4.4. Documentary evidence will be maintained either through BMS records, or as electronic records on CMMS and can be made available for inspection on site as required.

4.5.2 Reporting Procedure

Once the review of the reference data has been completed, a report will be submitted to the Environment Agency using the appropriate template report structure. In conjunction with the ASR, this report will formally document the baseline condition of the site.

Since no on-going environmental monitoring is proposed at present, no additional reporting procedures are proposed for environmental monitoring data.

Results of infrastructure monitoring will be embedded within existing management systems in the BMS. Since each action within these systems is tracked, and subject to internal and external audit, it is not intended to routinely generate reports on the findings of the SPMP infrastructure monitoring programme. If however the monitoring demonstrates a potential loss of containment and or pollution to ground or groundwater, the installation will produce a separate infrastructure assessment report for the Environment Agency that will consist of:

- Results of the 'emergency' inspection/assessment of site infrastructure and containment systems;
- Review of material inventories, with an assessment of the volume that could potentially be unaccounted for (if any); and
- Issue of report to the Environment Agency once produced.

4.5.3 Recording and Data Management

Once the review of the reference data has been completed, a report will be submitted to the Environment Agency using the appropriate template report structure. In conjunction with the ASR, this report will formally document the baseline condition of the site.

Since no on-going environmental monitoring is proposed at present, no additional data management procedures are proposed for environmental monitoring data.

Results of infrastructure inspections and routine maintenance will be recorded electronically in the established CMMS system, and can be made available for inspection on site as required.

Data from the CMMS system is routinely backed up. Environmental data related to the SPMP will be stored for the duration of the operation of the power station.

In the event of a significant infrastructure failure, or an unplanned release, the site's emergency procedure will be implemented and the Environment Agency will be informed at the earliest opportunity.

5.0 Other Issues

No other issues relevant to the protection of ground or groundwater at the installation have been identified.

6.0 References

1. Centrica Barry Power Station PPC Permit Application JP3333LV, dated February 2006;
2. PPC Permit Application Site Report, Centrica Barry Power Station, dated February 2006;
3. Environment Agency Technical Guidance Note IPPC H7 on Integrated Pollution Prevention and Control (IPPC) titled 'Guidance on the Protection of Land Under the PPC Regime: Application Site Report and Site Protection and Monitoring Programme', Version 1, dated August 2003;
4. Environment Agency Technical Guidance Note IPPC H7 (Reporting Template 2) on Integrated Pollution Prevention and Control (IPPC) titled 'Template for Design of a Site Protection and Monitoring Programme for Installations Requiring Reference Data to be Collected', Version 1, dated August 2003;
5. BS 5930:1999: Code of Practice for Site Investigations;
6. BS 10175:2001: Code of Practice for the Investigation of Potentially Contaminated Land);
7. BS 6068-6.14 (1998) (ISO 5667 – 14: 1998): Water quality. Sampling. Guidance on Quality Assurance of Environmental Water Sampling and Handling of Water Samples;
8. BS 6068-6.3 (1998) (ISO 5667 – 13: 1998): Water quality. Sampling. Guidance on the Preservation and Handling of Water Samples;
9. Environment Agency R&D Technical Report P5-065/TR, titled 'Technical Aspects of Site Investigation', dated 2000

7.0 Glossary

ASR	Application Site Report
BMS	Business Management System
CMMS	Computerised Maintenance Management System
CSM	Conceptual Site Model
CT	Combustion Turbine
EA	Environment Agency
EAL	Environmental Assessment Level
EPH	Extractable Petroleum Hydrocarbons ('diesel range' C10-C35)
EQS	Environmental Quality Standard
FID	Flame Ionisation Detection
GC	Gas Chromatography
GPS	Global Positioning System
LRL	Lower Reporting Level
MS	Mass Spectrometry
PAH	Polynuclear Aromatic hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photoionisation Detector
SHEMS	Safety, Health and Environmental Management System
SPMP	Site Protection and Monitoring Programme
TPH	Total Petroleum Hydrocarbons
VPH	Volatile Petroleum Hydrocarbons ('petrol range' <C10)

APPENDIX A

FIGURES AND PLANS

Contents

A1 Plan showing proposed borehole locations

APPENDIX B

INVESTIGATION AND SAMPLING PROTOCOLS

Contents

B1 Soil

B2 Groundwater

(Infrastructure monitoring protocols are described in Appendix E)

APPENDIX C

ANALYTICAL PROTOCOLS AND LABORATORY ACCREDITATION

Contents

C1 Tables

Table C1 Sampling Strategy

Determinand	Groundwater (all locations)	Soil Samples ^A							
		BPS-BH1	BPS-BH2	BPS-BH3	BPS-BH4	BPS-BH5	BPS-BH6	BPS-BH7	BPS-BH8
Speciated TPH	√	√	√	√	√	√	√	√	√
Speciated PAH	√	√	√	√	√	√	√	√	√
Chlorides	√	√	√	√	√	√	√	√	√
pH	√	√	√	√	√	√	√	√	√
Sulphates	√	√	√	√	√	√	√	√	√

^A No soil samples will be collected from existing boreholes BPS-BHA or BPS-BHB

Table C2 Required Analytical Techniques and Lower Reporting Levels

Determinand	Lower Reporting Level (LRL)	
	Soils	Groundwater
Speciated TPH		
VPH	<0.01mg/kg	<1µg/L
EPH	<0.1mg/kg	<5µg/L
Speciated PAH	<0.01mg/kg ^A	<0.01µg/L
pH	0.01pH units ^A	0.01pH units
Sulphate		
Water Soluble	0.003g/l	3mg/l
Acid Soluble	50mg/kg	N/A
Chlorides	N/A	1mg/l

All analyses will be UKAS Accredited. ^A indicates requirement for UKAS and MCERTS accreditation

APPENDIX D

QUALITY ASSURANCE AND QUALITY CONTROL

Contents

- D1 RSK9001, 14001 and 18001 Certification;
 Envirolab Accreditation certificate
 ALcontrol Accreditation certificate

Note: A consultant has not yet been appointed to undertake the investigative works, and a laboratory has not yet been selected to undertake the analysis. The certifications in this section are provided as examples for Centrica and the EA only.

APPENDIX E

INSPECTION AND MONITORING PROTOCOLS

Please refer to Appendix B and C for the relevant environmental monitoring protocols and technical procedures.

Full details of the site inspection and monitoring protocols are documented within the site's environmental emergency response plan, ISO14001 certified Business Management System (BMS) and EMAS accreditation. The BMS covers all key environmental management considerations for the site and is described in detail in the PPC permit application.

A summary of the site's infrastructure monitoring programme is provided in Table E1.

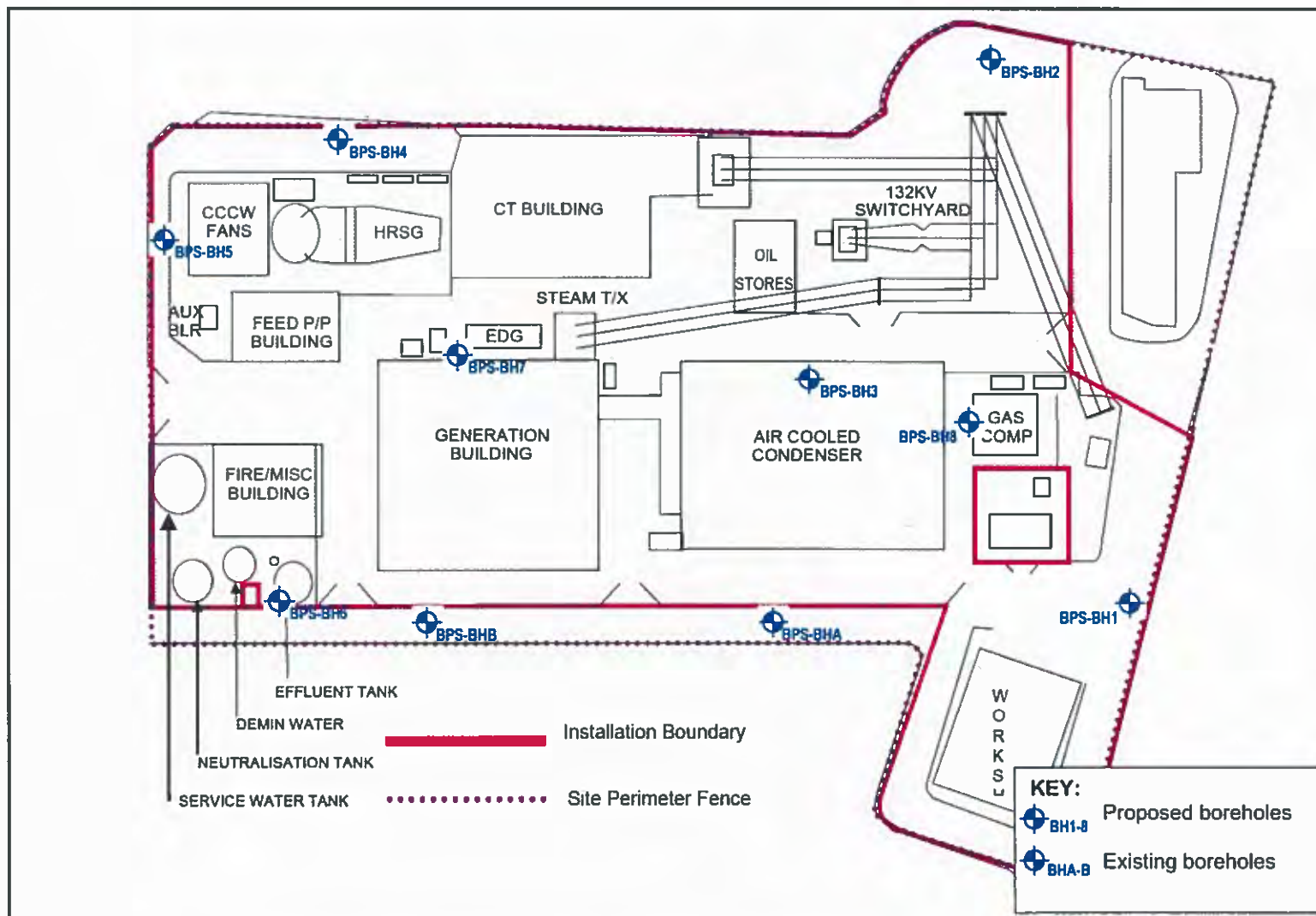


Figure 1A: Proposed Borehole Locations – CENTRICA Barry Power Station

Zone	Tank/Equipment (tank/ pipe/ pump/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
1	Emergency Diesel Generator Storage Tank - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and route spillage to surface water ditch via Penstock valve	Diesel storage tank equipped with high level transmitter and local level indication. Activity continuously supervised	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Emergency Diesel Generator Storage Tank	Steel	Diesel	~2600 litres	Concrete bund. Overflow from tank flows into the bunded area.	Diesel storage tank equipped with high level transmitter and local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Emergency Diesel Generator Storage Transfer Pipework	Steel	Diesel	~ 60 litres	Concrete bund.	Low-level alarm on tank. Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	CT Lube Oil Storage - Drum	Steel	CT Lube Oil	200 litres	Bund	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1 Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	CT Lube Oil Reservoir - Tank	Steel	CT Lube Oil	18,000 litres max (9,000 litres working volume)	Impervious building floor of CT building and bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	CT Lube Oil Reservoir - Transfer Pipework	Steel	CT Lube Oil	9,000 litres working volume (max)	Impervious building floor of CT building and bund	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	ST Lube Oil Reservoir - Drum	Steel	ST Lube Oil	200 litres	Metal bund	Transfer and filling operation performed manually and under continuous supervision	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	ST Lube Oil Reservoir - Tank	Steel	ST Lube Oil	11,000 litres (5,500 litres working)	Concrete bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarm/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet Identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
1	ST Lube Oil Reservoir - Transfer Pipework	Steel	ST Lube Oil	5500 litres (working)	Double-walled pipe	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Oil Stores - Drums/IBC	Metal/ plastic	Turbine lube, transformer and waste oils	8 x 200-litre 15 x 25-litre 900 litre waste oil IBC	Locked container unit with spill trays	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Fire/ Miscellaneous Pumps Unloading Area - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and routing spillage to surface water ditch via Penstock valve	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Fire/ Miscellaneous Pumps Building - Day Tank	Steel	Diesel	800 litre	Concrete bund	Local level indication. Low-level alarm and level switch Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Fire/ Miscellaneous Pumps Building - Pump	Steel	Diesel	N/A	Impervious building floor sloping towards oily drain routed to oil/water separator	Local level indication. Low-level alarm and level switch Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Visual inspection twice a day. Weekly testing of pumps for 30min	Daily shift inspection log. PM-OPS-2D
1	Mobile Diesel Bowser	Steel	Diesel	1000 litres	Double-skinned tank	Routine checks once per shift	Approved Operating Procedures (AOP) 'Using the Mobile Diesel Bowser' AOP048, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Sulphuric Acid Tank Unloading Area - Tanker	N/A	98% w/w sulphuric acid	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Sulphuric Acid Tank	Stainless Steel	98% w/w sulphuric acid	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bunded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	HSE Guidance - Bulk Storage of Acids HSG235	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet Identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
2	Bulk Sulphuric Acid Tank - Transfer pipework	Lined stainless steel	98% w/w sulphuric acid	15 litres	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Acid is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Acid Pump Oil Change' AOP025, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Caustic Solution Tank Unloading Area - Tanker	N/A	50% w/w caustic solution	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Caustic Solution Tank	Stainless Steel	50% w/w caustic solution	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bunded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Caustic Solution Tank - Transfer pipework	Lined stainless steel	50% w/w caustic solution	N/A	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Caustic solution is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Caustic Pump Oil Change' AOP024, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Boiler Feed/ CCCW Pump Building - IBC	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	500 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Boiler Feed/ CCCW Pump Building - pipework	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Generation Building - IBC	Stainless Steel	Amine and oxygen scavenger chemicals	1000 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers; PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Generation Building - pipework	Stainless Steel	Amine and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets

Zone	Tank/Equipment (tank/ pipel pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
3	Air Cooled Condensers	Carbon steel	Engineering oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Oil pressure indication and low oil pressure alarm Routine checks once per shift	Approved Operating Procedures (AOP) 'Air-Cooled Condenser Fan Oil Change' AOP006, Issue 1		Routine visual Inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Gas Compressor	Carbon steel	Engineering oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual Inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Transformers	Carbon steel	Transformer oil	N/A	Concrete bund with drain (normally isolated) routed to oil/water separator. Discharge via manually operated valve	Remote monitoring from control room Routine checks once per shift	Approved Operating Procedures (AOP) 'Check CT/ST/AUX Transformer Bund Levels and Isolation Valves' AOP047, Issue 1		Routine visual Inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Site drainage system - Oil separator/ coalescers	GRP	Oily Water	8000 litre	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Continuous oil-in-water analyser and high oil-in-water alarm. High-level and low-level switches, indicators and alarms and automatic closure device.	Approved Operating Procedures (AOP) 'Oil/Water Separator Alarms and Manual Emptying' AOP052, Issue 1	Maintained in accordance with manufacturers instructions; PPG18 - Managing Firewater and Major Spillages and PPG3 - Use and Design of Oil Separators	Routine visual Inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Site drainage system - Pipes	Various	Oily Water	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	None	Approved Operating Procedures (AOP) 'Monitor and Maintain Surface and Storm Water Drain Quality' AOP051, Issue 1		CCTV Survey has been undertaken to determine the integrity of drainage system.	Results of Camera Surveys recorded on DVD and summary report kept on record. Any defects requiring attention are raised on CMMS system. Water samples recorded on monthly plant checks
3	Neutralisation Tank	Steel	Water treatment plant effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual Inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Effluent Tank	Steel	Waste effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual Inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Solid Waste Skips	Metal	Wood, metal, general waste		Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG11 - Preventing Pollution from Industrial Sites	Not required for the SPMP (no significant risk of ground or groundwater contamination)	N/A

Zone	Tank/Equipment (tank/ pipe/ pump/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ handstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ combustion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
3	Liquid Waste - IBC	Steel	CT blade wash effluent	1000 litres	Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Batteries	Plastic	Battery electrolyte	10kg	Acid resistant floor graded towards chemical drain and lip at entrance	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Turbine (off-line) washwater effluent - IBC	Steel	CT wash residue	1 m ³	Mobile bund located within the CT building	Tank level gauge Routine checks once per shift	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Turbine washwater effluent tank (off-line) - Tanker	N/A	CT wash residue	N/A	Impervious building floor of CT building would divert loss into surface water/drain close to EDG. Valves are configured to route spillage to surface water ditch via Penstock valve	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 2		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets

Envirocheck[®] Report

Report on:

CHP station

Barry

National Grid Reference :

314510, 168710

Prepared For :

Posford Haskoning Ltd

Rightwell House

Bretton

PETERBOROUGH

PE3 8DW

Your Reference:

Newman,C34803/1A/001

Summary

Agency & Hydrological

Waste

Hazardous Substances

Geological

Industrial Land Use

Sensitive Land Use

Data Currency

Data Suppliers & Copyright Statements

Useful Contacts

BGS Borehole Order Form

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity Data Sheet places great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from English Nature (and the Scottish and Welsh equivalents), the Environment Agency (and the Scottish equivalent) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the legend database to 1km from a single point provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Ordnance Survey County Series Published 1878 to 1879

County	Mapsheet	Scale	Year
Glamorganshire	047_13	1:2,500	1878
Glamorganshire	047_14	1:2,500	1878
Glamorganshire	051_01	1:2,500	1878
Glamorganshire	051_02	1:2,500	1879

Ordnance Survey County Series Published 1900

County	Mapsheet	Scale	Year
Glamorganshire	047_13	1:2,500	1900
Glamorganshire	047_14	1:2,500	1900
Glamorganshire	051_01	1:2,500	1900
Glamorganshire	051_02	1:2,500	1900

Ordnance Survey County Series Published 1919 to 1920

County	Mapsheet	Scale	Year
Glamorganshire	047_13	1:2,500	1920
Glamorganshire	047_14	1:2,500	1919
Glamorganshire	051_01	1:2,500	1920
Glamorganshire	051_02	1:2,500	1920

Ordnance Survey County Series Published 1942 to 1943

County	Mapsheet	Scale	Year
Glamorganshire	047_13	1:2,500	1942
Glamorganshire	047_14	1:2,500	1942
Glamorganshire	051_01	1:2,500	1943
Glamorganshire	051_02	1:2,500	1943

Ordnance Survey Plan Published 1956 to 1970

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST1468	1:2,500	1956
Ordnance Survey Plan	ST1469	1:2,500	1970

Ordnance Survey Plan Published 1971

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST1468	1:2,500	1971

Ordnance Survey Plan Published 1956

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST1468NE	1:1,250	1956
Ordnance Survey Plan	ST1468NW	1:1,250	1956
Ordnance Survey Plan	ST1468SE	1:1,250	1956
Ordnance Survey Plan	ST1468SW	1:1,250	1956

Ordnance Survey Plan Published 1964 to 1970

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST1468NE	1:1,250	1964
Ordnance Survey Plan	ST1468NW	1:1,250	1964
Ordnance Survey Plan	ST1468SE	1:1,250	1970
Ordnance Survey Plan	ST1468SW	1:1,250	1964

Ordnance Survey Plan Published 1970

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST1468NE	1:1,250	1970
Ordnance Survey Plan	ST1468NW	1:1,250	1970
Ordnance Survey Plan	ST1468SW	1:1,250	1970

Ordnance Survey Plan Published 1991

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST1468SW	1:1,250	1991

Ordnance Survey County Series Published 1885

County	Mapsheet	Scale	Year
Glamorganshire	047_00	1:10,560	1885
Glamorganshire	051_00	1:10,560	1885

Ordnance Survey County Series Published 1901

County	Mapsheet	Scale	Year
Glamorganshire	047_SW	1:10,560	1901
Glamorganshire	051_NW	1:10,560	1901

Ordnance Survey County Series Published 1921 to 1922

County	Mapsheet	Scale	Year
Glamorganshire	047_SW	1:10,560	1922
Glamorganshire	051_NW	1:10,560	1921

Ordnance Survey County Series Published 1947

County	Mapsheet	Scale	Year
Glamorganshire	047_SW	1:10,560	1947
Glamorganshire	051_NW	1:10,560	1947

Ordnance Survey Plan Published 1964 to 1965

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST16NE	1:10,560	1964
Ordnance Survey Plan	ST16NW	1:10,560	1965
Ordnance Survey Plan	ST17SE	1:10,560	1965
Ordnance Survey Plan	ST17SW	1:10,560	1964

Ordnance Survey Plan Published 1972 to 1975

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST16NE	1:10,000	1972
Ordnance Survey Plan	ST16NW	1:10,000	1975
Ordnance Survey Plan	ST17SE	1:10,000	1974
Ordnance Survey Plan	ST17SW	1:10,000	1972

Ordnance Survey Plan Published 1984

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST16NW	1:10,000	1984
Ordnance Survey Plan	ST17SE	1:10,000	1984

Ordnance Survey Plan Published 1989 to 1996

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST16NE	1:10,000	1989
Ordnance Survey Plan	ST16NW	1:10,000	1991
Ordnance Survey Plan	ST17SE	1:10,000	1996
Ordnance Survey Plan	ST17SW	1:10,000	1991

Ordnance Survey Plan Published 1999

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	ST16NE	1:10,000	1999
Ordnance Survey Plan	ST16NW	1:10,000	1999
Ordnance Survey Plan	ST17SE	1:10,000	1999
Ordnance Survey Plan	ST17SW	1:10,000	1999

Data Type	On Site	0 to 250m	251 to 500m	501 to 1000m (up to 2000m)
Agency & Hydrological				
Air Pollution Controls			1	1
Air Pollution Control Enforcements				
Contaminated Land Register Entries and Notices				
Discharge Consents		4	10	4
Enforcement and Prohibition Notices		1	5	1
Integrated Pollution Controls		25	35	11
Integrated Pollution Prevention And Control				
Nearest Surface Water Feature		Yes		
Pollution Incidents to Controlled Waters		2	2	1
Prosecutions Relating to Authorised Processes				1
Prosecutions Relating to Controlled Waters				
Red List Discharge Consents				
Registered Radioactive Substances		3	9	3
River Quality		1		1
Water Abstractions			4	1 (*10)
Groundwater Vulnerability	Yes			
Fluvial Indicative Floodplains	Yes	Yes		
Tidal Indicative Floodplains				
Source Protection Zones			1	
River Flood Data (Scotland)				
Waste				
BGS Recorded Landfill Sites			2	
Integrated Pollution Control Registered Waste Sites				
Licensed Waste Management Facilities (Landfills)				1
Local Authority Recorded Landfill Sites				1
Registered Landfill Sites			1	1
Registered Waste Transfer Sites				1
Registered Waste Treatment or Disposal Sites				

Data Type	On Site	0 to 250m	251 to 500m	501 to 1000m (+ up to 2000m)
Hazardous Substances				
Control of Major Accident Hazards Sites (COMAH)		1	4	4
Explosive Sites				
Notification of Installations Handling Hazardous Substances (NIHHS)		2	3	1
Planning Hazardous Substance Consents	1	1	10	5
Planning Hazardous Substance Enforcements				
Geological				
BGS Boreholes	1	16	49	69
BGS Recorded Mineral Sites				
BGS 1:625,000 Solid Geology	Yes			
Coal Mining Affected Areas				
Shallow Mining Hazards	Yes	Yes		
Natural Subsidence Hazards	Yes	Yes		
Radon Affected Areas	Yes			
Radon Protection Measures	Yes			
Industrial Land Use				
Contemporary Trade Directory Entries		11	27	29
Fuel Station Entries			3	1

Data Type	On Site	0 to 250m	251 to 500m	501 to 1000m (up to 2000m)
Sensitive Land Uses				
Areas of Adopted Green Belt				
Areas of Unadopted Green Belt				
Areas of Outstanding Natural Beauty				
Environmentally Sensitive Areas				
Forest Parks				
Local Nature Reserves				
Marine Nature Reserves				
National Nature Reserves				
National Parks				
National Scenic Areas				
Nitrate Sensitive Areas				
Nitrate Vulnerable Zones				
Ramsar Sites				
Sites of Special Scientific Interest				1
Special Areas of Conservation				
Special Protection Areas				

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Air Pollution Controls					
1	Name: Barry Car Sales Location: Cardiff Road, BARRY, South Glamorgan, CF63 2QW Authority: Vale Of Glamorgan County Borough Council, Environmental Health Department Permit Reference: VOG/35 Dated: 18th May 1999 Process Type: Local Authority Air Pollution Control Description: PG 1/14 Petrol filling station Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	NW	375	1	314110 168900
Air Pollution Controls					
2	Name: Safeway Petrol Station Location: Palmerston Road, Barry, South Glamorgan, CF63 2PE Authority: Vale Of Glamorgan County Borough Council, Environmental Health Department Permit Reference: VOG/26 Dated: 22nd December 1998 Process Type: Local Authority Air Pollution Control Description: PG 1/14 Petrol filling station Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	NW	626	1	313920 169100
Discharge Consents					
3	Operator: Cabot Carbon Property Type: Undefined Or Other Location: Barry - Fumed Silica Facility Authority: Environment Agency, Welsh Region Catchment Area: River Cadogton Reference: An0217502 Permit Version: 1 Effective Date: 31st October 1990 Issued Date: 31st October 1990 Revocation Date: 30th June 1994 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: Cadogton River Status: Revoked and replaced by IPC Authorisation Positional Accuracy: Located by supplier to within 100m	NW	196	2	314300 168900
Discharge Consents					
4	Operator: Dow Corning Ltd Property Type: Spec. Chemicals, Household Use Location: Barry Site Cardiff Road Barry Authority: Environment Agency, Welsh Region Catchment Area: River Cadogton Reference: Ag0016901 Permit Version: 1 Effective Date: 25th August 1983 Issued Date: 25th August 1983 Revocation Date: 2nd May 1994 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Cadogton Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	S	202	2	314520 168420

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Discharge Consents					
4	<p>Operator: Dow Coming Ltd</p> <p>Property Type: Spec. Chemicals, Household Use</p> <p>Location: Barry Site Cardiff Road Barry</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Catchment Area: River Cadoxton</p> <p>Reference: Ag0016901</p> <p>Permit Version: 2</p> <p>Effective Date: 3rd May 1994</p> <p>Issued Date: 3rd May 1994</p> <p>Revocation Date: 30th June 1994</p> <p>Discharge Type: Trade Effluent</p> <p>Discharge: Freshwater Stream/River</p> <p>Environment:</p> <p>Receiving Water: River Cadoxton</p> <p>Status: Revoked and replaced by IPC Authorisation</p> <p>Positional Accuracy: Located by supplier to within 10m</p>	S	209	2	314510 168410
Discharge Consents					
5	<p>Operator: Dow Chemical Co Ltd</p> <p>Property Type: Basic Industry, Chemicals Organic</p> <p>Location: Sully Dow Chemical Point A - Emerge, Dow Chemical Point A - Emerge</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Catchment Area: River Cadoxton</p> <p>Reference: Ag0005001</p> <p>Permit Version: 1</p> <p>Effective Date: 19th May 1981</p> <p>Issued Date: 19th May 1981</p> <p>Revocation Date: 6th May 1994</p> <p>Discharge Type: Unspecified</p> <p>Discharge: Freshwater Stream/River</p> <p>Environment:</p> <p>Receiving Water: Sully Brook</p> <p>Status: Revoked and replaced by IPC Authorisation</p> <p>Positional Accuracy: Located by supplier to within 100m</p>	S	234	2	314400 168400
Discharge Consents					
6	<p>Operator: Cabot Carbon</p> <p>Property Type: Undefined Dr Other</p> <p>Location: Barry - Fumed Silica Facility</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Catchment Area: River Cadoxton</p> <p>Reference: An0217501</p> <p>Permit Version: 1</p> <p>Effective Date: 31st October 1990</p> <p>Issued Date: 31st October 1990</p> <p>Revocation Date: 30th June 1994</p> <p>Discharge Type: Trade Effluent</p> <p>Discharge: Freshwater Stream/River</p> <p>Environment:</p> <p>Receiving Water: Cadoxton River</p> <p>Status: Revoked and replaced by IPC Authorisation</p> <p>Positional Accuracy: Located by supplier to within 10m</p>	W	271	2	314200 168750
Discharge Consents					
7	<p>Operator: Bp Chemicals Ltd</p> <p>Property Type: Undefined Or Other</p> <p>Location: Sully-Bralthwaite Tank Bp Chemicals, Bp Chemicals Ltd</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Catchment Area: River Cadoxton</p> <p>Reference: Af3021001</p> <p>Permit Version: 1</p> <p>Effective Date: 6th November 1970</p> <p>Issued Date: 6th November 1970</p> <p>Revocation Date: 7th August 1992</p> <p>Discharge Type: Unspecified</p> <p>Discharge: Freshwater Stream/River</p> <p>Environment:</p> <p>Receiving Water: Cadoxton River</p> <p>Status: Consent expired</p> <p>Positional Accuracy: Located by supplier to within 100m</p>	W	283	2	314200 168600

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Discharge Consents					
8	Operator: Bp Chemicals Ltd Property Type: Undefined Or Other Location: Biglis Supply Main Bp Chemicals Sul,Bp Chemicals Sully Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Af4028501 Permit Version: 1 Effective Date: 16th November 1978 Issued Date: 16th November 1978 Revocation Date: 7th August 1992 Discharge Type: Unspecified Discharge: Freshwater Stream/River Environment: Receiving Water: Cadoxton River Via Culvert Status: Consent expired Positional Accuracy: Located by supplier to within 100m	SW	360	2	314200 168400
Discharge Consents					
8	Operator: Bp Chemicals Ltd Property Type: Undefined Or Other Location: Sully-Bp Chemicals Pt A Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Af4025901 Permit Version: 1 Effective Date: 15th May 1978 Issued Date: 15th May 1978 Revocation Date: 7th August 1992 Discharge Type: Trade Effluent Discharge: Freshwater Stream/River Environment: Receiving Water: River Cadoxton Status: Consent expired Positional Accuracy: Located by supplier to within 10m	SW	371	2	314220 168360
Discharge Consents					
8	Operator: Dow Chemical Co Ltd Property Type: Basic Industry, Chemicals Organic Location: Dow Chemical Company Hayes Road Sul,Hayes Road Sully Penarth Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Af3024601 Permit Version: 1 Effective Date: 16th December 1971 Issued Date: 16th December 1971 Revocation Date: 15th December 1971 Discharge Type: Trade Effluent Discharge: Freshwater Stream/River Environment: Receiving Water: River Cadoxton Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	SW	393	2	314190 168360
Discharge Consents					
8	Operator: Dow Chemical Co Ltd Property Type: Basic Industry, Chemicals Organic Location: Dow Chemical Company Hayes Road Sul,Hayes Road Sully Penarth Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Af3024601 Permit Version: 2 Effective Date: 16th December 1971 Issued Date: 16th December 1971 Revocation Date: 22nd December 1993 Discharge Type: Unspecified Discharge: Freshwater Stream/River Environment: Receiving Water: River Cadoxton Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	SW	393	2	314190 168360

Map	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	Discharge Consents				
9	Operator: Dow Corning Ltd Property Type: Spec. Chemicals, Household Use Location: Dow Corning Ltd Barry Site Cardiff, Barry Site Cardiff Road Barry Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Ag0017001 Permit Version: 1 Effective Date: 26th August 1983 Issued Date: 26th August 1983 Revocation Date: 2nd May 1994 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Cadoxton Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	W	439	2	314030 168750
9	Operator: Dow Corning Ltd Property Type: Spec. Chemicals, Household Use Location: Dow Corning Ltd Barry Site Cardiff, Barry Site Cardiff Road Barry Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Ag0017001 Permit Version: 2 Effective Date: 3rd May 1994 Issued Date: 3rd May 1994 Revocation Date: 30th June 1994 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Cadoxton Status: Revoked and replaced by IPC Authorisation Positional Accuracy: Located by supplier to within 10m	W	439	2	314030 168750
10	Operator: Dow Chemical Co Ltd Property Type: Basic Industry, Chemicals Organic Location: Dow Chemical Company Hayes Road Sul, Hayes Road Sully Penarth Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: Af3024601 Permit Version: 3 Effective Date: 23rd December 1993 Issued Date: 23rd December 1993 Revocation Date: 6th May 1994 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Cadoxton Status: Revoked and replaced by IPC Authorisation Positional Accuracy: Located by supplier to within 10m	SW	452	2	314130 168340
11	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Pumping Station - Water Company Location: Sully Moors Ps Cardiff Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: AN0223001 Permit Version: 1 Effective Date: 16th January 1991 Issued Date: 16th January 1991 Revocation Date: Not Supplied Discharge Type: Unspecified Discharge Environment: Freshwater Stream/River Receiving Water: Trib Of Sully Brook Status: New Consent, by Application (Water Resources Act 1991, Section 88) Positional Accuracy: Located by supplier to within 100m	SE	493	2	314970 168360

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Discharge Consents					
12	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Pumping Station - Water Company Location: Biglis Storm Ps Cardiff Road Barry Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: AN0088901 Permit Version: 1 Effective Date: 19th October 1989 Issued Date: 19th October 1989 Revocation Date: Not Supplied Discharge Type: Unspecified Discharge Environment: Freshwater Stream/River Receiving Water: Cadoxton Status: New Consent, by Application (Water Resources Act 1991, Section 88) Positional Accuracy: Located by supplier to within 100m	NE	681	2	314910 169370
Discharge Consents					
12	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Pumping Station - Water Company Location: Biglis Storm Ps Cardiff Road Barry Authority: Environment Agency, Welsh Region Catchment Area: Not Supplied Reference: As2000301 Permit Version: 1 Effective Date: 8th May 1963 Issued Date: 8th May 1963 Revocation Date: Not Supplied Discharge Type: Unspecified Discharge Environment: Unknown Receiving Water: Unknown Status: New Consent, by Application (Water Resources Act 1991, Section 88) Positional Accuracy: Located by supplier to within 10m	NE	681	2	314910 169370
Discharge Consents					
13	Operator: Vopak Windmill Ltd Property Type: Wholesale Distribution Fuels & Metals Location: Windmill Site Hayes Road Barry, Hayes Road, Cf84 5yb Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: AN028010101 Permit Version: 1 Effective Date: 27th April 1998 Issued Date: 27th April 1998 Revocation Date: 22nd January 2001 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Cadoxton Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 100m	SW	942	2	313700 168100

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Discharge Consents					
13	Operator: Vopak Windmill Ltd Property Type: Wholesale Distribution Fuels & Metals Location: Windmill Site Hayes Road Barry, Hayes Road, CF64 5yb Authority: Environment Agency, Welsh Region Catchment Area: River Cadoxton Reference: An028010101 Permit Version: 2 Effective Date: 23rd January 2001 Issued Date: 22nd January 2001 Revocation Date: Not Supplied Discharge Type: Trade Discharges - Site Drainage Discharge Environment: Freshwater Stream/River Receiving Water: River Cadoxton Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 100m	SW	942	2	313700 168100
Enforcement and Prohibition Notices					
14	Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AG3860 Enforcement Date: 28th March 1995 Details: Press Release HM176, Unauthorised releases of PVC & VCM; under EPA90. Positional Accuracy: Manually positioned to the road within the address or location	E	77	2	314620 168730
Enforcement and Prohibition Notices					
15	Location: SULLY Authority: Environment Agency, Welsh Region Permit Reference: Not Supplied Enforcement Date: 24th November 2000 Details: Ea Ref Sm339/00lr. Notice issued Following An Incident Where The Amount Of Phenol In The Effluent Discharge Was Found To Be Above That Approved By The Agency. Borden Chemicals Ltd Where Required To Improve Existing Management Systems. Positional Accuracy: Manually positioned to the address or location	NW	255	2	314220 168840
Enforcement and Prohibition Notices					
15	Location: River Cadoxton, Sully Moors Road, SULLY, Authority: Environment Agency, Welsh Region Permit Reference: Not Given Enforcement Date: Not Supplied Details: Incident Between 19 And 21 Sept 01. 900 Cu/M Of Treated Process Effluent Leaked Into River Cadoxton. Enforcement Notice - Inspection, Maintenance, Design, Construction And Operation To Be Reviewed By 31st Dec 01. Positional Accuracy: Manually positioned to the address or location	NW	255	2	314220 168840
Enforcement and Prohibition Notices					
16	Location: Sully, PENARTH, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: not given Enforcement Date: 28th January 1999 Details: Environment Business 28/01/1999, Unauthorised release of process reactor waste gases. Positional Accuracy: Automatically positioned to the address	SE	301	2	314730 168380
Enforcement and Prohibition Notices					
17	Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: Not Given Enforcement Date: 3rd April 1995 Details: Press Release HM179, Unauthorised releases of methyl chloride and hydrogen chloride; under EPA90. Positional Accuracy: Unknown	W	461	2	314010 168850

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Enforcement and Prohibition Notices					
17	Location: Cardliff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: Not Supplied Enforcement Date: Not Supplied Details: Enforcement Notice Issued Under The Radioactive Substances Act 1993 Following A Radioactive Component Being Sent To A Recycling Facility. The Notice Requires Improvement Or Marking And Procedures When Dealing With Hazardous Components. Positional Accuracy: Manually positioned to the address or location	W	475	2	313990 168850
Enforcement and Prohibition Notices					
18	Location: Sully Works, Barry, PENARTH, South Glamorgan, CF64 5XB Authority: Environment Agency, Welsh Region Permit Reference: NOT GIVEN Enforcement Date: 10th October 1997 Details: ENDS Report 273 (October 1997), Two tonnes of vinyl chloride monomer leaked from an over pressurised vessel. (Prohibition Notice lifted on the 14/10/1997 after the plant was modified.) Positional Accuracy: Manually positioned to the address or location	SW	795	2	313900 168090
Integrated Pollution Controls					
19	Name: European Vinyls Corporation (uk) Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BE4983 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Manually positioned to the road within the address or location	E	69	2	314610 168720
Integrated Pollution Controls					
19	Name: European Vinyls Corporation (uk) Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BB4421 Dated: 15th June 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	70	2	314610 168720
Integrated Pollution Controls					
19	Name: European Vinyls Corporation (uk) Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BA6658 Dated: 20th February 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	73	2	314620 168710
Integrated Pollution Controls					
19	Name: Laporte Performance Chemicals UK Ltd Location: Sully Moors Road, PENARTH, South Glamorgan, CF64 5RZ Authority: Environment Agency, Welsh Region Permit Reference: B12220 Dated: 3rd July 2001 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	73	2	314610 168740

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NG
	Integrated Pollution Controls				
19	<p>Name: Cabot Carbon Ltd</p> <p>Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Permit Reference: BE5645</p> <p>Dated: 24th November 1998</p> <p>Process Type: IPC minor (non-substantial) variation to previous variation</p> <p>Description: 4.4 A (D) processes involving Halogens within the Chemical Industry</p> <p>Status: Application has been authorised and any conditions apply to the operator</p> <p>Positional Accuracy: Manually positioned to the road within the address or location</p>	E	75	2	314620 168720
	Integrated Pollution Controls				
19	<p>Name: Cabot Carbon Ltd</p> <p>Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Permit Reference: BB4782</p> <p>Dated: 30th June 1998</p> <p>Process Type: IPC minor (non-substantial) variation to previous variation</p> <p>Description: 4.4 A (D) processes involving Halogens within the Chemical Industry</p> <p>Status: Authorisation superseded by a substantial or non substantial variation</p> <p>Positional Accuracy: Manually positioned to the road within the address or location</p>	E	75	2	314620 168720
	Integrated Pollution Controls				
19	<p>Name: Cabot Carbon Ltd</p> <p>Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Permit Reference: AL8959</p> <p>Dated: 26th May 1994</p> <p>Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation</p> <p>Description: 4.4 A (D) processes involving Halogens within the Chemical Industry</p> <p>Status: Authorisation superseded by a substantial or non substantial variation</p> <p>Positional Accuracy: Manually positioned to the road within the address or location</p>	E	75	2	314620 168720
	Integrated Pollution Controls				
19	<p>Name: Cabot Carbon Ltd</p> <p>Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Permit Reference: BB6996</p> <p>Dated: 13th November 1998</p> <p>Process Type: IPC major (substantial) variation</p> <p>Description: 4.4 A (D) processes involving Halogens within the Chemical Industry</p> <p>Status: Authorisation superseded by a substantial or non substantial variation</p> <p>Positional Accuracy: Manually positioned to the road within the address or location</p>	E	75	2	314620 168720
	Integrated Pollution Controls				
19	<p>Name: Cabot Carbon Ltd</p> <p>Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Permit Reference: AP7261</p> <p>Dated: 21st April 1995</p> <p>Process Type: IPC minor (non-substantial) variation to previous variation</p> <p>Description: 4.4 A (D) processes involving Halogens within the Chemical Industry</p> <p>Status: Authorisation superseded by a substantial or non substantial variation</p> <p>Positional Accuracy: Manually positioned to the road within the address or location</p>	E	75	2	314620 168720
	Integrated Pollution Controls				
19	<p>Name: Cabot Carbon Ltd</p> <p>Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP</p> <p>Authority: Environment Agency, Welsh Region</p> <p>Permit Reference: AX5242</p> <p>Dated: 17th December 1996</p> <p>Process Type: IPC minor (non-substantial) variation to previous variation</p> <p>Description: 4.4 A (D) processes involving Halogens within the Chemical Industry</p> <p>Status: Authorisation superseded by a substantial or non substantial variation</p> <p>Positional Accuracy: Manually positioned to the road within the address or location</p>	E	75	2	314620 168720

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NCF
Integrated Pollution Controls					
19	Name: Cabot Carbon Ltd Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AX8519 Dated: 28th August 1997 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	75	2	314620 168720
Integrated Pollution Controls					
19	Name: Cabot Carbon Ltd Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AZ5758 Dated: 2nd September 1997 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	75	2	314620 168720
Integrated Pollution Controls					
19	Name: Cabot Carbon Ltd Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AZ9800 Dated: 3rd November 1997 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	75	2	314620 168720
Integrated Pollution Controls					
19	Name: European Vinyls Corporation (UK) Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AG3860 Dated: 30th June 1993 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	79	2	314620 168720
Integrated Pollution Controls					
19	Name: European Vinyls Corporation (uk) Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AP4661 Dated: 20th March 1995 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	E	81	2	314620 168730
Integrated Pollution Controls					
20	Name: Laporte Performance Chemicals UK Ltd Location: Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AD5487 Dated: 25th May 1992 Process Type: IPC new application Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	145	2	314570 168490

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
	Integrated Pollution Controls				
20	Name: Laporte Performance Chemicals Uk Ltd Location: Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AV0681 Dated: 11th November 1996 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	150	2	314570 168480
	Integrated Pollution Controls				
20	Name: Laporte Performance Chemicals Uk Ltd Location: Sully Moors Road, PENARTH, South Glamorgan, CF6 2YU Authority: Environment Agency, Welsh Region Permit Reference: BD5364 Dated: 24th November 1996 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	151	2	314570 168480
	Integrated Pollution Controls				
21	Name: Laporte Performance Chemicals Uk Ltd Location: Sully Moors Road, Penarth, South Glamorgan, CF64 5rz Authority: Environment Agency, Welsh Region Permit Reference: Bs0345 Dated: 6th June 2002 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Manually positioned to the road within the address or location	N	161	2	314560 168970
	Integrated Pollution Controls				
21	Name: Kooltherm Insulation Products Ltd Location: Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AJ9822 Dated: 8th October 1993 Process Type: Application since found to be exempt from IPC Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application since found to be exempt from IPC Positional Accuracy: Unknown	N	189	2	314600 168980
	Integrated Pollution Controls				
21	Name: Evc (Uk) Ltd Location: Barry Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AZ9524 Dated: 13th October 1997 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has met the requirements for authorisation (but not yet authorised) Positional Accuracy: Unknown	N	193	2	314580 168990
	Integrated Pollution Controls				
21	Name: Aes Barry Ltd Location: Chp Plant, Sully Moors Road, Sully, BARRY, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BA9835 Dated: 11th December 1998 Process Type: IPC major (substantial) variation Description: 1.3 A (B) Combustion processes within the Fuel & Power Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	N	201	2	314600 169000

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
Integrated Pollution Controls					
21	Name: Aes Barry Ltd Location: Chp Plant, Sully Moors Road, Sully, BARRY, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BA5791 Dated: 17th February 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 1.3 A (B) Combustion processes within the Fuel & Power Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	N	203	2	314610 169000
Integrated Pollution Controls					
21	Name: Aes Barry Ltd Location: CHP Plant, Sully Moors Road, Sully, BARRY, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AV4504 Dated: 17th January 1997 Process Type: IPC new application Description: 1.3 A (B) Combustion processes within the Fuel & Power Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	N	205	2	314600 169000
Integrated Pollution Controls					
21	Name: Aes Barry Ltd Location: CHP Plant, Sully Moors Road, Sully, BARRY, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BE3103 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 1.3 A (B) Combustion processes within the Fuel & Power Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	N	207	2	314610 169000
Integrated Pollution Controls					
22	Name: Kingspan Insulation Ltd Location: Blagden Chemicals Site, Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BG7924 Dated: 16th September 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Manually positioned to the road within the address or location	N	261	2	314530 169070
Integrated Pollution Controls					
23	Name: Kingspan Insulation Ltd Location: Blagden Chemical Site, Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AM1468 Dated: 26th May 1994 Process Type: IPC new application Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the address or location	SE	265	2	314650 168380
Integrated Pollution Controls					
24	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5UY Authority: Environment Agency, Welsh Region Permit Reference: Bm2594 Dated: 14th February 2002 Process Type: IPC major (substantial) variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Manually positioned to the address or location	SW	284	2	314350 168370

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	Integrated Pollution Controls				
25	Name: Borden Chemical Uk Ltd Location: Blagden Cellobond, Sully Moors Road, PENARTH, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: BG3996 Dated: 28th September 1999 Process Type: IPC major (substantial) variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	299	2	314730 168390
	Integrated Pollution Controls				
25	Name: Borden Chemical Uk Ltd Location: Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: AJ9075 Dated: 5th January 1994 Process Type: IPC new application Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	300	2	314730 168390
	Integrated Pollution Controls				
25	Name: Borden Chemical Uk Ltd Location: Sully Moors Road, Penarth, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: BJ3497 Dated: 6th November 2000 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	SE	300	2	314730 168390
	Integrated Pollution Controls				
25	Name: Borden Chemical Uk Ltd Location: Sully, Penarth, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: BI3943 Dated: Not Supplied Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.1 A (D) Petrochemical processes within the Chemical Industry Status: Application has met the requirements for authorisation (but not yet authorised) Positional Accuracy: Automatically positioned to the address	SE	300	2	314730 168390
	Integrated Pollution Controls				
25	Name: Borden Chemical Uk Ltd Location: Sully Moors Road, PENARTH, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: BH3681 Dated: 12th May 2000 Process Type: IPC major (substantial) variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	304	2	314730 168380
	Integrated Pollution Controls				
25	Name: Borden Chemical Uk Ltd Location: Sully Moors Road, PENARTH, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: AZ5154 Dated: 3rd February 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	305	2	314730 168380

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Integrated Pollution Controls					
25	Name: Borden Chemical UK Ltd Location: Barry Business Group, Sully Moors Group, PENARTH, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: BE0775 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	307	2	314730 168380
Integrated Pollution Controls					
25	Name: Aes Barry Ltd Location: Chp Plant, Sully Moors Road, PENARTH, South Glamorgan, CF64 5YU Authority: Environment Agency, Welsh Region Permit Reference: BH8071 Dated: 27th March 2000 Process Type: IPC minor (non-substantial) variation to previous variation Description: 1.3 A (B) Combustion processes within the Fuel & Power Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	SE	307	2	314730 168380
Integrated Pollution Controls					
26	Name: Kingspan Insulation Ltd Location: Blagden Chemical Site, Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: BD0028 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	353	2	314720 168320
Integrated Pollution Controls					
26	Name: Kingspan Insulation Ltd Location: Blagden Chemical Site, Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AO5123 Dated: 31st October 1994 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	SE	353	2	314720 168320
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: BC8279 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	450	2	314020 168850
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: BC8252 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	451	2	314020 168850

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
27	Integrated Pollution Controls Name: Dow Corning Ltd Location: Barry Plant Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: BE1917 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	451	2	314020 168860
27	Integrated Pollution Controls Name: Dow Corning Ltd Location: Barry Plant Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: BE2948 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	452	2	314020 168860
27	Integrated Pollution Controls Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AL8584 Dated: 26th May 1994 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	455	2	314010 168850
27	Integrated Pollution Controls Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AM4533 Dated: 24th May 1994 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	456	2	314010 168850
27	Integrated Pollution Controls Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AM4541 Dated: 24th May 1994 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	456	2	314010 168860
27	Integrated Pollution Controls Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BF3150 Dated: 25th February 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	457	2	314010 168860

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AO6928 Dated: 4th January 1995 Process Type: IPC major (substantial) variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	460	2	314010 168850
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AS2084 Dated: 29th July 1995 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	461	2	314010 168860
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, Barry, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BJ0331 Dated: 14th August 2000 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	461	2	314010 168850
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BI3927 Dated: 14th August 2001 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	W	461	2	314010 168850
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AW7479 Dated: 4th October 1996 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	462	2	314010 168860
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BF5853 Dated: 31st March 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	W	462	2	314010 168860

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	Integrated Pollution Controls				
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: BA0889 Dated: 21st November 1997 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	465	2	314000 168850
	Integrated Pollution Controls				
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: BA4850 Dated: 4th March 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	465	2	314000 168840
	Integrated Pollution Controls				
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AM4525 Dated: 26th May 1994 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	466	2	314000 168860
	Integrated Pollution Controls				
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: AY4934 Dated: 8th October 1997 Process Type: IPC major (substantial) variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	467	2	314000 168860
	Integrated Pollution Controls				
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BF4704 Dated: 31st March 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	467	2	314000 168860
	Integrated Pollution Controls				
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BG1454 Dated: 19th July 1999 Process Type: IPC new application Description: 4.5 A (M) inorganic Chemical processes within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	W	471	2	314000 168860

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BG3309 Dated: 19th July 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	W	471	2	314000 168850
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BF7058 Dated: 5th July 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	472	2	314000 168860
Integrated Pollution Controls					
27	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: Bk7137 Dated: 6th June 2001 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (D) processes involving Halogens within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Manually positioned to the address or location	W	509	2	313960 168860
Integrated Pollution Controls					
28	Name: Dow Chemical Co Ltd Location: Hayes Road, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: AY9685 Dated: 13th June 1997 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	S	622	2	314470 168000
Integrated Pollution Controls					
28	Name: Dow Chemical Co Ltd Location: Hayes Road, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: BF7538 Dated: 14th July 1999 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	S	622	2	314470 168000
Integrated Pollution Controls					
28	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: BD9998 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	S	623	2	314460 168000

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	Integrated Pollution Controls				
28	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: AK5393 Dated: 28th February 1994 Process Type: IPC new application Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	S	627	2	314460 167990
	Integrated Pollution Controls				
28	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: AR9460 Dated: 6th February 1996 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (A) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	S	632	2	314470 167990
	Integrated Pollution Controls				
29	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: AJ8796 Dated: 5th January 1994 Process Type: IPC new application Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	637	2	314530 167990
	Integrated Pollution Controls				
29	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: BA6836 Dated: 22nd May 1996 Process Type: IPC major (substantial) variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	637	2	314530 167980
	Integrated Pollution Controls				
29	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: BE3278 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	637	2	314530 167980
	Integrated Pollution Controls				
29	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: AV8186 Dated: 4th November 1996 Process Type: IPC major (substantial) variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	637	2	314530 167980

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
Integrated Pollution Controls					
29	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: BH3983 Dated: 1st May 2001 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (C) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	S	637	2	314530 167980
Pollution Incidents to Controlled Waters					
30	Property Type: Not Given Location: Bp Chemicals, Hayes Road, SULLY Authority: Environment Agency, Welsh Region Pollutant: Crude Sewage Note: Not Supplied Incident Date: 2nd August 1991 Incident Reference: 1338 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Severity of Incident: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	S	118	2	314500 168500
Pollution Incidents to Controlled Waters					
31	Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, Welsh Region Pollutant: Mud/Clay/Soil Note: Tributary Sully Bk At Sully Mars Road Barry; Run-Off Incident Date: 15th November 1997 Incident Reference: 34159 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Poor Management Control Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	SE	144	2	314700 168600
Pollution Incidents to Controlled Waters					
32	Property Type: Warehouses Location: Dow Corning, BARRY Authority: Environment Agency, Welsh Region Pollutant: Industrial Solid Waste Note: Not Supplied Incident Date: 28th March 1995 Incident Reference: 23017 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	SW	310	2	314200 168500
Pollution Incidents to Controlled Waters					
33	Property Type: Not Given Location: Field At Side Of, Sully Moors Road Authority: Environment Agency, Welsh Region Pollutant: Agricultural: Carcasses Note: Sully Bk Incident Date: 15th January 1998 Incident Reference: 34606 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	SE	365	2	314900 168500

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Pollution Incidents to Controlled Waters					
34	Property Type: Not Given Location: Jewsons On, Barry Dock Authority: Environment Agency, Welsh Region Pollutant: Agricultural: Silage Liquor Note: Not Supplied Incident Date: 16th July 1991 Incident Reference: 1558 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Severity of Incident: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	SW	942	2	313700 168100
Prosecutions Relating to Authorised Processes					
35	Location: Sully, PENARTH, South Glamorgan, CF64 Authority: Environment Agency, Welsh Region Prosecution Text: EA News Release 07/05/1998, Releasing of between 5.7 and 8.5 tonnes of VCM (vinyl chloride monomer) into the atmosphere from its sully plant. Breaching the conditions of its authorisation. Prosecution Act: EPA90 Hearing Date: 7th May 1998 Verdict: Guilty Fine: 18000 Costs: 13000 Positional Accuracy: Unknown	SW	786	2	314000 168000
Registered Radioactive Substances					
36	Name: Id Chemicals And Polymers Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AE7805 Dated: 31st March 1991 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation either revoked or cancelled Positional Accuracy: Manually positioned to the road within the address or location	E	75	2	314620 168720
Registered Radioactive Substances					
37	Name: Cabot Carbon Ltd Location: Cab-O-Sil Division; Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Environment Agency, Welsh Region Permit Reference: AC9548 Dated: 5th May 1992 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Unknown	N	187	2	314600 168980
Registered Radioactive Substances					
37	Name: European Vinyls Corporation (UK) Ltd Location: Barry, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5SY Authority: Environment Agency, Welsh Region Permit Reference: AJ1147 Dated: 30th June 1993 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned in the proximity of the address	N	216	2	314620 169010

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Registered Radioactive Substances					
38	Name: European Vinyls Corporation (UK) Ltd Location: Sully Moors Road, Sully, PENARTH, South Glamorgan, CF84 5RP Authority: Environment Agency, Welsh Region Permit Reference: AP9329 Dated: 15th March 1995 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Unknown	SE	276	2	314700 168400
Registered Radioactive Substances					
38	Name: European Vinyls Corporation (UK) Ltd Location: Barry Site, Sully Moors Road, Sully, PENARTH, South Glamorgan, CF6 2SY Authority: Environment Agency, Welsh Region Permit Reference: A13461 Dated: 31st March 1991 Process Type: Not Supplied Description: Registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	SE	279	2	314710 168400
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AH0696 Dated: 31st March 1991 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	W	450	2	314020 168840
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AH0718 Dated: 31st March 1991 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	W	450	2	314020 168850
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AH0688 Dated: 31st March 1991 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	451	2	314020 168850

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF6 7YL Authority: Environment Agency, Welsh Region Permit Reference: AY2699 Dated: 7th May 1997 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	452	2	314020 168860
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: BC0391 Dated: 11th November 1998 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	452	2	314020 168860
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Barry Plant, Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: AC6107 Dated: 7th February 1992 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Minor variation to registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	W	457	2	314010 168860
Registered Radioactive Substances					
39	Name: Dow Corning Ltd Location: Cardiff Road, Barry, South Glamorgan, CF63 2YL Authority: Environment Agency, Welsh Region Permit Reference: Bk5304 Dated: 9th March 2001 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	W	461	2	314010 168850
Registered Radioactive Substances					
40	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: BB8940 Dated: 3rd September 1998 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	S	622	2	314460 168000

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Registered Radioactive Substances					
40	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: Bk9172 Dated: 8th May 2001 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	S	627	2	314460 167990
Registered Radioactive Substances					
40	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YB Authority: Environment Agency, Welsh Region Permit Reference: AQ6295 Dated: 22nd March 1995 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under S7 or S10 RSA for 1 or more closed sources =< 4 Terabecquerels also for storage in transit Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	S	633	2	314460 167990
River Quality					
	Name: Cadoxton GQA Grade: River Quality C Reach: Tidal Limit - Conf. Cold Bk. Estimated Distance of Reach (km): 1.5 Flow Rate: Flow less than 0.62 cumecs Flow Type: River Year: 2000	NW	170	3	314390 168950
River Quality					
	Name: Cadoxton GQA Grade: River Quality B Reach: Conf. Cold Bk. - Conf. At Dinas Powys Estimated Distance of Reach (km): 2.1 Flow Rate: Flow less than 0.62 cumecs Flow Type: River Year: 2000	NE	621	3	314800 169360
Water Abstractions					
41	Operator: Dow Corning Ltd Licence Number: 21/58/11/0003 Permit Version: 100 Location: River Cadoxton At Dow Corning Authority: Environment Agency, Welsh Region Abstraction: Chemicals: Process Water Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: River Cadoxton At Dow Corning Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 5th September 1997 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	SW	364	2	314200 168400

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Water Abstractions					
41	Operator: Dow Corning Ltd Licence Number: 21/58/11/0003 Permit Version: 100 Location: River Cadoxton At Dow Corning Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: River Cadoxton At Dow Corning Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 5th September 1997 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	SW	367	2	314200 168400
Water Abstractions					
41	Operator: Dow Corning Ltd Licence Number: 21/58/11/0003 Permit Version: 100 Location: River Cadoxton At Dow Corning Authority: Environment Agency, Welsh Region Abstraction: Chemicals: Evaporative Cooling Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: R.Cadoxton Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 5th September 1997 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	SW	368	2	314190 168400
Water Abstractions					
41	Operator: Dow Corning Ltd Licence Number: 21/58/11/0003 Permit Version: 100 Location: River Cadoxton At Dow Corning Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (High Loss) Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: R.Cadoxton Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 5th September 1997 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	SW	371	2	314190 168400
Water Abstractions					
42	Operator: Dwr Cymru Cyf Licence Number: 21/58/11/0002 Permit Version: 100 Location: Biglis Well (Point A) Authority: Environment Agency, Welsh Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: BIGLIS WELL (A) Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 1999 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	N	992	2	314730 169780

Map	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Water Abstractions					
Operator:	Dwr Cymru Cyf	N	1014	2	314740
Licence Number:	21/58/11/0002				169800
Permit Version:	100				
Location:	Biglis Well (Point B)				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Public Water Supply: Potable Water Supply - Direct				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Groundwater				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	BIGLIS WELL (B)				
Authorised Start:	01 January				
Authorised End:	31 December				
Permit Start Date:	1st April 1999				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 100m				
Water Abstractions					
Operator:	Mr John Andrew Edmunds	NW	1587	2	313850
Licence Number:	21/58/11/0010				170260
Permit Version:	Not Supplied				
Location:	Location Description: Not Available				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Spray Irrigation				
Abstraction Type:	Not Supplied				
Source:	Pond or Lake				
Daily Rate (m3):	26				
Yearly Rate (m3):	3400				
Details:	Not Supplied				
Authorised Start:	Not Supplied				
Authorised End:	Not Supplied				
Permit Start Date:	Not Supplied				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 100m				
Water Abstractions					
Operator:	Mr J Edmunds	NW	1593	2	313830
Licence Number:	21/58/11/0010				170260
Permit Version:	100				
Location:	Lagoon At Greenyard Farm				
Authority:	Environment Agency, Welsh Region				
Abstraction:	General Agriculture: Spray Irrigation - Direct				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Surface				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	75M X 25M X 2.5M = 4700 CUM - VOLUME				
Authorised Start:	01 April				
Authorised End:	31 October				
Permit Start Date:	11th June 1999				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 100m				
Water Abstractions					
Operator:	Mr J Edmunds	NW	1600	2	313840
Licence Number:	21/58/11/0012				170270
Permit Version:	100				
Location:	Borehole At Greenyard Farm				
Authority:	Environment Agency, Welsh Region				
Abstraction:	General Agriculture: Spray Irrigation - Direct				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Groundwater				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	Borehole At St Andrews Major Golf Club; Well And Borehole				
Authorised Start:	01 April				
Authorised End:	31 October				
Permit Start Date:	11th June 1999				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 100m				

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NCR
	Water Abstractions				
	Operator: Partners For The Time Being Of W Baker & Sons (Barry) Ltd	SW	1926	2	313160
	Licence Number: 21/58/11/0011				167220
	Permit Version: 100				
	Location: Cadoxton River At Barry				
	Authority: Environment Agency, Welsh Region				
	Abstraction: Other Industrial/Commercial/Public Services: Make-Up Or Top Up Water				
	Abstraction Type: Water may be abstracted from a single point				
	Source: Tidal				
	Daily Rate (m3): Not Supplied				
	Yearly Rate (m3): Not Supplied				
	Details: River Cadoxton				
	Authorised Start: 01 January				
	Authorised End: 31 December				
	Permit Start Date: 24th April 1996				
	Permit End Date: Not Supplied				
	Positional Accuracy: Located by supplier to within 100m				
	Water Abstractions				
	Operator: Partners For The Time Being Of W Baker & Sons (Barry) Ltd	SW	1926	2	313170
	Licence Number: 21/58/11/0011				167210
	Permit Version: 100				
	Location: Cadoxton River At Barry				
	Authority: Environment Agency, Welsh Region				
	Abstraction: Other Industrial/Commercial/Public Services: Mineral Washing				
	Abstraction Type: Water may be abstracted from a single point				
	Source: Tidal				
	Daily Rate (m3): Not Supplied				
	Yearly Rate (m3): Not Supplied				
	Details: Licenced from 01-Jan to 31-Dec				
	Authorised Start: 01 January				
	Authorised End: 31 December				
	Permit Start Date: 24th April 1996				
	Permit End Date: Not Supplied				
	Positional Accuracy: Approximate location provided by supplier				
	Water Abstractions				
	Operator: Apex Coal Ltd	SW	1926	2	313160
	Licence Number: 21/58/11/0011				167220
	Permit Version: 101				
	Location: Cadoxton River At Barry				
	Authority: Environment Agency, Welsh Region				
	Abstraction: Other Industrial/Commercial/Public Services: Dust Suppression				
	Abstraction Type: Water may be abstracted from a single point				
	Source: Tidal				
	Daily Rate (m3): Not Supplied				
	Yearly Rate (m3): Not Supplied				
	Details: Coal Depot At Barry Docks				
	Authorised Start: 01 January				
	Authorised End: 31 December				
	Permit Start Date: 25th June 2001				
	Permit End Date: Not Supplied				
	Positional Accuracy: Located by supplier to within 10m				
	Water Abstractions				
	Operator: Apex Coal Ltd	SW	1926	2	313160
	Licence Number: 21/58/11/0011				167220
	Permit Version: 101				
	Location: Cadoxton River At Barry				
	Authority: Environment Agency, Welsh Region				
	Abstraction: Other Industrial/Commercial/Public Services: Make-Up Or Top Up Water				
	Abstraction Type: Water may be abstracted from a single point				
	Source: Tidal				
	Daily Rate (m3): Not Supplied				
	Yearly Rate (m3): Not Supplied				
	Details: Not Supplied				
	Authorised Start: 01 January				
	Authorised End: 31 December				
	Permit Start Date: 25th June 2001				
	Permit End Date: Not Supplied				
	Positional Accuracy: Located by supplier to within 10m				

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Water Abstractions					
Operator:	Apex Coal Ltd	SW	1928	2	313160 167220
Licence Number:	21/58/11/0011				
Permit Version:	101				
Location:	Cadoxton River At Barry				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Other Industrial/Commercial/Public Services: Mineral Washing				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Tidal				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	Not Supplied				
Authorised Start:	01 January				
Authorised End:	31 December				
Permit Start Date:	25th June 2001				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 10m				
Water Abstractions					
Operator:	Partners For The Time Being Of W Baker & Sons (Barry) Ltd	SW	1929	2	313160 167210
Licence Number:	21/58/11/0011				
Permit Version:	100				
Location:	Cadoxton River At Barry				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Other Industrial/Commercial/Public Services: Dust Suppression				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Tidal				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	Licensed from 01-Jan to 31-Dec				
Authorised Start:	01 January				
Authorised End:	31 December				
Permit Start Date:	24th April 1996				
Permit End Date:	Not Supplied				
Positional Accuracy:	Approximate location provided by supplier				
Groundwater Vulnerability					
Geological Classification:	Major Aquifer (Highly permeable) - These are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public water supply and other purposes	-	0	3	314510 168710
Soil Classification:	Soils of High Leaching Potential (U) - Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise				
Map Sheet:	Sheet 36 Mid Glamorgan				
Scale:	1:100,000				
Groundwater Vulnerability					
Geological Classification:	Minor Aquifer (Variably permeable) - These can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in supplying base flow to rivers	N	0	3	314500 168730
Soil Classification:	Soils of High Leaching Potential (H1) - Soils which readily transmit liquid discharges because they are either shallow, or susceptible to rapid by-pass flow directly to rock, gravel or groundwater				
Map Sheet:	Sheet 36 Mid Glamorgan				
Scale:	1:100,000				
Drift Deposits					
Description	None				
Fluvial Indicative Floodplains					
Type:	Fluvial Indicative Flood Zone	S	0	3	314510 168680
Source:	Environment Agency, Head Office				
Fluvial Indicative Floodplains					
Type:	Fluvial Indicative Flood Zone	E	180	3	314730 168730
Source:	Environment Agency, Head Office				



Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Tidal Indicative Floodplains					
Description	None				
Source Protection Zones					
Name:	Biglis Wells	N	362	3	314530
Source:	Environment Agency, Head Office				169170
Reference:	We073				
Type:	Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source.				
River Flood Data (Scotland)					
Description	None				

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Recorded Landfill Sites					
43	Site Name: Bigl's Tip Location: No2, Cardiff Rd, BARRY, Glam Authority: British Geological Survey, Information Services Group Ground Water: Information not available Surface Water: Information not available Geology: N/A Positional Accuracy: Positioned by the supplier Boundary Accuracy: Moderate	E	262	-	314800 168830
BGS Recorded Landfill Sites					
44	Site Name: Bigl's Tip no. 2 Location: Cardiff Rd, Barry, CARDIFF, South Glamorgan Authority: British Geological Survey, Information Services Group Ground Water: Information not available Surface Water: Information not available Geology: N/A Positional Accuracy: Positioned by the supplier Boundary Accuracy: Moderate	NE	397	-	314800 168940
Licensed Waste Management Facilities (Landfills)					
45	Name: Dow Corning Ltd Licence Number: 30043 Location: Dow Corning Landfill, Cardiff Road, Barry, Vale Of Glam, CF63 2YL Licence Holder: Dow Corning Ltd Authority: Environment Agency - Welsh Region, South East Area Site Category: Industrial Waste Landfills Maximum Input Rate: Small (Less than 25,000 tonnes per year) Licence Status: Active Issued: 9th April 1991 Last Modified: Not Supplied Expires: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied Positional Accuracy: Positioned by the supplier Boundary Accuracy: As Supplied	W	877	4	313640 168400
Local Authority Landfill Coverage					
	Name: Vale Of Glamorgan County Borough Council - Has supplied landfill data	-	0	5	314510 168710
Local Authority Recorded Landfill Sites					
46	Location: Not Supplied Reference: 9 Authority: Vale Of Glamorgan County Borough Council Last Reported Status: Unknown Types of Waste: Not Supplied Date of Closure: Not Supplied Positional accuracy: Located by supplier to within 100m Boundary Quality: Not Applicable	W	744	5	313740 168570

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
	Registered Landfill Sites				
47	<p>Licence Holder: Dow Corning Ltd</p> <p>Licence Reference: 22/A WAS 9</p> <p>Site Location: Dow Corning Factory, East 2 Dock, Barry, South Glamorgan</p> <p>Licence Easting: 313740</p> <p>Licence Northing: 168570</p> <p>Operator Location: Cardiff Road, BARRY, South Glamorgan, CF6 7YL</p> <p>Authority: Environment Agency - Welsh Region, South East Area</p> <p>Site Category: Landfill</p> <p>Maximum Input: Very Small (Less than 10,000 tonnes per year)</p> <p>Rate:</p> <p>Waste Source: Only waste produced on site</p> <p>Restrictions:</p> <p>Status: Record superseded</p> <p>Dated: 1st December 1980</p> <p>Preceded By: Not Given</p> <p>Licence:</p> <p>Superseded By: 38</p> <p>Licence:</p> <p>Positional Accuracy: Manually positioned to the address or location</p> <p>Boundary Accuracy: Not Applicable</p> <p>Waste Types on Site:</p> <p>Authorised Waste: Gellspent Silicon Inert Calcium Sulphate Water Treatment Wastes</p>	W	491	4	313990 168610
	Registered Landfill Sites				
48	<p>Licence Holder: Dow Corning Ltd</p> <p>Licence Reference: 38</p> <p>Site Location: Dow Corning Factory, East No 2 Dock, Barry, South Glamorgan</p> <p>Licence Easting: 313400</p> <p>Licence Northing: 168300</p> <p>Operator Location: Cardiff Road, BARRY, South Glamorgan, CF6 7YL</p> <p>Authority: Environment Agency - Welsh Region, South East Area</p> <p>Site Category: Landfill</p> <p>Maximum Input: Undefined</p> <p>Rate:</p> <p>Waste Source: Waste produced/controlled by licence holder</p> <p>Restrictions:</p> <p>Status: Operational as far as is known</p> <p>Dated: 9th April 1991</p> <p>Preceded By: 22/A WAS 9</p> <p>Licence:</p> <p>Superseded By: Not Given</p> <p>Licence:</p> <p>Positional Accuracy: Manually positioned to the address or location</p> <p>Boundary Accuracy: Not Applicable</p> <p>Waste Types on Site:</p> <p>Authorised Waste: Calcium Sulphate Filter Cake Carbon Filter / Molecular Sieve Kieselguhr Limestone Max. Waste Permitted By Licence Silicon Gel Spent Silicon</p> <p>Prohibited Waste: Flammable Liquids Including Petrol Percussive/Explosive/Similar Waste Special Wastes Sub's Control. Radioactive Subs Act'60 Substances As Per Dir. 76/464/EEC</p>	W	882	4	313630 168390

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Registered Waste Transfer Sites					
49	Licence Holder: Ecovert Ltd Licence Reference: 52 Site Location: Hayes Road C.A.Site,Sully,PENARTH,South Glamorgan,CF64 5SG Operator Location: South Wales Area Office,Unit 8 Bridgend Business Centre,Bennett Street,BRIDGEND,Mid Glamorgan,CF31 3XJ Authority: Environment Agency - Welsh Region, South East Area Site Category: Civic Amenity Maximum Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source: No known restriction on source of waste Restrictions: Licence Status: Operational as far as is known Dated: 16th March 1993 Preceded By: Not Given Licence: Superseded By: Not Given Licence: Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Waste Types on Site: Authorised Waste: <ul style="list-style-type: none"> Asbestos Asbestos Waste Car Batteries Construction Wastes Controlled Waste Controlled Wastes L.P.G. Containers Recycled Glass Recycled Metal Recycled Oil Recycled Paper Recycled Textiles Refrigerators Prohibited Waste: <ul style="list-style-type: none"> Explosive/Percussive Waste Highly Flammable Waste Radioactive Wastes Special Wastes 	S	588	4	314760 168080

VAD ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Control of Major Accident Hazards Sites (COMAH)					
50	Name: Cardiff Gas Location: Sully Moors Road, BARRY, South Glamorgan, CF Reference: 564 Type: Lower Tier Status: Active Positional Accuracy: Manually positioned to the road within the address or location	E	75	6	314620 168740
Control of Major Accident Hazards Sites (COMAH)					
51	Name: European Vinyls Corporation Uk Ltd Location: Sully Moors Road, PENARTH, South Glamorgan, CF64 5RP Reference: 777 Type: Upper Tier Status: Active Positional Accuracy: Unknown	SE	272	6	314700 168400
Control of Major Accident Hazards Sites (COMAH)					
52	Name: Dow Corning Ltd Location: Cardiff Road, BARRY, South Glamorgan, CF63 2YL Reference: 779 Type: Upper Tier Status: Active Positional Accuracy: Automatically positioned to the address	W	481	6	314010 168850
Control of Major Accident Hazards Sites (COMAH)					
53	Name: Transco Plc Location: Velons Industrial Estate, BARRY, South Glamorgan, CF62 2NU Reference: 599 Type: Lower Tier Status: Active Positional Accuracy: Manually positioned to the address or location	NW	487	6	314020 168990
Control of Major Accident Hazards Sites (COMAH)					
53	Name: British Gas Plc Location: CF63 1FJ Reference: Not Supplied Type: Lower Tier Status: Record Ceased To Be Supplied Under COMAH Regulations Positional Accuracy: Manually positioned to the address or location	NW	490	6	314010 168990
Control of Major Accident Hazards Sites (COMAH)					
54	Name: Borden Chemicals Uk Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 5YU Reference: 1791 Type: Upper Tier Status: Active Positional Accuracy: Manually positioned to the road within the address or location	S	540	6	314750 168130
Control of Major Accident Hazards Sites (COMAH)					
55	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, Sully, PENARTH, South Glamorgan, CF64 Reference: 364 Type: Lower Tier Status: Active Positional Accuracy: Manually positioned to the address or location	S	594	6	314480 168020
Control of Major Accident Hazards Sites (COMAH)					
55	Name: Zeon Chemicals International Limited Location: Hayes Road, Sully, BARRY, South Glamorgan, CF6 2YU Reference: Not Supplied Type: Lower Tier Status: Record Ceased To Be Supplied Under COMAH Regulations Positional Accuracy: Manually positioned to the address or location	S	599	6	314460 168020
Control of Major Accident Hazards Sites (COMAH)					
56	Name: Vopak Terminal Windmill Ltd Location: Windmill Site, Hayes Road, BARRY, South Glamorgan, CF64 5YB Reference: 1615 Type: Upper Tier Status: Active Positional Accuracy: Manually positioned to the address or location	SW	826	6	314100 167890

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Notification of Installations Handling Hazardous Substances (NIHHS)					
57	Name: Cardiff Gas Location: Sully Moors Road, BARRY, South Glamorgan, CF Status: Active Positional Accuracy: Manually positioned to the road within the address or location	E	74	6	314620 168730
Notification of Installations Handling Hazardous Substances (NIHHS)					
58	Name: E V C (UK) Limited Location: PENARTH, South Glamorgan, CF64 5RP Status: Record Ceased To Be Supplied Under NIHHS Regulations (1982) Positional Accuracy: Manually positioned to the address or location	N	192	6	314580 168990
Notification of Installations Handling Hazardous Substances (NIHHS)					
59	Name: Van Ommeren Tank Terminal Barry Ltd Location: No1 Dock, BARRY, South Glamorgan, CF62 5XX Status: Active Positional Accuracy: Manually positioned to the road within the address or location	W	430	6	314050 168880
Notification of Installations Handling Hazardous Substances (NIHHS)					
60	Name: Dow Corning Limited Location: Cardiff Road, Sully, BARRY, South Glamorgan, CF63 2YL Status: Record Ceased To Be Supplied Under NIHHS Regulations (1982) Positional Accuracy: Automatically positioned to the address	W	470	6	314000 168840
Notification of Installations Handling Hazardous Substances (NIHHS)					
61	Name: Transco Location: Gasworks, Verlons Industrial Estate, BARRY, South Glamorgan, CF Status: Active Positional Accuracy: Unknown	NW	485	6	314020 168990
Notification of Installations Handling Hazardous Substances (NIHHS)					
62	Name: Zeon Chemicals International Limited Location: Hayas Road, Sully, BARRY, South Glamorgan, CF6 2YU Status: Record Ceased To Be Supplied Under NIHHS Regulations (1982) Positional Accuracy: Manually positioned to the address or location	S	599	6	314470 168020
Planning Hazardous Substance Consents					
63	Name: ICI Chemicals & Polymers Ltd Location: Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 92/01078/HAZ Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Maximum Quantity: 3900 Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Application date: 27th October 1992 Decision: Deemed consent granted between June 1992 and November 1992 Positional Accuracy: Manually positioned to the address or location	S	0	7	314510 168710
Planning Hazardous Substance Consents					
64	Name: European Vinyls Corporation Plc Location: Sully Moors Road, Sully, PENARTH, South Glamorgan, CF64 5RP Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 01/00678/Haz Hazardous Substance: Unknown at time of report Maximum Quantity: 0 Unknown at time of report Application date: 14th June 2001 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the road within the address or location	N	210	7	314550 169020

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Planning Hazardous Substance Consents					
65	Name: Borden Chemicals Uk Ltd Location: Sully Moors Road, Sully, BARRY, South Glamorgan, CF64 5YU Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 00/01032/Haz Hazardous Substance: Combination of Dangerous Substances Maximum Quantity: 0 Combination of Dangerous Substances Application date: 29th August 2000 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the road within the address or location	SE	271	7	314720 168410
Planning Hazardous Substance Consents					
66	Name: Cardiff Gas Location: Sully Moors Road, SULLY, South Glamorgan, CF64 5RP Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 92/01191/HAZ Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Liquefied petroleum gas held at >1.4 bar where amount held is greater than or equal to 25 tonnes Maximum Quantity: 70 Part C, Flammable Substance (Not in Parts A&B), Liquefied petroleum gas held at >1.4 bar where amount held is greater than or equal to 25 tonnes Application date: 1st December 1992 Decision: Deemed consent granted between June 1992 and November 1992 Positional Accuracy: Manually positioned to the road within the address or location	SE	291	7	314690 168370
Planning Hazardous Substance Consents					
67	Name: Dow Corning Limited Location: Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 93/00908/Haz Hazardous Substance: Unknown at time of report Maximum Quantity: 0 Unknown at time of report Application date: 2nd September 1993 Decision: Deemed Consent Granted Positional Accuracy: Unknown	W	454	7	314020 168890
Planning Hazardous Substance Consents					
67	Name: Dow Corning Limited Location: Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 93/00909/Haz Hazardous Substance: Unknown at time of report Maximum Quantity: 0 Unknown at time of report Application date: 2nd September 1993 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the road within the address or location	W	454	7	314020 168890
Planning Hazardous Substance Consents					
67	Name: Dow Corning Ltd Location: Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 92/01168/Haz Hazardous Substance: Unknown at time of report Maximum Quantity: 0 Unknown at time of report Application date: 25th November 1992 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the road within the address or location	W	454	7	314020 168890

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Planning Hazardous Substance Consents					
67	Name: Dow Corning Ltd Location: Cardiff Road, BARRY, South Glamorgan, CF63 2YL Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 93/00910/Haz Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Maximum Quantity: 2400 Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Application date: 2nd September 1993 Decision: Deemed consent granted between June 1992 and November 1992 Positional Accuracy: Automatically positioned to the address	W	461	7	314010 168850
Planning Hazardous Substance Consents					
68	Name: British Gas Plc Location: Verlons Holder Station, Verlons Industrial Estate, Cardiff Road, BARRY, South Glamorgan, CF63 Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 93/00908/Haz Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Substances flammable in air above their Bpt, as a liquid or with gas at >1.4bar, amount held is >=25t Maximum Quantity: 279 Part C, Flammable Substance (Not in Parts A&B), Substances flammable in air above their Bpt, as a liquid or with gas at >1.4bar, amount held is >=25t Application date: 2nd September 1993 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the address or location	NW	455	7	314040 168960
Planning Hazardous Substance Consents					
68	Name: British Gas Plc Location: Verlons Holder Station, Verlons Industrial Estate, Cardiff Road, BARRY, South Glamorgan, CF63 Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 92/01179/Haz Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Maximum Quantity: 80.3 Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Application date: 27th November 1992 Decision: Deemed consent granted between June 1992 and November 1992 Positional Accuracy: Manually positioned to the address or location	NW	464	7	314030 168950
Planning Hazardous Substance Consents					
68	Name: British Gas Plc Location: Verlons Holder Station, Verlons Industrial Estate, Cardiff Road, BARRY, South Glamorgan, CF63 Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 00/00578/Haz Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Substances flammable in air above their Bpt, as a liquid or with gas at >1.4bar, amount held is >=25t Maximum Quantity: 853 Part C, Flammable Substance (Not in Parts A&B), Substances flammable in air above their Bpt, as a liquid or with gas at >1.4bar, amount held is >=25t Application date: 10th May 2000 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the address or location	NW	472	7	314020 168960
Planning Hazardous Substance Consents					
68	Name: British Gas Plc Location: Verlons Holder Station, Verlons Industrial Estate, Cardiff Road, BARRY, South Glamorgan, CF63 Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 01/00008/Haz Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Maximum Quantity: 713 Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes Application date: 5th January 2001 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the address or location	NW	484	7	314020 168980

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
	Planning Hazardous Substance Consents				
69	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, SULLY, South Glamorgan, CF64 5YB Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 93/00202/HAZ Hazardous Substance: Part A, Toxic Substance, Acrylonitrile, where amount held is greater than or equal to 20 tonnes Maximum Quantity: 170 Part A, Toxic Substance, Acrylonitrile, where amount held is greater than or equal to 20 tonnes Application date: 2nd March 1993 Decision: New application granted conditionally Positional Accuracy: Manually positioned to the address or location	S	553	7	314540 168070
	Planning Hazardous Substance Consents				
70	Name: Zeon Chemicals Europe Ltd Location: Hayes Road, SULLY, South Glamorgan, CF64 5YB Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 93/01227/HAZ Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15 tonnes Maximum Quantity: 135 Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15 tonnes Application date: 20th October 1999 Decision: New application granted conditionally Positional Accuracy: Automatically positioned in the proximity of the address	S	632	7	314460 167990
	Planning Hazardous Substance Consents				
71	Name: Van Ommeren Tank Terminal Location: Windmill Site, Hayes Road, BARRY, South Glamorgan, CF62 5XX Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 97/01187/HAZ Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), All other liquid or liquids with flashpoint less than 21C, where amount held is >= 10,000 tonnes Maximum Quantity: 20000 Part C, Flammable Substance (Not in Parts A&B), All other liquid or liquids with flashpoint less than 21C, where amount held is >= 10,000 tonnes Application date: 4th November 1997 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the address or location	SW	826	7	314100 167890
	Planning Hazardous Substance Consents				
71	Name: Van Ommeren Tank Terminal Location: Windmill Site, Hayes Road, BARRY, South Glamorgan, CF62 5XX Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 97/01187/HAZ Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), All other liquid or liquids with flashpoint less than 21C, where amount held is >= 10,000 tonnes Maximum Quantity: 20000 Part C, Flammable Substance (Not in Parts A&B), All other liquid or liquids with flashpoint less than 21C, where amount held is >= 10,000 tonnes Application date: 24th December 1997 Decision: New application granted conditionally Positional Accuracy: Manually positioned to the address or location	SW	826	7	314100 167890
	Planning Hazardous Substance Consents				
71	Name: Vopak Windmill Terminal Location: Hayes Road, Sully, BARRY, South Glamorgan, CF64 Authority: Vale Of Glamorgan County Borough Council, Planning Department Application Ref: 01/01410/Haz Hazardous Substance: Unknown at time of report Maximum Quantity: 6500 Unknown at time of report Application date: 16th November 2001 Decision: Deemed Consent Granted Positional Accuracy: Manually positioned to the address or location	SW	826	7	314080 167900

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Boreholes					
72	BGS Reference: St16nw188 Drilled Length (m): Not Supplied Borehole Name: Barry B.P.C.L Chimneys. Bh.4a	S	0	8	314500 168650
BGS Boreholes					
73	BGS Reference: St16nw187 Drilled Length (m): Not Supplied Borehole Name: Barry B.P.C.L Chimneys. Bh.3a	NW	7	8	314460 168800
BGS Boreholes					
74	BGS Reference: St16nw190 Drilled Length (m): Not Supplied Borehole Name: Barry Bpcl/Pvc Off Sites. Bh.6	NE	34	8	314570 168750
BGS Boreholes					
75	BGS Reference: St16nw191 Drilled Length (m): Not Supplied Borehole Name: Barry Bpcl/Pvc Off Sites. Bh.7	NE	34	8	314560 168800
BGS Boreholes					
76	BGS Reference: St16nw180 Drilled Length (m): Not Supplied Borehole Name: Le Grand Adscs Ltd, Sully. Bh.7	SW	98	8	314390 168610
BGS Boreholes					
77	BGS Reference: St16nw185 Drilled Length (m): Not Supplied Borehole Name: Barry B.P.C.L Chimneys. Bh.1a	S	158	8	314550 168470
BGS Boreholes					
77	BGS Reference: St16nw175 Drilled Length (m): Not Supplied Borehole Name: British Geon Ltd, Sully. Bh.4	S	179	8	314560 168450
BGS Boreholes					
78	BGS Reference: St16nw199 Drilled Length (m): Not Supplied Borehole Name: Le Grand Adscs, Sully. Bh.18	NW	177	8	314310 168880
BGS Boreholes					
79	BGS Reference: St16nw186 Drilled Length (m): Not Supplied Borehole Name: Barry B.P.C.L Chimneys. Bh.2a	W	187	8	314290 168730
BGS Boreholes					
80	BGS Reference: St16nw164 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry. Bh.1	NE	197	8	314720 168830
BGS Boreholes					
81	BGS Reference: St16nw182 Drilled Length (m): Not Supplied Borehole Name: Le Grand Adscs Ltd, Sully. Bh.12	SW	215	8	314300 168510
BGS Boreholes					
81	BGS Reference: St16nw181 Drilled Length (m): Not Supplied Borehole Name: Le Grand Adscs Ltd, Sully. Bh.8	SW	239	8	314260 168540
BGS Boreholes					
82	BGS Reference: St16nw176 Drilled Length (m): Not Supplied Borehole Name: British Geon Ltd, Sully. Bh.5	S	218	8	314500 168400
BGS Boreholes					
82	BGS Reference: St16nw192 Drilled Length (m): Not Supplied Borehole Name: Davis & Middleton, Barry. Bh.1-12	S	218	8	314500 168400

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	BGS Boreholes				
83	BGS Reference: St16nw189 Drilled Length (m): Not Supplied Borehole Name: Barry Bpdl/Pvc Off Sites, Bh.1-5	S	234	8	314400 168400
	BGS Boreholes				
84	BGS Reference: St16nw196 Drilled Length (m): Not Supplied Borehole Name: F.W. Chandler, Barry Bh.3	S	237	8	314600 168400
	BGS Boreholes				
85	BGS Reference: St16nw165 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry, Bh.2	SE	248	8	314790 168540
	BGS Boreholes				
85	BGS Reference: St16nw90 Drilled Length (m): 7.52 Borehole Name: Sully No.2, Cardiff Dept No.33	SE	260	8	314820 168530
	BGS Boreholes				
86	BGS Reference: St16nw69 Drilled Length (m): 5.79 Borehole Name: Sully No.1, Cardiff Dept No.32	E	255	8	314800 168730
	BGS Boreholes				
87	BGS Reference: St16nw40 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group, Bh.26	W	265	8	314210 168620
	BGS Boreholes				
87	BGS Reference: St16nw133 Drilled Length (m): Not Supplied Borehole Name: Midland Silicones, Grinding Plant	W	279	8	314200 168620
	BGS Boreholes				
88	BGS Reference: St16nw131 Drilled Length (m): Not Supplied Borehole Name: Midland Silicones, P.15 Building Extension	W	268	8	314200 168770
	BGS Boreholes				
89	BGS Reference: St16nw179 Drilled Length (m): Not Supplied Borehole Name: Le Grand Adisco Ltd, Sully, Bh'S.1-11	SW	266	8	314300 168400
	BGS Boreholes				
90	BGS Reference: St16nw36 Drilled Length (m): 3.66 Borehole Name: Barry Eastern Drainage, Second Group, Bh.18	NW	310	8	314350 169080
	BGS Boreholes				
91	BGS Reference: St16nw37 Drilled Length (m): 3.66 Borehole Name: Barry Eastern Drainage, Second Group, Bh.19	NW	312	8	314220 168990
	BGS Boreholes				
92	BGS Reference: St16nw166 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry, Bh.3	E	321	8	314860 168610
	BGS Boreholes				
93	BGS Reference: St16nw174 Drilled Length (m): Not Supplied Borehole Name: British Geon Ltd, Sully, Bh.2	SE	321	8	314800 168420
	BGS Boreholes				
93	BGS Reference: St16nw167 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry, Bh.4	SE	343	8	314820 168410

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
BGS Boreholes					
94	BGS Reference: St16nw177 Drilled Length (m): Not Supplied Borehole Name: British Geon Ltd, Sully, Bh.1	SE	322	8	314730 166360
BGS Boreholes					
95	BGS Reference: St16nw130 Drilled Length (m): Not Supplied Borehole Name: Midland Silicones, Office Block	E	323	8	314870 168730
BGS Boreholes					
96	BGS Reference: St16nw34 Drilled Length (m): 2.74 Borehole Name: Barry Eastern Drainage, Second Group, Bh.16	N	324	8	314520 169130
BGS Boreholes					
96	BGS Reference: St16nw33 Drilled Length (m): 3.05 Borehole Name: Barry Eastern Drainage, Second Group, Bh.15	N	351	8	314560 169160
BGS Boreholes					
97	BGS Reference: St16nw41 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group, Bh.27	SW	327	8	314210 168450
BGS Boreholes					
98	BGS Reference: St16nw135 Drilled Length (m): Not Supplied Borehole Name: Midland Silicones, Dryer Base, P.I. Extension	SW	343	8	314150 168550
BGS Boreholes					
99	BGS Reference: St16nw168 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry, Bh.5	SE	355	8	314880 168480
BGS Boreholes					
100	BGS Reference: St16nw39 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group, Bh.25	W	356	8	314120 168730
BGS Boreholes					
101	BGS Reference: St16nw178 Drilled Length (m): Not Supplied Borehole Name: The Grand Adscs Ltd, Bh'S.13-17	SW	380	8	314200 168400
BGS Boreholes					
101	BGS Reference: St16nw197 Drilled Length (m): Not Supplied Borehole Name: F.W. Chandler, Barry Bh.4	SW	383	8	314230 168360
BGS Boreholes					
102	BGS Reference: St16nw35 Drilled Length (m): 3.96 Borehole Name: Barry Eastern Drainage, Second Group, Bh.17	N	361	8	314460 169170
BGS Boreholes					
102	BGS Reference: St16nw362 Drilled Length (m): 5.54 Borehole Name: Barry Link Road Bh 22	N	363	8	314480 169170
BGS Boreholes					
103	BGS Reference: St16nw32 Drilled Length (m): 3.96 Borehole Name: Barry Eastern Drainage, Second Group, Bh.14	N	375	8	314550 169180
BGS Boreholes					
104	BGS Reference: St16nw64 Drilled Length (m): 9.45 Borehole Name: Barry Eastern Drainage, Second Group, Bh.24	NW	382	8	314100 168900

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
BGS Boreholes					
104	BGS Reference: St16nw38 Drilled Length (m): 7.62 Borehole Name: Barry Eastern Drainage, Second Group, Bh.21	NW	403	8	314080 168920
BGS Boreholes					
104	BGS Reference: St16nw65 Drilled Length (m): 4.42 Borehole Name: Barry Eastern Drainage, Second Group, Bh.22	NW	406	8	314070 168900
BGS Boreholes					
105	BGS Reference: St16nw169 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry, Bh.6	E	389	8	314940 168550
BGS Boreholes					
106	BGS Reference: St16nw132 Drilled Length (m): Not Supplied Borehole Name: Midland Silicones, P.62 Plant	SW	394	8	314100 168540
BGS Boreholes					
107	BGS Reference: St16nw134 Drilled Length (m): Not Supplied Borehole Name: Midland Silicones, P/9/2 Plant	W	395	8	314080 168670
BGS Boreholes					
108	BGS Reference: St16nw195 Drilled Length (m): Not Supplied Borehole Name: F.W. Chandler, Barry Bh.2	S	414	8	314560 168210
BGS Boreholes					
108	BGS Reference: St16nw193 Drilled Length (m): Not Supplied Borehole Name: Anglo-Am. Oil Co, Barry, Bh.1-10	S	432	8	314600 168200
BGS Boreholes					
109	BGS Reference: St16nw66 Drilled Length (m): 4.57 Borehole Name: Barry Eastern Drainage, Second Group, Bh.23	W	426	8	314050 168870
BGS Boreholes					
109	BGS Reference: St16nw67 Drilled Length (m): 5.79 Borehole Name: Barry Eastern Drainage, Second Group, Bh.20	W	436	8	314040 168690
BGS Boreholes					
110	BGS Reference: St16nw184 Drilled Length (m): Not Supplied Borehole Name: Georesearch, Distrens, Bh.1-4	S	426	8	314400 168200
BGS Boreholes					
110	BGS Reference: St16nw238 Drilled Length (m): Not Supplied Borehole Name: Dow Chemical Barry Bh Dow 2	S	441	8	314410 168180
BGS Boreholes					
110	BGS Reference: St16nw239 Drilled Length (m): Not Supplied Borehole Name: Dow Chemical Barry Bh Dow 2a	S	441	8	314410 168180
BGS Boreholes					
111	BGS Reference: St16nw141 Drilled Length (m): 2.51 Borehole Name: Dow Chemicals Bh.9	SW	430	8	314280 168240
BGS Boreholes					
112	BGS Reference: St16nw172 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry, Bh.9	SE	450	8	314990 168500

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
BGS Boreholes					
113	BGS Reference: St16nw171 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry. Bh.8	SE	458	8	314960 168410
BGS Boreholes					
114	BGS Reference: St16nw31 Drilled Length (m): 2.44 Borehole Name: Barry Eastern Drainage, Second Group. Bh.13	N	459	8	314560 169270
BGS Boreholes					
115	BGS Reference: St16nw198 Drilled Length (m): Not Supplied Borehole Name: F.W. Chandler, Barry Bh.5	SE	461	8	314830 168280
BGS Boreholes					
116	BGS Reference: St16nw170 Drilled Length (m): Not Supplied Borehole Name: Sully Moors Road, Barry. Bh.7	SE	464	8	314920 168340
BGS Boreholes					
117	BGS Reference: St16nw361 Drilled Length (m): 1 Borehole Name: Barry Link Road Bh 20	N	468	8	314440 169270
BGS Boreholes					
118	BGS Reference: St16nw137 Drilled Length (m): 2.74 Borehole Name: Dow Chemicals, New Warehouse Bh.2	S	474	8	314330 168170
BGS Boreholes					
118	BGS Reference: St16nw241 Drilled Length (m): Not Supplied Borehole Name: Dow Chemical Barry Bh Dow 4	S	476	8	314310 168180
BGS Boreholes					
119	BGS Reference: St16nw79 Drilled Length (m): 45.72 Borehole Name: Ocean Salts Ltd, (Now Midland Silicons)	SW	479	8	314020 168510
BGS Boreholes					
119	BGS Reference: St16nw366 Drilled Length (m): 45.72 Borehole Name: Ocean Salts Ltd	W	489	8	314010 168510
BGS Boreholes					
120	BGS Reference: St16nw42 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group. Bh.28	SW	485	8	314090 168340
BGS Boreholes					
121	BGS Reference: St16nw99 Drilled Length (m): 5.33 Borehole Name: Proposed Development, Sully No.9	SW	512	8	314110 168270
BGS Boreholes					
122	BGS Reference: St16nw96 Drilled Length (m): 4.88 Borehole Name: Proposed Development, Sully No.6	SW	516	8	314170 168210
BGS Boreholes					
123	BGS Reference: St16nw136 Drilled Length (m): 3.35 Borehole Name: Dow Chemicals, New Warehouse Bh.1	S	517	8	314380 168110
BGS Boreholes					
124	BGS Reference: St16nw145 Drilled Length (m): 13.72 Borehole Name: Dow Corning Extension Bh.3	W	522	8	313960 168580

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Boreholes					
125	BGS Reference: St16nw138 Drilled Length (m): 7.16 Borehole Name: British Geon. Bh.3	S	548	B	314500 168070
BGS Boreholes					
125	BGS Reference: St16nw140 Drilled Length (m): 4.72 Borehole Name: Dow Chemicals Bh.8	S	549	B	314530 168070
BGS Boreholes					
125	BGS Reference: St16nw237 Drilled Length (m): Not Supplied Borehole Name: Dow Chemical Barry Bh Dow 1a	S	554	B	314510 168060
BGS Boreholes					
125	BGS Reference: St16nw236 Drilled Length (m): Not Supplied Borehole Name: Dow Chemical Barry Bh Dow 1	S	555	B	314510 168060
BGS Boreholes					
126	BGS Reference: St16nw360 Drilled Length (m): 1 Borehole Name: Barry Link Road Bh 19	N	552	B	314320 169330
BGS Boreholes					
127	BGS Reference: St16nw143 Drilled Length (m): 14.02 Borehole Name: Dow Corning Extension Bh.1	W	561	B	313940 168490
BGS Boreholes					
127	BGS Reference: St16nw144 Drilled Length (m): 15.24 Borehole Name: Dow Corning Extension Bh.2	W	561	B	313910 168530
BGS Boreholes					
127	BGS Reference: St16nw151 Drilled Length (m): 10.36 Borehole Name: Dow Corning Extension Bh.10	SW	581	B	313930 168450
BGS Boreholes					
128	BGS Reference: St16nw52 Drilled Length (m): 3.05 Borehole Name: Barry Eastern Drainage, Second Group. Bh.39	W	562	B	313910 168840
BGS Boreholes					
129	BGS Reference: St16nw100 Drilled Length (m): 4.11 Borehole Name: Proposed Development, Sully No.10	SW	562	B	314190 168140
BGS Boreholes					
130	BGS Reference: St16nw139 Drilled Length (m): 4.8 Borehole Name: Dow Chemicals Bh.7	S	561	B	314550 168040
BGS Boreholes					
130	BGS Reference: St16nw194 Drilled Length (m): Not Supplied Borehole Name: F.W. Chandler, Barry Bh.1	S	590	B	314540 168030
BGS Boreholes					
131	BGS Reference: St16nw94 Drilled Length (m): 8.08 Borehole Name: Proposed Development, Sully No.4	SW	587	B	314230 168090
BGS Boreholes					
132	BGS Reference: St16nw97 Drilled Length (m): 4.57 Borehole Name: Proposed Development, Sully No.7	SW	590	B	314060 168210

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Boreholes					
133	BGS Reference: St16nw142 Drilled Length (m): 6.55 Borehole Name: Dow Chemicals Bh.5	S	591	8	314360 168040
BGS Boreholes					
133	BGS Reference: St16nw91 Drilled Length (m): 5.79 Borehole Name: Proposed Development, Sully No.1	S	630	8	314320 168010
BGS Boreholes					
134	BGS Reference: St16nw43 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group, Bh.29	SW	583	8	314000 168280
BGS Boreholes					
135	BGS Reference: St16nw30 Drilled Length (m): 3.05 Borehole Name: Barry Eastern Drainage, Second Group, Bh.12	N	599	8	314620 169400
BGS Boreholes					
136	BGS Reference: St16nw240 Drilled Length (m): Not Supplied Borehole Name: Dow Chemical Barry Bh Dow 3	S	600	8	314450 168020
BGS Boreholes					
136	BGS Reference: St16nw173 Drilled Length (m): Not Supplied Borehole Name: Dismine Site Bh.1-4	S	624	8	314400 168000
BGS Boreholes					
137	BGS Reference: St16nw146 Drilled Length (m): 10.67 Borehole Name: Dow Corning Extension Bh.4	W	624	8	313880 168470
BGS Boreholes					
138	BGS Reference: St16nw155 Drilled Length (m): 10.97 Borehole Name: Dow Corning Extension Bh.13	W	636	8	313840 168630
BGS Boreholes					
139	BGS Reference: St16nw95 Drilled Length (m): 4.27 Borehole Name: Proposed Development, Sully No.5	SW	638	8	314100 168110
BGS Boreholes					
140	BGS Reference: St16nw152 Drilled Length (m): 10.67 Borehole Name: Dow Corning Extension Bh.11	SW	654	8	313870 168400
BGS Boreholes					
141	BGS Reference: St16nw147 Drilled Length (m): 15.24 Borehole Name: Dow Corning Extension Bh.5	W	664	8	313830 168510
BGS Boreholes					
142	BGS Reference: St16nw207 Drilled Length (m): 6.5 Borehole Name: Barry Road Link, Bh.18	NW	672	8	314170 169400
BGS Boreholes					
142	BGS Reference: St16nw359 Drilled Length (m): 6 Borehole Name: Barry Link Road Bh.18	NW	685	8	314160 169410
BGS Boreholes					
142	BGS Reference: St16nw358 Drilled Length (m): 1 Borehole Name: Barry Link Road Bh.17	NW	694	8	314180 169430

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	BGS Boreholes				
143	BGS Reference: St16nw98 Drilled Length (m): 4.72 Borehole Name: Proposed Development, Sully No.8	SW	677	8	313970 168180
	BGS Boreholes				
144	BGS Reference: St16nw29 Drilled Length (m): 2.74 Borehole Name: Barry Eastern Drainage, Second Group. Bh.11	N	680	8	314560 169490
	BGS Boreholes				
145	BGS Reference: St16nw148 Drilled Length (m): 10.36 Borehole Name: Dow Corning Extension Bh.6	W	683	8	313800 168560
	BGS Boreholes				
146	BGS Reference: St16nw123 Drilled Length (m): 8.5 Borehole Name: Cardiff Road Bypass, Barry No.6	W	688	8	313780 168760
	BGS Boreholes				
146	BGS Reference: St16nw53 Drilled Length (m): 3.66 Borehole Name: Barry Eastern Drainage, Second Group. Bh.40	W	707	8	313760 168780
	BGS Boreholes				
147	BGS Reference: St16nw127 Drilled Length (m): 1.6 Borehole Name: Palmerstown Nursery School	W	690	8	313780 168860
	BGS Boreholes				
148	BGS Reference: St16nw92 Drilled Length (m): 4.88 Borehole Name: Proposed Development, Sully No.2	SW	698	8	314180 167990
	BGS Boreholes				
149	BGS Reference: St16nw149 Drilled Length (m): 16.76 Borehole Name: Dow Corning Extension Bh.7	W	700	8	313810 168440
	BGS Boreholes				
149	BGS Reference: St16nw150 Drilled Length (m): 10.67 Borehole Name: Dow Corning Extension Bh.8	W	712	8	313790 168470
	BGS Boreholes				
150	BGS Reference: St16nw153 Drilled Length (m): 10.52 Borehole Name: Dow Corning Extension Bh.12	W	718	8	313760 168600
	BGS Boreholes				
151	BGS Reference: St16nw357 Drilled Length (m): 1 Borehole Name: Barry Link Road Bh 16	NW	721	8	314120 169430
	BGS Boreholes				
151	BGS Reference: St16nw206 Drilled Length (m): 6.5 Borehole Name: Barry Road Link, Bh.15	NW	730	8	314140 169450
	BGS Boreholes				
151	BGS Reference: St16nw356 Drilled Length (m): 6 Borehole Name: Barry Link Road Bh 15	NW	739	8	314140 169460
	BGS Boreholes				
152	BGS Reference: St16nw44 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group. Bh.30	SW	731	8	313880 168210

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Boreholes					
153	BGS Reference: St16nw154 Drilled Length (m): 13.72 Borehole Name: Dow Corning Extension Bh.9	W	757	8	313730 168530
BGS Boreholes					
154	BGS Reference: St16nw93 Drilled Length (m): 5.03 Borehole Name: Proposed Development, Sully No.3	SW	775	8	314060 167970
BGS Boreholes					
155	BGS Reference: St16nw232 Drilled Length (m): 2.4 Borehole Name: Palmerston Ind. Estate Tp 7	W	779	8	313720 169020
BGS Boreholes					
155	BGS Reference: St16nw233 Drilled Length (m): .25 Borehole Name: Palmerston Ind. Estate Tp 8	W	810	8	313680 168990
BGS Boreholes					
156	BGS Reference: St16nw230 Drilled Length (m): .65 Borehole Name: Palmerston Ind. Estate Tp 5	NW	804	8	313710 169070
BGS Boreholes					
157	BGS Reference: St16nw122 Drilled Length (m): 9.2 Borehole Name: Cardiff Road Bypass, Barry No.5	W	813	8	313660 168700
BGS Boreholes					
158	BGS Reference: St16nw234 Drilled Length (m): 1.2 Borehole Name: Palmerston Ind. Estate Tp 9	W	813	8	313670 168960
BGS Boreholes					
159	BGS Reference: St16nw231 Drilled Length (m): 1.75 Borehole Name: Palmerston Ind. Estate Tp 6	W	830	8	313670 169030
BGS Boreholes					
160	BGS Reference: St16nw54 Drilled Length (m): 1.22 Borehole Name: Barry Eastern Drainage, Second Group, Bh.41	W	845	8	313620 168800
BGS Boreholes					
161	BGS Reference: St16nw235 Drilled Length (m): .05 Borehole Name: Palmerston Ind. Estate Tp 10	W	866	8	313620 168980
BGS Boreholes					
162	BGS Reference: St16nw229 Drilled Length (m): .85 Borehole Name: Palmerston Ind. Estate Tp 4	NW	867	8	313650 169090
BGS Boreholes					
162	BGS Reference: St16nw228 Drilled Length (m): 1.05 Borehole Name: Palmerston Ind. Estate Tp 3	W	896	8	313610 169060
BGS Boreholes					
163	BGS Reference: St16nw28 Drilled Length (m): 2.74 Borehole Name: Barry Eastern Drainage, Second Group, Bh.10	N	869	8	314510 169680
BGS Boreholes					
164	BGS Reference: St16nw205 Drilled Length (m): 11.5 Borehole Name: Barry Road Link, Bh.14	NW	888	8	313980 169540

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Boreholes					
164	BGS Reference: St16nw355 Drilled Length (m): 11 Borehole Name: Barry Link Road, Bh 14	NW	902	8	313970 169550
BGS Boreholes					
165	BGS Reference: St16nw45 Drilled Length (m): 1.83 Borehole Name: Barry Eastern Drainage, Second Group, Bh.31	SW	901	8	313750 168100
BGS Boreholes					
166	BGS Reference: St16nw77 Drilled Length (m): 15.81 Borehole Name: Barry Docks, Timber Pond	SW	942	8	313600 168300
BGS Boreholes					
167	BGS Reference: St16nw227 Drilled Length (m): .8 Borehole Name: Palmerston Ind. Estate Tp 2	W	947	8	313560 169070
BGS Boreholes					
168	BGS Reference: St16nw27 Drilled Length (m): 3.66 Borehole Name: Barry Eastern Drainage, Second Group, Bh.9	N	984	8	314430 169790
BGS Boreholes					
169	BGS Reference: St16nw121 Drilled Length (m): 10.15 Borehole Name: Cardiff Road Bypass, Barry No.4	W	985	8	313490 168670
BGS Boreholes					
170	BGS Reference: St16nw369 Drilled Length (m): 12.19 Borehole Name: Biglis	N	987	8	314700 169780
BGS Boreholes					
170	BGS Reference: St16nw70 Drilled Length (m): 12.19 Borehole Name: Biglis, For Barry Udc	N	991	8	314700 169780
BGS Boreholes					
171	BGS Reference: St16nw226 Drilled Length (m): .7 Borehole Name: Palmerston Ind. Estate Tp 1	W	994	8	313500 169030
BGS 1:625,000 Solid Geology					
	Description: Triassic mudstones (including Keuper Marl, Dolomitic Conglomerate and Rhaetic)	-	0	9	314510 168710
Coal Mining Affected Areas					
	Description: In an area which may not be affected by coal mining	-	-	-	-
Shallow Mining Hazards					
	Risk: Very Low Source: British Geological Survey, Information Services Group	-	0	-	314510 168710
Shallow Mining Hazards					
	Risk: Very Low Source: British Geological Survey, Information Services Group	W	183	-	314260 168700
Natural Subsidence Hazards					
	Risk: Low Source: British Geological Survey, Information Services Group	-	0	-	314510 168710
Natural Subsidence Hazards					
	Risk: Moderate Source: British Geological Survey, Information Services Group	N	0	-	314520 168760

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGP
Natural Subsidence Hazards					
Risk:	Low	N	164	-	314490 168970
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Moderate	NW	183	-	314370 168950
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Low	NW	186	-	314390 168970
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Low	NW	189	-	314300 168890
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Moderate	W	205	-	314260 168700
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Low	W	208	-	314260 168700
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Low	NE	238	-	314740 168920
Source:	British Geological Survey, Information Services Group				
Natural Subsidence Hazards					
Risk:	Moderate	N	241	-	314480 169050
Source:	British Geological Survey, Information Services Group				
Radon Affected Areas					
Description:	Less than 1% of homes are above the Action Level	-	0	10	314510 168710
Source:	National Radiological Protection Board				
Radon Protection Measures					
Type:	Basic radon protective measures should be installed	-	0	9	314510 168710
Source:	British Geological Survey, Information Services Group				

Map ID	Details	Compass Direction	Estimated Distance From Site	Contract	NGR
Contemporary Trade Directory Entries					
172	Name: Welsh Volkswagen Specialists Location: Sully Moors Rd, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Car Dealers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	E	75	-	314620 168720
Contemporary Trade Directory Entries					
173	Name: G H Moreton Ltd Location: Sully Moors Rd, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Road Haulage Services Status: Active Positional Accuracy: Manually positioned to the road within the address or location	NE	75	-	314590 168840
Contemporary Trade Directory Entries					
174	Name: Printmet Ltd Location: Sully Moors Rd, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Sheet Metal Work Status: Active Positional Accuracy: Manually positioned to the road within the address or location	N	110	-	314580 168910
Contemporary Trade Directory Entries					
174	Name: E V C Location: Sully Moors Rd, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Plastic Products - Manufacturers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	N	121	-	314570 168920
Contemporary Trade Directory Entries					
174	Name: Capital Prosthetics Laboratory Location: Printmet Buildings, Sully Moors Rd, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Medical & Dental Laboratories Status: Active Positional Accuracy: Manually positioned to the road within the address or location	N	121	-	314570 168920
Contemporary Trade Directory Entries					
174	Name: Cardiff Gas Location: Sully Moors Rd, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Gas Suppliers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	N	122	-	314570 168920
Contemporary Trade Directory Entries					
174	Name: P A D S & Co Location: Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Commercial Vehicle Bodybuilders & Repairers Status: Active Positional Accuracy: Automatically positioned to the address	NE	152	-	314620 168930
Contemporary Trade Directory Entries					
175	Name: European Vinyls Corporation (Uk) Ltd Location: Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Classification: PVC-U Products - Manufacturers & Suppliers Status: Active Positional Accuracy: Automatically positioned in the proximity of the address	N	217	-	314600 169010
Contemporary Trade Directory Entries					
175	Name: Cabot Carbon Ltd Location: Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Chemicals & Allied Products Status: Active Positional Accuracy: Automatically positioned in the proximity of the address	N	217	-	314600 169010
Contemporary Trade Directory Entries					
175	Name: Kingspan Industrial Insulation Ltd Location: Blagden Chemical Site, Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Insulation Materials Status: Active Positional Accuracy: Automatically positioned in the proximity of the address	N	217	-	314600 169010

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Contemporary Trade Directory Entries					
175	Name: Kingspan Industrial Insulation Ltd Location: Blagden Chemical Site, Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5RP Classification: Insulation Materials Status: Active Positional Accuracy: Automatically positioned in the proximity of the address	N	217	-	314600 169010
Contemporary Trade Directory Entries					
176	Name: Bordan Chemical UK Ltd Location: Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5YU Classification: Chemicals & Allied Products Status: Active Positional Accuracy: Automatically positioned to the address	SE	300	-	314730 168380
Contemporary Trade Directory Entries					
176	Name: Zeon Chemicals Europe Ltd Location: Sully, Penarth, South Glamorgan, CF64 5YU Classification: Rubber & Plastic Products - Manufacturers Status: Active Positional Accuracy: Manually positioned within the geographical locality	SE	323	-	314740 168370
Contemporary Trade Directory Entries					
177	Name: Barry Car Sales Location: Cardiff Rd, Cadoxton, Barry, South Glamorgan, CF63 2QW Classification: Car Dealers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	NW	318	-	314280 169050
Contemporary Trade Directory Entries					
178	Name: Penarth Industrial Services Location: Ty Verion Indust Est, Cardiff Rd, Barry, South Glamorgan, CF63 2BE Classification: Engineers - General Status: Active Positional Accuracy: Manually positioned to the road within the address or location	NW	321	-	314320 169080
Contemporary Trade Directory Entries					
179	Name: South West Bottle Gas Location: Sully Moors Road, Sully, Penarth, South Glamorgan, CF64 5SY Classification: Gas Suppliers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	SE	345	-	314780 168370
Contemporary Trade Directory Entries					
180	Name: Thomas Motor Services Location: The Service Station, Cardiff Rd, Barry, South Glamorgan, CF63 2NW Classification: Garage Services Status: Active Positional Accuracy: Manually positioned to the road within the address or location	N	366	-	314550 169170
Contemporary Trade Directory Entries					
181	Name: Sax Group Plc Location: Unit 319 & 328, Vale Enterprise Centre, Hayes Road, Sully, Penarth, South Glamorgan, CF64 5SY Classification: Plastics - Machinery & Equipment Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	SE	398	-	314790 168310
Contemporary Trade Directory Entries					
181	Name: Albertronic Location: Unit 304/305, Vale Enterprise Centre, Hayes Road, Sully, Penarth, South Glamorgan, CF64 5SY Classification: Telecommunications Equipment & Systems Status: Active Positional Accuracy: Manually positioned to the address or location	SE	398	-	314790 168310
Contemporary Trade Directory Entries					
182	Name: Watts Tyre & Auto Centre Location: Cardiff Rd, Cadoxton, Barry, South Glamorgan, CF63 2QW Classification: Garage Services Status: Active Positional Accuracy: Manually positioned to the road within the address or location	NW	408	-	314080 168940

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Contemporary Trade Directory Entries					
182	Name: Briscoe Cleaning Services Location: Cardiff Rd, Barry, South Glamorgan, CF63 2QW Classification: Dry Cleaners Status: Active Positional Accuracy: Manually positioned to the road within the address or location	NW	424	-	314080 168920
Contemporary Trade Directory Entries					
182	Name: Barry Caravan Centre Location: Cardiff Rd, Barry, South Glamorgan, CF63 2QW Classification: Caravan Dealers & Manufacturers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	W	497	-	314040 168910
Contemporary Trade Directory Entries					
183	Name: British Dredging Aggregates Ltd Location: Barry Docks, Barry, South Glamorgan, CF63 2YN Classification: Sand, Gravel & Other Aggregates Status: Inactive Positional Accuracy: Manually positioned within the geographical locality	W	409	-	314080 168760
Contemporary Trade Directory Entries					
184	Name: Town & Country Coalings (Southern) Ltd Location: Unit 303, Vale Enterprise Centre, Hayes Road, Sully, Panarth, South Glamorgan, CF64 5SY Classification: Coating Specialists Status: Active Positional Accuracy: Automatically positioned in the proximity of the address	SE	410	-	314750 168270
Contemporary Trade Directory Entries					
185	Name: M J Motors Location: Unit 10, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	NW	413	-	314260 169160
Contemporary Trade Directory Entries					
185	Name: Vale Heating Spares Location: Unit 9, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Heating Equipment - Sales & Service Status: Active Positional Accuracy: Automatically positioned to the address	NW	417	-	314260 169160
Contemporary Trade Directory Entries					
185	Name: Orbit Print Ltd Location: Unit 24/25, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: T-Shirts Status: Active Positional Accuracy: Manually positioned to the address or location	NW	430	-	314270 169180
Contemporary Trade Directory Entries					
186	Name: Frameseal Location: Unit 5, 1, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Window Frame Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	NW	433	-	314190 169130
Contemporary Trade Directory Entries					
186	Name: Frameseal Architectural Systems Location: Unit 5, 1, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Window Frame Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	NW	433	-	314190 169130
Contemporary Trade Directory Entries					
187	Name: Redrup Motors (Barry) Ltd Location: Cardiff Rd, Barry, South Glamorgan, CF63 2QW Classification: Car Dealers Status: Active Positional Accuracy: Manually positioned to the road within the address or location	N	433	-	314660 169220

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
Contemporary Trade Directory Entries					
188	Name: Cyberbond Ltd Location: Unit B1, Ty Verlon Ind Est, Cardiff Rd, Barry, South Glamorgan, CF63 2BE Classification: Adhesive & Sealant Manufacturers & Distributors Status: Active Positional Accuracy: Manually positioned to the address or location	N	439	-	314340 169220
Contemporary Trade Directory Entries					
188	Name: Lewis Berl Location: Unit A, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Electric Motor Sales & Service Status: Active Positional Accuracy: Automatically positioned to the address	N	454	-	314320 169230
Contemporary Trade Directory Entries					
189	Name: Dow Corning Ltd Location: Cardiff Road, Barry, South Glamorgan, CF63 2YL Classification: Chemicals & Allied Products Status: Inactive Positional Accuracy: Automatically positioned to the address	W	461	-	314010 168850
Contemporary Trade Directory Entries					
189	Name: Lme Location: Cardiff Rd, Barry, South Glamorgan, CF63 2YL Classification: Engineers - General Status: Active Positional Accuracy: Manually positioned to the road within the address or location	W	485	-	313990 168870
Contemporary Trade Directory Entries					
190	Name: Architectural Aluminium Co Location: Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Aluminium Fabricators Status: Active Positional Accuracy: Automatically positioned to the address	NW	468	-	314210 169190
Contemporary Trade Directory Entries					
190	Name: Alan Williams & Co (Wales) Ltd Location: Unit D, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Ventilators & Ventilation Systems Status: Active Positional Accuracy: Automatically positioned to the address	NW	468	-	314210 169190
Contemporary Trade Directory Entries					
190	Name: Roperhurst Ltd Location: Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Plastic Products - Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	NW	468	-	314210 169190
Contemporary Trade Directory Entries					
190	Name: Penarth Pneumatic Ltd Location: Unit 22, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Air Compressors Status: Active Positional Accuracy: Automatically positioned to the address	NW	509	-	314210 169240
Contemporary Trade Directory Entries					
191	Name: Filtermax (Uk) Ltd Location: Ty Verlon Indust Est, Cardiff Rd, Barry, South Glamorgan, CF63 2BE Classification: Filter Manufacturers & Suppliers Status: Active Positional Accuracy: Manually positioned to the address or location	NW	483	-	314160 169170
Contemporary Trade Directory Entries					
192	Name: Fabmec Ltd Location: Unit 1, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Engineers - General Status: Active Positional Accuracy: Automatically positioned to the address	NW	521	-	314080 169140

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NCR
Contemporary Trade Directory Entries					
192	Name: Techni-Flow UK Ltd Location: Unit 1, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Pumps - Sales, Servicing & Repairs Status: Active Positional Accuracy: Automatically positioned to the address	NW	521	-	314080 169140
Contemporary Trade Directory Entries					
193	Name: Cyberbond (UK) Ltd Location: Priority Business Pk, Barry, South Glamorgan, CF63 2BG Classification: Adhesives, Glues & Sealants Status: Active Positional Accuracy: Manually positioned within the geographical locality	NW	541	-	314240 169290
Contemporary Trade Directory Entries					
194	Name: J Jones Location: 1, Taff Cottages, Cog Road, Sully, Penarth, South Glamorgan, CF64 5TF Classification: Cabinet Makers Status: Active Positional Accuracy: Automatically positioned to the address	SE	551	-	315060 168390
Contemporary Trade Directory Entries					
195	Name: Clarke & Sons (Barry) Ltd Location: Wayside Garage, Ty Verlon Industrial Estate, Cardiff Road, Barry, South Glamorgan, CF63 2BE Classification: Mechanical Engineers Status: Active Positional Accuracy: Automatically positioned to the address	NW	559	-	314060 169180
Contemporary Trade Directory Entries					
195	Name: Seer Property Services Location: Storage House, Priority Business Park, Barry, South Glamorgan, CF63 2BG Classification: Cleaning Services - Commercial Status: Active Positional Accuracy: Automatically positioned in the proximity of the address	NW	579	-	314080 169230
Contemporary Trade Directory Entries					
195	Name: Global Transportation Ltd Location: Unit 1, Priority Business Park, Barry, South Glamorgan, CF63 2BG Classification: Freight Forwarders Status: Active Positional Accuracy: Automatically positioned to the address	NW	579	-	314050 169200
Contemporary Trade Directory Entries					
196	Name: Atlantic Spray Location: Priority Business Park, Barry, South Glamorgan, CF63 2BG Classification: Car Body Repairs Status: Active Positional Accuracy: Automatically positioned to the address	NW	598	-	314010 169180
Contemporary Trade Directory Entries					
197	Name: Dow Chemical Co Ltd Location: Hayes Road, Sully, Penarth, South Glamorgan, CF64 5YB Classification: Rubber & Plastic Products - Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	S	627	-	314460 167990
Contemporary Trade Directory Entries					
198	Name: M C C Cleaning Location: 110, Greenacres, Barry, South Glamorgan, CF63 2PN Classification: Cleaning Services - Commercial Status: Active Positional Accuracy: Automatically positioned to the address	NW	711	-	314080 169400
Contemporary Trade Directory Entries					
199	Name: Penarth Fencing & Joinery Location: Unit 3, Palmerston Workshops, Palmerston Road, Barry, South Glamorgan, CF63 2YZ Classification: Fencing Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	W	789	-	313720 169040

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Contemporary Trade Directory Entries					
199	Name: Concept Structural Ltd Location: Unit 4,Palmerston Workshops,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Concrete Contractors Status: Active Positional Accuracy: Automatically positioned to the address	W	797	-	313710 169040
Contemporary Trade Directory Entries					
199	Name: V P S Location: Unit 19,Palmerston Workshops,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Car Paint & Lacquer Manufacturers & Suppliers Status: Active Positional Accuracy: Automatically positioned to the address	W	819	-	313680 169020
Contemporary Trade Directory Entries					
199	Name: Kemex International Location: Palmersvale Business Centre,Palmerston Rd,Barry,South Glamorgan,CF63 2YZ Classification: Chemicals - Distributors & Wholesalers Status: Active Positional Accuracy: Manually positioned to the address or location	W	841	-	313650 168990
Contemporary Trade Directory Entries					
200	Name: The Real Pie Co Location: Unit 7,Palmarston Workshops,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Food Products - Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	NW	800	-	313710 169060
Contemporary Trade Directory Entries					
200	Name: A F C Engineering Location: Unit 8,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Engineers - General Status: Active Positional Accuracy: Automatically positioned to the address	NW	816	-	313700 169080
Contemporary Trade Directory Entries					
200	Name: Sure Bright Windows Location: Unit 9,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: PVC-U Products - Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	NW	826	-	313690 169090
Contemporary Trade Directory Entries					
200	Name: Metron Wrought Ironwork Location: Unit 15,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Wrought Ironwork Status: Active Positional Accuracy: Automatically positioned to the address	W	830	-	313670 169040
Contemporary Trade Directory Entries					
200	Name: Meticulous Location: Unit 13,Palmerston Workshops,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Ornamental Metalwork Status: Inactive Positional Accuracy: Automatically positioned to the address	W	834	-	313670 169050
Contemporary Trade Directory Entries					
200	Name: Daytona Blinds Location: Unit 10,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Blinds, Awnings & Canopies Status: Active Positional Accuracy: Automatically positioned to the address	NW	837	-	313680 169080
Contemporary Trade Directory Entries					
200	Name: Edson Print Services Location: Unit 11,Palmerston Workshops,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Printers Status: Active Positional Accuracy: Automatically positioned to the address	NW	844	-	313670 169080

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGR
Contemporary Trade Directory Entries					
200	Name: Penarth Air Services Location: Unit 12,Palmerston Workshops,Palmerston Road,Barry,South Glamorgan,CF63 2YZ Classification: Air Compressors Status: Active Positional Accuracy: Automatically positioned to the address	NW	852	-	313660 169080
Contemporary Trade Directory Entries					
201	Name: Adseal Ltd Location: Cardiff Road,Barry,South Glamorgan,CF63 2NW Classification: Adhesive & Sealant Manufacturers & Distributors Status: Active Positional Accuracy: Automatically positioned to the address	W	810	-	313660 168820
Contemporary Trade Directory Entries					
201	Name: Clarke & Sons (Barry) Ltd Location: Cardiff Road,Barry,South Glamorgan,CF63 2NW Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	W	810	-	313660 168820
Contemporary Trade Directory Entries					
201	Name: Port Painters Ltd Location: Cardiff Road,Barry,South Glamorgan,CF63 2NW Classification: Spraying - Paint & Coatings Status: Active Positional Accuracy: Automatically positioned to the address	W	810	-	313660 168820
Contemporary Trade Directory Entries					
202	Name: Windrush Chemicals Ltd Location: Unit 3E,Palmer Vale Business Centre,Palmerston Road,Barry,South Glamorgan,CF63 2XA Classification: Gum & Resin Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	W	894	-	313620 169080
Contemporary Trade Directory Entries					
203	Name: Aerospace Consultancy Services Ltd Location: The Pines,Cog Rd,Sully,Penarth,South Glamorgan,CF64 5TE Classification: Engineering Services Status: Active Positional Accuracy: Manually positioned to the road within the address or location	E	905	-	315460 168590
Contemporary Trade Directory Entries					
204	Name: Flexequip Hydraulic Ltd Location: 1c-1d,Unit,Palmer Vale Business Centre,Palmerston Road,Barry,South Glamorgan,CF63 2XA Classification: Hose, Tubing & Fittings Status: Active Positional Accuracy: Automatically positioned to the address	W	976	-	313530 169080
Fuel Station Entries					
205	Name: Thomas Motors Location: Cardiff Road,Palmerston,BARRY,South Glamorgan,CF63 4HT Brand: OUT OF INDUSTRY Premises Type: Petrol Station Status: Out of Industry Positional Accuracy: Automatically positioned to the address	NW	379	-	314100 168900
Fuel Station Entries					
205	Name: Barry Service Station Location: Cardiff Road,Palmerston,BARRY,South Glamorgan,CF63 2QW Brand: Texaco Premises Type: Petrol Station Status: Open Positional Accuracy: Automatically positioned to the address	NW	381	-	314100 168900

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGF
Fuel Station Entries					
205	Name: Wayside Garage Location: Cardiff Road,Palmerston,BARRY,South Glamorgan,CF63 2BE Brand: OUT OF INDUSTRY Premises Type: Petrol Station Status: Out of Industry Positional Accuracy: Manually positioned to the address or location	NW	387	-	314100 168920
Fuel Station Entries					
206	Name: Safeway Barry Location: Palmerston Road,Palmerston,BARRY,South Glamorgan,CF63 2PE Brand: SAFEWAY Premises Type: Hypermarket Status: Open Positional Accuracy: Unknown	W	767	-	313700 168800

Map ID	Details	Compass Direction	Estimated Distance from Site	Contact	NGN
Sites of Special Scientific Interest					
Name:	Hayes Point To Bendrick Rock	S	895	11	314510
Multiple Area:	Y				167720
Area (m2):	284621.937				
Source:	Countryside Council for Wales				
Reference:	510,33wdp				
Designation Details:	Geological				
	18th March 1996				
	Notified				

Data Type	Version	Update Cycle
Agency & Hydrological		
Air Pollution Controls Vale Of Glamorgan County Borough Council Environmental Health Department	August-2002	Annual Rolling Update
Air Pollution Control Enforcements Vale Of Glamorgan County Borough Council Environmental Health Department	August-2002	Annual Rolling Update
Discharge Consents Environment Agency Welsh Region	July-2002	Bi-Annually
Enforcement and Prohibition Notices Environment Agency Welsh Region	January-2003	As notified
Integrated Pollution Controls Environment Agency Welsh Region	December-2002	Quarterly
Integrated Pollution Prevention And Control Environment Agency Welsh Region	December-2002	Bi-Annually
Pollution Incidents to Controlled Waters Environment Agency Welsh Region	December-1998	Bi-Annually
Prosecutions Relating to Authorised Processes Environment Agency Welsh Region	January-2003	As notified
Prosecutions Relating to Controlled Waters Environment Agency Welsh Region	January-2003	As notified
Red List Discharge Consents Environment Agency Welsh Region	December-2002	Quarterly
Registered Radioactive Substances Environment Agency Welsh Region	December-2002	Quarterly
River Quality Environment Agency Head Office	November-2001	Not Applicable
Water Abstractions Environment Agency Welsh Region	July-2002	Bi-Annually
Groundwater Vulnerability Environment Agency Head Office	January-1999	Not Applicable
Drift Deposits Environment Agency Head Office	January-1999	Not Applicable
Fluvial Indicative Floodplains Environment Agency Head Office	December-2001	Variable
Tidal Indicative Floodplains Environment Agency Head Office	December-2001	Variable

RUSSELL BOWLER ENVIRONMENTAL

PO Box No 726 Beaconsfield Buckinghamshire HP9 1XH

Tel No 01494 680558 Fax No 01494 670844

Email rab@rbenv.co.uk



*Environmental &
Project Consultants*

20 August 2003

Our Ref. 1067

Due Di 1

Dr Diana Montgomery
Centrica plc
Millstream
Maidenhead Road
Windsor
Berkshire SL4 5GD

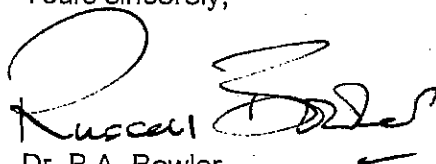
Dear Diana,

Project Cobra

I find that I have 2 copies of the hard copy of Posford's Phase 1 Report for Cobra. Although this has been sent to you electronically and is included as an appendix in my final report, you may wish to place the hard copy in your files.

Kind Regards

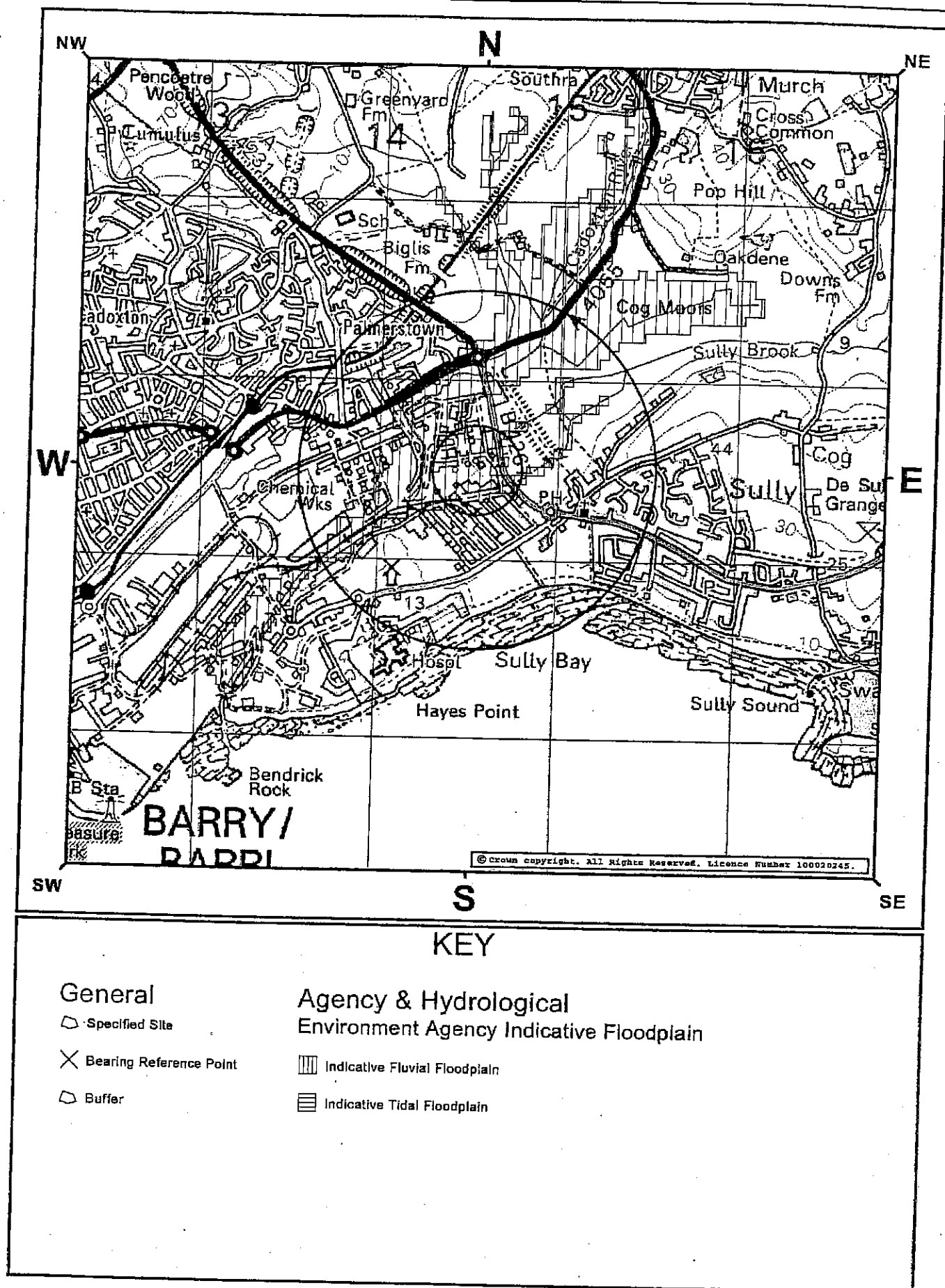
Yours sincerely,

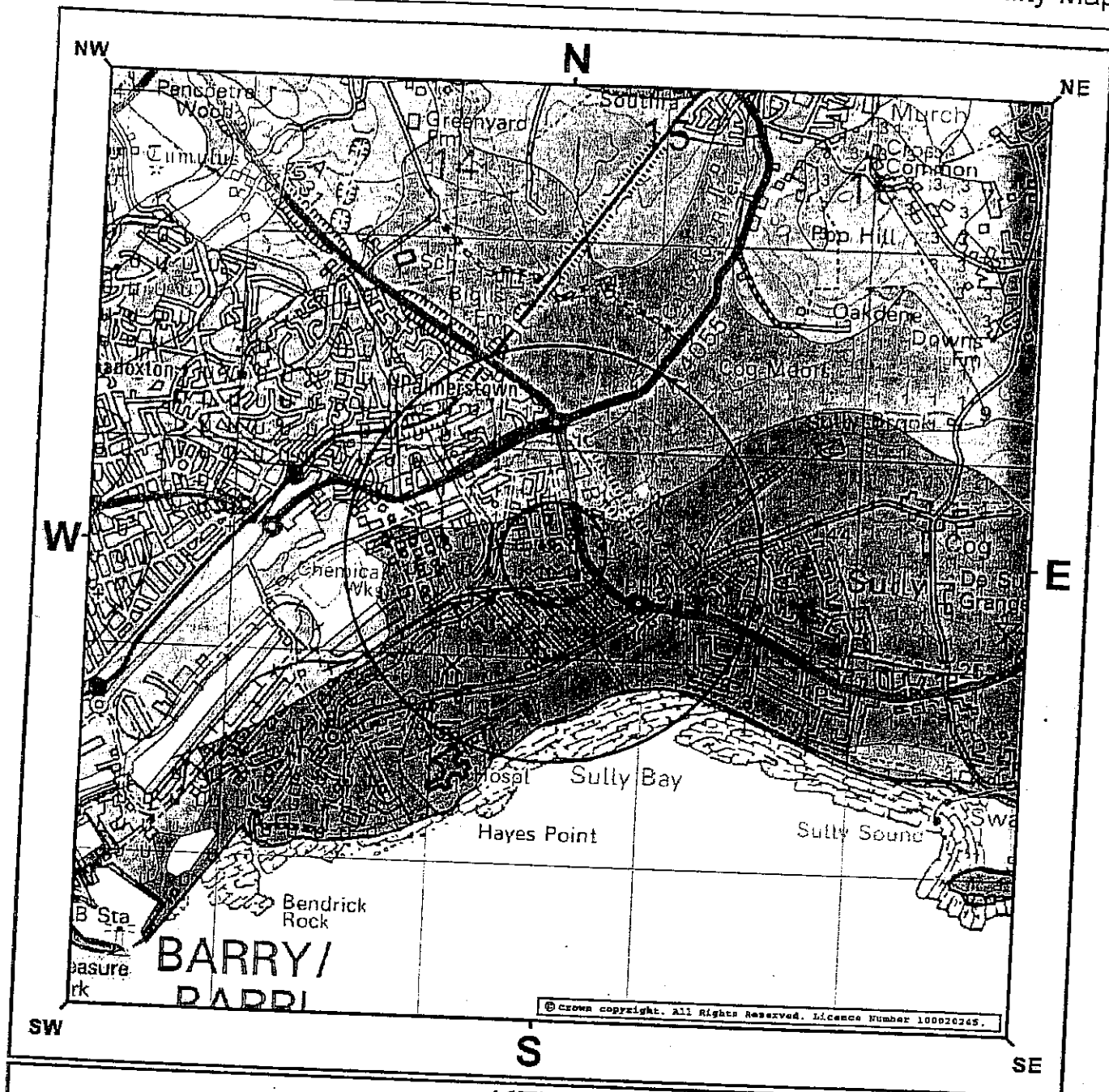

Dr. R.A. Bowler
Director

RUSSELL BOWLER ENVIRONMENTAL LIMITED

Director Dr R A Bowler MSc PhD CEng MICE MASCE
Company Secretary R H Vine BSc FCA

Registered Office: 11 Tilsworth Road Beaconsfield Buckinghamshire HP9 1TR
Registered in England and Wales No. 3171897





KEY

General

- ◻ Specified Site
- ✕ Bearing Reference Point
- ◻ Buffer

Groundwater Vulnerability

Geological Classes

Major Aquifer
(High Permeable)

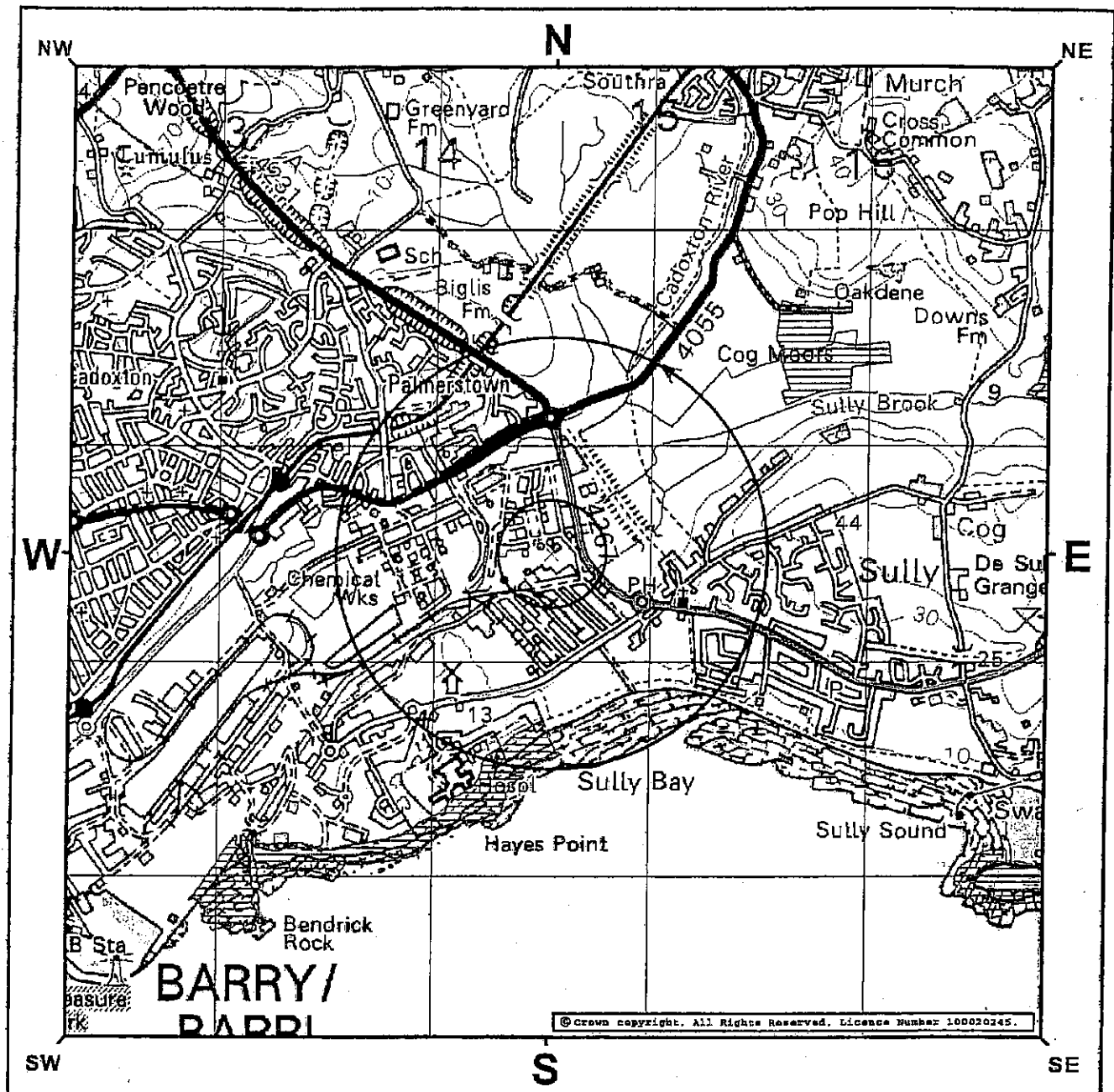
Minor Aquifer
(Variable Permeable)

Non Aquifer
(Negligibly Permeable)

Soil Classes

- High (H) 1, 2, 3, U
- Intermediate (I) 1, 2
- Low
- High (H) 1, 2, 3, U
- Intermediate (I) 1, 2
- Low

◻ Drift Deposit



KEY

General

○ Specified Site

× Bearing Reference Point

○ Buffer

▨ Environmentally Sensitive Area

▨ Forest Park

▨ Local Nature Reserve

▨ Nitrate Sensitive Area

▨ Nitrate Vulnerable Zone

▨ Ramsar Site

Sensitive Land Uses

▨ Area of Adopted Green Belt

▨ Area of Unadopted Green Belt

▨ Area of Outstanding Natural Beauty

▨ Marine Nature Reserve

▨ National Nature Reserve

▨ National Park

▨ National Scenic Area

▨ Site of Special Scientific Interest

▨ Special Area of Conservation

▨ Special Protection Area

Appendix C

CLIENT DETAILS Envirocheck Order No. EC233792_1_1

Perford Haskoning Ltd

Ally-Hall House Boston

REFERENCES

PETERBOROUGH

SITE DETAILS		Grid Reference	168500
--------------	--	----------------	--------

Geological Correlation

Project Code:

3
2
1
4
0

Historical Map Legend



Quantum



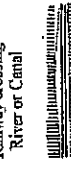
Gravel Pit



Refuse Heap



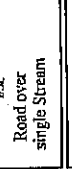
Priliv: etymology



QUESTION



4

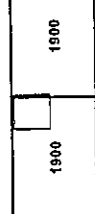


10

The historical maps shown were reproduced from maps readily available at the scale adopted for England, Wales and Scotland in the 1:60,000 scale. In 1914, the 1:60,000 scale was adopted for mapping urban areas and by 1918 it covered the whole of what were considered to be the populated parts of Great Britain. The published date shows as the night is visible. The published date shows as the night is visible. When some years later than the surveyed date.

Each 1914, all OS maps were based on the General Staffing, with independent survey of a single county or group of counties, giving rise to significant inaccuracies in plotting areas.

SOURCE MAP SCALE - 1:7,500

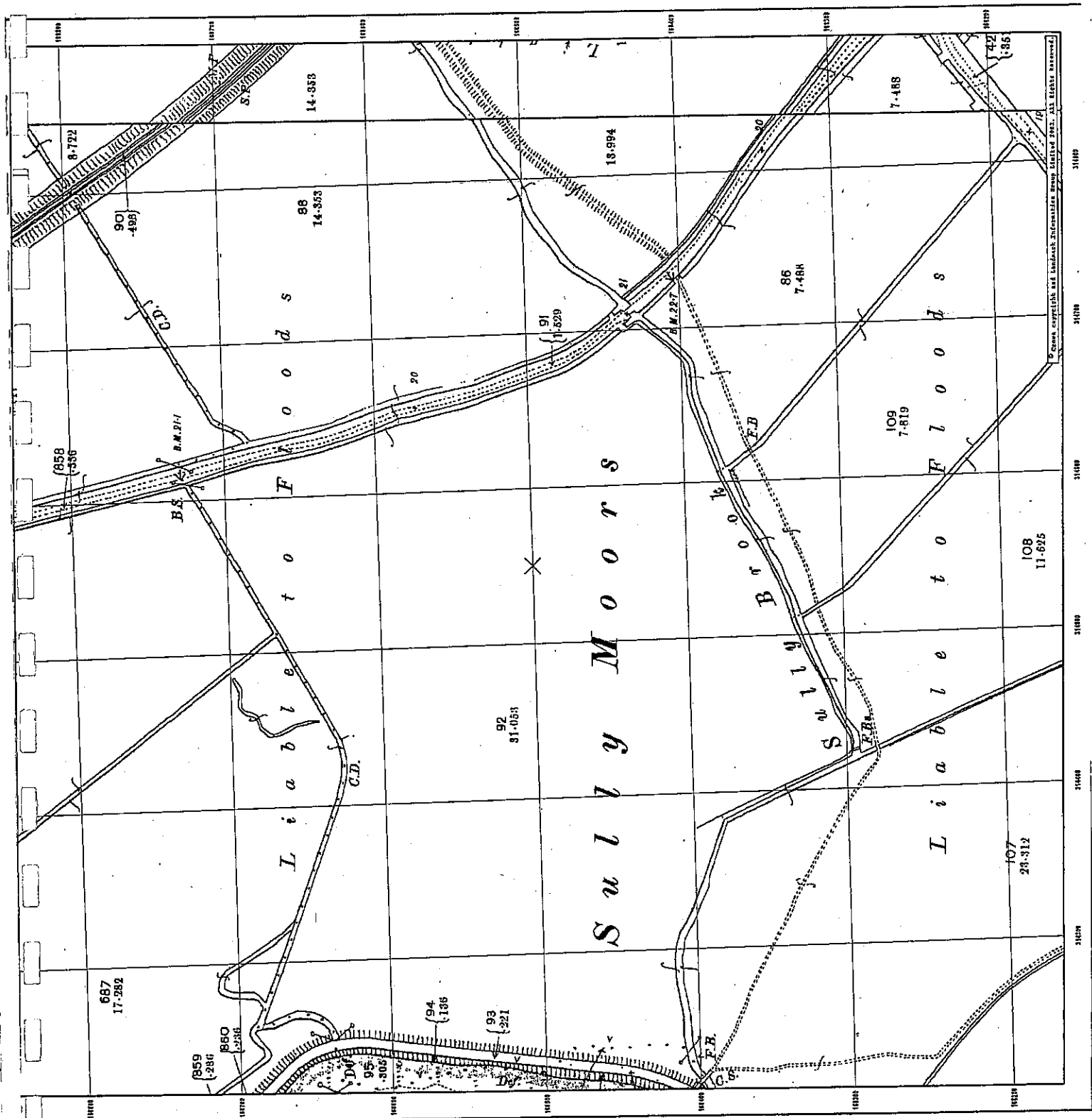


Date(s) of Publication

O'S Ordnance Survey
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CLIENT DETAILS Envirocheck Order No. EC233792_1_1

Powford Hosiery Ltd

Ontario Planning and
Blackwell House Motion

RIGHTWELL HOUSE PRESTON
STANDARDOLICH

PETERBOROUGH
N24 6BW

SITE DETAILS

Project Code:

**Sully Miers Road
Project, Eureka**

HARRY

Historical Map Legend



Quantity



Gravel Pit



Refuse Heap



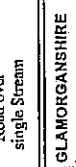
Railway crossing



Embankment



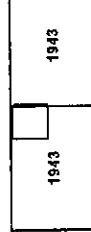
THE



The electrical maps shown were

The historical maps shown were reproduced from maps predominantly held at the archive adopted for England, Wales and Scotland in the 1940's. In 1854 the 1:50,000 scale was adopted for mapping urban areas and by 1885 it covered the whole of what were transferred to the centenary pairs of Great Britain. The published data given on the right is often some years later than the surveyed date. Before 1918, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to localised horizontal errors in such areas.


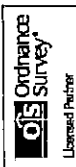
1000



1983

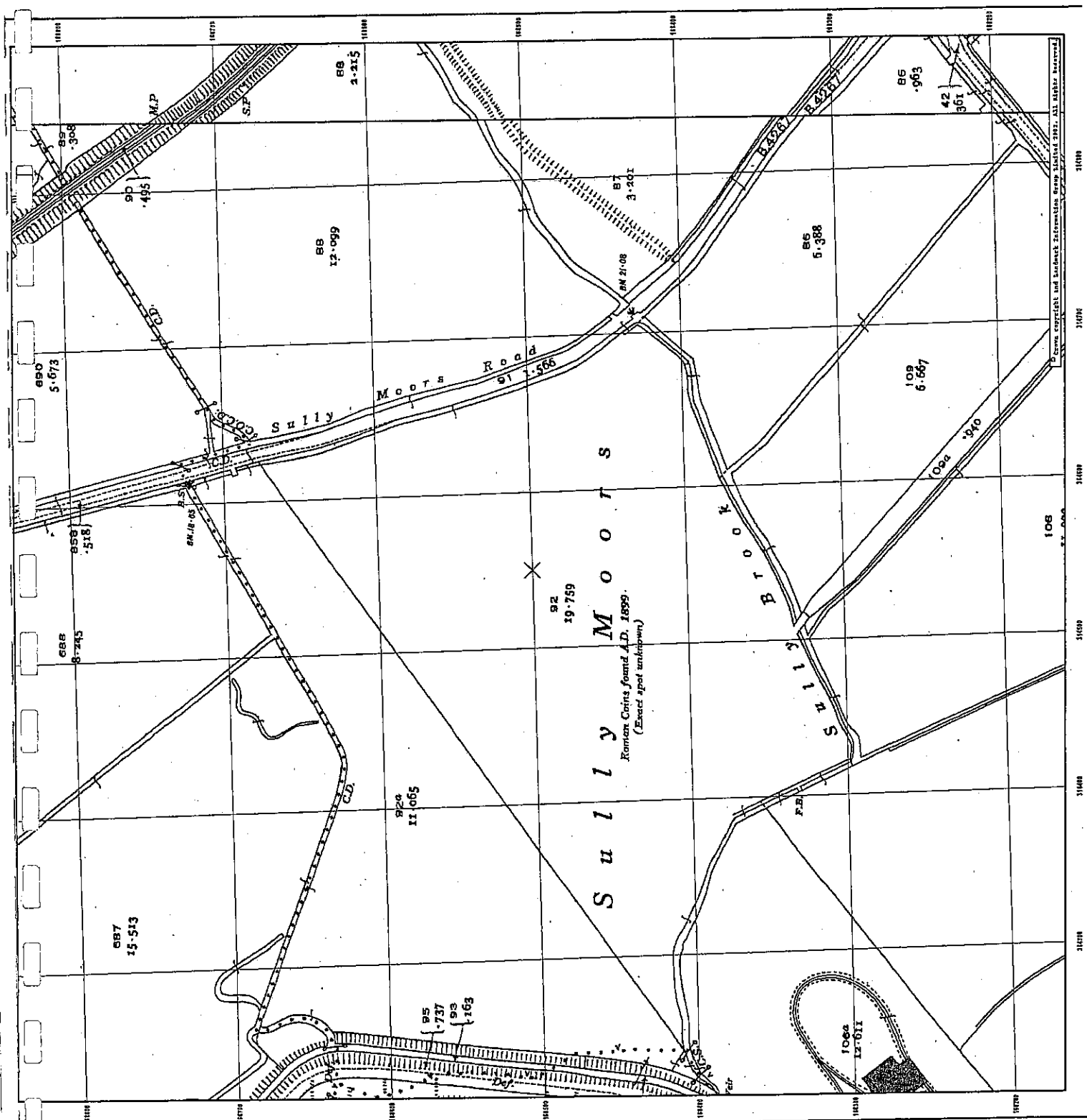
1982

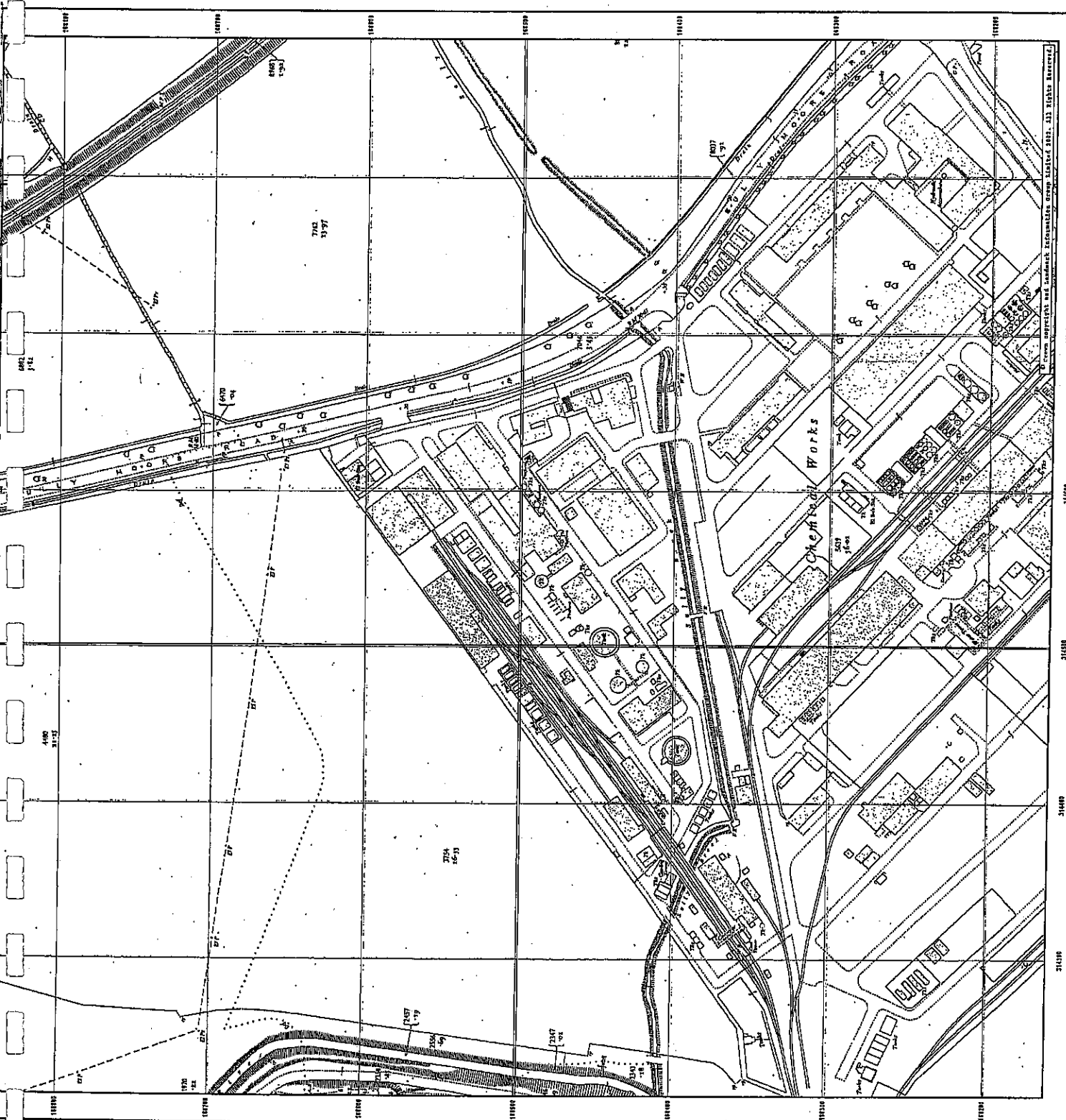
Date(s) of Publication



Ordinance Survey
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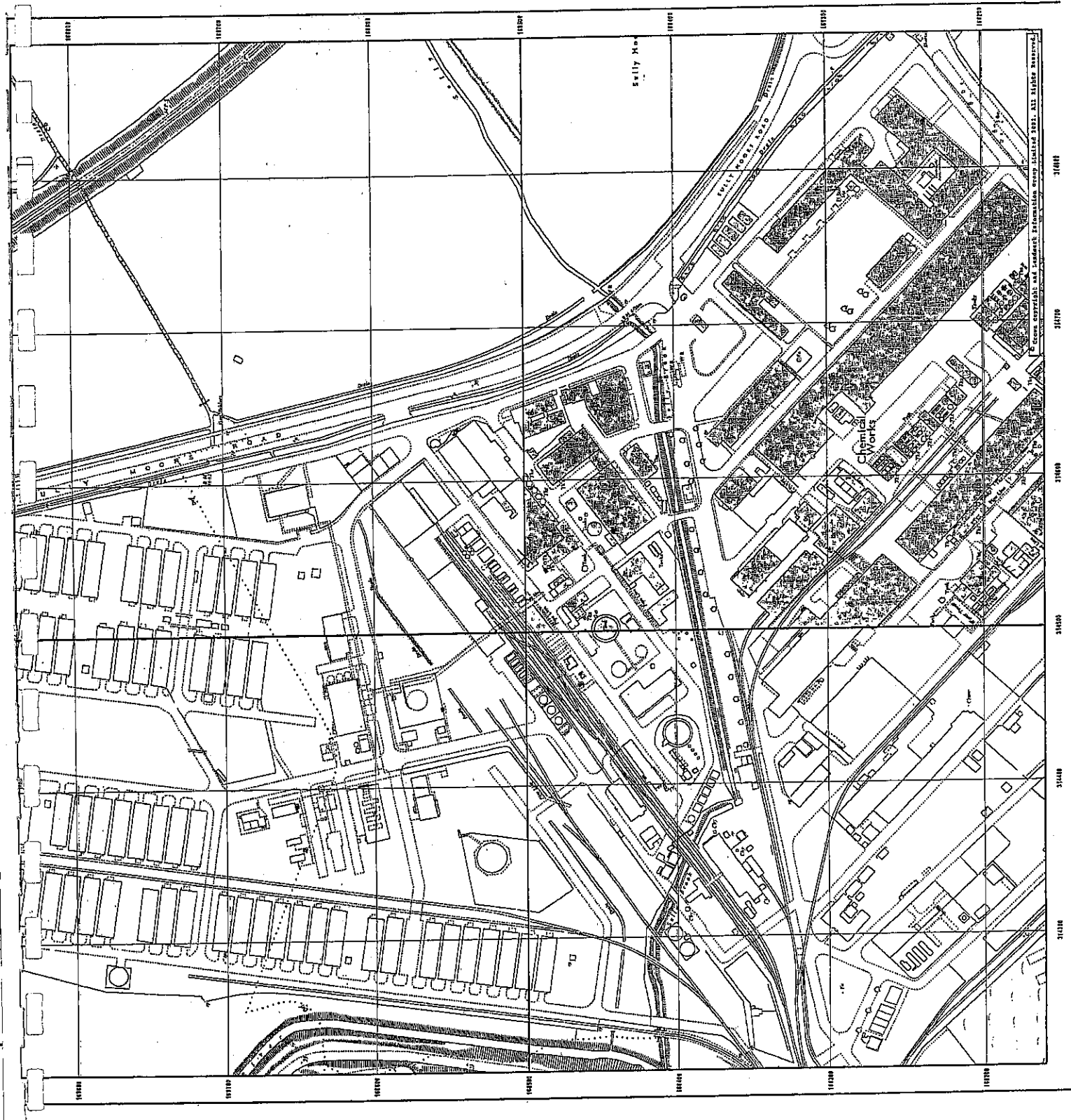
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Information Group





Historical Map Legend

ORDNANCE SURVEY PLAN



CLIENT DETAILS
Envirocheck Order No. EC233792.1.1
Customer: Rafi Elliot Newman Ltd
Pestford Marketing Ltd
Ripswell House Brecken
PETERBOROUGH
PE1 1DW

SITE DETAILS
Project: Cebra
Sully Moore Road
BARRY

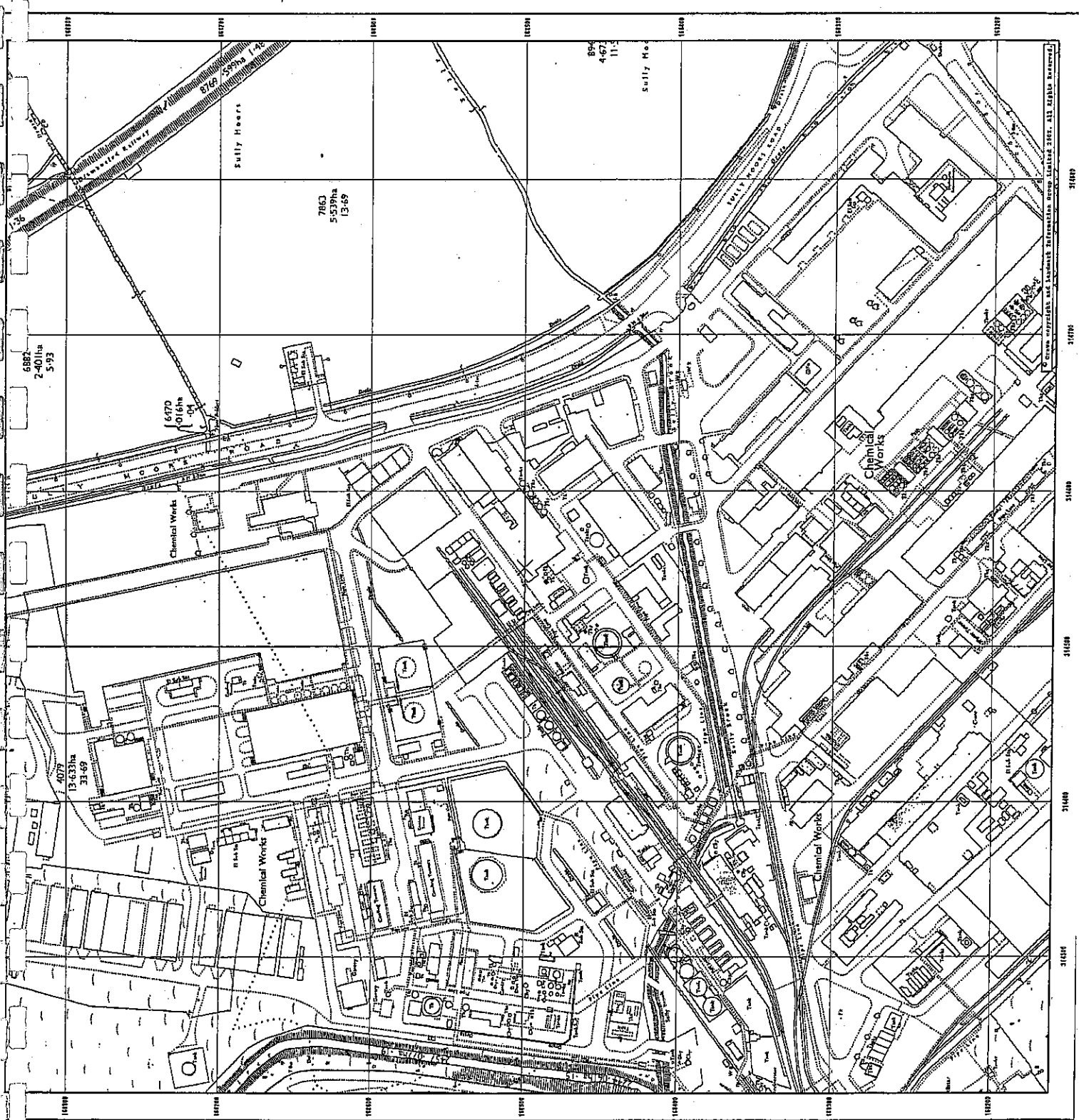
Historical Map Legend

	Inactive Quarry, Chalk Pit or Clay Pit		Active Quarry, Chalk Pit or Clay Pit
	Slope		Direction of Water Flow
	Electricity Transmission Line		Coppice, Osier
	Pylon		Reeds
	Marsh		Orchard Tree
	Rough Grassland		Heath
	Scrub		Bracken
	Coniferous Tree (Surveyed)		Non-coniferous Tree (Surveyed)
	Coniferous Tree (Not Surveyed)		Non-coniferous Tree (Not Surveyed)

ORDNANCE SURVEY PLAN

The historical maps shown were surveyed from 1860 to 1890 and are not necessarily true to the actual ground. They are reproduced here for reference only and should not be used for any purpose other than that for which they were originally intended. The published data given on the plan is for reference only and should not be used for any purpose other than that for which they were originally intended. The published data given on the plan is for reference only and should not be used for any purpose other than that for which they were originally intended.

Date(s) of Publication



CIENT DETAILS

Customer Refilllot: Nemman, L.M.
Oxford Hestoning Ltd
Whitwell House Bretton
TERSBOUGH
13 RDWY

Envirocheck Order No. EC233792_1_1
(P/INTVNT 0486)

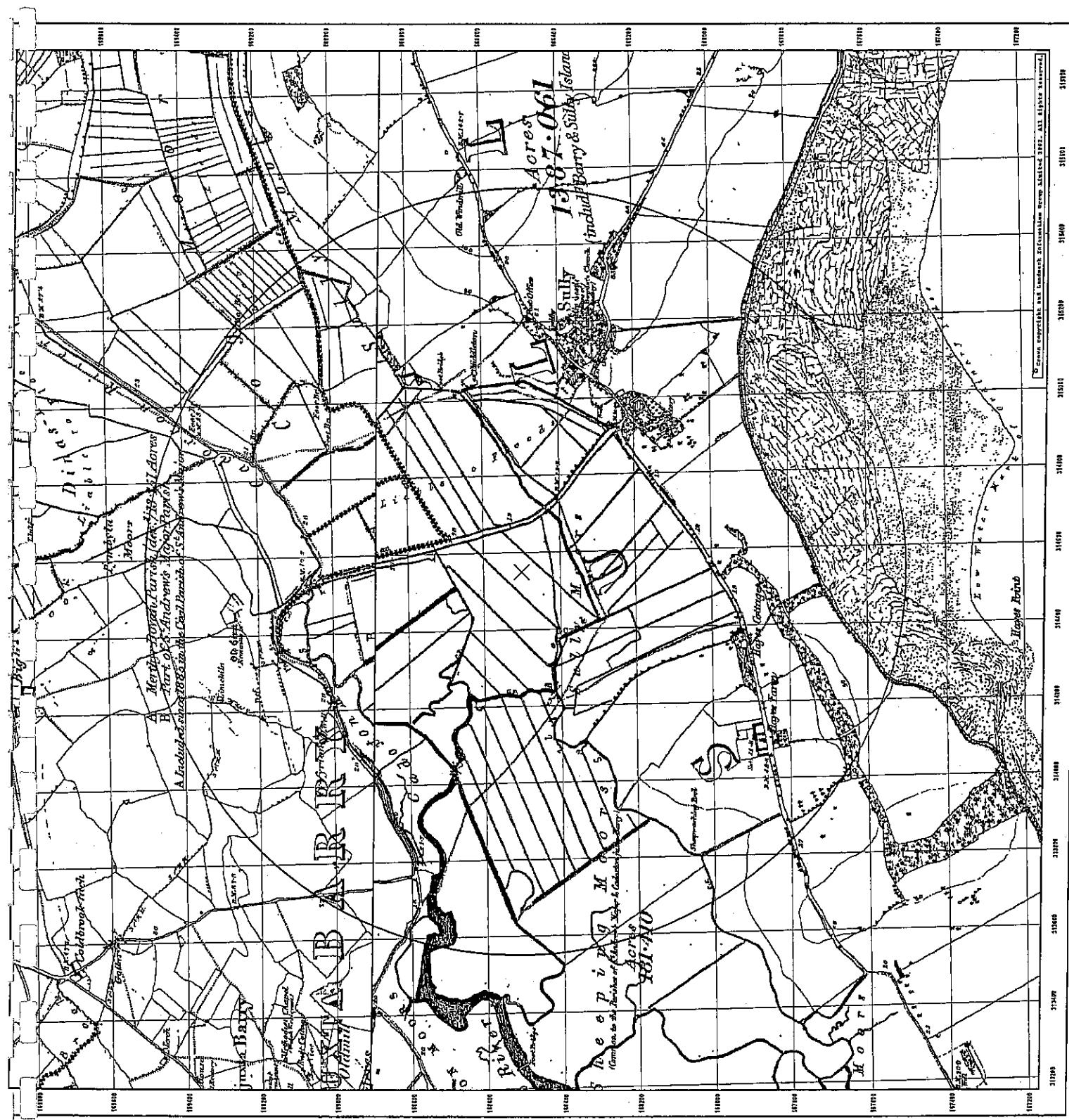
SITE DETAILS		Grid Reference	314550	168500
Object Code				
City Name Road				
CARRY				

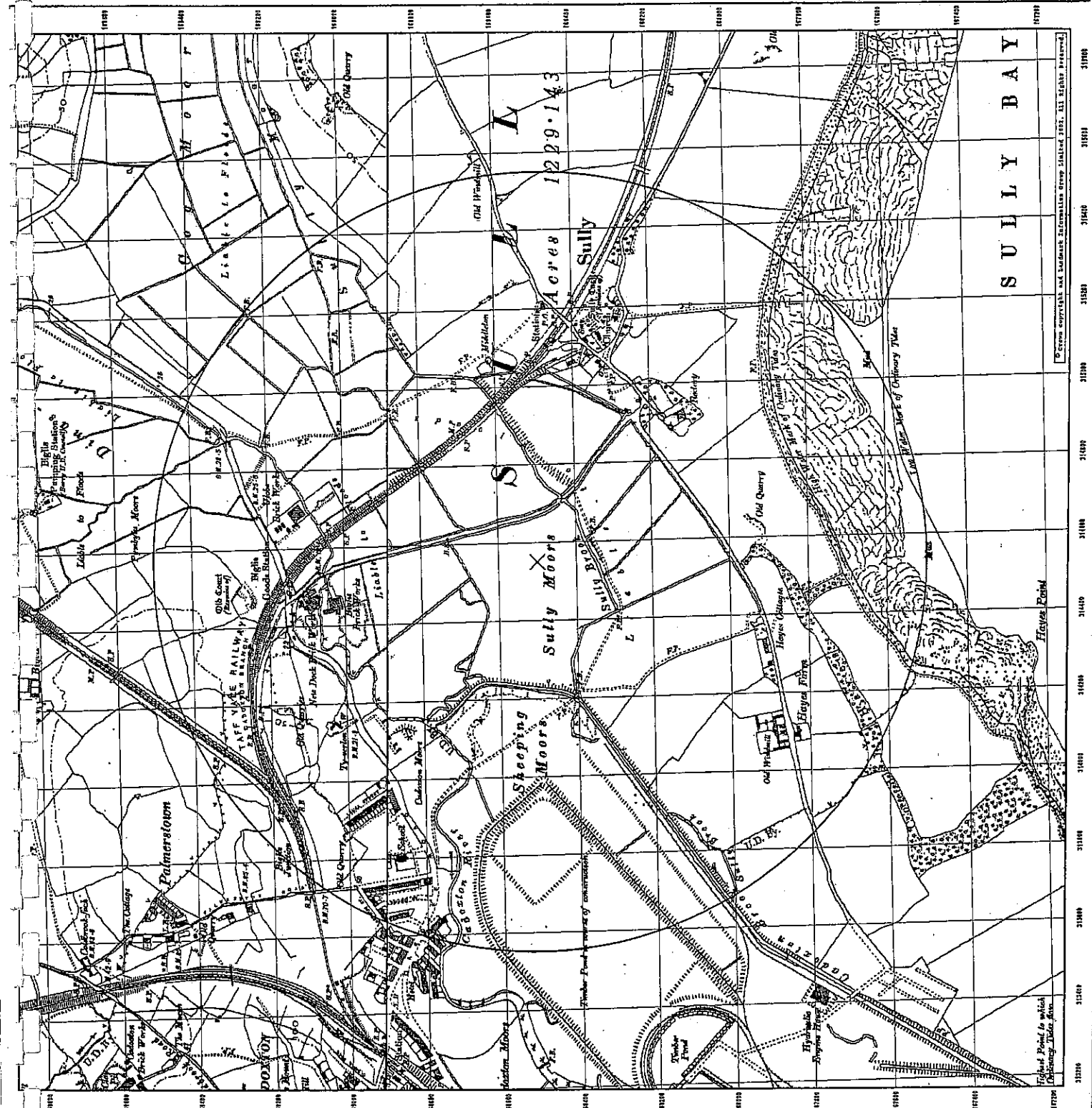
Historical Map Legend	
	Quarry
	Shingle
	Travel Pit
	Sand Pit
	Other Pits
	Mough Pasture
	Furze
	Marsh
	Reeds
	Sunkun Road
	Raised Road
	Instrumental Contour
	Skatched Contour
	Arrow denotes Flow of Water
	Road over Railway
	Railway over Road
	Level Crossing
	Road over Stream
	River or Canal

[illegible]

Date(s) of Publication

Landmark
Information Group





CLIENT DETAILS
 Envirocheck Order No. EC233792_1_1
 Customer Ref: Elliot Newman, L.M.
 Pastord Heston Ltd
 Rightwood House Belford
 PETERBOROUGH
 PE1 1BW

SITE DETAILS
 Grid Reference 314550 169500
 Project Colors
 Sully Means Road
 BARRY

Historical Map Legend

Quail Pit	Clay Pit	Non-coniferous Trees	Bracken
Gravel Pit	Coniferous Trees	Heath	Rough Ground
Sand Pit	Scrub	Lake, Loch or Pond	Reeds
Disturbed Pit or Quarry	Pylon	Electricity	Saltings
Refuse or Slag Heap	Pole	Transmission Line	Marsh
Direction of Flow of Water	Shingle	Sand	
Cutting	Embankment	Standard Gauge Multiple Track	
Road Over	Level Crossing	Standard Gauge Single Track	
Under	Foot Crossing	Siding, Tramway or Mineral Line	
	Narrow Gauge		

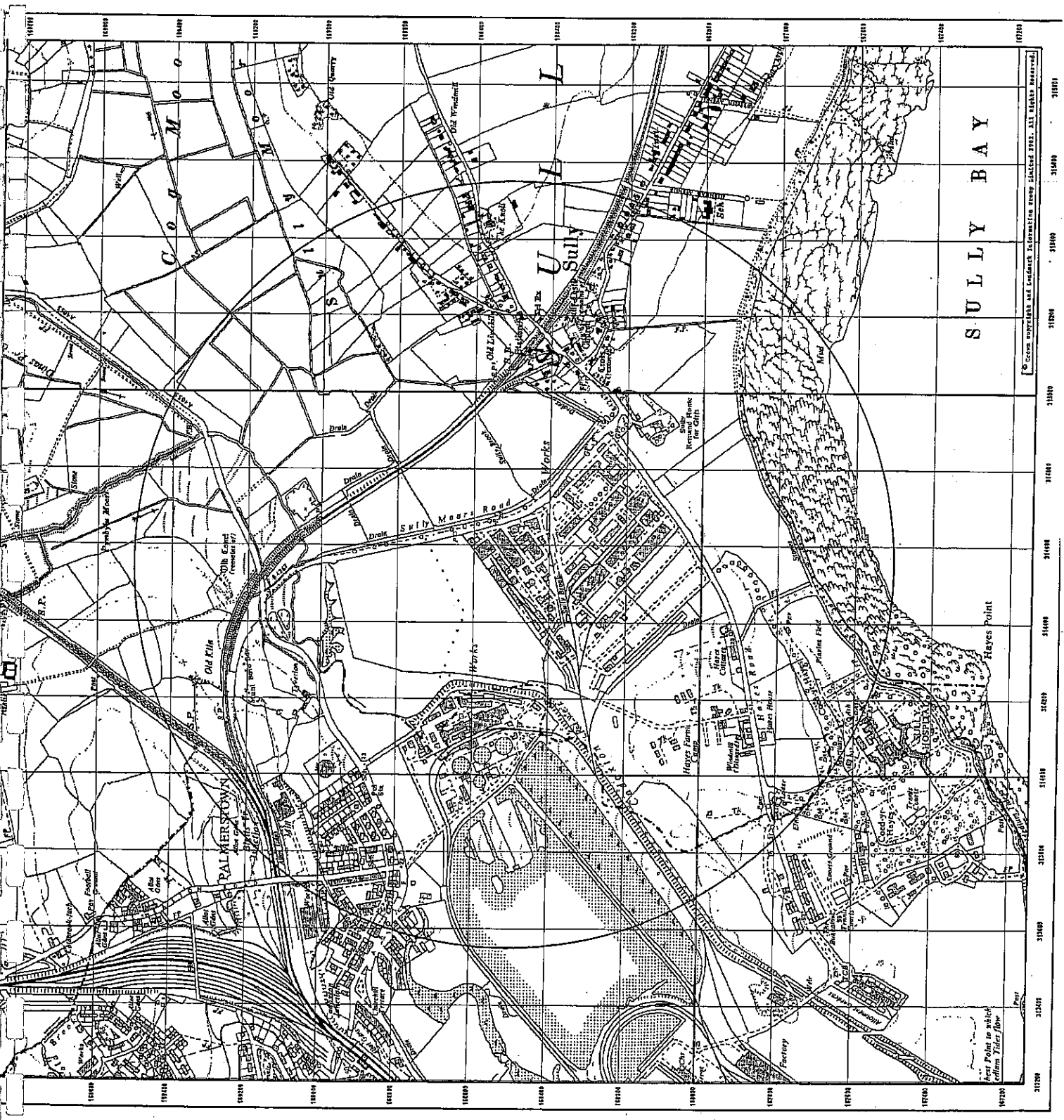
ORDNANCE SURVEY PLAN

The historical map shown was purchased from the Ordnance Survey and is a reproduction of the map published in 1864. The map is a plan of the Sully area, showing the Sully River and the Sully River Bridge. The map is a plan of the Sully area, showing the Sully River and the Sully River Bridge. The map is a plan of the Sully area, showing the Sully River and the Sully River Bridge.

1864

1964

Date(s) of Publication



CLIENT DETAILS
 Envirocheck Order No: EC233792_1_1
 Customer Ref: B121 Newham, L.M.
 Perford Hacking Ltd
 Rightwell House Breilton
 PETERBOROUGH
 PE1 3DW

SITE DETAILS
 Grid Reference 314550 188500
 Project Code
 Sully Moore Road
 BARRY

Historical Map Legend	
Chalk Pit	Non-coniferous Trees
Clay Pit or Quarry	Coniferous Trees
Gravel Pit	Scrub
Sand Pit	Lake, Loch or Pond
Disused Pit or Quarry	Electricity or Transmission Line
Refuse or Slag Heap	Marsh
Direction of Flow of Water	Shingle Sand
Cutting	Embankment
Standard Gauge	Multiple Gauge
Standard Gauge	Standard Gauge
Single Track	Single Track
Under	Over
Road	Level
Foot	Crossing Bridge
Siding, Tramway or Mineral Line	Narrow Gauge

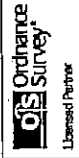
ORNDANCE SURVEY PLAN

The Ordnance Survey plan shown was adopted for the purpose of the survey in 1972. It is based on the 1:25,000 scale map of the area, which was first published in 1967. The plan shows the boundaries of the area, the location of the survey points, and the location of the survey area. The plan is based on the 1:25,000 scale map of the area, which was first published in 1967. The plan shows the boundaries of the area, the location of the survey points, and the location of the survey area.

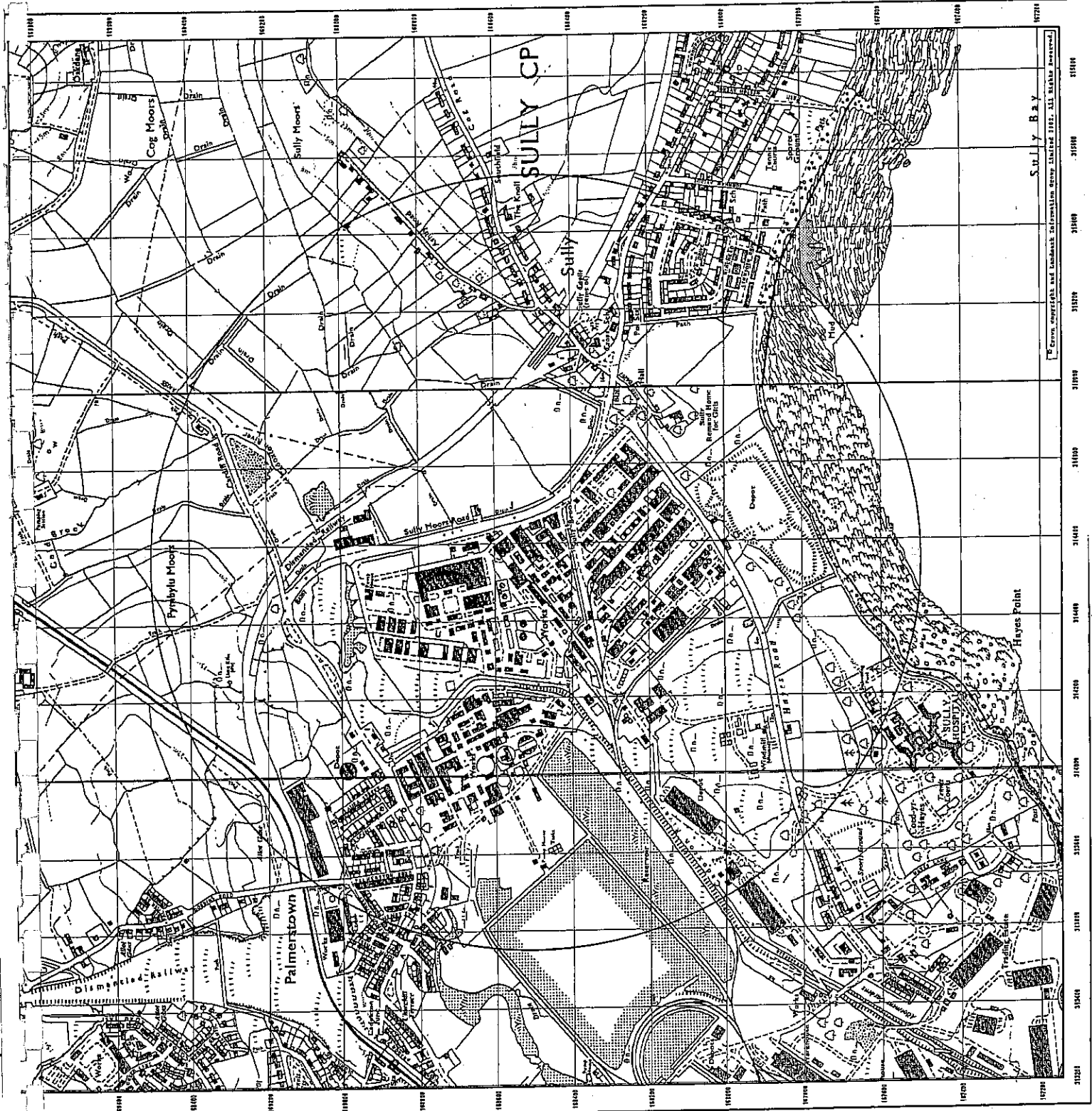
The 1:25,000 scale map of the area, which was first published in 1967, is based on the 1:25,000 scale map of the area, which was first published in 1967. The plan shows the boundaries of the area, the location of the survey points, and the location of the survey area. The plan is based on the 1:25,000 scale map of the area, which was first published in 1967. The plan shows the boundaries of the area, the location of the survey points, and the location of the survey area.

Date(s) of Publication

1:25,000



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CLIENT DETAILS
 Envirocheck Order No. EC233792.1.1
 Customer Ref: Elna Newman, LM
 Project: Haulage Ltd
 Regional: North West
 PETERBOROUGH
 PE3 3JW

SITE DETAILS
 Grid Reference 314550 168500
 Project Code
 Sully Moors Road
 BARRY

Historical Map Legend	
	Chalk Pit
	Clay Pit, or Quarry
	Gravel Pit
	Scrub
	Sand Pit
	Disused Pit or Quarry
	Refuse or Slag Heap
	Lake, Loch or Pond
	Pylon
	Electricity Transmission Line
	Direction of Flow of Water
	Shingle
	Sand
	Embankment
	Standard Gauge Multiple Track
	Standard Gauge Single Track
	Foot Crossing
	Road Over
	Siding, Tramway or Mineral Line
	Narrow Gauge
	Marsh

ORDNANCE SURVEY PLAN

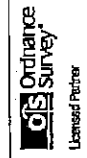
The historical maps shown were reproduced from the original maps held by the Ordnance Survey, Southampton, which were produced in the 1840's. In 1854, the 1:25,000 scale was adopted for mapping urban areas. The maps were then revised in 1884, 1904, 1924, 1944, 1964, 1984 and 1994. The published data plan on the right illustrates the data plan for the area shown on the map. The data plan is a plan of the area shown on the map, which is a plan of the area shown on the map. The data plan is a plan of the area shown on the map, which is a plan of the area shown on the map.

In the 1840's, 1:25,000 scale maps were produced from a number of sources. The maps appear to be a combination of the 1:25,000 scale maps, which were produced with the 1:25,000 scale, and the 1:50,000 scale maps, which were produced with the 1:50,000 scale. The maps were produced with the 1:25,000 scale, which was the standard scale for mapping urban areas. The maps were produced with the 1:50,000 scale, which was the standard scale for mapping rural areas. The maps were produced with the 1:25,000 scale, which was the standard scale for mapping urban areas. The maps were produced with the 1:50,000 scale, which was the standard scale for mapping rural areas.

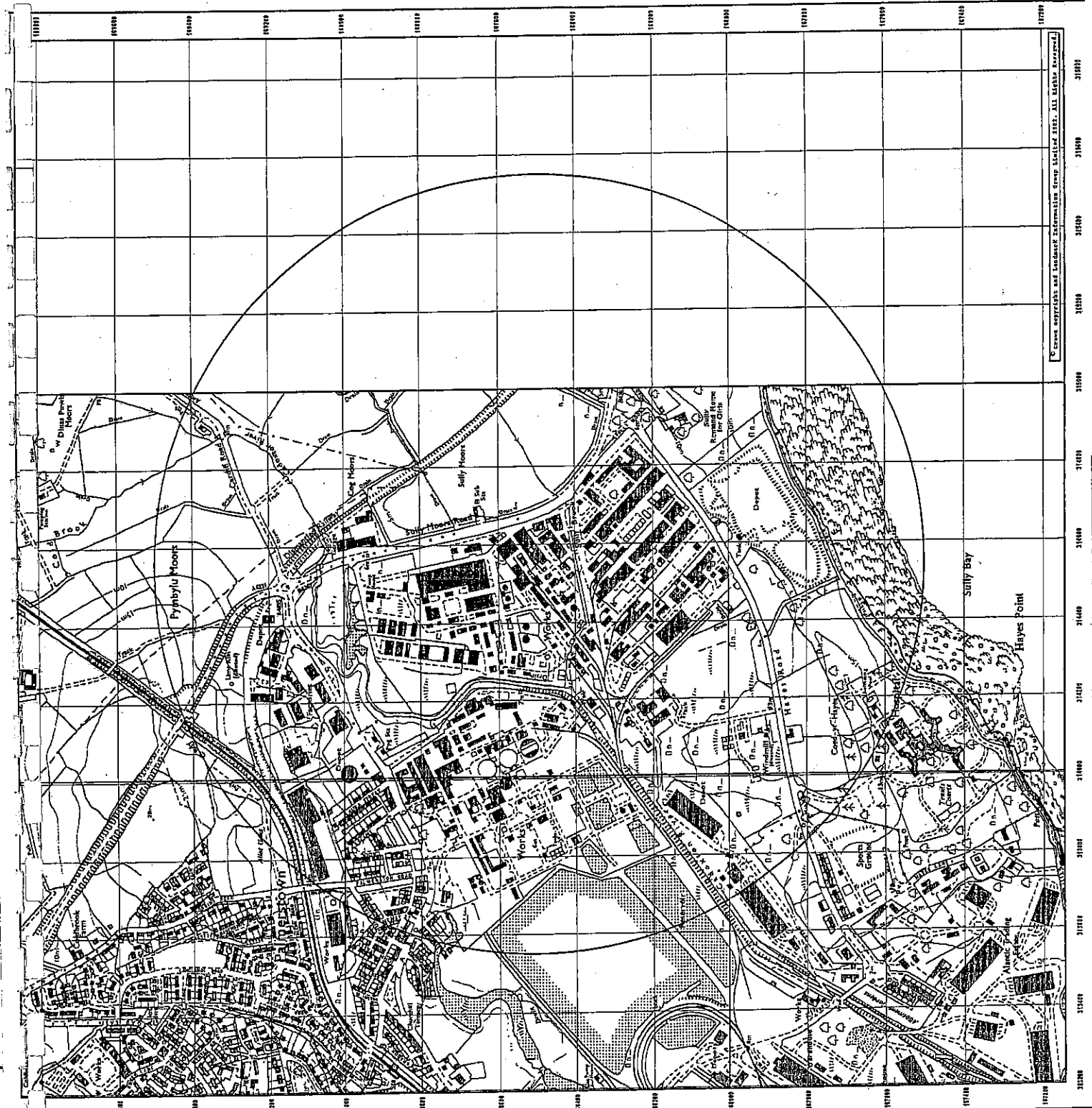
Source map scale - 1:25,000

Date(s) of Publication

1:25



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 Information Group



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CLIENT DETAILS Envirocheck Order No. EC231792_1.1
Customer Ref: Elliot Newman Ltd
Project: Hacking Ltd
Registered: Iona Brechin
Permitted: 01/01/01
PLS DW

SITE DETAILS Grid Reference 314550 169500
Project Centre
Sully Moors Road
BARRY

Historical Map Legend

Chalk Pit	Non-coniferous Trees	Bracken	Heath	Rough Grassland
Clay Pit or Quarry	Gravel Pit	Coniferous Trees	Lake, Loch or Pond	Reeds
Sand Pit	Disused Pit or Quarry	Refuse or Slag Heap	Electricity Transmission Line	Saltings
Direction of Flow of Water	Shingle Sand	Marsh	Standard Gauge	Multiple Track
Cutting	Embankment	Standard Gauge	Single Track	Siding, Tramway or Mineral Line
Road Under	Road Over	Level Crossing	Bridge	Narrow Gauge

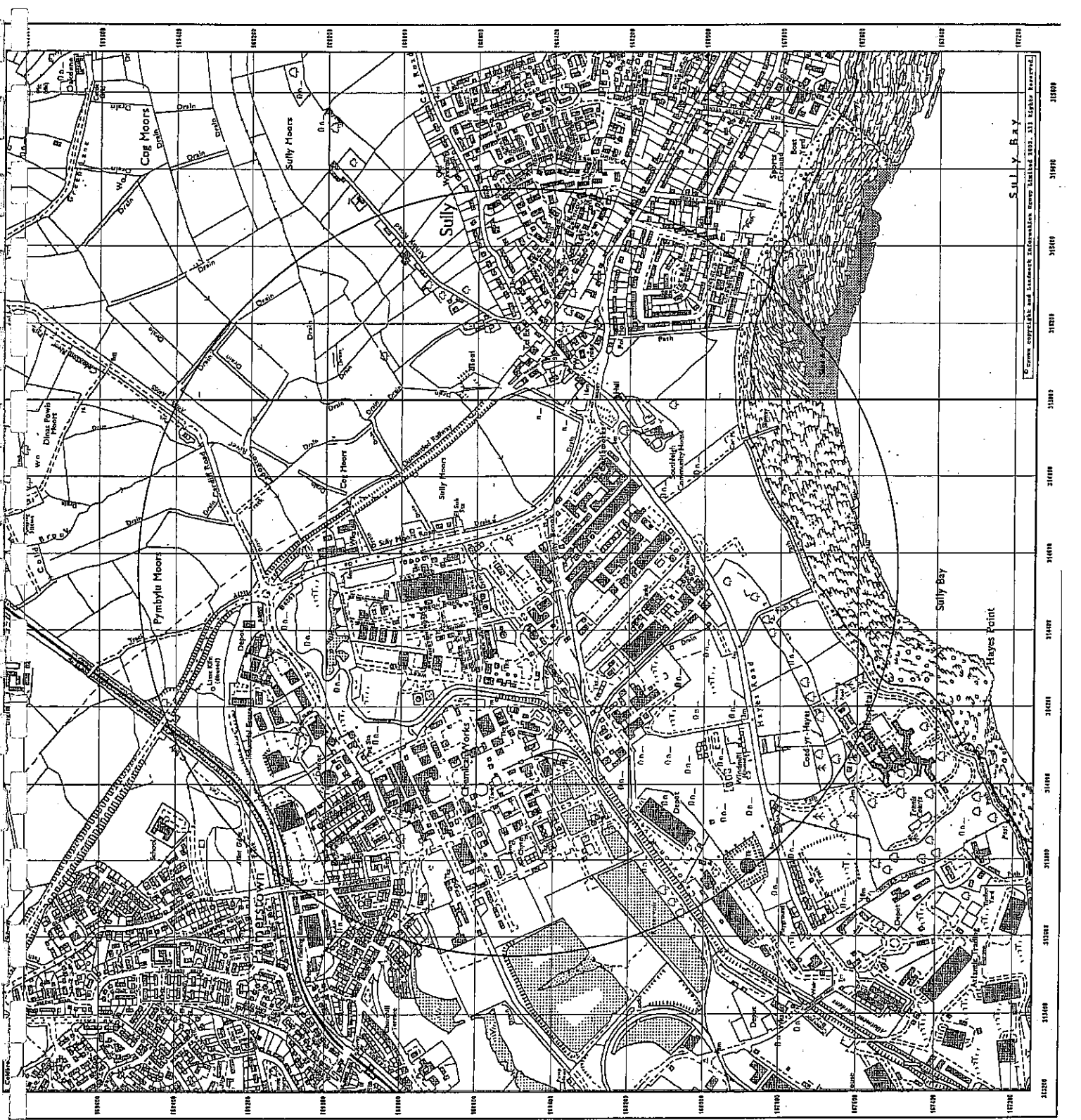
ORDNANCE SURVEY PLAN

The historical maps shown were reproduced from maps produced by the Ordnance Survey. The maps were produced by the Ordnance Survey in the 19th century and were used to produce this map. The maps were produced by the Ordnance Survey in the 19th century and were used to produce this map. The maps were produced by the Ordnance Survey in the 19th century and were used to produce this map.

In the late 19th century, the Ordnance Survey was produced, which updated the 1:50,000 mapping. The maps were produced by the Ordnance Survey in the 19th century and were used to produce this map. The maps were produced by the Ordnance Survey in the 19th century and were used to produce this map.

Scale map scale - 1:50,000

Date(s) of Publication



CLIENT DETAILS
 Envirocheck Order No. EC233792.1.1
 Customer Ref: Ellis Newman, LM
 Peckford Harkening Ltd
 Rightwell House Bracken
 PETERSBOROUGH
 PE1 1DW

SITE DETAILS
 Grid Reference 314550 168500
 Project Code
 Sully Moors Road
 BARNBY

Historical Map Legend

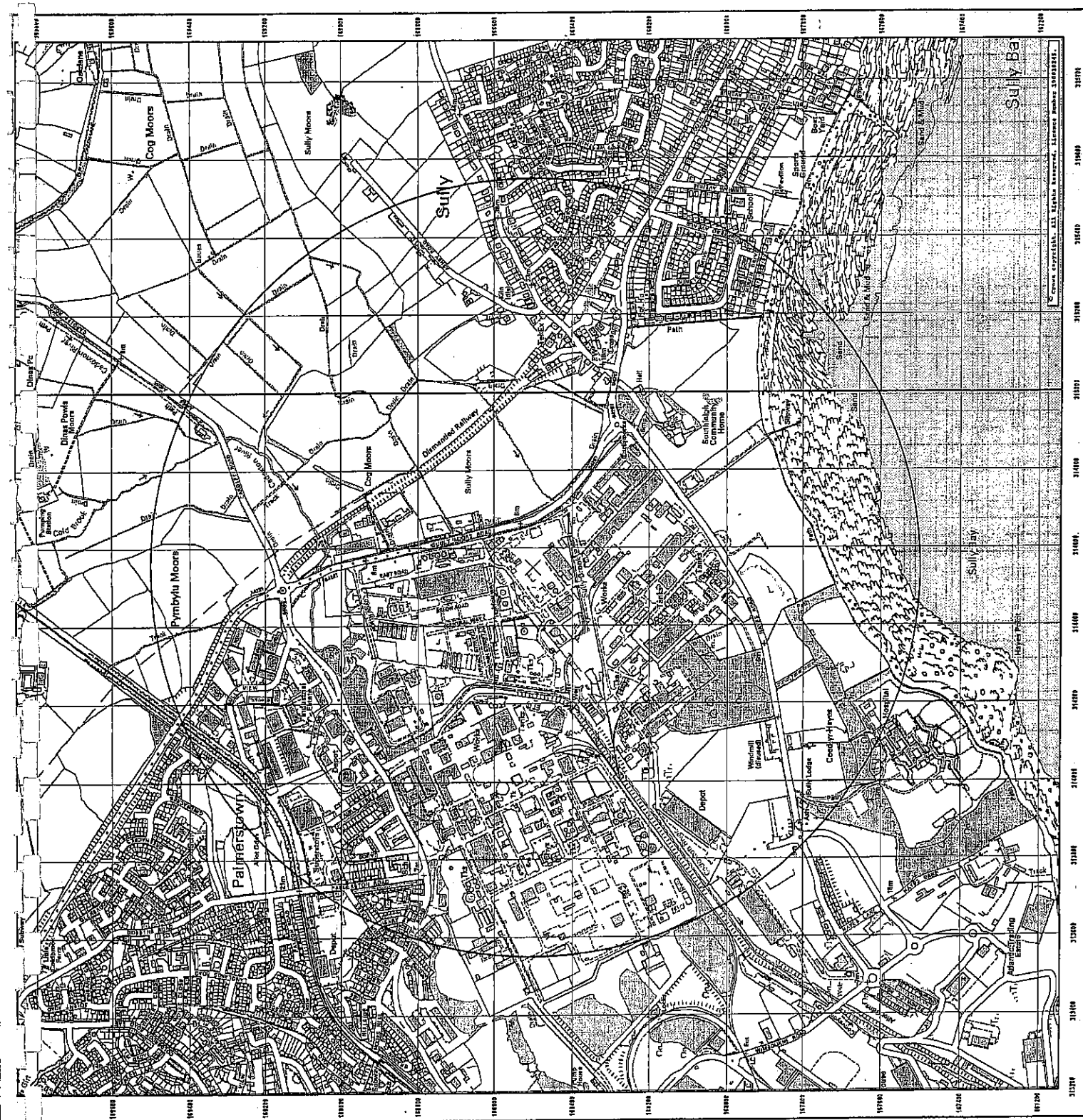
	Non-coniferous Trees		Pylon
	Coniferous Trees		Telephone Line (where shown)
	Orchard		Electricity Transmission Line (with poles)
	Rough Grassland		Gravel Pit
	Heath		Shingle
	Scrub		Refuse Tip or Slag Heap
	Marsh, Salt Marsh or Reeds		Sand
	County Boundary (England only)		Sand Pit
	Civil Parish or Community Boundary		Slopes
	Constituency Boundary		District, Unitary, Metropolitan, London Borough Boundary

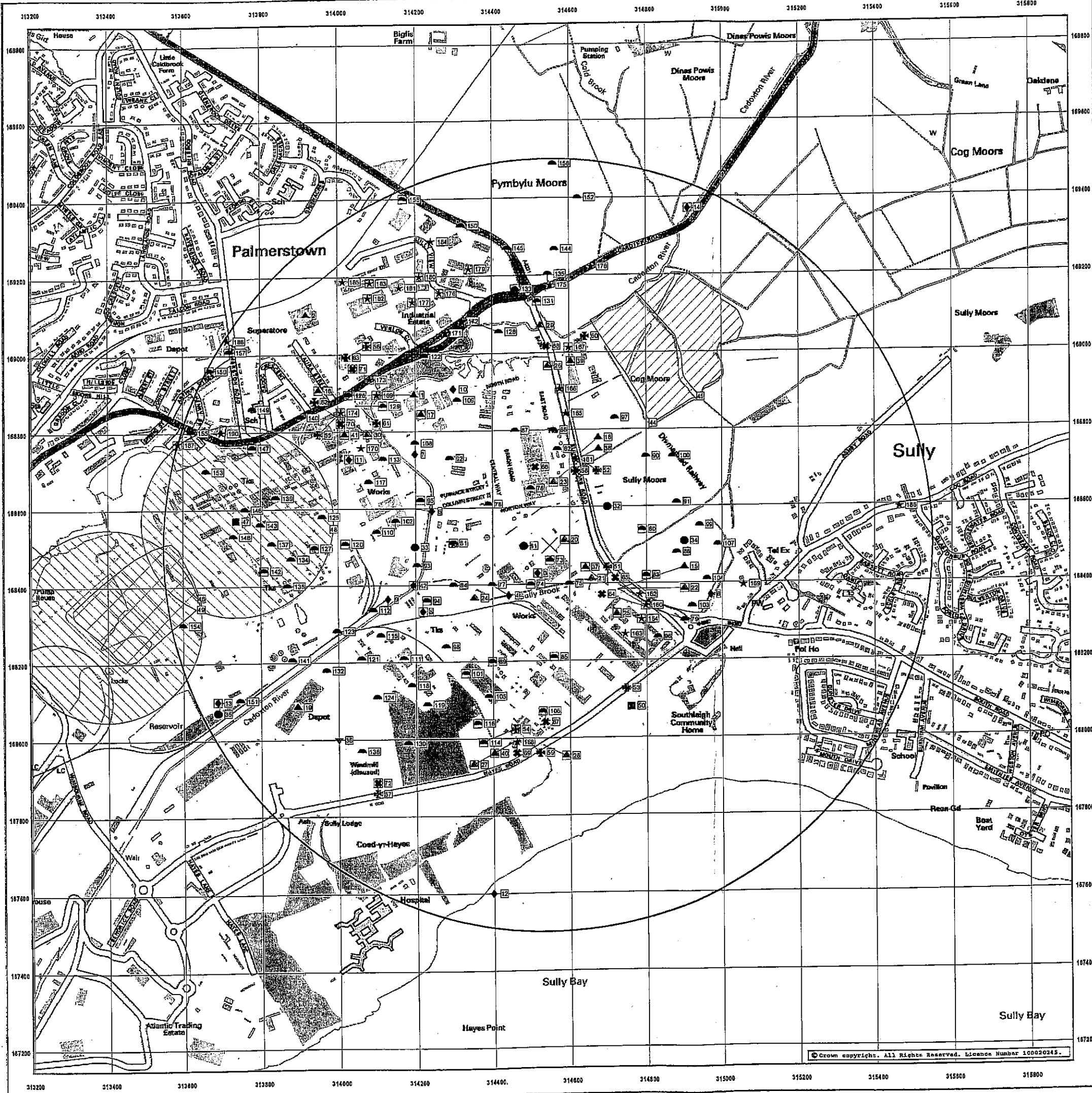
ORDNANCE SURVEY PLAN

The historical maps shown were produced from the Ordnance Survey's 1:50,000 scale series maps. The maps are shown in their original form, with the original 1:50,000 scale map only.

The data is highly detailed showing buildings, roads, railways, water features, and other features. It is not a simplified map and should not be used for navigation purposes. The data is not to be used for any other purpose without the written permission of the Ordnance Survey.

Source map code - 155,001



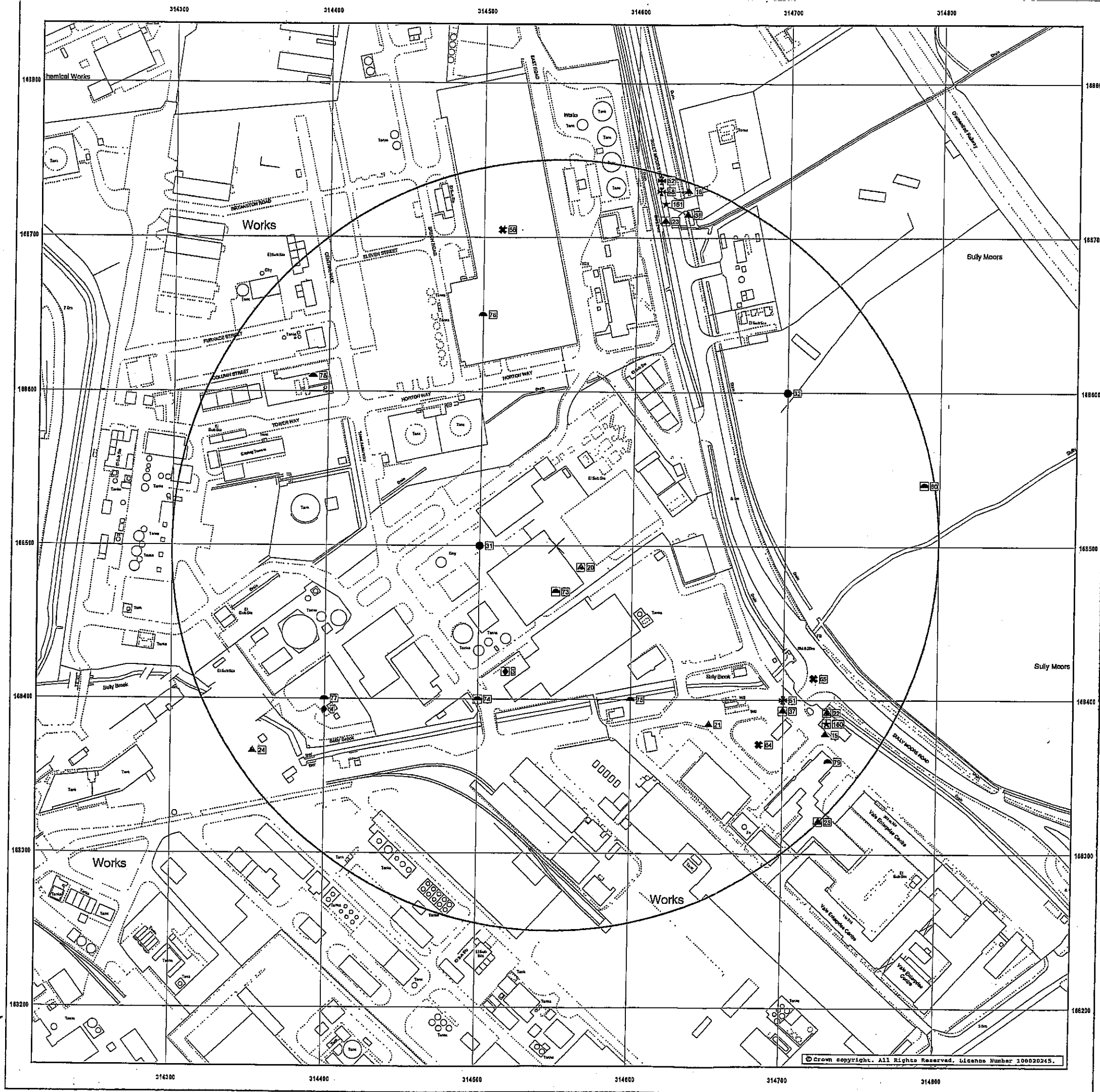


CLIENT DETAILS Envirocheck Order No. EC233792_1_1
(03-Feb-2003 14:23)
Customer Ref: Elliot Newman, LM
Postford Haskoning Ltd
Rightwell House Bretton
PETERBOROUGH
PE3 8DW

SITE DETAILS Grid Reference 314550 168500
Project Cobra
Sully Moors Road
BARRY

KEY TO THE LEGEND DATABASE

- | | |
|--|---|
| General | Waste |
| ○ Specified Site | ▼ Point Location of BGS Recorded Landfill Site |
| × Bearing Reference Point | ▨ BGS Recorded Landfill Site |
| ○ Buffer (1000m) | ▲ Integrated Pollution Control Registered Waste Site |
| Ⓢ Reference Number | ▨ Licensed Waste Management Facilities (Landfill) |
| □ Several of Type at Location | ■ Point Location of Local Authority Recorded Landfill Site |
| | ▨ Local Authority Recorded Landfill Site |
| | ▨ Registered Landfill Site |
| | ■ Point Location of Registered Waste Transfer Site |
| Agency and Hydrological | ▨ Registered Waste Transfer Site |
| ▲ Air Pollution Control | ■ Point Location of Registered Waste Treatment or Disposal Site |
| ▼ Air Pollution Control Enforcement | ▨ Registered Waste Treatment or Disposal Site |
| ● Point Location of Contaminated Land Register Entry or Notice | |
| ▨ Contaminated Land Register Entry or Notice | Hazardous Substances |
| ◆ Discharge Consent | ✠ COMAH Site |
| ▲ Enforcement Or Prohibition Notice | ✠ Explosive Site |
| ▲ Integrated Pollution Control | ✠ NIHS Site |
| ■ Integrated Pollution Prevention Control | ✠ Planning Hazardous Substance Consent |
| ● Pollution Incident to Controlled Waters | ✠ Planning Hazardous Substance Enforcement |
| ▼ Prosecution Relating to Authorised Processes | Geological |
| ◆ Prosecution Relating to Controlled Waters | ● BGS Borehole |
| ◆ Red List Discharge Consent | ▼ BGS Recorded Mineral Site |
| ▲ Registered Radioactive Substance | Industrial Land Use |
| ◆ Water Abstraction | ★ Contemporary Trade Directory Entry |
| | ★ Fuel Station Entry |



CLIENT DETAILS Envirocheck Order No. **EC233792_1_1**
(01-Feb-2003 10:23)
Customer Ref: Elliot Newman, LM
Postford Haskoning Ltd
Rightwell House Bretton
PETERBOROUGH
PE3 8DW

SITE DETAILS Grid Reference **314550 168500**
Project Cobra
Sully Moors Road
BARRY

KEY TO THE LEGEND DATABASE

General	Waste
○ Specified Site	▼ Point Location of BGS Recorded Landfill Site
✕ Bearing Reference Point	▨ BGS Recorded Landfill Site
○ Buffer (250m)	▲ Integrated Pollution Control Registered Waste Site
□ Reference Number	▨ Licensed Waste Management Facilities (Landfill)
□ Several of Type at Location	■ Point Location of Local Authority Recorded Landfill Site
⌘ Pylon	▨ Local Authority Recorded Landfill Site
— Overhead Transmission Line	▨ Registered Landfill Site
Agency and Hydrological	Hazardous Substances
▲ Air Pollution Control	■ Point Location of Registered Waste Transfer Site
▼ Air Pollution Control Enforcement	▨ Registered Waste Transfer Site
● Point Location of Contaminated Land Register Entry or Notice	■ Point Location of Registered Waste Treatment or Disposal Site
▨ Contaminated Land Register Entry or Notice	▨ Registered Waste Treatment or Disposal Site
◆ Discharge Consent	✕ COMAH Site
▲ Enforcement Or Prohibition Notice	✕ Explosive Site
▲ Integrated Pollution Control	✕ NIHS Site
■ Integrated Pollution Prevention Control	✕ Planning Hazardous Substance Consent
● Pollution Incident to Controlled Waters	✕ Planning Hazardous Substance Enforcement
▼ Prosecution Relating to Authorised Processes	Geological
▼ Prosecution Relating to Controlled Waters	● BGS Borehole
◆ Red List Discharge Consent	▼ BGS Recorded Mineral Site
▲ Registered Radioactive Substance	Industrial Land Use
— River Network or Water Feature	★ Contemporary Trade Directory Entry
◆ Water Abstraction	★ Fuel Station Entry



ENVIRONMENT
AGENCY

ENVIRONMENTAL PROTECTION ACT 1990

Authorisation and Introductory Note

AES BARRY

**AES Barry CHP Plant
Sully Moors Road
Barry CF64 5RP**

Authorisation Number AV4504

INTRODUCTORY NOTE

IN 1. This Note does not form part of the Authorisation.

IN 2. The following Authorisation is issued under section 6 of the Environmental Protection Act 1990 ("the 1990 Act") to operate a combustion process. The Authorisation comprises Part 1 (operation of the process, records and notifications), Part 2 (releases into air), Part 3 (releases into controlled waters), Part 4 (releases into sewer), Part 5 (releases into on-site effluent treatment plant), Part 6 (other releases from the process), Part 7 (reporting requirements), Part 8 (improvement programme), Part 9 (interpretation), Schedule 1 (notifications in accordance with condition 1.13), Schedule 2 (reporting of monitoring data), Schedule 3 (reporting of annual releases).

The Authorisation is subject to the express conditions set out in Parts 1 to 9. Aspects of the process not regulated by those conditions are subject to a general condition implied by section 7(4) of the 1990 Act that the person carrying it on must use the best available techniques not entailing excessive costs:-

(a) for preventing the release of substances prescribed for any environmental medium into that medium or, where that is not practicable by such means, for reducing the release of such substances to a minimum and for rendering harmless any such substances which are so released; and

(b) for rendering harmless any other substances which might cause harm if released into any environmental medium.

Techniques include (in addition to technical means and technology) the number, qualifications, training and supervision of persons employed in the process and the design, construction, lay-out and maintenance of the buildings in which the process is carried on.

IN 3. Description of Process

The process is designed to burn natural gas in a combined cycle gas turbine (CCGT) rated at 230MW electrical, equivalent to approximately 500MW thermal. The process will operate to generate electricity as the needs of the National Grid demand. The predicted operating regime indicates that the annual operating capacity will be about 80%. During the period July to September it is anticipated that the turbine will shut down for 6 to 8 hours overnight. Start up will follow in advance of the peak early morning demand for electricity.

There will be no supplementary fuels to the natural gas, except for the use of distillate oil containing no more than 0.1% wt. sulphur which will be used on the emergency electricity generator.

The plant will consist of an industrial gas turbine connected directly to an air cooled generator. The turbine consists of air inlet filters, an air compression section, combustion chamber, power turbine and exhaust duct. Natural gas is fed into the combustion chamber where it is mixed with compressed air. There will be no fuel fired into the gas turbine exhaust. On combustion the fuel burns and the resulting hot

gases drive the power turbine. The dry, low NO_x burners limit the production of oxides of nitrogen; the trace quantities of sulphur within natural gas ensure minimal production of sulphur dioxide. There are no particulate formed.

The exhaust gases from the gas turbine pass to the waste heat recovery boiler and thereafter discharge to atmosphere via a 60m high stack at a velocity of 15m/s. Steam from the waste heat recovery boiler drives a steam turbine which increases the thermal efficiency to about 50%. This compares well with the 35% usually delivered by a traditional coal fired unit. The waste heat boiler is rated at approximately 75MW electrical. On leaving the steam turbine the remaining steam is condensed in an air cooled condenser. Condensed steam is recycled back to the system as boiler feedwater. Any loss of water is made up by the addition of mains water which is deionised before addition to the process. An auxiliary boiler, also fired with natural gas, will operate to provide steam during plant shutdown and at start up to reduce the start up period to a minimum. The auxiliary boiler, rated at about 6MW thermal, will discharge combustion products of oxides of nitrogen at a height of 26m with a velocity of 12m/s. An emergency diesel generator, is included on site to provide electricity in times of power failure. This will be fired by distillate oil with a sulphur content of 0.1wt%.

A water treatment plant will serve to provide deionised water for steam generation. Liquid effluent from the water regeneration plant will be discharged to the local Welsh Water sewer. Process surface water will pass through an oil/water interceptor. Captured oil will be disposed to an off-site facility, water will pass to sewer.

The electrical output from the process will be stepped up to 132kV and connected to the SWALEC distribution system. Other transformers will provide for plant electrical supplies. All transformers will be oil filled and banded to 110% of the transformer contents.

Solid waste from the process results from the replacement of air filters from the air compressor which feeds the turbine combustion chamber.

THE ENVIRONMENT AGENCY

ENVIRONMENTAL PROTECTION ACT 1990

AUTHORISATION

AES BARRY

Authorisation Number AV4504

The Environment Agency, in exercise of its powers under section 6 of the Environmental Protection Act 1990 ("the 1990 Act"), hereby authorises

AES BARRY
("the Operator")

whose Registered Office is

Burleigh House
17 - 19 Worples Way
Richmond TW10 6AG

to carry on a combustion process prescribed in paragraph b of Section 1.3A of Schedule 1 to The Environmental Protection (Prescribed Processes and Substances) Regulations 1991 ("the Authorised Process") at the premises occupied by the Operator at

The Operator's Premises

AES Barry CHP Plant
Sully Moors Road
Barry CF64 5RP

subject to the conditions in this Authorisation.

This Authorisation shall have effect from 22 January 1997.

Signed.....

Mrs C Davies authorised to sign on behalf of the Environment Agency

Signed on

PART 1

OPERATION OF PROCESS

- 1.1 The Authorised Process shall, subject to the provisions of this Authorisation, be carried on using the techniques and in the manner described in the Application.
- 1.2 The Operator shall maintain in good operating condition all plant, equipment and technical means used in carrying on the Authorised Process.
- 1.3 The Authorised Process shall be managed and operated by sufficient persons who are suitably qualified, experienced, trained and supervised in respect of the duties to be undertaken in connection with the carrying on of the process.
- 1.4 The Operator shall provide the persons mentioned in condition 1.3 with appropriate written operating instructions for their duties in relation to the carrying on of the Authorised Process.
- 1.5 Any person having duties which are or may be affected by the matters set out in the Authorisation shall have convenient access to a copy of this document kept at or near to the place where he carries out those duties.
- 1.6(a) The auxiliary boiler shall discharge to atmosphere through a stack of height 26 metres.
- 1.6(b) Both the axial boiler and the gas turbine shall operate without generating smoke.
- 1.6(c) The gas turbine and auxiliary boiler shall be fired on natural gas. There shall be no supplementary fuels used in the authorised process except on the emergency diesel generator which shall be fired using distillate oil with a maximum sulphur content of 0.1%wt.
- 1.6(d) Any natural gas vented from the process shall do so through a stack of height 10 metres consistent with the prevention of odours at ground level.
- 1.6(e) Turbine start-ups shall be undertaken in a manner which minimises the generation of oxides of nitrogen, consistent with the requirements of Table 2.1 of this Authorisation.
- 1.7 Unless otherwise specified in Schedule 2 of this Authorisation, safe and permanent means of access shall be provided to enable sampling and monitoring to be carried out in relation to the release points specified in that Schedule.
A safe means of access shall be provided to other sampling and monitoring points when required by the Environment Agency.
- 1.8 The Operator shall, subject to the provisions of this Authorisation, take such samples and carry out such analyses, calibrations, examinations, measurements, tests and surveys as are specified in the Application at the frequency and in the manner so specified.

- 1.9 Subject to the provisions of this Authorisation, any assessment of analytical or monitoring results in relation to compliance with specified limits or operational parameters shall have regard to any provisions in the Application relevant to that assessment.

RECORDS

- 1.10 The Operator shall make a record of all samples, analyses, calibrations, examinations, measurements, tests and surveys taken or carried out as required by condition 1.8 ("specified records") and of any assessment made in accordance with condition 1.9.
- 1.11 The Operator shall make available for inspection by the Environment Agency at any reasonable time -

(a) specified records;

(b) any other operational records made by the Operator in the course of carrying on the process ("operational records").

- 1.12 Specified records and Operational records shall:-

(a) be legible;

(b) be made as soon as reasonably practicable;

(c) if amended, be amended in such a way as to permit, where practicable, retrieval of the original record;

(d) be retained, in the case of specified records for a period of four years from the date when the records were made and in the case of operational records for a period of one year from the date when the records were made.

NOTIFICATIONS

- 1.13 The Operator shall notify the Environment Agency:-

(a) of the detection of the release of any substance which exceeds any relevant limit or criteria specified in relation to the substance in this Authorisation;

(b) of the detection of the release of any other substance which might cause harm except in a quantity so trivial that it would be incapable of causing harm or its capacity to cause harm is insignificant;

(c) of any malfunction or breakdown of plant, equipment, technical means or technology if the malfunction or breakdown has potential to cause serious pollution of the environment.

- 1.14 Notification under condition 1.13 shall be made *without delay* to the Reporting Address. In the case of a release mentioned in condition 1.13 (a) or (b) the Operator shall within 24 hours of such notification, send to the Reporting Address in writing the

information set out in Part A of Schedule 1 and, as soon as practicable thereafter, the information set out in Part B of that Schedule.

- 1.15** If a release mentioned in condition 1.13 (a) or (b) is into controlled waters the Operator shall, *without delay, also* inform the Environment Agency of the release via its Emergency Hotline - 0800 80 70 60.

OR

- 1.16** If a release mentioned in condition 1.13 (a) or (b) is into controlled waters and meets the locally agreed reporting criteria the Operator shall, *without delay, also* inform the Environment Agency of the release via its Emergency Hotline - 0800 80 70 60.

PART 2

RELEASES INTO AIR

- 2.1 A release from the Authorised Process into the air from a release point specified in Table 2.1 shall arise only from the source for that release specified in that Table.

TABLE 2.1	
Release Point	Source
A1	CCGT 60m exhaust stack.

- 2.2 A release from the Authorised Process into the air from a release point specified in Table 2.2 shall not exceed the limit for that release point in relation to any parameter specified in that Table.

TABLE 2.2	
Parameters	Release Point A1 Maximum hourly mean concentration (mg/m ³)
Carbon Monoxide	100(c)
Oxides of nitrogen (as NO ₂)	60(a)
	85(b)

(a) = during all operating periods excepting 1 hr after start-up.

(b) = during the first hour of start-up.

(c) = during all operating periods.

PART 3
RELEASES INTO CONTROLLED WATERS

- 3.1** No release from the Authorised Process shall be made into controlled waters.

PART 4

RELEASES INTO SEWER

- 4.1** Provisions proposed in the Application with regard to releases to sewer include the discharge of water treatment plant effluent. This is to be discharged to sewer under consent from Welsh Water PLC. The Environment Agency will not be placing limitations on this discharge.

PART 5

RELEASES INTO ON-SITE EFFLUENT-TREATMENT PLANT

5.1 There is no on-site effluent treatment plant.

PART 6**OTHER RELEASES FROM THE PROCESS**

6.1 The Operator shall have a written management procedure which in respect of all "relevant wastes/releases" from the Authorised Process -

- (a) ensures that waste materials for release are handled, treated and disposed of in the manner most appropriate to avoid pollution of the environment;
- (b) specifies the means of control of any accumulation and storage of relevant wastes;
- (c) specifies the routes and timetable for the disposal of relevant wastes.

6.2 The Operator shall review the procedure mentioned in condition 6.1 and record the results of the review in writing -

- (a) whenever changes are proposed to the procedure which might have environmental significance; and
- (b) in any case, not less frequently than once in every period of two years.

6.3 The Operator shall record -

- (a) the composition, or as appropriate, the description of the relevant release;
- (b) the best estimate of the quantity of relevant release produced;
- (c) disposal routes for relevant waste;
- (d) the best estimate of the quantity/ies of any relevant waste sent for recovery.

6.4 Materials arising which will be a relevant release shall only be stored on the site in the location and manner described in the Application and subject to the conditions specified in Table 6.1.

TABLE 6.1			
Release from Process	Location of Storage on Site	Manner of Storage	Storage Conditions
Miscellaneous waste	L1	Skip	Hardstanding area

PART 7

REPORTING REQUIREMENTS

- 7.1** The Operator shall, in respect of the parameters and release points specified in Table A in Schedule 2, report the results of such samples and analyses, calibrations, examinations, measurements, tests and surveys as are taken and carried out in accordance with condition 1.7 and of any assessment made in accordance with condition 1.9.
- 7.2** The reports mentioned in condition 7.1 shall -
- (a) be made for the reporting periods and on the forms specified in that Table; and
 - (b) be sent to the Environment Agency at the Reporting Address within 28 days of the end of the reporting period to which the results refer.
- 7.3** The Operator shall by not later than 31 January in each year -
- (a) determine the best estimate of the total mass of each substance specified in Table A in Schedule 3 which was actually released during the preceding year; and
 - (b) send that estimate to the Environment Agency at the Reporting Address on Forms S3/AR/1 set out in Schedule 3.
- 7.4** The Operator shall supply to the Environment Agency at the Reporting Address on demand and without charge a copy of any specified or operational records as may be required.

PART 8

IMPROVEMENT PROGRAMME

The Operator shall complete the requirements specified in Table 8.1 by the date specified in that table and shall notify the Environment Agency, at the Reporting Address, of the date of completion of those requirements.

TABLE 8.1		
Reference	Requirement	Date
8.1	Submit proposals to the Environment Agency for sampling of site run-off water to provide data on the presence and extent of mercury and paraffin.	1 October 1997
8.2	Submit proposals to the Environment Agency for a programme of environmental monitoring to demonstrate the impact of NO _x releases from the process. NO _x monitoring is to be carried at locations to be agreed with the Environment Agency and the Vale of Glamorgan Council and is to commence 12 months prior to commissioning of the plant and continue for 24 months after commissioning of the plant. Thereafter the programme will be reviewed.	12 months before the start of process commissioning.
8.3	Put in place the Incident Response Manual for the Barry site submitted as part of the application.	Before the first day of process commissioning .
8.4	Beginning the first day of power generation document each start-up between the hours of 09 00 and 18 00 and include the period of start up, the weather conditions(mean wind speed and direction)and the maximum hourly mean concentration of oxides of nitrogen released from the 60m exhaust stack.	Report the details within 28 days of the end of each quarter.

PART 9**INTERPRETATION**

- 9.1** In this Authorisation the following expressions have the meanings hereby assigned to them.

"the Application" means the Application by the Operator dated 9 April 1996 and his responses to any notices served under Schedule 1 to the 1990 Act; and any additional information supplied by the Operator in writing.

"background concentration" has the same meaning as in Regulation 4(7) of the Environmental Protection (Prescribed Processes and Substances) Regulations (S.I.1991/472).

"controlled waters" shall have the same meaning as in Part III of the Water Resources Act 1991;

"public sewer" has the same meaning as in the Water Industry Act 1991;

"release point" followed by the letter A, W, E or S means respectively a point shown on a map or plan forming part of the Application for the release from the Authorised Process into the air, into controlled waters, into an on-site effluent treatment plant or into a public sewer.

"relevant wastes/release" means all wastes, other than releases into the air, controlled waters, any on-site effluent treatment system or any public sewer, arising from the Authorised Process.

"Reporting Address" means the address, from time to time notified to the Operator, for that purpose by the Environment Agency in writing.

"substance prescribed for water" means a substance prescribed by regulation 6(2) of the Environmental Protection (Prescribed Processes and Substances) Regulations (S.I.1991/472) and set out in Schedule 5 to those Regulations;

"year" means calendar year.

- 9.2** References in any condition to a release not exceeding a limit shall, in relation to a limit expressed to be a minimum, mean that the release shall not be less than that limit.

- 9.3** No condition in this Authorisation applies so as to regulate or apply to the final disposal by deposit in or on land of controlled waste within the meaning of Part II of the Environmental Protection Act 1990.

9.4 Unless otherwise stated, references to concentrations of substances in releases into air mean -

(a) in relation to combustion gases, the concentration in dry air at a temperature of 273 K, at a pressure of 101.3 kPa and with an oxygen content of 15% dry for gaseous fuels.

(b) in relation to non-combustion gases, the concentration at a temperature of 273 K and at a pressure of 101.3kPa, with no correction for water vapour content.

9.5 Any reference to the notification of information on a form set out in Schedule 2 or 3 may be made on a form substantially to the like effect as the form referred to.

SCHEDULE 1

NOTIFICATIONS IN ACCORDANCE WITH CONDITION 1.13

Part A

Name of Operator.

Location of Process.

Date information provided.

Name[s] of the prescribed substance[s] or other substance[s] which might cause harm.

Time, date and location of the release.

Best estimate of the quantity of the substance[s] released or the rate of release and the time during which the release took place.

Environmental medium into which the release took place.

Measures taken, or intended to be taken, to stop the release.

Part B

Any more accurate information on the quantity of the substance[s] released or the rate of the release.

Measures taken, or intended to be taken, to prevent a recurrence of the incident.

Measures taken, or intended to be taken, to rectify any environmental damage which has been or may be caused by the release.

The dates of any unauthorised releases from the process which have taken place in past 2 years.

NOTE

(a) If any information supplied is considered confidential, a statement of which information this applies to and the reasons why must be specified.

(b) Units used in Part A and Part B shall be the same as those specified for similar releases in this Authorisation.

SCHEDULE 2**REPORTING OF MONITORING DATA**

Parameters for which data shall be reported, in accordance with Part 7.1 of this Authorisation, are listed below.

The data should be submitted on forms included with this Schedule.

TABLE A			
PARAMETER	RELEASE POINT	REPORTING PERIOD	FORM NUMBER
Oxides of Nitrogen mg/m ³	A1	3 Months	S2/A/1
Carbon Monoxide mg/m ³			
Gas flowrate nm ³ /hr			

SCHEDULE 3**LIST OF SUBSTANCES FOR WHICH ANNUAL MASS RELEASES ARE REQUIRED****Authorisation Number AV4504**

(in accordance with Part 7.3 of this Authorisation)

The data should be submitted on forms included with this Schedule.

TABLE A			
SUBSTANCE	RELEASE POINT NUMBER	RELEASED TO	ANNUAL MASS RELEASE LIMIT/(kg) (where applicable)
Carbon Monoxide	A1	AIR	-
Oxides of Nitrogen	A1	AIR	-

ANNUAL RELEASES INVENTORY

Releases for Year 199_

Operator: AES Limited

Authorisation Number: AV4504

Location: CHP Plant, Sully Moors Road, Barry CF64 5RP

SUBSTANCE	RELEASE POINT No.	ACTUAL RELEASE (kg)	ANNUAL LIMIT (kg)
Carbon Monoxide	A1		-
Oxides of Nitrogen	A1		-

NOTE. If some of the information supplied is considered to be confidential, a statement of which information this applies to and the reasons why must be specified.

Signed on behalf of the Operator.....

Dated

S3/AR/1



DŴR CYMRU
WELSH WATER

Dŵr Cymru Cyf
Rhanbarth y De Ddwyrain
Heol Pentwyn
Nelson
Treharris CF46 6LY

Ffôn: (01443) 450 577
Ffacs: (01443) 451 748

100035/CTR12/BAR/17
Dŵr Cymru Cyf
South Eastern Division
Pentwyn Road
Nelson
Treharris CF46 6LY

Tel: (01443) 450 577
Fax: (01443) 451 748

(17)

RECEIVED 02 DEC 1997

Mr R. King,
AES Barry Ltd.,
Sully Moors Road
SULLY
Penarth

DATE
25th November 1997

CONTACT
Nia Derec

OUR REF.
TE 508

Dear Sir

CONSENT TO DISCHARGE

Ref. AES Barry Ltd., Sully Moors Road, SULLY, Penarth.

I herewith enclose the Authority's Consent to Discharge. I would be grateful if you could acknowledge receipt of this document by signing, detaching and returning the slip below.

Yours faithfully

Nia Derec

Nia Derec
TRADE EFFLUENT OFFICER

Enc

.....
To: Process Control, Environmental Services Section,
Cilfynydd Waste Water Treatment Works, Cilfynydd, Pontypridd,
CF37 4WX.

I acknowledge receipt of the Trade Effluent Consent No. TE508

Signed

Peter Hughes 2/12/97



A Hyder company

Dŵr Cymru Cyf, a limited company registered in Wales No 2366777
Registered office: Plas y Ffynnon, Cambrian Way, Brecon, Powys LD3 71HP
Dŵr Cymru Cyf, a limited company registered in Wales No 2366777



NOTE

**THIS IS AN IMPORTANT
DOCUMENT**

PLEASE KEEP IN A SAFE PLACE

**IF ANY ALTERATIONS ARE
PROPOSED WHICH MAY AFFECT
THE DETAILS OF THIS DOCUMENT,
THEN IT IS YOUR RESPONSIBILITY
TO INFORM THE TRADE
EFFLUENT OFFICER, IN WRITING,
AS IT MAY BE NECESSARY TO
REVIEW YOUR CONSENT.**



CONSENT No. TES08 OF 1997

DŴR CYMRU CYFYNGEDIG

WATER INDUSTRY ACT 1991

**CONDITIONAL CONSENT TO THE DISCHARGE
OF TRADE EFFLUENT TO THE PUBLIC SEWER**

TO: AES Barry Ltd. - the Owner and Occupier of the trade premises (herein called "the Occupiers") whose registered office is situated at Burleigh House, 17-19 Worple Way, Richmond, TW10 6AG.

RECITALS

1. The 29th day of October 1996 you applied for consent under Section 119 of the Water Industry Act 1991 for consent to discharge trade effluent from the following trade premises known as AES Barry Ltd and situated at Sully Moors Road, Sully, Penarth, South Glamorgan (hereinafter, the Application) which trade premises are for the purpose of identification only shown on the location plan attached hereto and marked "A" (hereinafter, "the said trade premises").
3. Compliance with the conditions hereunder shall be ascertained by reference to the method of analysis as from time to time employed by the Undertaker, its servants, agents or contractors, save where the said condition(s) otherwise expressly provide(s)

DWR CYMRU CYFYNGEDIG ("the Undertaker) in the exercise of its powers under Section 121 of the Water Industry Act 1991, and thinking it fit to impose conditions as hereinafter appear, **GIVES ITS CONSENT** to the discharge of trade effluent from the said trade premises into the Undertaker's public sewers, **SUBJECT TO THE FOLLOWING CONDITIONS AND NOT OTHERWISE**

- (1) The public sewer into which the trade effluent may be discharged is the 750mm more particularly identified by means of a line(s) coloured RED drawn on the plan attached hereto and marked "B".
- (2) The discharge of trade effluent shall be made at the point marked "X" on the said plan and the said trade effluent shall enter into the public sewer shown on the said plan at the point marked "Y" thereon and not otherwise. Further, no connection, linkage, conduit, pipe, channel or other communication whatsoever shall be made to the said sewer between the said points "X" and "Y" [without the prior approval in writing of the Undertaker]
- (3) The trade effluent to be discharged shall consist solely of that which was specified in the Trade Effluent Notice or application and derived [exclusively] from effluent derived from the regeneration of ion-exchange units, blowdown water from the steam cycle and discharge from the condensate polishing of the CHP plant combustion process - a process designated for centim control within the meaning of Section 138(2) Water Industry Act 1991
- (4) Without prejudice to condition 3 above, the nature and/or composition of the trade effluent which may be discharged is as specified in the FIRST SCHEDULE hereto
- (5) The trade effluent shall not include any of the substances or properties listed in the SECOND SCHEDULE hereto in concentration greater than stated therein
- (6) The maximum quantity of trade effluent discharged on any day (being any continuous 24 hour period) shall not exceed 200 cubic metres

- (7) The highest rate at which trade effluent may be discharged shall not exceed 20 cubic metres per hour.
- (8) The trade effluent shall only be discharged into the public sewer(s) at any time.
- (9) No uncontaminated condensing water shall be discharged.
- (10) There shall be eliminated from the trade effluent before it is discharged the matters listed below:
- (a) Effluent with a temperature in excess of 43° Celsius (110° Fahrenheit);
 - (b) Calcium Carbide;
 - (c) Petroleum Spirit within the meaning of Section 111 of the Water Industry Act 1991 and/or the Petroleum Act 1928, save as otherwise permitted herein;
 - (d) Other material forming a constituent of the trade effluent, whether alone or in combination with other materials, specified hereby as that which is explosive;
 - (e) Any other substance forming a constituent of the trade effluent which is hereby specified as that which is likely to injure the sewers or to interfere with the free flow of their contents or to affect prejudicially the treatment and disposal of their contents;
 - (f) Any other substance forming a constituent of the trade effluent which is hereby specified as that which in its pure state or in combination with other materials in the contents of the sewer(s) ("the sewage") is capable of producing toxic or flammable vapours.

- (11) No trade effluent shall be discharged the pH value of which is less than 6.0 or greater than 11.0
- (12) No trade effluent shall be discharged the nature or composition of which includes a matter, substance, property or matters, substances or properties which would constitute the trade effluent as Special Category Effluent within the meaning of Section 138 of the Water Industry Act 1991.
- (13) The Occupier shall give to the Undertaker prior written notice of any change in the process of manufacture, materials, or other circumstances howsoever arising capable of altering the nature and/or composition of the trade effluent. No new substances or properties shall be discharged until the Undertaker has agreed thereto, either with or without imposing a limit and thereafter the said substance(s) and/or property(ies) shall be deemed incorporated into the SECOND SCHEDULE
- (14) An inspection chamber or manhole shall be provided and maintained by the Occupier in a suitable position and/or at the point(s) marked "X" on the plan annexed hereto in connection with each pipe through which the trade effluent is discharged and such inspection chamber or manhole shall be constructed and maintained in accordance with the Undertaker's reasonable requirements as from time to time notified in writing to the occupier so as to enable a person readily at any time to take samples of the trade effluent being discharged.

- (15) A notch gauge, continuous recorder or some other apparatus suitable and adequate to the Undertaker for measuring and automatically recording the volume and rate of trade effluent so discharged shall be provided, such apparatus to be tested and maintained in accordance with the Undertaker's reasonable requirements as from time to time notified in writing to the Occupier.
- (16) Apparatus capable of accurately determining, measuring and recording the nature and/or composition of the trade effluent discharged shall be provided, such apparatus to be tested and maintained in accordance with the Undertaker's reasonable requirements as from time to time notified in writing to the Occupier.
- (17) The Occupier shall keep records of the volume, rate, nature and/or composition of the trade effluent discharged into the sewer(s) at all times available for inspection by any authorised officer of the Undertaker and copies of such records shall be sent to the Undertaker on demand.
- (18) (a) The Occupier shall pay to the Undertaker charges for the reception, conveyance, treatment and disposal of the trade effluent and the costs of sampling, measuring and/or analysis of the same under the Undertaker's trade effluent's functions, which charges shall be determined as set out below, and all sums payable under this condition shall be payable upon demand;
- (b) The charges under (a) above shall be calculated in accordance with Undertaker's Scheme of Charges as from time to time amended,
- (c) For the avoidance of doubt, the charge shall be payable by any person who is or was the Occupier of the said trade premises during the period of discharge of the trade effluent or at the time payment is due.

- (19) If the notch gauge, meter, recorder or other apparatus ceases to record or is suspected of not recording and/or measuring accurately, the quantity of trade effluent discharged into the sewer(s) during the period from the date and/or time at which the records were last accepted by the Undertaker as being correct up to the date when the notch gauge, meter, recorder or other apparatus again registers accurately shall for the purpose of any payment to be made under these conditions be based on the average daily volume of trade effluent discharged during the preceding period over which the records were last accepted by the Undertaker as being accurate or during the month immediately after the notch, gauge, meter, recorder or other apparatus or means of measurement and recording has been accurate whichever is the higher.

YOUR RIGHT OF APPEAL

Any person aggrieved by:- The refusal of a Sewage Undertaker to give consent for which application has been made to the Undertaker under Section 119 of the Water Industry Act 1991;

OR

Any condition attached by a Sewage Undertaker to such consent may appeal to the
Director General of Water Services at City Centre Tower, 7 Hill Street,
Birmingham B5 4UA

On an appeal in respect of a refusal to give consent, the Director may give the necessary consent either unconditionally or subject to such conditions as he thinks fit to impose


On an appeal in respect of a condition, the Director may take into review all the conditions whether appealed against or not and may substitute for them any other set of conditions (whether more or less favourable to the Appellant) or annul any of the conditions and may include provision as to the charges to be made in pursuance of any condition attached to a Consent for any period before the determination of the appeal

On any appeal the Director may give direction that the trade effluent shall not be discharged until a specified date.

FAILURE TO COMPLY WITH CONDITIONS

If in the case of any trade premises a condition of the Consent or this Direction is contravened, the occupier of the premises will be guilty of an offence and liable on conviction by a Magistrates' Court to a fine not exceeding the statutory maximum or on conviction by the Crown Court to an unlimited fine.

DATED

November 25th 1997 

Signed: **STUART FISHER**

Designation: **PROCESS CONTROL OFFICER**

Address: **SOUTH EASTERN DIVISION
PENTWYN ROAD
NELSON
Treharris
MID GLAM. CF46 6LY**

First Schedule

The nature and composition of the trade effluent is. -

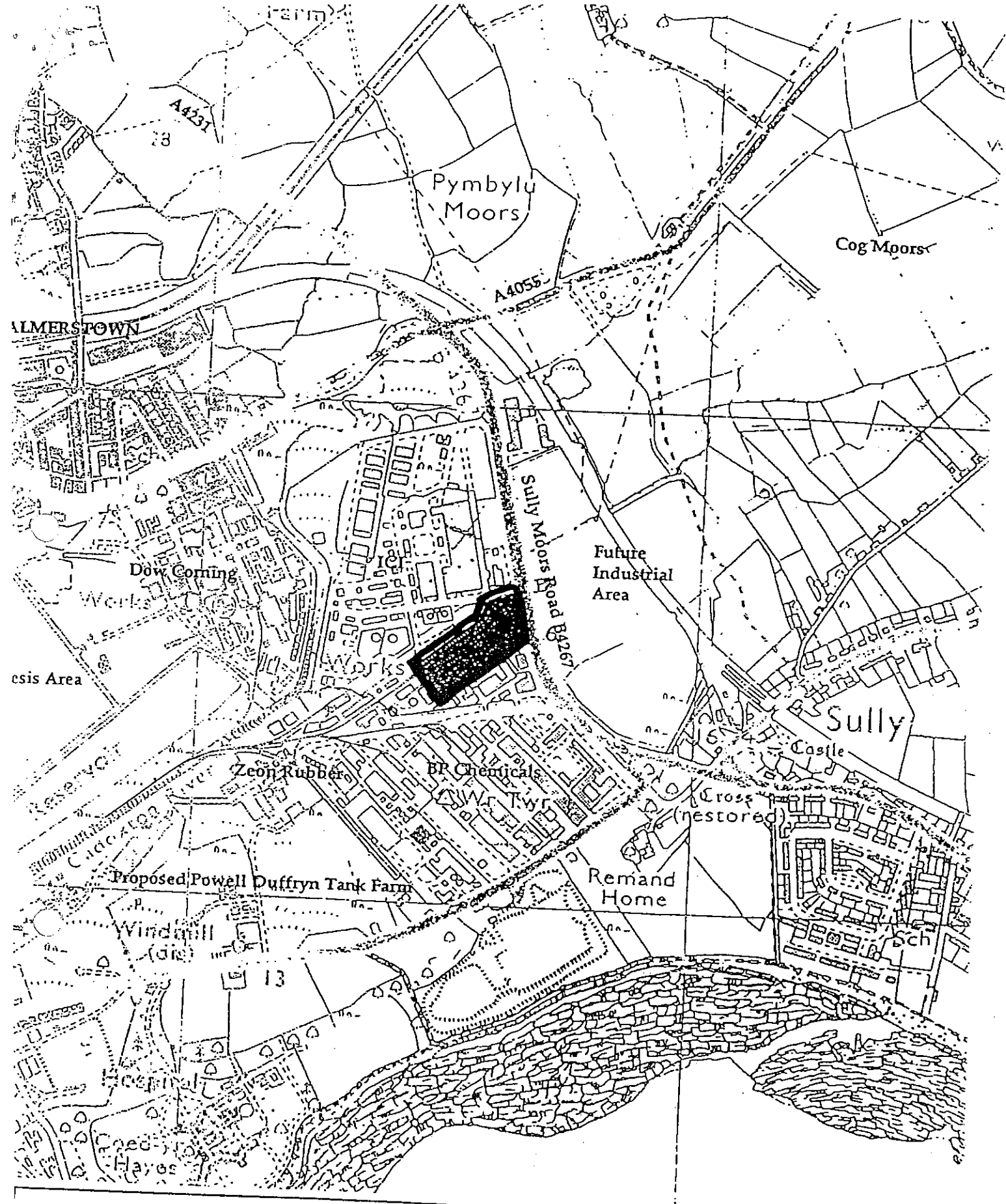
Effluent derived from the regeneration of the ion exchange units, blowdown water from the steam cycle and discharge from the condensate polisher water which will be collected in a neutralisation tank and pH controlled

Second Schedule

1. Total suspended solids of the trade effluent shall not exceed 400 milligrams per litre
2. Free or emulsified grease or oil shall not exceed 100 milligrams per litre.
3. Anionic synthetic detergent as manoxol OT shall not exceed 50 milligrams per litre
4. Total Chemical Oxygen Demand shall not exceed 1000 milligrams per litre.
1. Total ammonia shall not exceed 50 milligrams per litre (expressed as N).

Third Schedule

Not Applicable



SITE LOCATION

DWR CYMRU - WELSH WATER

Barry CHP Site

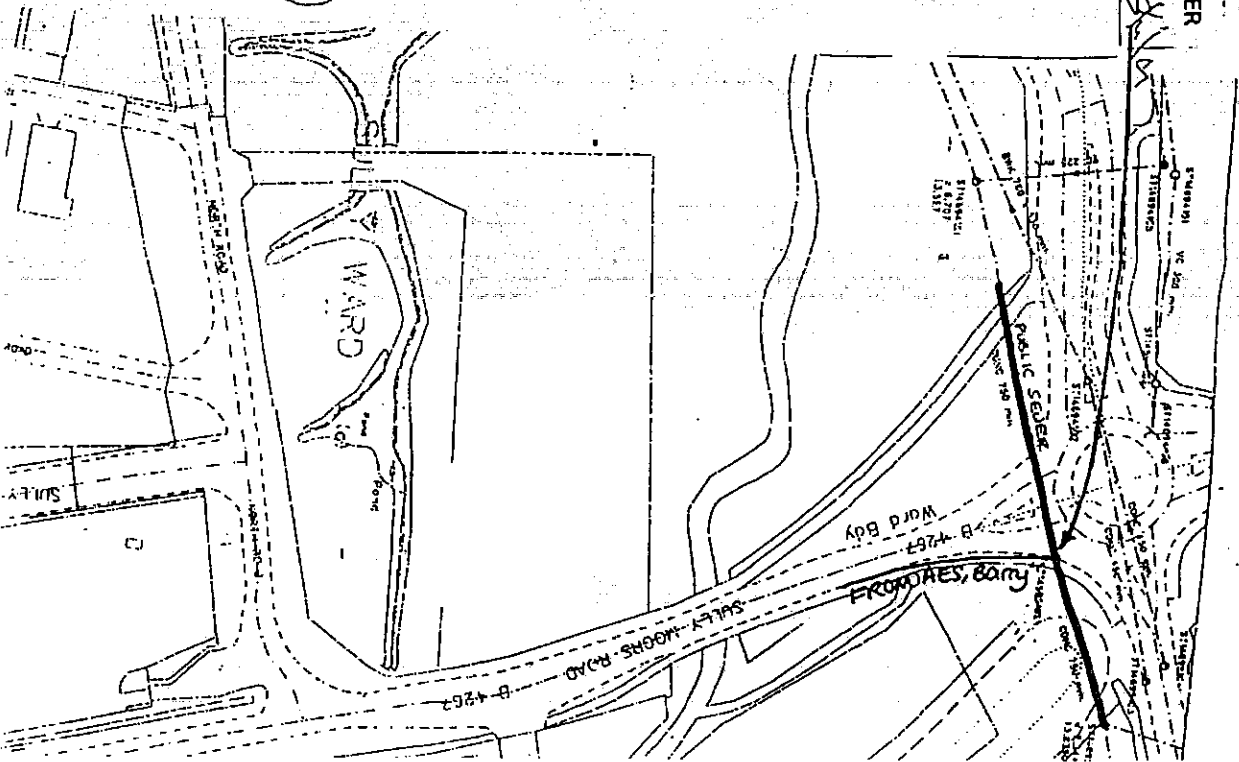
CONSENT PLAN A

0 100 200 300 Meters
Scale 1: 10,000

Based upon the Ordnance Survey map
with the permission of the Controller of

DISSENT PLAN B

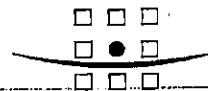
DWR CYMRU - WELSH WATER
~~CONSENT POINT~~ 23



~~SAMPLE~~ POINT: X

WASIE WALE SYSTEM (MOR) RELIABLE

11



ROYAL HASKONING

**POSFORD HASKONING LTD
ENVIRONMENT**

Phase I Land Quality Assessment
AES Barry Power Station

19 March 2003

Final Report

Russell Bowler Environmental

A handwritten signature in dark ink, appearing to read 'Russell Bowler', is written over a dark, horizontal, brush-stroke-like background.

**ROYAL HASKONING****POSFORD HASKONING LTD
ENVIRONMENT**

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Author(s)

Philip Harker

Client

Russell Bowler Environmental

Reference

9M7465/R/PH/PBor

Drafted by Philip Harker

Checked by Stuart Cassie

Date/Initials check

Approved by Philip Harker

Date/initials approval

SUMMARY

PHASE I LAND QUALITY ASSESSMENT

Barry Power Station

Project Brief

Posford Haskoning Ltd. (a company of Royal Haskoning) was appointed by Russell Bowler Environmental to undertake a Land Quality Assessment of Barry Power Station. The aim of the assessment is to gather data and assess any potential land quality liability that may be associated with the acquisition of the business, through:

- Identification of substances in or under the land that may cause a pollution risk (past, present and future);
- Providing information on the site sensitivity (e.g. groundwater vulnerability);
- Creating a conceptual model of the site;
- Assessment of any potential environmental liabilities that may be associated with contamination, hazardous materials, site processes and practices; and
- Making recommendations for further action.

Site Setting & Environs

The site comprises a single fuel power station, located in Sully within the Vale of Glamorgan, South Wales. The site is located within an industrial area, being bordered on three sides by chemical and manufacturing sites, and on the fourth side by the main access road.

The principal environs at the site are:

- Geology – made ground is present at the site which rest on the drift geology comprising alluvium, overlying Triassic Mercia Mudstone, which in turn overlies Carboniferous Limestone
- Hydrogeology – the site is underlain by a major aquifer. It is reported that major aquifers within this area comprise the Mercia Mudstone Group marginal facies (where it overlies Carboniferous Limestone) and the Carboniferous Limestone.
- Hydrology – the Sully Brook is situated approximately 50m south of the site, flowing eastwards. Drainage ditches run southward, either side of Sully Moors Road (B4267), and connect to Sully Brook just south of the entrance to the site

Conceptual Model

Potential sources of contamination:

- Mercury contaminated soil.
- Possible process / site drainage water.
- Neighbouring land uses.
- Previous underground infrastructure.
- Ground gases.

Potential pathways of contaminant migration:

- Permeable soils
- Infrastructure & foundations.
- Perched groundwater.
- Direct contact.
- Indirect contact.

Potential vulnerable receptors:

- Site users (highly sensitive).
- Groundwater (highly sensitive).
- Surface water (highly sensitive)
- Neighbouring properties & land use (low sensitivity)
- Ecological receptors (low sensitivity)

Risk Assessment

A qualitative risk assessment for the site has been undertaken. From reviewing the historic and current environmental information, and developing the conceptual model, the following risks (defined in Section 6.1) have been identified in relation to the site in its current setting:

Hazard	Risk
• Risk to human health – future site workers	Low
• Risk to groundwater	Medium
• Risk to surface water	Low
• Risk to neighbouring property and land use	Negligible
• Risk to ecological receptors	Negligible

Other Areas of Potential Concern

The majority of the floors of the buildings appear to be in good condition, and of a construction likely to be resistant to minor spills and leaks (although no structural inspection was possible).

Conclusions & Recommendations

The conclusions are as follows:

- The principle contamination risk at the site does not relate to the current operations but rather the historic processes and operations that have taken place at the site. Several site investigations have been undertaken across the site, and mercury contamination has been identified. Although some remediation has taken place, it is not certain that this effectively dealt with all the impacted area, however, the risk relates not the presence of mercury hot spots but the impact that any such contamination may have on identified receptors. The conceptual model has identified that the risk to site workers is relatively low but potential impacts to the underlying groundwater may be moderate (due to the construction methods employed at the site (i.e. piling)).
- Further contamination risks may be present from the unknown integrity of the process / site drainage water below ground collection sump situated in the Tank Farm area operated by the neighbours (BP Chemicals).
- Other risks may include:
 - substances trapped in historic underground infrastructure
 - release of substances from surrounding chemical sites
 - potential ground gas / radon

Although the identified potential risks exist, they are not considered to be of such a scale to inhibit the transaction to proceed given that appropriate risk management techniques, as outlined below, are employed.

1 SITE DETAILS

Posford Haskoning Ltd was commissioned to undertake a Phase I Land Quality Assessment of the AES Barry Power Station site. This investigation has been undertaken with all reasonable care and diligence and the assessment, conclusions and recommendations made accordingly. The limitations of this type of investigation are presented in Appendix A.

1.1 Site Location

The site is located at the just off Sully Moor Road (B4267) at national grid reference 314550 168500.

A general location map is presented in Figure 1. The address of the site is:

AES Barry Power Station
Sully Moors Road
Sully
Vale of Glamorgan
CF64 5YU

1.2 Site Ownership

It is believed that the site is owned by AES Barry Operations Ltd.

1.3 Site Setting

The site is located in an industrial area close to Barry Docks. The site is bordered on three sides by industrial chemical sites, to the north by ICI, to the west by BP Chemicals and to the south beyond South Road by Kooltherm (although this site is now disused).

Full details of the site setting can be found in the Envirocheck report, included as Appendix B.

2 SITE HISTORY

2.1 Site History

The following presents a review of the historical Ordnance Survey maps 1878 – 1999 (copies included as Appendix C). Key features and potential polluting or sensitive developments are referenced.

Map ID	Observation
1878-79	<ul style="list-style-type: none"> The site and surrounding area is undeveloped farmland. Two farm ditches appear to be crossing the site, running NE-SW.
1900	<ul style="list-style-type: none"> The site and surrounding area is marked as 'Sully Moors'. No drainage ditches are shown. Sully Brook, approximately 100m to the south of the site is shown.
1901	<ul style="list-style-type: none"> The area is marked 'liable to flooding'. A 'Timber Pond' is marked under construction approximately 500m west of the site. Residential development is present approximately 400m to the east south east of the site.
1920	<ul style="list-style-type: none"> No significant change.
1921 - 22	<ul style="list-style-type: none"> The site remains undeveloped A railway spur is present approximately 400m to the southwest of the site, leading to the 'Anchor Patent Fuel Works', running alongside a 'fresh water reservoir'.
1943	<ul style="list-style-type: none"> No significant change.
1947	<ul style="list-style-type: none"> The site is developed with buildings and tanks shown. A 'Magnesite Works' is present approximately 300m to the west of the site, with pipelines extending into the 'timber pond'. The 'Anchor Patent Fuel Works' is no longer shown. Railway sidings enter the site from the east, diverging to the south and also along the site's northern boundary. Further siding extend to the north of the site, between a series of rectangular units presented in rows.
1956	<ul style="list-style-type: none"> The site is further developed as a chemical plant with various building and tanks shown, appearing to be part of a chemical works located to the south.
1964	<ul style="list-style-type: none"> The site remains shown as part of a chemical works, with tanks, pipelines and buildings shown. The area to the north of the site is now developed. The development includes buildings, tanks, pipelines and further railway sidings, and is believed to represent another or expanded chemical works.
1970	<ul style="list-style-type: none"> The site is unchanged. The area to the north of the site is further developed with tanks and cooling towers, and is now labelled as 'Chemical works'.
1971	<ul style="list-style-type: none"> No significant change.
1972 - 75	<ul style="list-style-type: none"> No significant change to the site. Further residential development to the east south east of the site has occurred.

	<ul style="list-style-type: none"> • x2 low pressure & x2 high pressure pumps
Diesel Pump Building	<ul style="list-style-type: none"> • emergency fire water pump • 200 gal (CONVERT) bunded diesel tank – there is a drainage gully (connected to the site drainage system) located within the floor of the bund, although this was blocked with a temporary expanding drain bung • x2, 5 litre containers of oil
Tank Farm	<ul style="list-style-type: none"> • service water tank – stores incoming main water • site effluent water tank (storage prior to discharge to trade effluent sewer) • demineralisation Tank – treats and stores water for the process • neutralising Tank – treats effluent water prior to storage in effluent tank • below ground foul sewage treatment unit (biological) for on-site toilets etc.
Generator Building	<ul style="list-style-type: none"> • external bunded chemical loading area drains to a underground sealed collection pit during operation (drains via pipe and cut off tap to yard drainage whilst not in operation) • main reservoir oil tank (approx. 15,000 litre) located internally within a bunded area • water treatment chemicals (amine and oxygen scavengers in IBU containers) stored internally in bunded area & an ion exchange unit • 20,000 litre acid and 20,000 litre caustic tanks stored internally in separate bunds
Emergency Diesel Generator	<ul style="list-style-type: none"> • external 250 gal (CONVERT) bunded diesel tank with feed to the emergency diesel generator – there is a drainage gully (connected to the site drainage system) located within the floor of the bund, although this was blocked with a temporary expanding drain bung
In addition, an area of land to the east of the site (beyond East Road) is owned by AES	
Open land	<ul style="list-style-type: none"> • grassed field with electricity pylons running across it
Within the main site is a small substation, referred to as Sully Moor Rd Substation, which is outside the ownership of AES	
Substation	<ul style="list-style-type: none"> • three transformer bays, constructed of concrete floor and brick wall on 3 sides • only one bay still has a transformer within it • other bays are used by AES (unwritten agreement) to store various materials • x7, 205 litre plastic drums of detergent (trade name 'protoklenz') • x2, 205 litre empty metal rusted drums
Furthermore, there is an incoming compound owned by Transco within the Power Station boundary.	
Incoming	<ul style="list-style-type: none"> • main incoming gas pipe

4 ENVIRONMENTAL SETTING

4.1 Geology

Details of the geology at the site were obtained from the Solid Geology and Drift Geology (sheet 263) 1:50,000 scale maps published by the British Geological Survey (BGS).

The drift geology at the site comprises Quaternary Alluvium deposits.

The solid geology comprises Triassic age Mercia Mudstone Group and marginal facies up to 35m thick. An unconformity separates the Mercia Mudstone from the Carboniferous Limestone underlying it.

Previous site investigation (see Section 5) and BGS boreholes in the area have confirmed that the geological sequence present at the site is:

- Made ground from 0.6 to 1.6m bgl consisting of cobbles, boulders, rock, clay, sand, slag gravel and concrete.
- Soft to firm grey brown clay from 1.5 to 8m bgl (thought to represent the Alluvium).
- Limestone pebbles from circa 8 to 11m bgl (thought to represent the Mercia Mudstone Group).
- Grey green limestone from circa 11m bgl (thought to represent the Limestone).

4.1.1 Radon

The site is located in an area where radon may be present at such levels to warrant protective measures to be installed.

4.2 Hydrogeology

The Environment Agency Groundwater Vulnerability map (sheet 36) identifies that the site is underlain by a major aquifer.

Major aquifers are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions. It is reported that major aquifers within this area comprise the Mercia Mudstone Group marginal facies (where it overlies Carboniferous Limestone) and the Carboniferous Limestone

There are no known groundwater abstractions within 250m of the site.

4.3 Hydrology

Sully Brook is situated approximately 50m south of the site, flowing eastwards. Drainage ditches run southward, either side of Sully Moors Road (B4267), and connect to Sully Brook just south of the entrance to the site.

The Cadoxton River flows generally south-eastwards approximately 200m north of the site. This river is classified as 'fairly good' quality under the Environment Agency's General Quality Assessment criteria.

The site is located with the Environment Agency indicative fluvial floodplain.

4.4 Ecology

Five Sites of Special Scientific Interest (SSSI) are within the general locality of the site, two of which are also Local Nature Reserves (LNR), these being:

- Cliff Wood – Golden Stairs SSSI and LNR (circa 5km west of the site).
- Penarth Coat SSSI and Lavernock LNR (circa 3.5km east of the site).
- Comeston Park SSSI (circa 2.5km north east of the site).
- Barry Island SSSI (circa 3.5km south west of the site)
- Sully Island SSSI (circa 2.5km south east of the site)

5 PREVIOUS INVESTIGATIONS & DATA GAPS

Several site investigations have been undertaken at the site, as summarised below:

5.1 TC Engineering Services Investigation, May 1993

This investigation was reported within the AES Barry CHP Plant, Environmental Statement report, dated 1996 and comprised 11 trial pits to a maximum depth of 3.2m. Ten soil samples were analysed for a relatively limited range of determinants, mainly metals, considering the past use of the site. Four water samples (obtained from water ingress into the trial pits) were also obtained. The investigation identified elevated levels of mercury within the soil at two locations and slightly elevated levels of paraffin oil within the groundwater (although this would not be regarded as been representative of the local groundwater due to the collection methodology).

This investigation also reported that historic on-site service pipes were present and that potentially contaminated substances may be contained within them.

5.2 Wimtec, December 1996

This investigation (reported on within the Rust Environmental report (see below)) comprised 9 trial pits, from which six soil samples were obtained. The result of analysis confirmed the mercury contamination identified within the 1993 investigation, and also identified elevated levels of phenol within the same area.

5.3 Construction Phase Investigation, 1997

During the construction of the CHP plant, during the installation of the fire main, an area of mercury contamination was uncovered, prompting a remediation exercise and further site investigation.

It is worth noting that the area of contamination was uncovered by accident (as part of the construction process) and did not relate to the 1993 investigation (reported in the 1996 Environmental Statement) which identified elevated mercury concentrations in this area of the site. This is worrying as the risks identified within the Environmental Statement should have been proactively addressed as part of the Power Station construction, rather than been left to chance discovery as was the case.

The mercury uncovered during the construction process was visible to the naked eye, and the remediation exercise undertaken was done so based on visual observations. There is some correspondence (Rust Environmental letter dated 16 May 1997, to Paul Wilson of Rust Kennedy & Donkin Ltd) that intimates that the Environment Agency were contacted and agreed to soil being excavated to 2m in depth.

5.4 Rust Environmental Investigation, January 1997

The Rust Environmental investigation was undertaken after the identification and removal of the mercury and phenol contaminated material identified during the construction phase of the power station. This investigation comprised 8 trial pits with 25

soil samples being analysed (15 samples taken by AES Barry Ltd and 10 samples taken by Rust Environmental).

The results of the investigation did not identify any significant elevated levels of contaminants across the site.

5.5

Data Gaps

From reviewing the previous investigations undertaken at the site relative to its environmental setting, development history, and proposed acquisition, the following data gaps have been identified:

- Groundwater quality – unfortunately no permanent groundwater monitoring wells have been installed at the site. Whilst some snap shot data has been acquired of the perched groundwater, prior to the construction of the current buildings, no monitoring has been undertaken since, and as the current building was of a pile foundation design, there is a potential that migration pathways may have been created.
- Historic on-site services – may be present and may contain contaminating substances.
- Ground gas – peat was identified within the alluvium underlying the site. This has the potential to generate methane and may present a risk.
- Mercury contamination – may still be present at the site, as the investigations do not appear to have concentrated on delineating the known hot spot. Anecdotal information suggests that the 'remediation' of mercury contamination was based on visual observations. No site chemical data exists relative to its potential toxicological (i.e. organic form) nature. In addition, various acids have been used at the site (by both current and previous occupiers) which may have increased potential mobilisation of contaminants.

6 ENVIRONMENTAL RISK ASSESSMENT

6.1 Risk assessment guideline

For 'contaminated land' to exist a valid contaminant linkage must be present, that is, there should be a source of contamination, a pathway by which the contamination may migrate and a target where 'significant harm' or pollution of controlled waters may result. Should any element of this contaminant linkage not be present (or severed) then the land may not be regarded as contaminated land, as defined by the Environment Protection Act 1990 (amended).

The risk rating terms used to describe the risks identified at the site are based upon the Department of Environment (now Department of Environment, Fisheries and Rural Affairs), Contaminated Land Research Report series (CLR Report No. 6) site prioritisation and categorisation rating system, as defined below:

Contamination risk rating terminology:	
High risk	<ul style="list-style-type: none"> Contaminants very likely to represent an unacceptable risk to identified targets Site probably not suitable for current use Enforcement action possible Urgent action required
Medium risk	<ul style="list-style-type: none"> Contaminants likely to represent an unacceptable risk to identified targets Site may not be suitable for current use Action required in the medium term
Low risk	<ul style="list-style-type: none"> Contaminants may be present but unlikely to create unacceptable risk to identified targets Site probably suitable for current use Action unlikely to be needed whilst site remains in current use.
Negligible risk	<ul style="list-style-type: none"> If contamination sources are present they are considered to be minor in nature and extent Site suitable for current use No further action required
Based upon the DoE CLR report No. 6 'Prioritisation and categorisation procedure for sites which may be contaminated'	

Where no data exists then a professional judgement has been made to determine the potential risk that may be present.

The following presents a conceptualisation of the source, pathway, receptor contaminant linkage model to enable potential risks to be identified.

6.2 Conceptual model

6.2.1 Potential Sources

Contamination sources can include neighbouring land uses and historical activities both on and off site. The environmental assessment has identified the following potential contamination sources:

- Mercury contaminated soil – It is unclear whether complete remediation of mercury contaminated soils has taken place. Certainly some excavation and backfilling occurred during the construction process but it is reported that this was undertaken based upon visual observation only, within an area determined by construction parameters. It is possible that areas of mercury contamination still exist at the site as discrete hot spots.
- Possible process / site drainage water – It is unknown whether the below ground collection sump situated in the Tank Farm area operated by the neighbours (BP Chemicals) receives site drainage or process waters. Furthermore, the integrity of the sump is not known. It is possible that this sump may be a source of contamination to the site.
- Neighbouring land uses – The site is surrounded by chemical facilities which have the potential to release chemicals into the environment. Any such releases may impact the sites environs.
- Previous underground infrastructure – Previous investigation reports (prior to the construction of the current site) identified the presence of substances within underground pipes (from the former chemical works on the site). It is unknown whether all such infrastructure was appropriately removed during the construction process. Therefore, remaining substances in such infrastructure may be a potential source of contamination to the site.
- Ground gas – Previous investigations have identified that peat layers may be present within the Alluvium. Peat is recognised as a potential risk of natural ground gas generation (methane and carbon dioxide). In addition, the general area of the site may be at risk from radon.

6.2.2 Potential Pathways

The following potential migration pathways may be present at the site:

- Soils - Permeable made ground is present at the site which would allow the migration of contaminants (if present). Beneath the made ground, the Alluvium may act as a low permeability zone, reducing the potential for contaminants to migrated vertically.
- Infrastructure & Foundations – It is understood that piles were used as the principal foundation type. These piles extended to circa 12m bgl, and therefore may have penetrated the Alluvium which may be acting as a low permeability barrier to potential contaminant migration. As such, the construction design of the existing

operations may have increased the risk of contaminant migration to the underlying major aquifer.

- Perched groundwater – Perched groundwater has been identified within the made ground (resting on the Alluvium) and may act as a potential pathway for contaminant migration, if present.
- Direct Contact - From contaminants that may be at or near the surface or which become exposed through excavation / development / repair to subsurface.
- Indirect Contact - From airborne particles, ground gases and vapours which might be present on site.

6.2.3 Potential Targets

In relation to this site, the receptors that may be significantly harmed or polluted by potential contaminative materials (if present) are considered to be:

- Site users – are considered to be a sensitive receptor, as people working at the site are potentially at risk via direct contact (dermal), ingestion or inhalation of contaminants present in soil, water or vapours (if present), especially if undertaking ground maintenance or repair.
- Groundwater – is considered to be of high sensitivity, as perched groundwater was noted at shallow depth. The site is also located within an area of major aquifer.
- Surface water – is considered to be of high sensitivity due to the presence of Sully Brook just to the south of the site, and an unnamed drainage ditch (connected to Sully Brook) bordering the site to the east.
- Neighbouring properties & land use – is not considered to be a sensitive receptor due to its industrial nature.
- Ecological receptors (i.e. fauna and flora) – are considered to be of low sensitivity, as the site is reasonable distance from any sensitive ecological feature.

6.3 Risk Assessment

From analytical results from samples obtained during the previous site investigation (reported in Section 5) and utilising relevant soil and groundwater intervention values, a conceptual risk model (source, pathway and target contaminant linkage model) was developed. The following risks have been identified for the site in relation to its future use as residential housing:

Hazard	Risk
Risk to human health –site users	Low
Risk to groundwater	Medium
Risk to surface water	Low
Risk to neighbouring property and land use	Negligible
Risk to ecological receptors	Negligible

In summary, the environmental assessment has identified a low risk at the site with respect to human health site users and to surface water. The risk to neighbouring property and land use, and to ecological receptor was considered negligible. A medium risk to groundwater has been identified, due to the potential migration of contaminants which may have occurred through the piling operation as part of the power station construction.

6.4 Risk Management

The following liabilities have been identified with respect to this site:

6.4.1 Legal Liability

The key legal issues associated with potentially contaminated sites relate to environmental protection, waste management, planning and development and health and safety. Dependant upon the legislation the liability can be strict, retrospective, joint or may be shifted from one responsible person to another as under the Environmental Protection Act 1990, Part IIA. Within the UK there is a distinction between current operation sites that may be causing contamination and residual contamination from historic processes.

It is principally historic contamination that has to be considered in relation to the acquisition of this site. The following key guidance and legislation may be applicable:

- Environmental Protection Act (EPA) 1990, Part IIA (implemented via the Contaminated Land (England) Regulations 2000) – These regulations provide the definition of 'contaminated land', which in summary is any land which appears to be polluted such that significant harm is, or may be, caused to a receptor (including man, his property, the environment and controlled waters). This is based upon a valid contaminant linkage being present, that is, there should be a source of contamination, a pathway by which the contamination may migrate and a target where 'significant harm' or pollution of controlled waters may result. Should any element of this contaminant linkage not be present (or severed) then the land may not be regarded as 'contaminant land'.

Under these regulations enforcing authorities are able to prosecute and require remediation of contaminated sites to be undertaken, recovering reasonable costs from the appropriate person(s), based upon the suitable for use criteria.

Appropriate person(s) fall into two categories; Class A persons who caused or knowingly permitted the contamination to occur and Class B persons who may be the current owner / occupier of the land.

- Water Resources Act 1991, section 85 – Under this section it is an offence to cause or knowingly permit pollution to enter controlled waters (surface water and groundwater). Enforcing authorities are able to prosecute and require remediation of contaminated sites where pollution of controlled water has taken place.

- Water Resources Act 1991, section 161 – Under this act, the Environment Agency has the powers to undertake remedial works and recover the costs from the appropriate person(s).
- Environmental Protection Act 1990, Part II (waste management) – This provides the framework relative to waste management and control, including controlling the unauthorised deposition of waste material onto a site. The enforcing authority can require wastes to be removed and remediation of any impact caused by the waste deposition.
- Health & Safety at Work etc. Act 1974 – Applies to sites still in use as industrial premises, which should be kept in a safe working condition. The presence of contamination may represent a risk to employees or visitors, and should be reduced to an acceptable level under the Act.

6.4.2 Financial Liabilities

The principal business risks relate to the financial and legal liabilities associated with the potential contamination at the site, including:

- Investigation costs – associated with further defining and delineating potential contamination.
- Voluntary Remedial costs – associated with remediating the site to the “suitable for use” standard and to protect other environmental receptors.
- Potential Legal costs – relative to potential legal action which may be instigated by an enforcing authority (statutory) or individual (civil) relative to potential contamination (see section 7.1). The financial liability associated with this may take the form of:
 - Fines – as imposed by a court.
 - Enforced remediation – the cost (or recharge from an enforcing authority) in undertaking remedial works.
 - Legal costs – associated with dealing with all of the above relative to solicitor and barrister costs.
 - Company costs – relative to diverted management time and resources needed to resolve such environmental issues.
- Company reputation – may be damaged, which may impact share price
- Business disruption – caused through investigation and remedial works.
- Land value – may be reduced and impact any loans secured

6.4.3 Business Risk Management

In this instance, the potential environmental risks that exist at the site may translate to business risk, impacting the business both legally and financially. However, with appropriate risk management and control strategies, these risks can be recognised and managed effectively.

The various options of risk management stem from a fundamental understanding of the risks involved. Where risks can not be clearly defined or the potential that adverse risk may still be present (residual risk), as in this case, then the management of those risks becomes a fine art and ultimately a commercial decision must be made.

In this instance, the following risk management options may be considered:

- Due Diligence – continued investigation to determine the potential risk involved more clearly, thereby aiding determination of potential residual risk. The result of such due diligence may be to recommend remedial action (risk reduction) be undertaken.
- Legal exclusion – attempting to position the company so that it may claim one of the EPA 1990 Part IIA exclusion tests. However, this option is fraught with uncertainty as to how the regulators or the courts will ultimately interpret the exclusion tests.
- Contractual risk transfer – utilising appropriately worded warranties and indemnities as a mechanism for allocating risk between the vendor and purchaser in relation to the known or perceived contamination risks.
- Risk Financing – through building up or allocating sufficient funds to cover potential losses, should they occur. However, this may impact the company's balance sheets as provisions are set against the potential loss.
- Risk transfer – utilising appropriate insurance to cover potential losses, although premium costs and policy wording (i.e. length of cover) and general hardening of the market have reduced the attractiveness of this option.

We suggest that a combined approach focusing on risk and liability mitigation be adopted, through continued due diligence (as recommended in this report) and appropriately worded contractual risk transfer mechanisms (i.e. warranties).

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The following conclusions may be drawn from this report::

- The principal contamination risk at the site does not relate to the current operations but rather the historic processes and operations that have taken place at the site. Several site investigations have been undertaken across the site, and mercury contamination has been identified. Although some remediation has taken place, it is not certain that this effectively dealt with all the impacted area, however, the risk relates not only to the presence of mercury hot spots, but also to the impact that any such contamination may have on identified receptors. The conceptual model has identified that the risk to site workers is relatively low but potential risks to the underlying groundwater may be medium (due to the construction methods employed at the site (i.e. piling)).
- Further contamination risks may be present from the unknown integrity of the process / site drainage water below ground collection sump situated in the Tank Farm area operated by the neighbours (BP Chemicals).
- Other risks may include:
 - substances trapped in historic underground infrastructure
 - release of substances from surrounding chemical sites
 - potential ground gas / radon

Although the identified potential risks exist, they are not considered to be of such a scale to inhibit the transaction to proceed, given that appropriate risk management techniques are employed, as recommended below.

7.2 Recommendations

From an assessment of the information contained within this report the following recommendations are made:

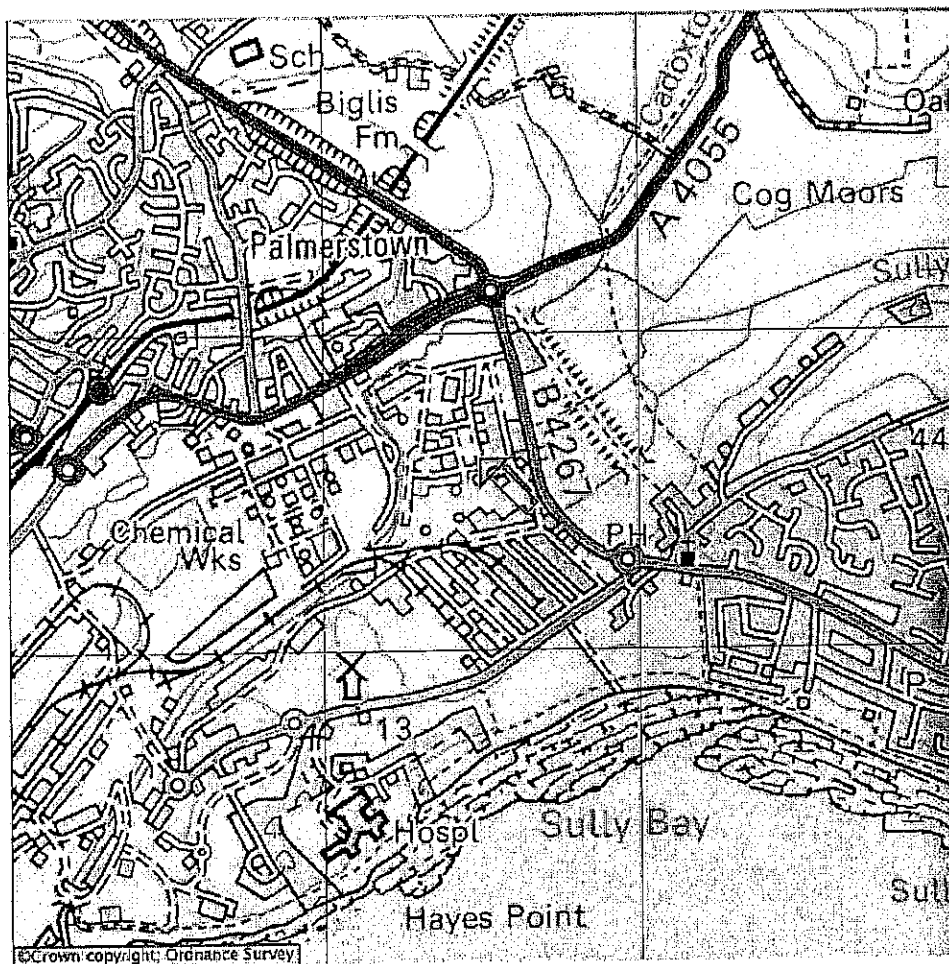
- Further inquiry be made into the structure and integrity of the below ground collection sump utilised by the neighbouring chemical company. In addition, confirmation with regard to the volume and type of discharge (i.e. process or drainage) which circulates via this sump should be obtained and reviewed.
- Further inquiry into the final construction design of the buildings should be initiated with regard to whether they included any passive gas venting or gas membranes to prevent the ingress of radon and/or ground gas.
- Investigation of potential impact to underlying groundwater resources are considered necessary, due to the pile foundation construction of the existing buildings, which may have created migration pathways, and the local setting of the site. This

investigation may also provide further information relative to the potential impact from the below ground collection sump,

Such an investigation should incorporate:

- Circa 6 boreholes – to penetrate to the limestone strata beneath the site and be installed for groundwater monitoring. These boreholes to be located around the perimeter and central to the site.
- Soil samples would be obtained from the boreholes and analysed for a range of determinants
- Although further investigation to delineate and confirm the presence or absence of mercury contamination would be useful, it is considered that such an investigation would create significant disruption to on-site activities. In addition, the risk of such contamination being present is relative to its potential impact and it is considered that the site construction minimises risk to site users. The potential risk to groundwater is covered by the preceding recommendation.
- In addition, we would recommend that contractual provisions are put in place to warranty or indemnify the purchaser against potential losses incurred due to potential contamination. Such provisions should, at least, cover the potential mercury contamination and risk to groundwater.

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Key:

Title:
Location Map

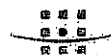
Project:
Cobra

Client:
Russell Bowler

Date:
March 2003

Scale:
NTS

Figure:
1



ROYAL HASKONING

POSFORD HASKONING

Source:
<http://www.streetmap.co.uk>

Appendix A

LIMITATIONS

Both the finite data on which they are based and the proposed works to which they are addressed direct the assessments and judgements given in this report. The acquisition of data is constrained by both physical and economic factors and, by definition, is subject to the limitations imposed by the methods of data collection employed.

Conditions at the site will change over time due to natural variations and may be affected by human activities. In particular, groundwater, surface water and soil gas conditions should be anticipated to change with diurnal, seasonal and meteorological variations. Soil and water chemistry may change due to the actions of groundwater flows and microbiological activity etc. The likely variations in the data with time can be assessed following extended periods of measurement and statistical analyses. Unless specifically discussed in the text, such extended measurement and analysis have not been carried out and the data collected are taken to be representative.

This document has been prepared for the titled project and should not be relied upon or used for any other project. Posford Haskoning Limited accepts no responsibility or liability for the consequences of this document being used for a purpose other than that purpose for which it was commissioned. This report has been prepared for the sole benefit of our client. The assessments and judgements contained herein should not be relied upon as legal opinion.

The findings and opinions are relevant to the dates of the report and should not be relied upon to represent conditions at substantially later dates. The opinions included herein are based on the information obtained from the data collation and from our experience. If additional information becomes available which might impact our environmental conclusions, we request the opportunity to review the information, reassess the potential concerns, and modify our opinion, if warranted.

Appendix B

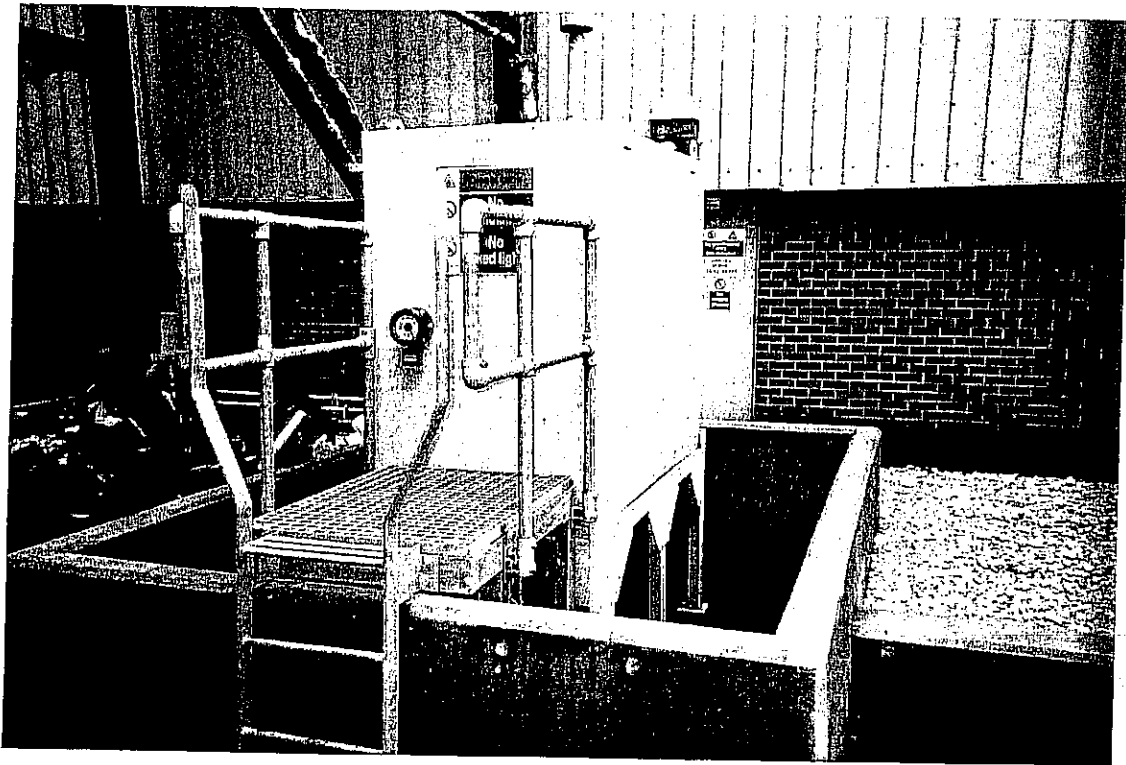


Plate 1:Emergency diesel tank

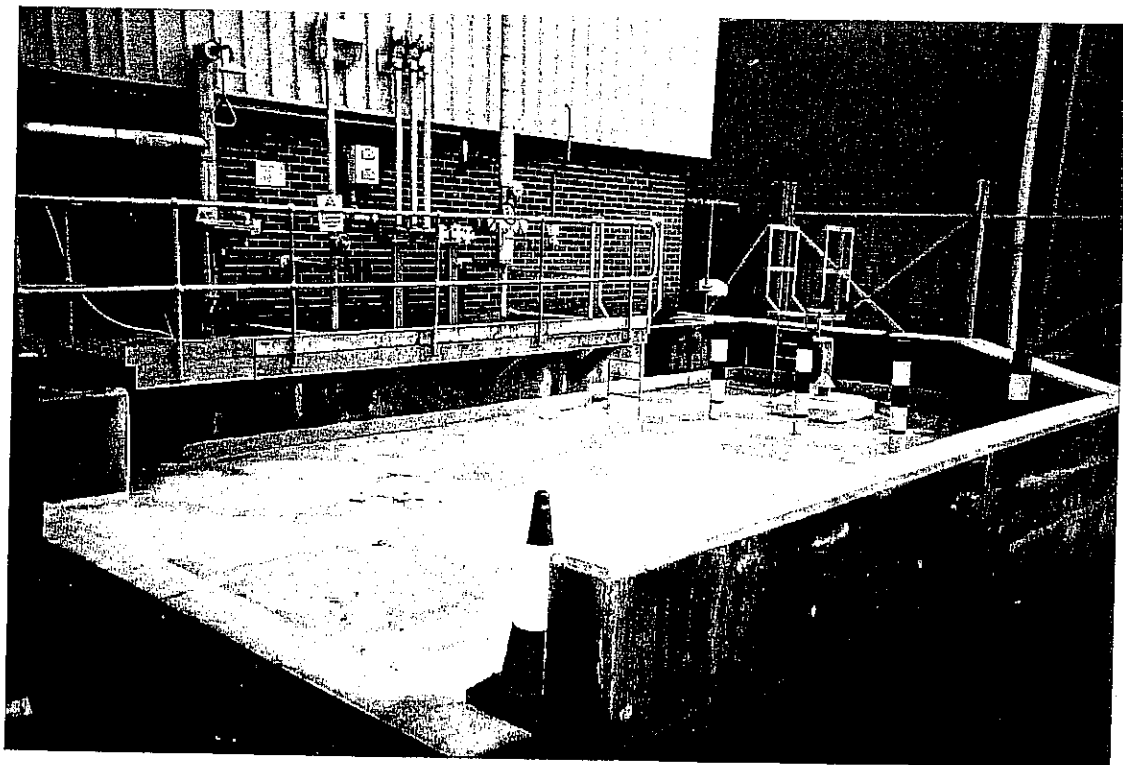


Plate 2:Chemical loading bay

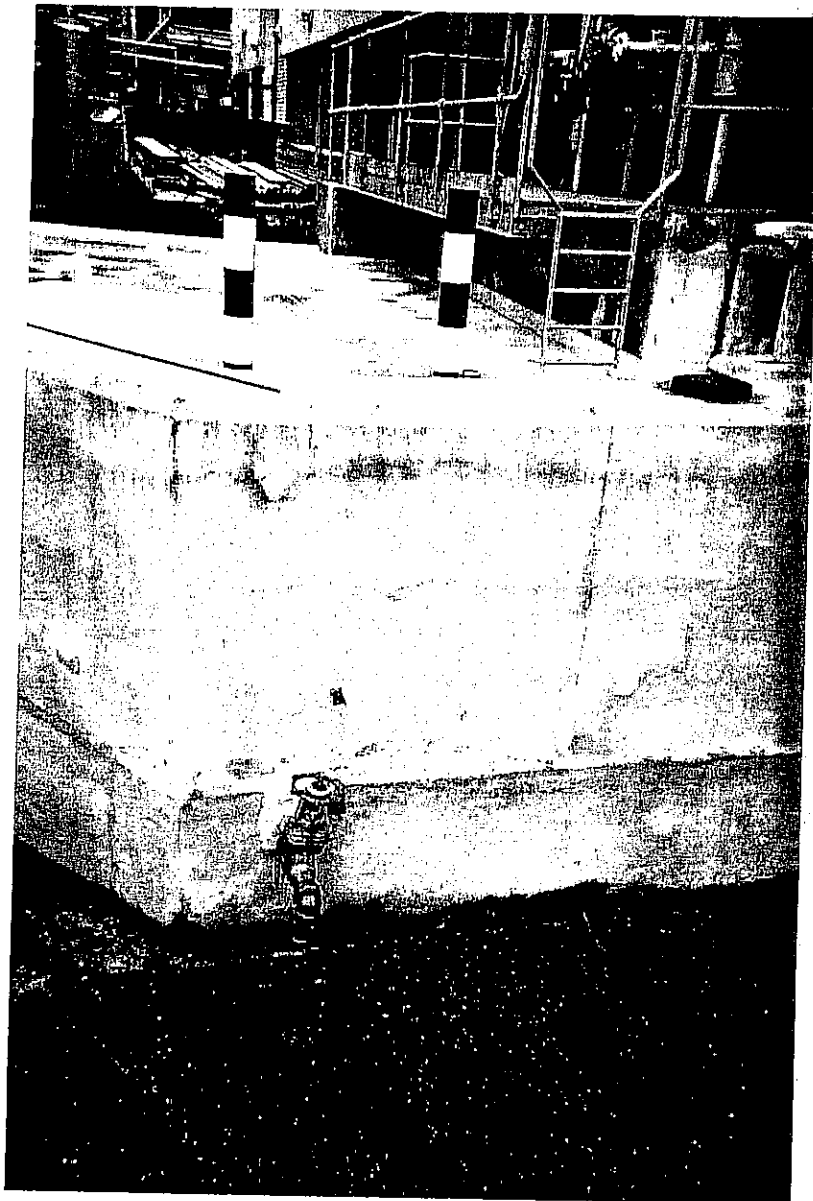


Plate 3: Drain in chemical loading bay bund



Plate 4: Drainage sump (owned by neighbouring site)

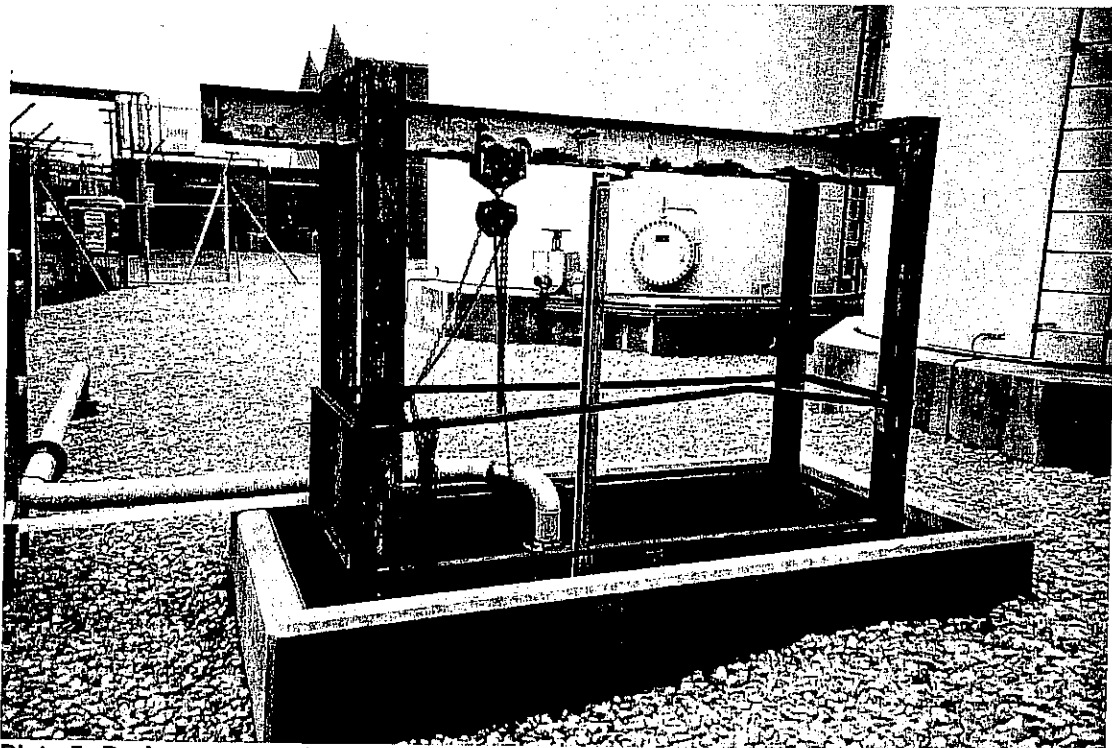


Plate 5: Drainage sump (owned by neighbouring site)



Plate 6: VCM Monitor (along northern fence boundary)



Plate 7: VCM spheres (on neighbouring site)



Plate 8: Oil Stores

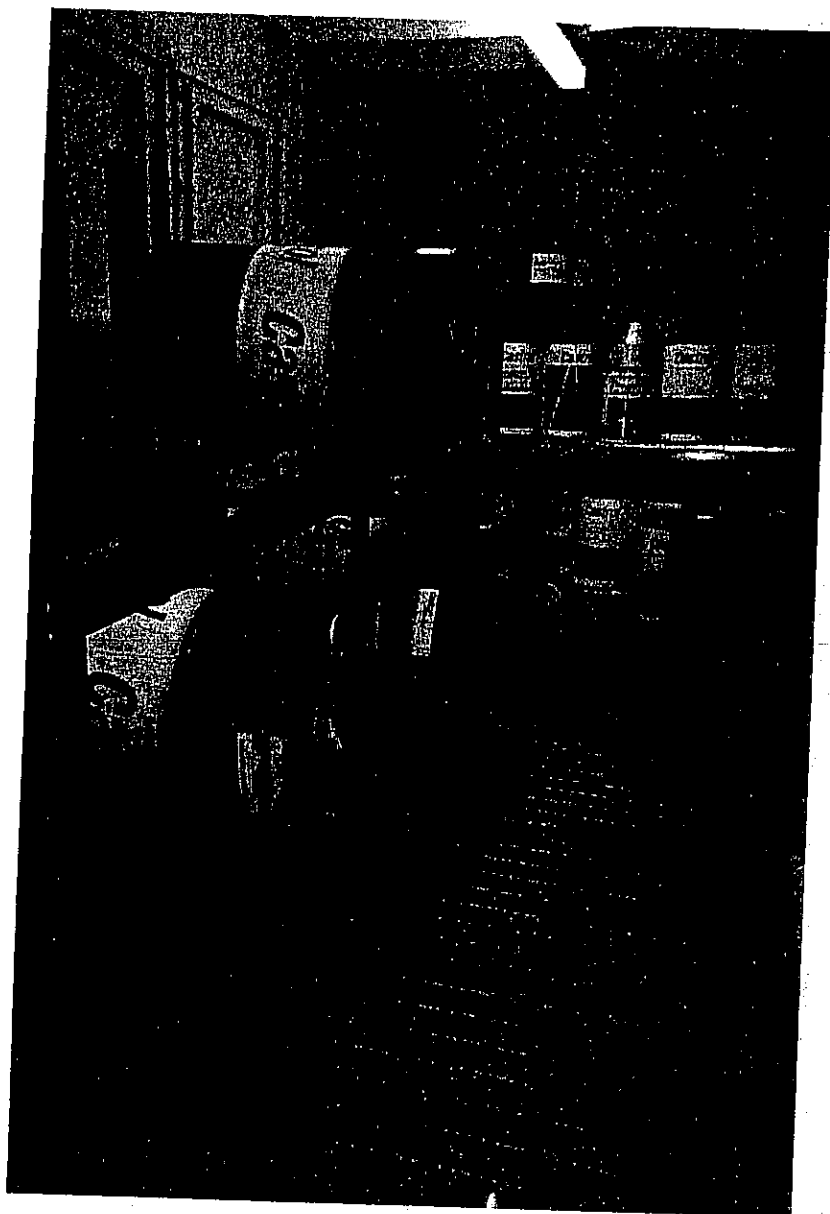


Plate 9: Oil Store (internal view showing drip trays)

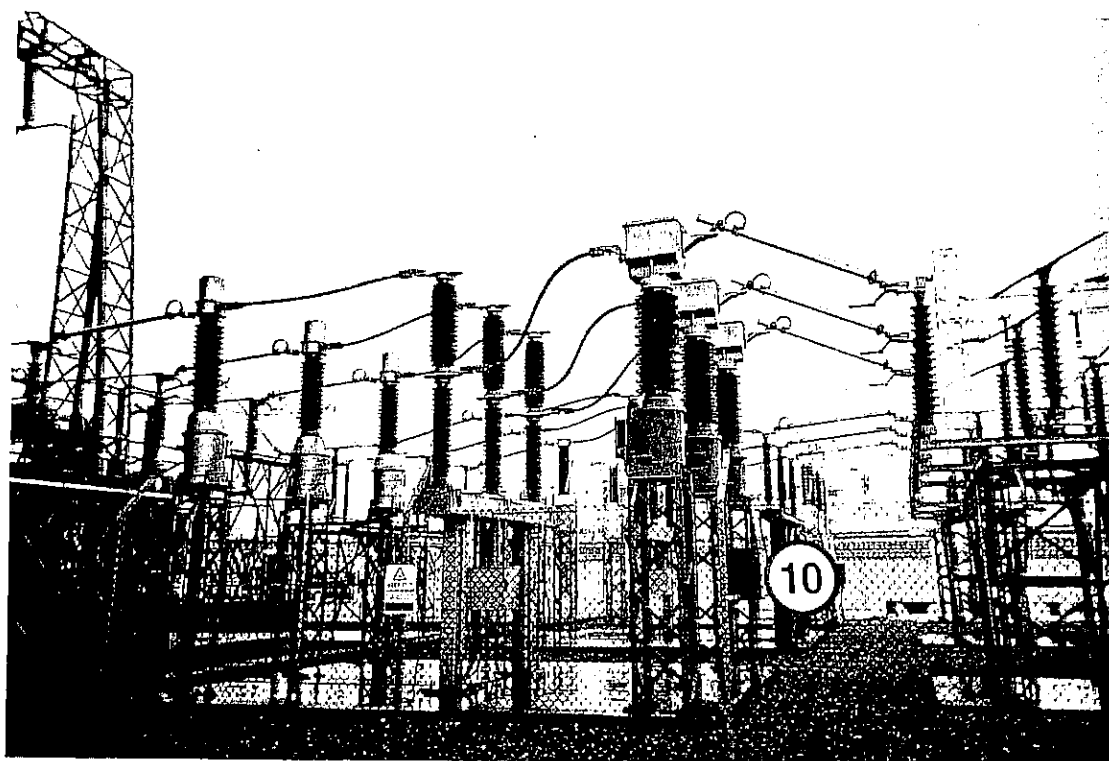


Plate 10: Switch compound

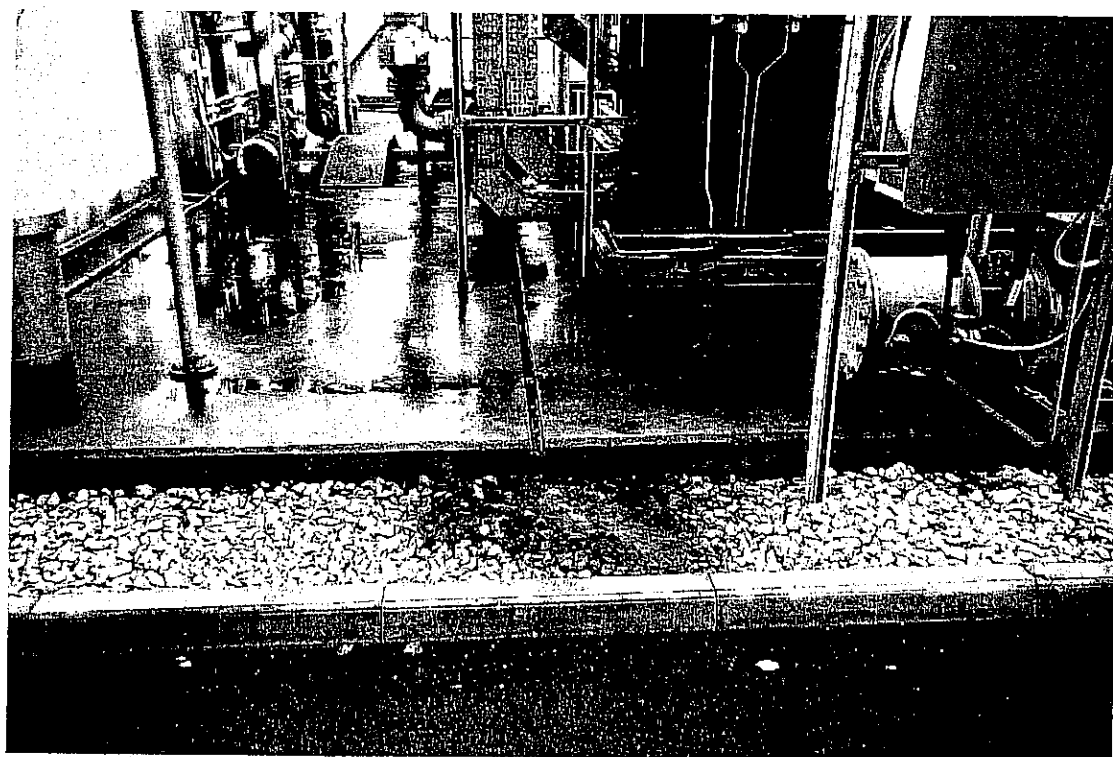


Plate 11: Discharge

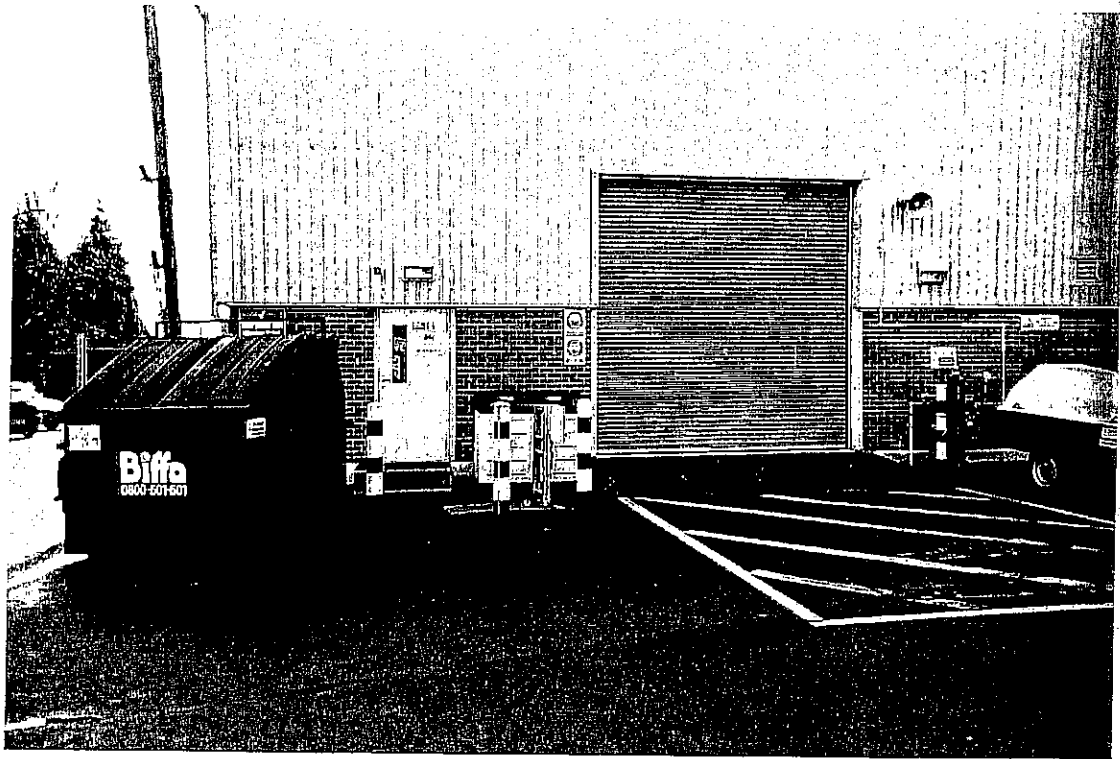


Plate 12: Workshop unit



Plate 13: land opposite power station (believed to be in ownership of AES)

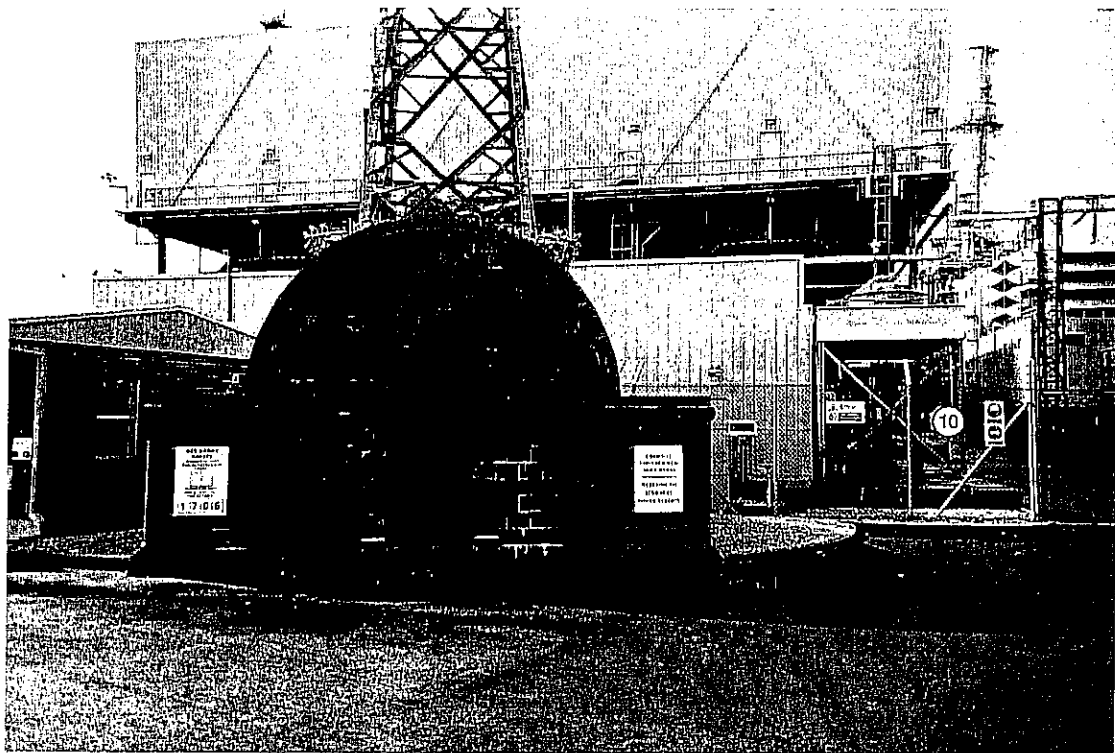


Plate 14: Entrance to power station

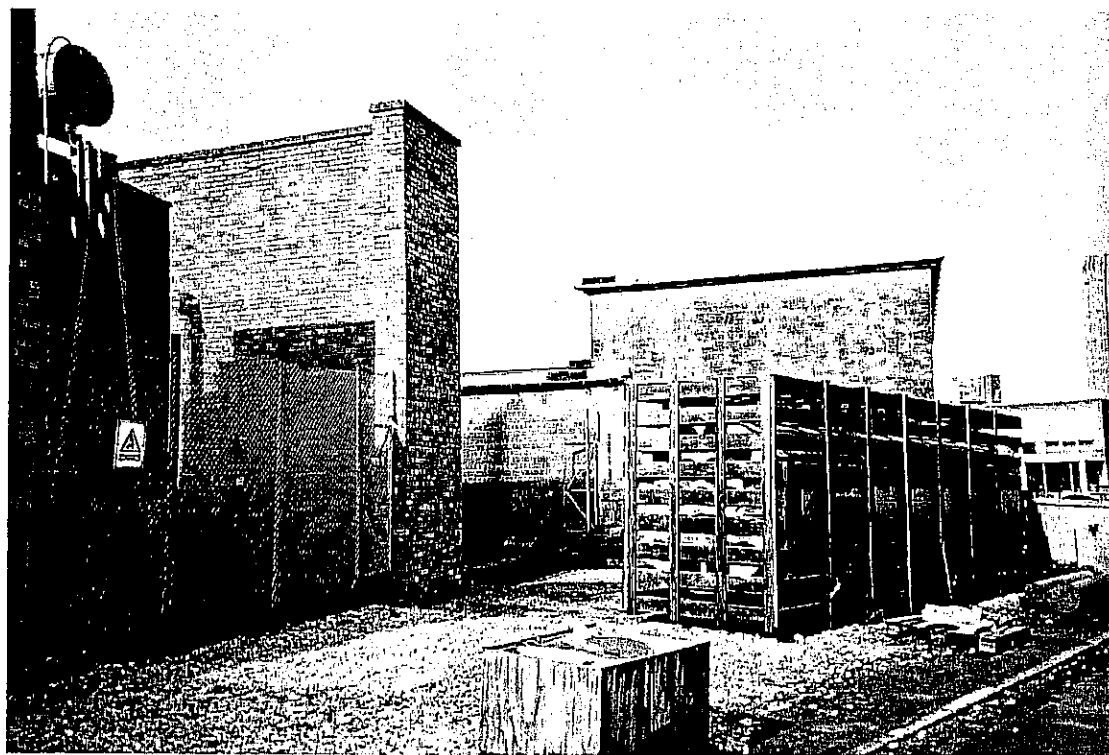


Plate 15: Transformer compound (believed to be in separate ownership)

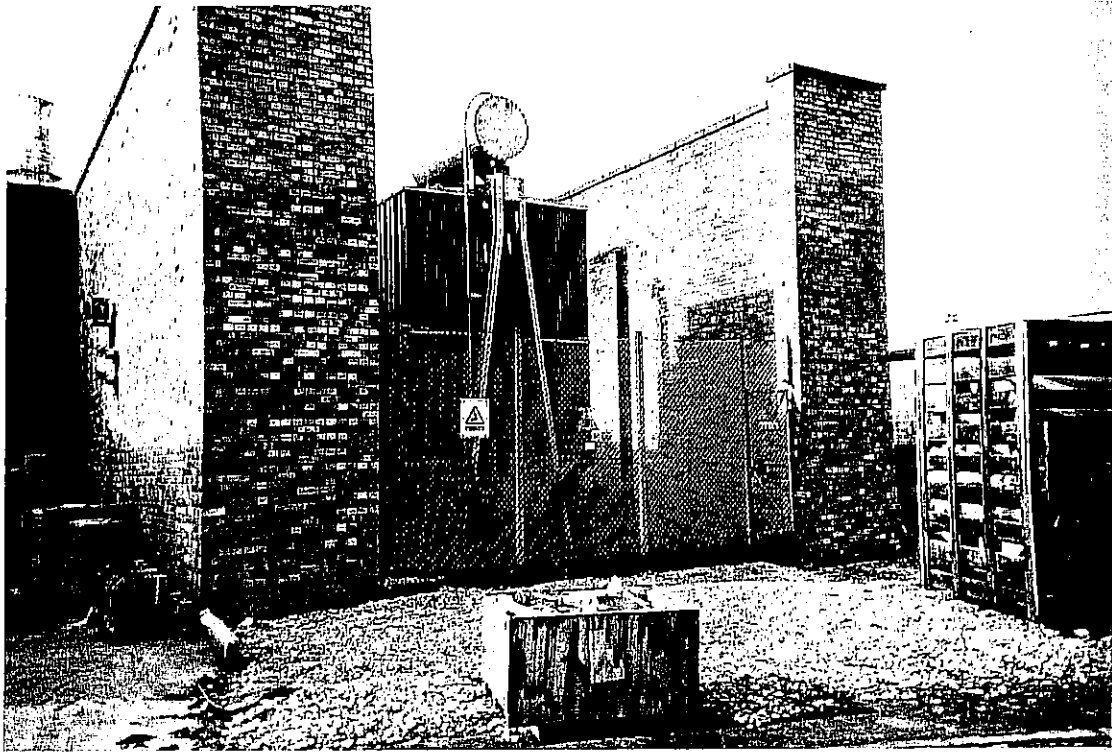


Plate 16: Transformer compound (believed to be in separate ownership)

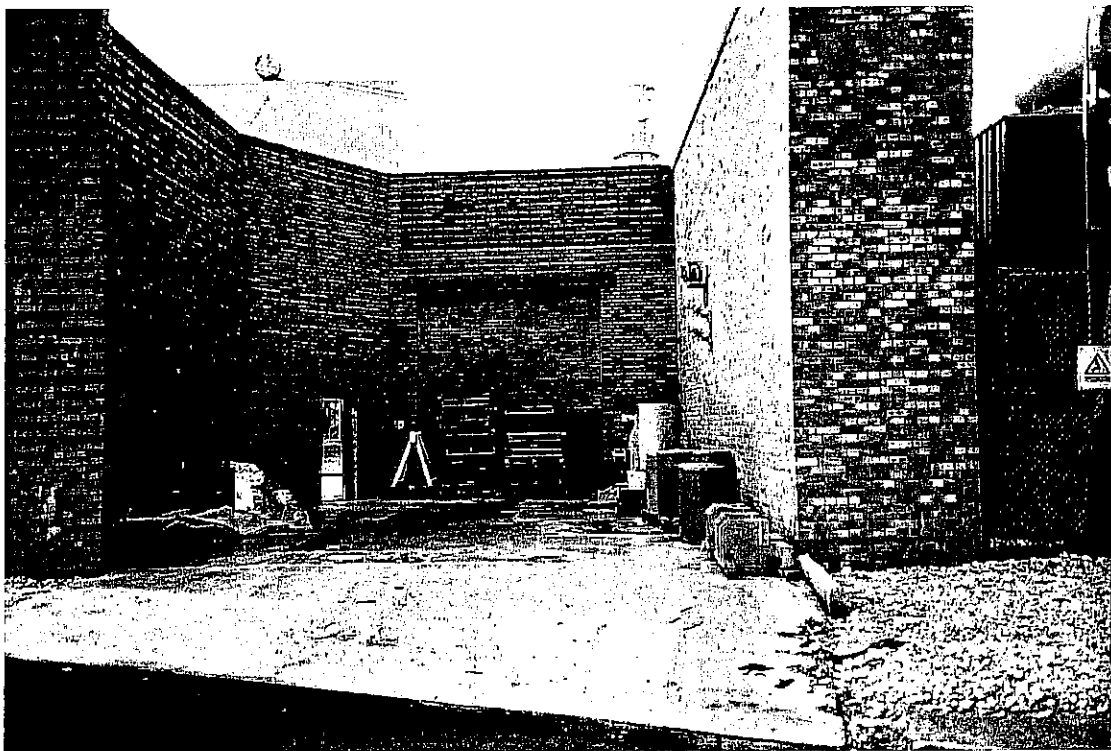


Plate 17: Transformer compound (believed to be in separate ownership)

**PPC PERMIT
APPLICATION SITE
REPORT**

**Barry Power Station,
Sully**

Centrica

January 2006

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APPENDIX B - SITE RECONNAISSANCE

APPENDIX C - DESK STUDY INFORMATION

APPENDIX D - DATA ASSESSMENT

APPENDIX E - CONCEPTUAL SITE MODEL

SUMMARY


This document represents the Site Report for Barry Power Station submitted as part of an application to the Environment Agency for a permit to operate an installation under Regulation 10 of the Pollution Prevention and Control (England and Wales) Regulations 2000.

Records of the site and surrounding areas have been reviewed along with operational site records in order to describe the condition of the site and, in particular, to identify any substance in, on or under the land that may constitute a future environmental pollution risk to the land. Pollution prevention measures have been identified and an assessment of pollution potential to land has been undertaken. The report establishes a reference against which any deterioration in condition can be assessed. Contamination levels have only been considered for substances that may be added to by the operation of the installation.

Measures are in place to ensure no indirect discharges of other materials stored on-site occur. The presence of extensive spill containment and firewater containment systems to all high risk areas of the site will minimise any potentially significant contamination from occurring under emergency conditions. The main raw material, natural gas does not present any surface water, ground or groundwater contamination risk.

This Application Site Report identifies that the most significant risk to ground or groundwater is presented by the storage of CT lube oil in the CT building and to a lesser extent loading of diesel into the Emergency Diesel Generator (EDG) Diesel Tank from tanker. CT lube oil is stored in an unbunded reservoir within the CT building and has the potential to migrate to the nearby external surface water in the event of a loss of primary containment. One option being considered by the site is to introduce raised curbs along building entrances and exits to provide additional spill containment. The feasibility of options will be reviewed and a report subsequently provided to the Environment Agency within 12 months of receipt of the PPC permit. The potential for minimising the environmental risk associated with loading diesel into the EDG will also be investigated.

No monitoring boreholes are present on site. No known spills of hazardous materials have been recorded. Existing monitoring records show that no significant contamination has occurred on the site.

It is recommended that several  monitoring wells are drilled around the perimeter of the site and in areas where there is potential for contamination as a result of site activities. There is currently an absence of data concerning the groundwater underlying the site and the installation of such boreholes will allow the assessment of groundwater quality and groundwater regime. The locations of the boreholes and proposed monitoring techniques, frequency and quality assurance measures will be identified within the Site Protection and Monitoring Plan (SPMP), which will be prepared within two months of issue of the PPC permit. Reference data obtained from the boreholes will be submitted to the Environment Agency within six months of permit issue.

The adequacy of proposed borehole monitoring techniques, frequency and quality assurance measures will be identified within the SPMP. The scope of an integrity testing and inspection programme will also be identified within the SPMP to ensure the continued integrity of containment systems and drainage. This will include, in particular, the oily water drainage system highlighted as a potential route for ground contamination.

Spills of hazardous materials however are not expected to occur due to the presence of spill containment bunds, operating procedures and trained staff. Detailed recording of future spills and clean-up response will also assist assessing and minimising potential future contamination.

To minimise the risk of diesel, engineering and/or waste oil losses to surface water drains during deliveries and manual transfers, the existing procedures will be reviewed to ensure that the penstock valve for site surface water is closed and that surface water drains are covered/plugged during such activities. In addition, drains within storage bunds will be sealed.



1 INTRODUCTION

Centrica Barry Ltd., as operator of Barry Power Station, in conjunction with RSK ENSR Environment Ltd has prepared this Application Site Report to accompany the Pollution Prevention and Control (PPC) permit application for the installation. The installation will be permitted under the Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended). The listed activity occurring on the site is a combustion activity falling under paragraph (a) of Part A(1) of Chapter 1, Section 1.1 of Schedule 1 of those regulations.

1.1 Site Location

The installation is located in South Wales in the Vale of Glamorgan to the south east of the town of Barry on Sully Moors Road (Barry, CF64 5YU) and occupies an area of approximately 1.7 hectares. The centre of the site is at National Grid Reference 314550 168500. The installation boundary and site location are illustrated in Figure 1 and Figure 2 respectively.

The site is located on the eastern edge of the Barry Chemical Works complex with a short frontage to Sully Moors Road (B4276) approximately 1km to the west of Sully and 3km to the east of Barry. To the north and west is an extensive INEOS Vinyls chemical works and to the south, Hexion Chemicals Ltd and a disused industrial site. DOW Corning and Zeon Rubber lie to the west. The land on the opposite side of Sully Moors Road is zoned for industry, but apart from the frontage is undeveloped. Beyond this is an area of low-lying open country.

1.2 Details of Installation

The site was used for the construction of the CCGT plant by AES Corporation in 1997 and acquired by Centrica in July 2003, having been derelict from the late 1970s. Prior to this, the land was a part of the BP Chemical site constructed during the 1950s.

The layout of the site consists of the following main areas:

- Combustion Turbine (CT) building;
- Air Cooled Condenser (ACC);
- Gas Compressor Compound for the incoming gas supply;
- Tank area (service water tank, demineralised water tank, neutralising tank, sewage, oil/water separator and effluent water tank);
- 132kV Switchyard;
- Generation Building;
- Fire/Miscellaneous Pumps Building;
- Emergency Diesel Generator (EDG);
- Auxiliary Boiler and associated plant;
- Boiler Feed Pump Building; and
- Workshop.

Areas excluded from this report comprise the Gas Metering Compound, the collection sump in the tank farm area and associated subsurface pipelines, neither of which are operated by Barry Power Station.

Dye tracer tests indicate that the surface water drains located outside the site perimeter fence are not connected to the installations' drainage network and have therefore been excluded from the installation area.

A full description of the installation and its activities is provided in the PPC permit application.

2 OBJECTIVES

The objectives of this report are:

To satisfy the requirements of the PPC Regulations at time of permitting by:

- Identifying the environmental setting and land pollution history of the site;
- Identifying activities that will be conducted at the installation that may lead to land pollution;
- Identifying and assess the preventative measures that are in place to protect the land; and
- Assessing whether there is:
 1. little likelihood that land pollution or leaks to land will occur during the future life of the installation;or there is:
 2. a reasonable possibility that there is potential for current or future land pollution of the land from the installation.

The overall objective of the initial condition report is to provide an initial reference point against which any future impact that is identified at the site can be assessed. The report will be used to assist in the surrender of any permit that has been issued in accordance with the IPPC regime. The closure report at the time of surrender will need to address any impact that has not been described in this initial baseline survey report.

This report describes information in respect of:

- The current former and proposed land uses on and surrounding the site
- The potential for contamination to be present on the site
- The environmental sensitivity of the site with reference to geology, hydrogeology, surface waters and neighbouring land uses
- A conceptual model of the site and its environs

The assessment has been based primarily on a review of documentation in respect of previous investigations at the site. The methods used to assess the baseline condition are based upon the guidance provided by the Environment Agency in their publications Integrated Pollution Prevention And Control (IPPC), Part A(1) Installations: Guide For Applicants and Horizontal Guidance Note H7.

3 SITE SETTING AND SOURCES OF DESK STUDY RESEARCH INFORMATION

3.1 Introduction

The following sections detail the sources of desk study information searched in order to describe the condition of the installation and, in particular, to determine the potential for substances to be present in, on or under the land associated with present and past uses of the site and its surrounding areas.

3.2 Environmental Consents, Licences, Authorisations, Permits and Designations for the Site and Surrounding Area

As part of the Site Report preparation, a review has been undertaken of the existing IPC licence (licence reference AV4504, latest variation BY6788). The licence identifies the discharge consent conditions associated with releases to effluent, surface water, air and waste. No direct releases to ground or groundwater exist.

Information from the Countryside Council for Wales shows that the nearest protected site to the power station is the Hayes Point to Bendrick Rock SSSI is located approximately 1km to the south and extends along the coast to the west. This area has been designated on the basis of its geology, rather than for ecological protection. The closest notified area of significant ecology and nature value is the Cog Moors. This site is classified as a Site of Special Scientific Interest (SSSI) due to its importance as a floodplain and wet grassland area. Cog Moors SSSI is located approximately 1.5km to the northeast. Other protected sites in the area are Sully Island 2.5km to the south east; Comeston Park SSSI 2.5km to the north east; Penarth Coat and Lavernock Local Nature Reserve (LNR) 3.5km east; Barry Island SSSI 3.5km to the southwest; and Cliff Wood-Golden Stairs SSSI / LNR approximately, 5km to the west. Environmentally sensitive sites are illustrated in Figure 3.

The site is not located within a groundwater Source Protection Zones (SPZ). The southern boundary of an SPZ is located approximately 600m to the north of the site and is associated with a public water supply wells a further 400m north.

The site is identified to be at risk of flooding from Cadoxton River and Sully Brook.

The area is designated by the Environment Agency as having a greater than 1.3% probability of flooding each year (1 in 75). This designation has taken into account the effect of any flood defences that may be with in the area.

3.3 Geological and Hydrogeological Data

The geology and hydrogeology associated with the installation and surrounding area is illustrated in Figures 4 and 5 respectively. Published geology records (Sheet 263 Cardiff) have also been reviewed. They indicate the following sequence of geology to underlie the site:

- Alluvial drift deposits;
- The solid geology shown by the maps indicate Mercia Mudstone and Marginal Facies overlie Carboniferous Limestone units. The red mudstones and siltstones of the Mercia Mudstone group pass laterally into the marginal facies, which consist of sand and gravel grade lithologies, reaching up to 35m in depth.

Previous intrusive investigations at the site were summarised in the Posford Haskoning Report. The shallow geology encountered under the site is described as made ground over grey/brown alluvial clays, over limestone pebbles (possibly the Marginal Facies of the Mudstone Group), over limestone from circa 11m bgl.

3.4 Site Operational Records, Emergency Response Records and Records of any Land Pollution Incidents in the Vicinity of the Site

A review of site operational records and discussions with site personnel show no evidence or records of previous pollution incidents or discrepancies in stock control. However, an acid leak, which occurred during 1998 that was contained within a chemical sump, prompted the construction of a containment area around the acid/caustic loading bay.

In addition, the loss of vinyl chloride monomer (VCM) from a neighbouring site north of the installation resulted in the migration of a cloud of VCM dust over the site. To satisfy HSE requirements, VCM monitors were installed along the northern boundary of the site. Alarms and procedures are in place in the event of another release.

3.5 Existing Site Investigation and Assessment Reports

Several site investigations have been carried out and are summarised in the report produced by Posford Haskoning Ltd. The findings are briefly reiterated below:

- May 1993, TC Engineering Services. Investigation comprising of eleven trial pits and analysis of soil and groundwater samples. The investigation indicated elevated concentrations of mercury within soil at two locations and paraffin type hydrocarbons within the groundwater. The investigation also revealed buried pipework on-site potentially containing contaminative substances.
- May 1996, CJ Associates. An intrusive investigation comprising of fifteen boreholes to depths between 3 and 10m were constructed for geotechnical purposes. All boreholes were backfilled on completion. The majority of the laboratory tests were performed for determining geotechnical properties. However, Total Petroleum Hydrocarbons (TPH) and mercury were also analysed - TPH and mercury concentrations ranged between <1 mg/kg and 84mg/kg and 0.4mg/kg and 3894mg/kg respectively.

- December 1996, Wimtec. This investigation comprised of a further nine trial pits with a six soil samples sent for analysis. The investigation confirmed the presence of mercury within the soil and also identified phenols.
- 1997, Construction Phase Investigation. During the construction of the plant soil visually contaminated with mercury was uncovered and lead to additional investigation and remediation. The summary of this work (as given in the Posford Haskoning report) suggests that this was a chance discovery of contamination, rather than a targeted investigation/remediation resulting from information retrieved from earlier investigations. The remediation effort apparently consists of the removal of impacted soils based on visual observations. Some correspondence was available to suggest an agreed excavation depth of 2m with the Environment Agency.
- January 1997, Rust Environmental Investigation. Further to the discovery and removal of the mercury contaminated soils an additional eight trail pits were dug and twenty-five soil samples analysed. The results were not reported to show any significantly elevated levels of contaminants, although there is no comment as to what assessment was carried out to establish the significance of the analytical results.

3.6 Other Information

Available historic maps from 1878 to 1943 show the site and surrounding area to be undeveloped and part of the Sully Moors. Various drainage ditches are shown leading to Sully Brook. From the 1956 map until the early 1990s the site formed part of a large chemical works, with numerous tanks occupying the current power station area and railway sidings formerly located at the site's current northern boundary.

According to the Posford Haskoning report, the chemical works were owned and operated by BP for polyvinyl chloride manufacture from 1948. Vinyl chloride monomer was transferred to the site via underground pipeline and various catalysts and reagents were used in the polymerisation process.

4 SITE RECONNAISSANCE

4.1 Introduction

The site reconnaissance was undertaken on the 21st July 2005 by two representatives of RSK ENSR of the area shown on Figure 2. The purpose of the reconnaissance was to inspect the site and surrounding area for indicators of potential land pollution. Site infrastructure was visually inspected to assess its competence and potential to cause or have caused releases to land.

4.2 Storage Tanks and Associated Pipe Work

Oil Storage

Various oils (i.e. transformer, lubricating, insulating and hydraulic) excluding gas oil are stored and used at following locations around the site:

- Unbundled CT lube oil reservoir housed within the CT building (capacity 18,500 litres);
- Two low capacity (~400 litre capacity) lube oil tanks for the HP Boiler feed pumps sited within the Auxiliary Boiler enclosure;
- ST lube oil tank (11,000 litre capacity) contained within a bund and held in the Generator Building; and
- Oil stores containing 205 litre drums and 25 litre containers of lube and transformer oils and a 1000 litre bunded waste oil tank.


The four transformers (i.e. CT, ST, Unit Auxiliary and Alternative Source transformers) are filled with mineral oils. Each transformer is located in a lockable metal caged pen and contained within a bund. The drain within the bund is normally isolated but can be opened to the oil/water separator to capture any oil in the event of a spillage. Access to the bunds was not possible at the time of the site visit. Although the bunds are not routinely accessed due to health and safety considerations, inspections are scheduled during outages.

At the time of the site visit, individual items of plant located within the CT and Generator Buildings were found to have drips trays and oil absorbent materials located around the base to capture any leaks.

Diesel storage

Diesel is stored at various locations around the site:

- Diesel Fire Pump Tank with a capacity of approximately 1250 litres housed within Fire/Miscellaneous Pumps Building and contained within a concrete bund delivers diesel to the emergency fire-water pump;
- EDG diesel tank (approximately 2,600 litres), serving the EDG, is located immediately adjacent to the generator. Feed pipes to the generator from the tank are above ground and are routed in manner to minimise the risk of damage from vehicular impact. The bund has been assessed against UK Oil Storage regulations and subsequent modification has since removed any drainage from the bund.

- A self-bunded mobile diesel bowser (capacity 1000 s) is located adjacent to emergency diesel generator (EDG). The bowser was originally bought on site during the fuel blockades of 2000, as an emergency measure if fuel needed to be moved around the site. The bowser has remained on site for use in an emergency and, at the time of the site visit, was approximately half full.

Water Treatment Chemicals

A number of tanks containing chemicals for water treatment are located around the site. A bulk sulphuric acid tank (28,600 litre capacity) and caustic tank (28,600 litre capacity) are located within the Generation Building and are both fully bunded. The tanker fill points are sited outside the building above a bunded loading bay (further details of the bund are given in Section 4.5 below)

Boiler treatment chemicals stored within the Generation Building (oxygen scavenger and amine) are contained in Intermediate Bulk Containers (IBCs). Spill containment is provided by the concrete bund. The drain within the bund diverts any chemical spillage to the neutralisation tank via the chemical sump and is normally plugged.

Chemicals for the treatment of the closed-circuit cooling water (CCCW) and boiler feedwater for the HRSG and Auxiliary boiler are kept within the Boiler Feed/CCCW Pump Building within a concrete bund. Again, the drain within the bund diverts any chemical spillage to the neutralisation tank via the HRSG sump and is normally plugged.

The tank farm area contains four tanks: a service water tank for storage of mains water (capacity 1,676,000L); demineralised water tank (capacity 137,000L); a neutralising tank for effluent treatment (capacity 300,000L) and effluent tank (capacity 300,000L). The tanks are not bunded and are situated on aggregate covered ground.

4.3 Concrete Hard Standing, Bunds and other Features

Areas of hardstanding were found to be in satisfactory condition. Some repair scars were noted in the tank farm area due to service tracing work. Hardstanding within the site is generally curbed and appears to slope towards the surface water drains. The drainage layout and slope is a reflection of the power station site area being formerly part of a larger site.

The oil store is located in the northern part of the site, immediately adjacent to the switchyard. The building is constructed on a concrete slab and the containers within the building sit on bunded stands. Adjacent to the oil stores are two temporary, self-bunded, storage units containing waste oil (CT wash residue) storage. Four empty 205L drums were also located on pallets in this area. These additional stores are all standing on the tarmac hardstanding. No open drains were located in the vicinity and the slope of the ground appeared to be towards the curbs.

The three main transformers (CT Transformer, Unit Auxiliary Transformer and ST Transformer) are located on bunds and are fenced away from vehicle routes. One smaller Alternative Source Transformer is located adjacent to a vehicle route (adjacent to the Emergency Diesel Generator). This transformer is located within a shallow concrete bund and metal barriers provide some protection against vehicular impact.

An external containment bund around the loading area for bulk chemical (acid & caustic) delivery was constructed along the western edge of the Generation Building following a minor acid spill. The bund drains to a sealed collection pit during operation.

An external diesel tank is located within a concrete bund adjacent to the Emergency Diesel Generator. The feed pipes from the tank are external to the bund and buildings, are located away from vehicle routes and are well maintained. The bund has no drainage. The plant associated with the Gas Compressors is located on a raised concrete slab surrounded by aggregate covered ground at its base. The concrete surface of the slab has drainage channels set in and evidence of staining shows that oily-water run-off occurs via the channels to the aggregate at the front of the compressors. Signs of some runoff to the aggregate at the back of the slab were also observed. Spill kits and oil waste bins are located adjacent to the compressor plant.

4.4 Vegetation

Little or no vegetation is present across the site with most areas covered by hardcore or hardstanding. (Some vegetation is present in a disused area to the north of the security gate. However, this falls outside the scope of this report.)

4.5 Surface Water Features

No surface water features are present within the installation boundary. The nearest feature is Sully Brook situated approximately 50m south of the site, flowing eastwards. Drainage ditches run southward, either side of Sully Moors Road (B4267), and connect to Sully Brook just south of the entrance to the site.

The Cadoxton River is located to the west of the site and generally flows in a southwesterly direction. The River's closest point of contact to the site is approximately 200m to the west. At this point the river flows in a north-south orientation prior to turning southwesterly.

An underground sump and penstock valve has recently been installed to intercept the installations' surface water run-off to the ditch in the event of a spillage. The ditch contained negligible water at the time of the site visit.

4.6 Nature of the Storage and Handling of Materials

The majority of materials are stored and handled in dedicated areas away from areas of vehicle or mechanical activity. The exceptions to this are the additional containers for waste oils located adjacent to the oil stores and the mobile diesel bowser adjacent to the backup diesel generator. At time of the site visit no site traffic in these areas was observed.


Procedural changes have been recommended to ensure that any open drains are covered and the penstock valve is closed during delivery, removal and transfer of potentially contaminative liquids.


4.7 Surface Water and Foul Drainage

Four separate drainage systems are active on-site: chemical water drains, oily water drains; storm water drains and site effluent/foul drains. Schematic diagram of the drainage foul, chemical and oily water drains are presented in Figure 6a to 6d.

A recent drainage survey has successfully mapped approximately 80% of the drainage system. However, the connectivity of a number of internal and external drains could not be established through the CCTV survey technique because of restricted access. Schematic representations of the drainage routes were made available at the time of the site reconnaissance.

Storm water is collected and channelled via a series of drains prior to discharge to the drainage ditch / stream outside the site's eastern boundary. This drainage ditch joins Sully Brook at a point approximately 100m south, which drains to Cadoxton River. No oil/water separator is present on this system. However, a recently installed penstock valve and sump provide a method of preventing discharge to the drainage ditch in the event of an unscheduled release of potentially contaminative substances. The sump provides 4500 litres capacity and is constructed of reinforced concrete. A maintenance programme for the valve is in operation and one for the sump is being developed. Discharge is sampled on a weekly basis and is analysed in-house for pH and oils.

Oily water drains are located within transformer bunds and various plant equipment drains and lead to an  4500L capacity GRP oil/water separator. Oil collected in the separator is periodically transferred into road tanker for offsite recovery and disposal. Separated water is discharged to foul sewer, via the main site effluent tank. Chemical drains direct runoff into the Neutralisation Tank via the chemical sump. This is pumped to foul sewer via the main site effluent tank.

Foul sewage is directed to the Sanitary Treatment plant located within the tank farm area, which consists of a sewage treatment tank (utilising bio filters) and septic / settling tank (capacity 4,500L). The treated discharge leaves the installation and enters foul sewer  the oil/water separator sump and then Effluent Tank.

Kerbstones delineating the edge of the access roads around the switchyard and air-cooled condensers contain drainage points, which drain to the underlying ground. These 'soakaway' points represent a possible route for any accidental release of contaminative substance reaching the underlying ground.

4.8 Other Indicators

No other indicators have been used in this Phase 1a assessment.

5 ASSESSMENT OF LAND POLLUTION POTENTIAL

5.1 Polluting Substances and Relevant Activities

With the exception of the oil and diesel fuel supplies to the emergency generator and fire pumps, and water treatment chemicals there are relatively few hazardous materials stored or used at the installation. However, those present could provide a potential source of contamination to the surrounding environment. The main fuel supply of natural gas does not present any risk to surface water, ground or groundwater.

A list of all substances used, stored, manufactured (or waste by-products from the manufacturing process) is contained in Appendix D1. An assessment of their pollution potential has been made based upon their properties, toxicity and volume stored, used or manufactured. Those substances thus identified in Appendix D1 have been taken forward to 5.2 below. The main risk associated with future activities based on the nature and stored volume of material is considered to be associated with the storage and use of diesel, oils, sulphuric acid and caustic soda. No underground storage tanks containing hazardous materials are present at the installation. However, various underground sumps and drainage pipework may provide a potential pathway for ground or groundwater contamination.

5.2 Preventative Measures

The pollution preventative measures (physical infrastructure and those relating to testing, inspection and maintenance) for each relevant activity associated with the potentially polluting substances have been identified and their extent and condition assessed. The results of this assessment are included in Appendix D2.

A summary of pollution prevention measures is provided below.

Procedures

Spill prevention measures are present on site, which include the existence of bunds around chemical and oil storage tanks, strategic positioning of spill-kits around the site and provisions to isolate contaminated surface water run-offs by means of the recently installed penstock valve. Although no specific formal training appropriate to spill response procedures currently exists, this will be incorporated into the site's environmental emergency response plan as part the ISO 14001 certified Business Management System (BMS).

A recommendation has been made to introduce procedure ensuring the covering of open drains and closure of the penstock valve during chemical/fuel delivery, transfer or waste removal.

Primary, Secondary and Tertiary Containment

Hazardous materials are stored in containers or tanks to provide primary containment. In the event of loss of primary containment, any release will be captured by any secondary containment measures. Secondary containment is provided via bund and spill trays for the majority of hazardous materials. The CT lube oil tank, located within the CT Building is unbunded. Any loss of material from spillage or tank failure would therefore flow out of the building towards the open surface water/oil drain (located to on the drain north of the EDG). The surface water valve is normally maintained open, diverting any spillage ultimately to Sully Brook via the penstock valve.

The feasibility of introducing additional raised curbs along building entrances and exits will also be reviewed by the Operator to provide additional spill containment.

The surface water drainage system allows the containment of some surface water and any hazardous material in the event of a spill or fire. However, surface water runoff may not be captured by the site drainage in areas where hardstanding does not slope towards the drains. Potential therefore exists for contaminated runoff/spillage to reach underlying ground in such areas.

Check Monitoring

Bulk storage tanks located in the tank farm area are fitted with level transmitters and high level alarms to minimise the risk of overfilling and subsequent release from the tanks. Low-level alarms would indicate a drop in inventory and potential loss of primary containment. The integrity of storage tanks is monitored by visual inspection. Daily checks are made for tank volumes and are logged. The daily volumes are used to update the electronically held inventory system on a weekly basis.

5.3 Assessment of the Likelihood of Land Pollution

Appendix D2 contains an assessment of the likelihood of land pollution from the installation. Existing monitoring data identifying historical contamination is limited. For all relevant activities at the installation, there is considered to be a low to moderate likelihood that land pollution or leaks to the land will occur during the future life of the installation. This is due to the presence of bunds and surface water protection system for areas where bulk hazardous materials are handled and stored and the presence of appropriate spill response procedures in the unlikely event of a spill occurring.

It is the conclusion of this report that additional reference data for the site to augment borehole data already present may need to be collected to identify groundwater flow and direction across the site. Such a requirement will be identified as part of the SPMP. Integrity testing of the oily water and effluent drains will also be carried out via CCTV camera survey to minimise the risk of leakages from these underground services. A statement identifying the inspection and testing regime to ensure the integrity of containment systems and drains will be submitted to the Environment Agency as part of the SPMP. Where mobile fuel containers are used, these will continue to be supported on mobile bunds during transfer between buildings.

6 CONCEPTUAL SITE MODEL

6.1 Geology and Hydrogeology

Published records for the area (Sheet 263 Cardiff) and previous site intrusive site investigations indicate that the site is underlain by the geological succession described in Table 6-1.

Strata	Description	Thickness*
Made Ground	Mixture of clay, sand, gravel, cobbles and boulders	0.6-1.6
Alluvium	Soft to firm grey brown clay	~6.5m
Mercia Mudstone Group and Marginal Facies	Limestone pebbles	~3m
Carboniferous Limestone	Grey green limestone	>11m bgl

Table 6-1: Underlying Geological Succession

The underlying Marginal Facies (of the Mercia Mudstone Group) and the Carboniferous Limestone geology is classed by the Environment Agency as a major aquifer. Groundwater contained within this geology will therefore be a controlled waters and a sensitive receptor to any contamination of the ground. The overlying alluvial clay will have low permeability and will inhibit both lateral and vertical migration of contamination, and therefore provide some protection to the underlying aquifer. The protection provided to the aquifer will be dependent on the thickness and continuity of the clay layer across the site.

Previous site investigations found that the made ground contained permeable geology (sand and gravel) and therefore any groundwater held in this unit may have a pathway to surface water features.

6.2 Surface Water Features

The surface water features in the vicinity of the site are discussed in Section 4.5.

The drainage ditch at the site's eastern boundary is a sensitive receptor to potential contamination. The risk of any release to the drainage ditch via the surface water drainage system has been greatly reduced with the introduction of the penstock valve.

6.3 Results of Previous Investigations/Assessments

In May 1993, the investigation carried out by TC Engineering Services comprised eleven trial pits and analysis of soil and groundwater samples. The investigation indicated elevated concentrations of mercury within soil at two locations and paraffin type hydrocarbons within the groundwater. The investigation also revealed buried pipework on-site potentially containing contaminative substances.

In May 1996, an intrusive investigation was undertaken by CJ Associates comprising of fifteen boreholes to depths between 3 and 10m, constructed for geotechnical purposes. All boreholes were backfilled on completion. The majority of the laboratory tests were performed for determining geotechnical properties. However, Total Petroleum Hydrocarbons (TPH) and mercury were also analysed. TPH and mercury concentrations ranged between <1 mg/kg and 84mg/kg and 0.4mg/kg and 3894mg/kg respectively.

The investigation by Wimtec in December 1996 comprised of a further nine trial pits with a six soil samples sent for analysis. The investigation confirmed the presence of mercury within the soil and also identified phenols.

During the construction of the plant in 1997, construction phase investigation revealed soil visually contaminated with mercury and lead to additional investigation and remediation. The summary of this work (as given in the Posford Haskoning report) suggests that this was a chance discovery of contamination, rather than a targeted investigation/remediation resulting from information retrieved from earlier investigations. The remediation effort apparently consists of the removal of impacted soils based on visual observations. Some correspondence was available to suggest an agreed excavation depth of 2m with the Environment Agency.

Further to the discovery and removal of the mercury contaminated soils an additional eight trial pits were dug and twenty-five soil samples analysed as part of the investigation by *Rust Environmental* in January 1997. The results were not reported to show any significantly elevated levels of contaminants, although there is no comment as to what assessment was carried out to establish the significance of the analytical results.

6.4 Other Receptors

Few human receptors are in close proximity of the site. The closest residential dwellings are greater than 1km distance from the site.

Ecologically sensitive receptors were identified in the area. However, the potential for contamination migration from site is considered to be negligible.

6.5 Land Pollution History

Prior to the existence of BPS, the site was formerly part of a chemical works and may therefore be the source of residual contamination from the time of its operation. Previous investigations have found an area of soil impacted by mercury. Documentary evidence shows that the contaminated soil has been remediated.

6.6 Site Zoning

The site has been divided into a series of zones based upon the activity and contaminated land potential. These zones are shown in Figure 8. Potential pollutant sources are shown within Figures 7a and 7b.

The zones are delineated based on:

- **Zone 1:** Diesel and oil storage and distribution (covering diesel storage tanks, transformers, and emergency diesel generator. This also includes the engineering oil store and underground sump drain)
- **Zone 2:** Water treatment chemicals storage, transfer and use
- **Zone 3:** All other storage locations.

6.7 Summary Of Conceptual Site Model

6.7.1 Introduction

The findings of the desk study and site reconnaissance have been used to develop the conceptual site model (CSM) for the site.

6.7.2 Tabular Representation Of The Site and Summary of Assessment

Tabular representations of the CSM are included in Appendix E1.

The most significant issue for future operations relate to the storage of oil, gas oil, water treatment chemicals (sulphuric acid and caustic soda), sumps containing oily water, above ground and underground pipework and the surface water drainage / soakaways. Whilst it is possible to distinguish between historic and future contributions by laboratory analysis, monitoring may be required should future spills occur. Detailed recording of future spills and clean-up response will assist in differentiating between historic and potential future contamination.

Existing contamination levels underneath the site are not that well established as information with respect to the nature and extent of soil contamination (in particular the remediation of the mercury impacted soil) is limited. Information concerning the groundwater regime and quality at the site is wanting.

6.7.3 Uncertainties In The CSM

Levels of impact (if any) associated with current operations onsite will benefit from additional reference data to assess fully whether any contamination of ground or groundwater has occurred. However, existing operational records and the absence of any un-remediated recorded spills, would suggest that no significant contamination is present.

APPENDIX A – FIGURES AND MAPS

Figure 1: Site Location

Figure 2: Site Boundary

Figure 3: Environmental Constraints

Figure 4: Geological Map

Figure 5: Hydrogeological Map

Figure 6: Drainage Schematic

Figure 7: Raw Materials Storage

Figure 8: Site Zoning

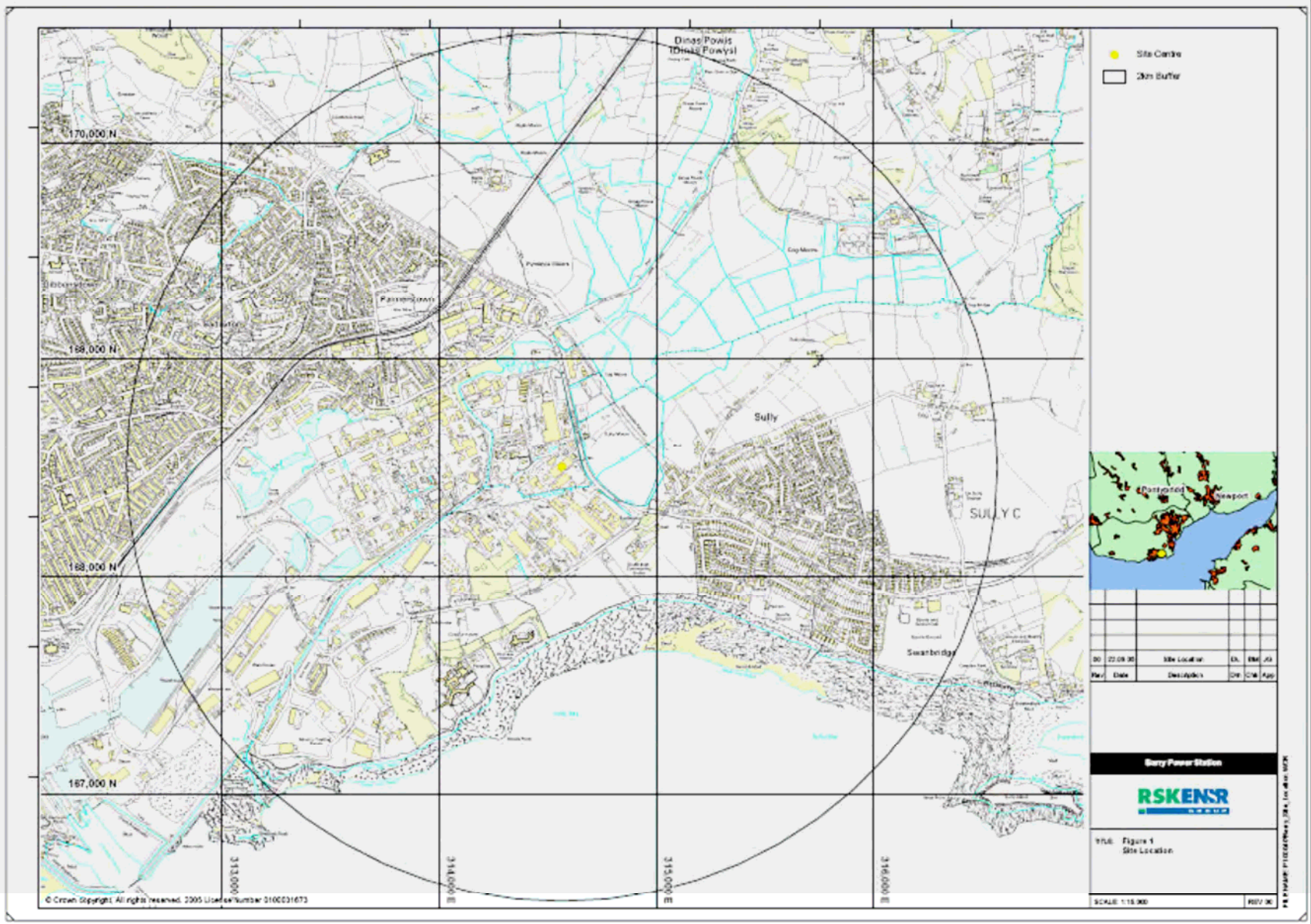


Figure 1: Site Location

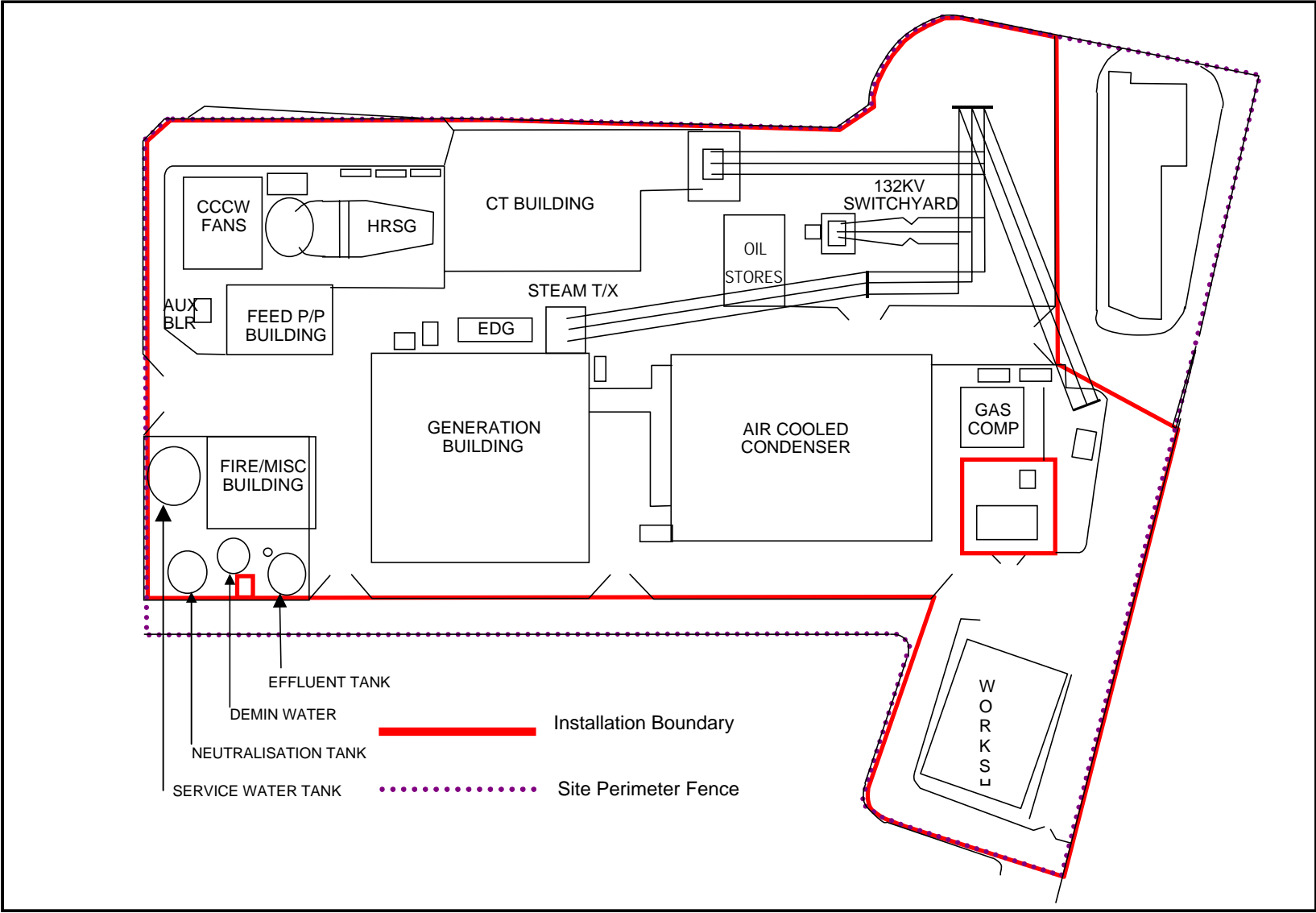


Figure 2: Site Boundary

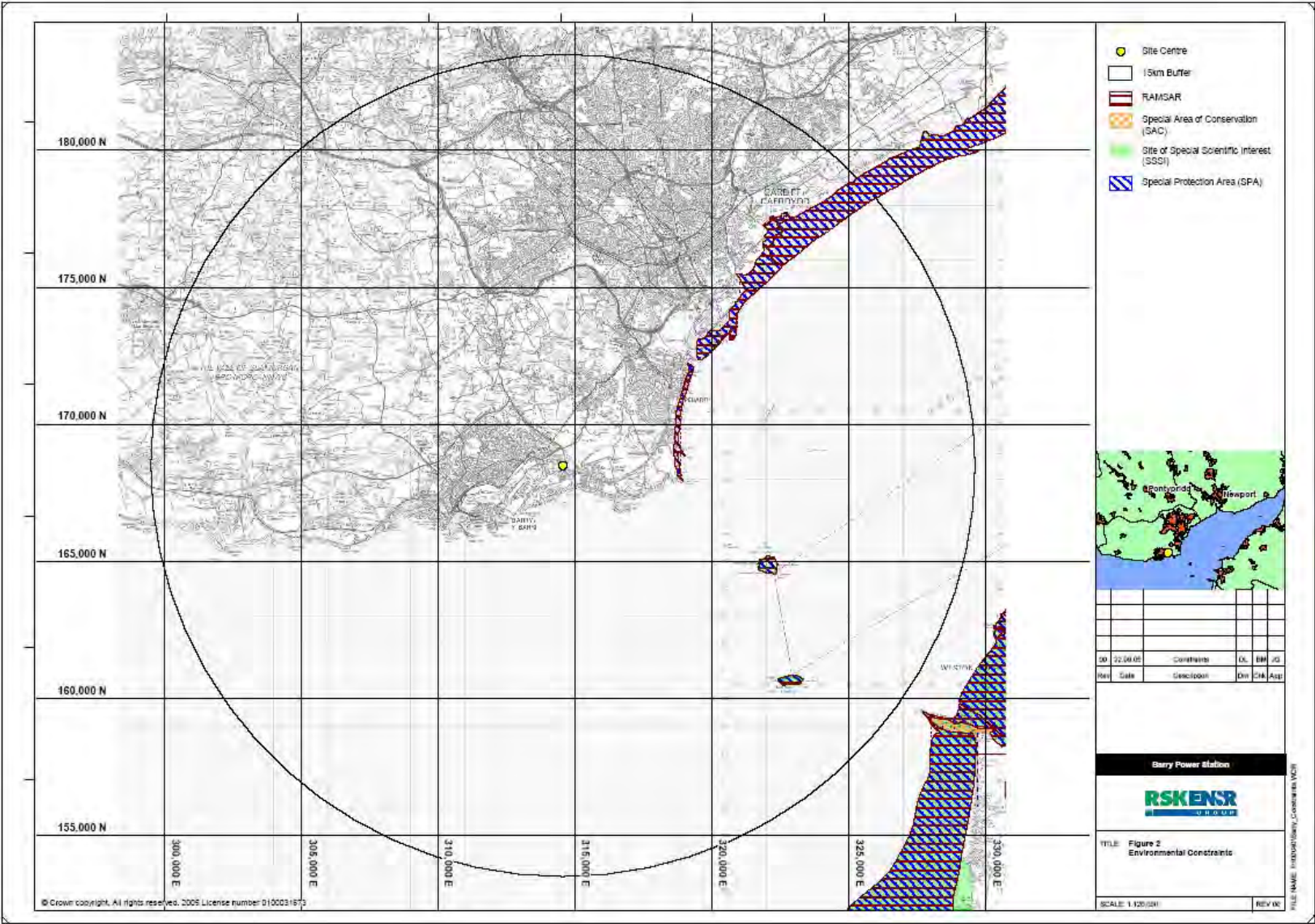


Figure 3: Environmental Constraints

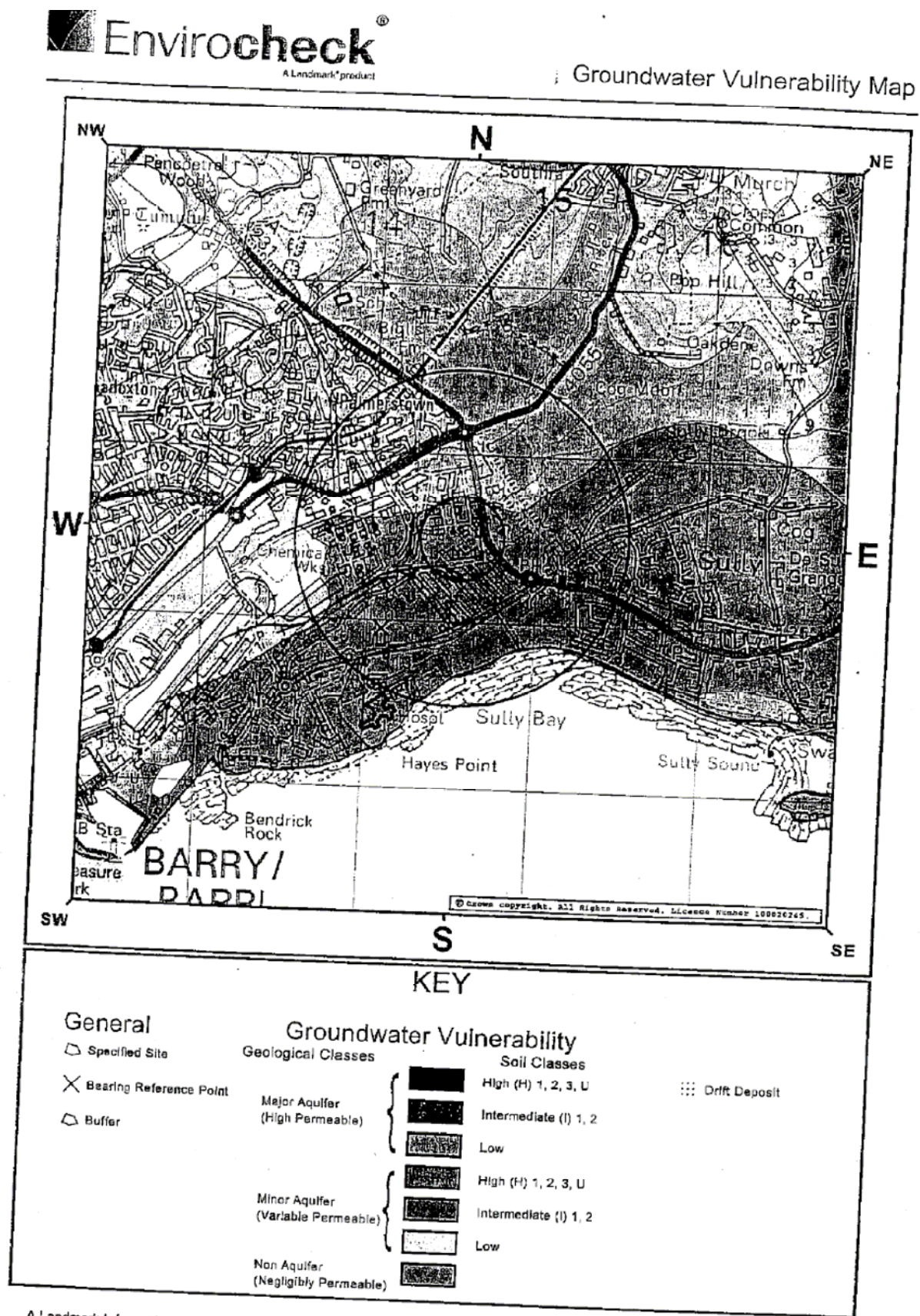


Figure 4 Groundwater Vulnerability Map



Flood Map

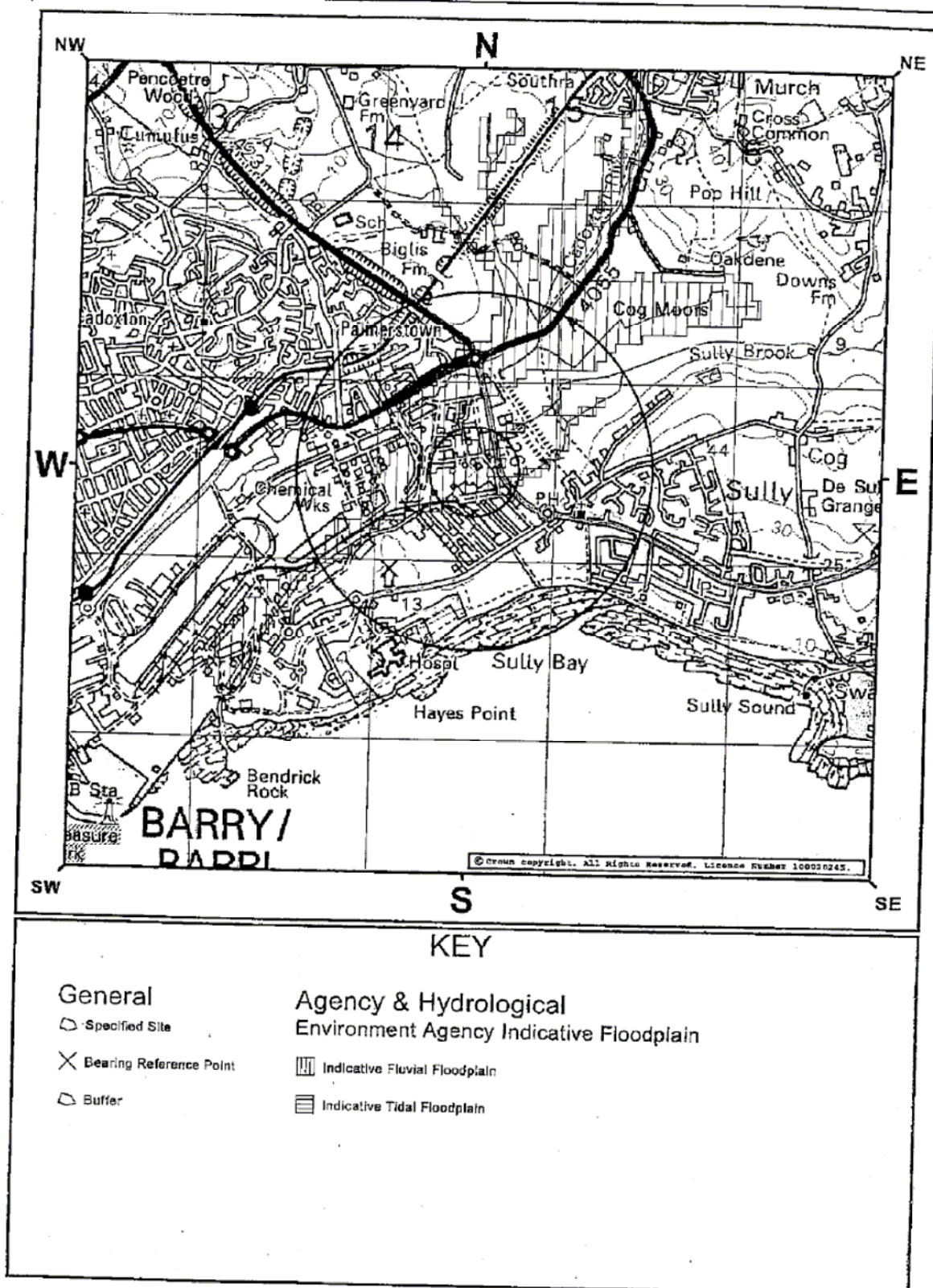


Figure 5 Flood Plan

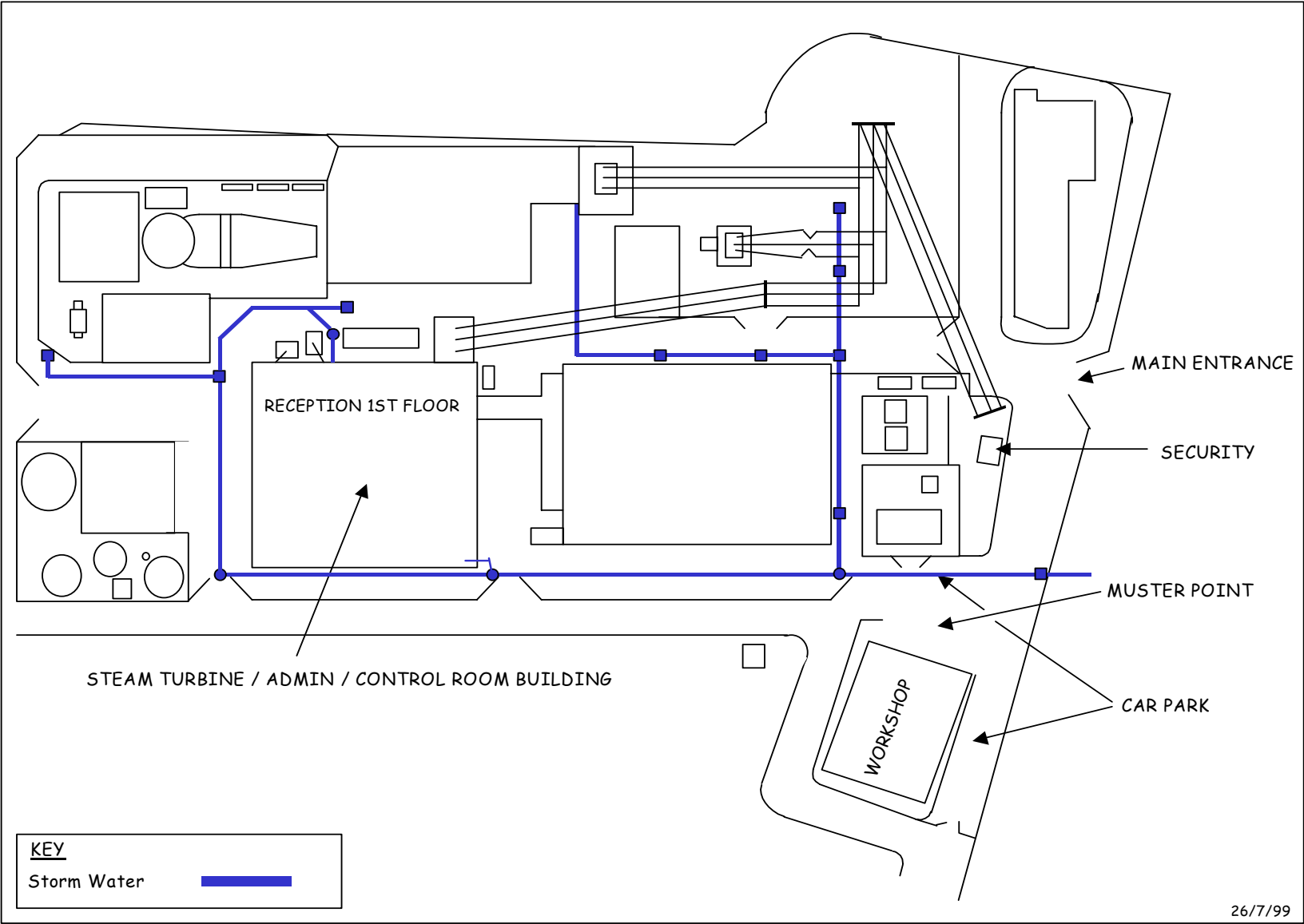


Figure 6(a): Surface Water Drainage System

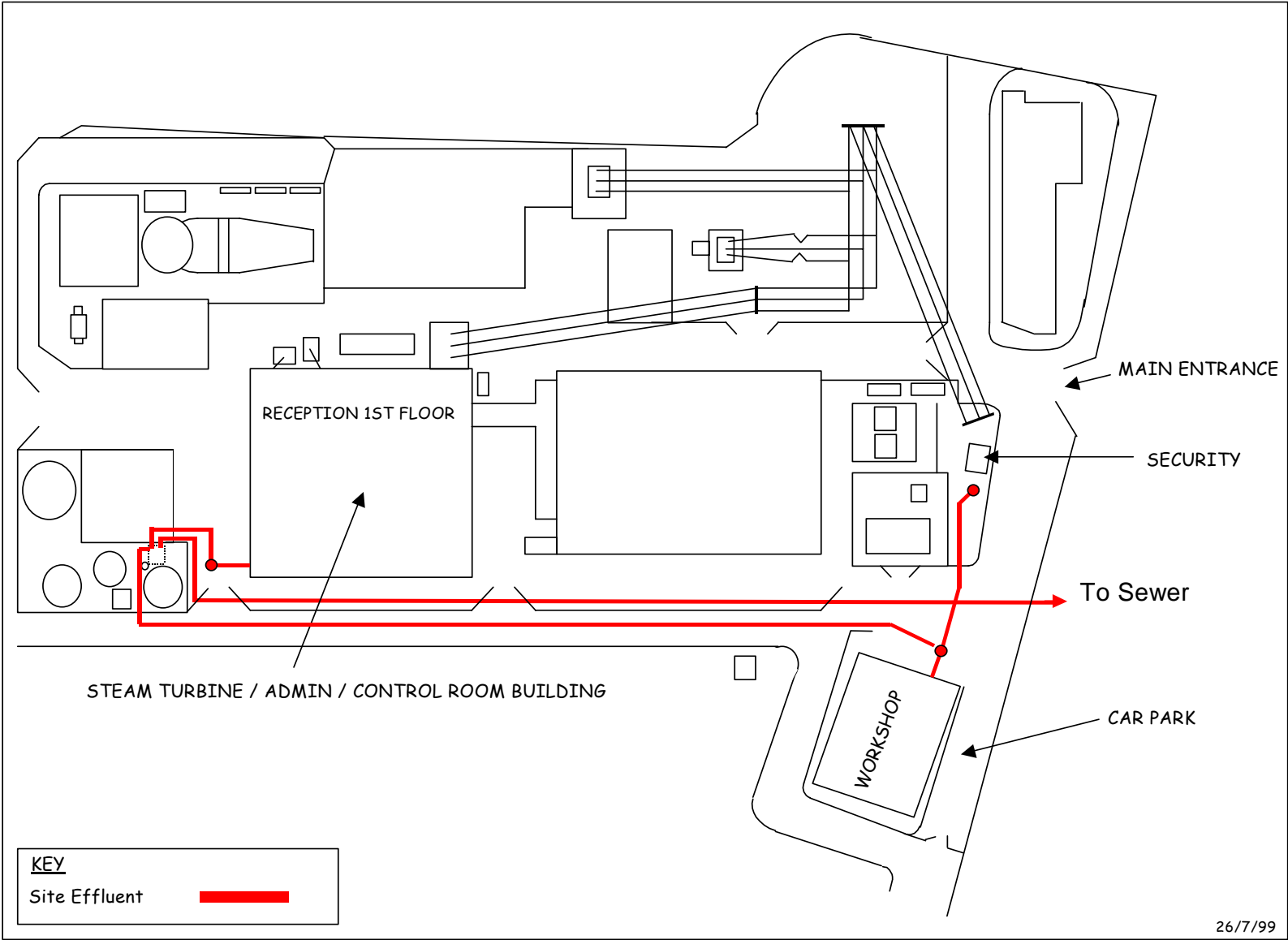
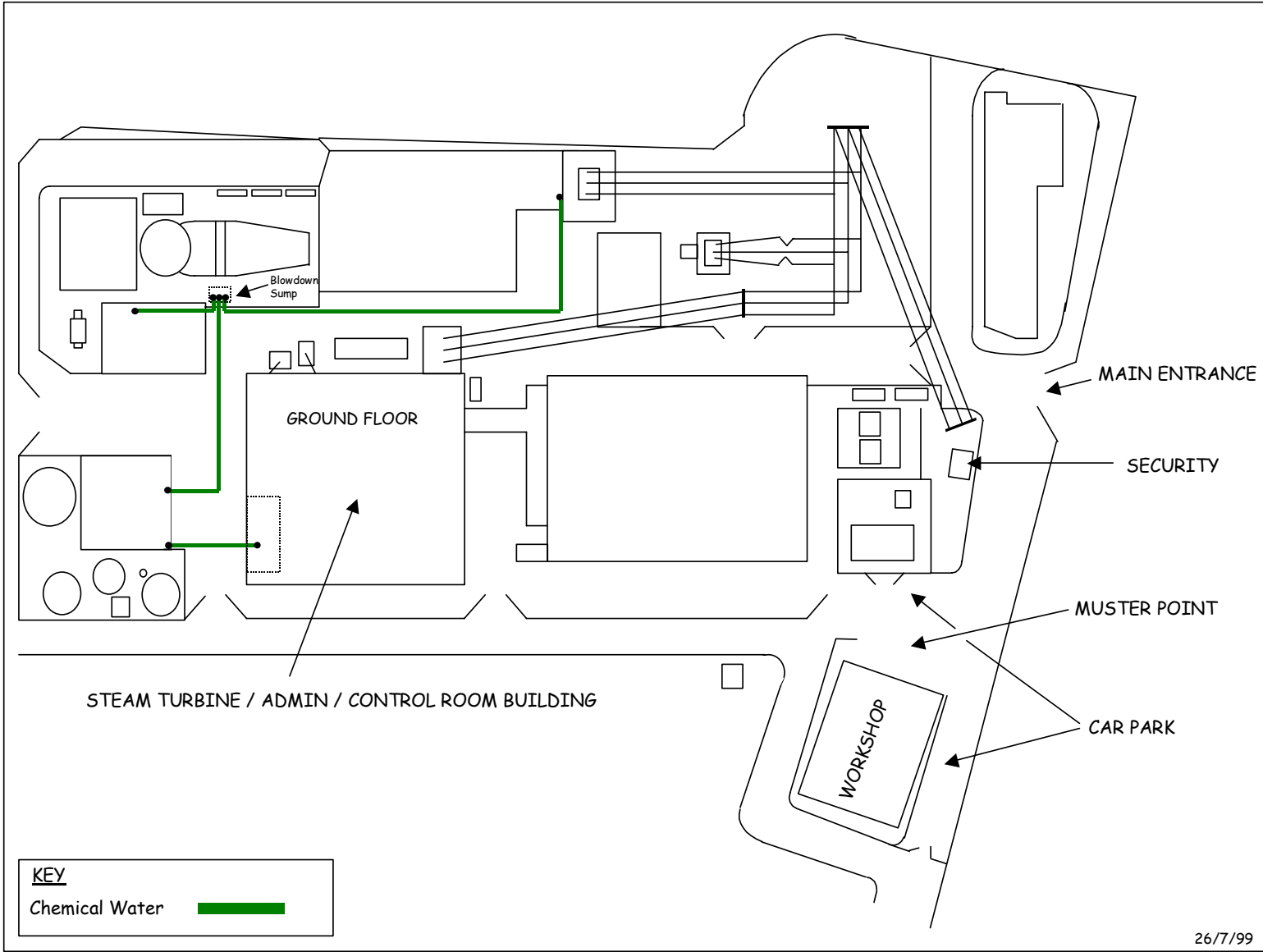


Figure 6(b): Foul Water Drainage System



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Figure 6(c): Chemical Water Drainage System

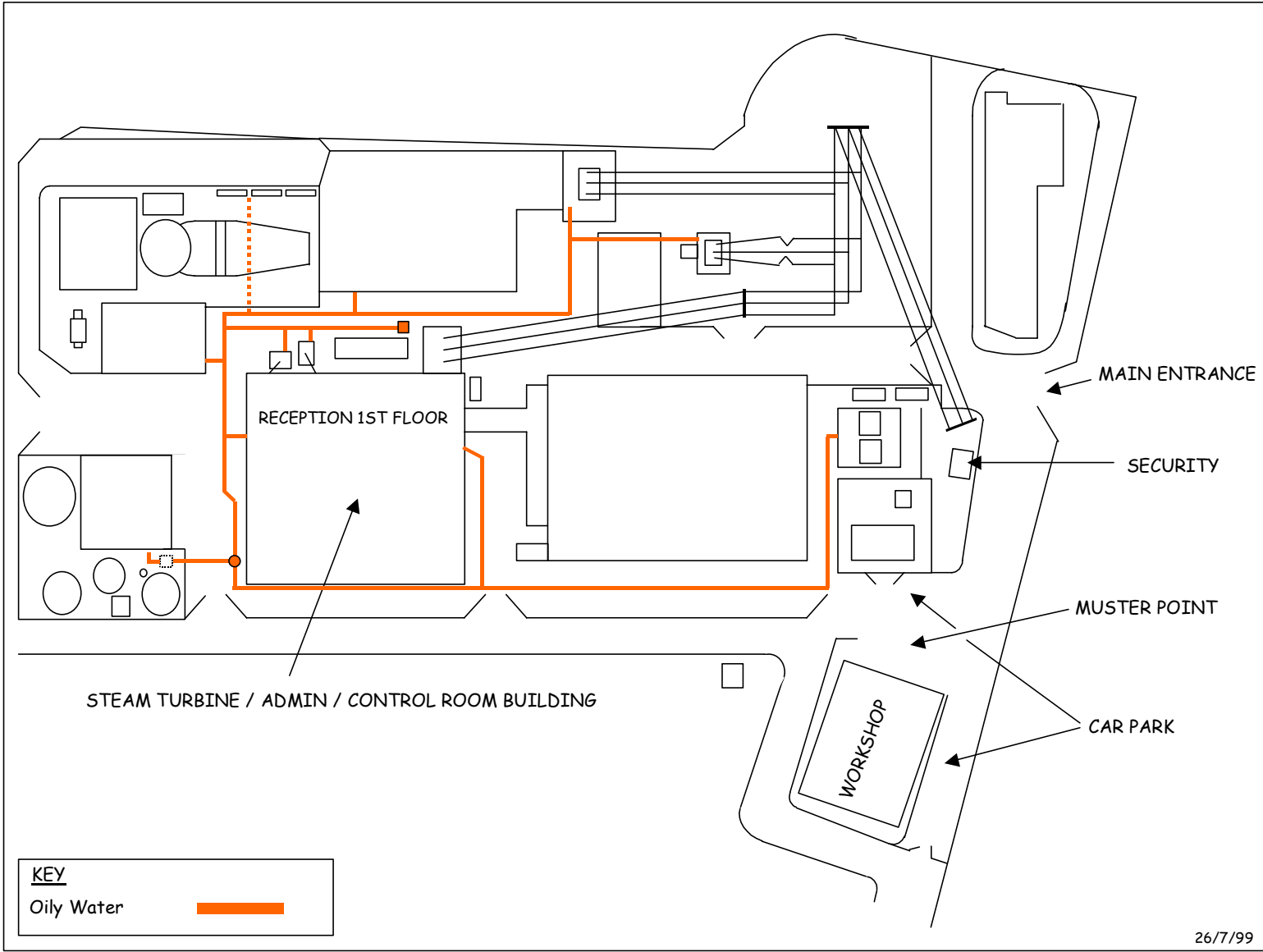


Figure 6(d): Oily Water Drainage System

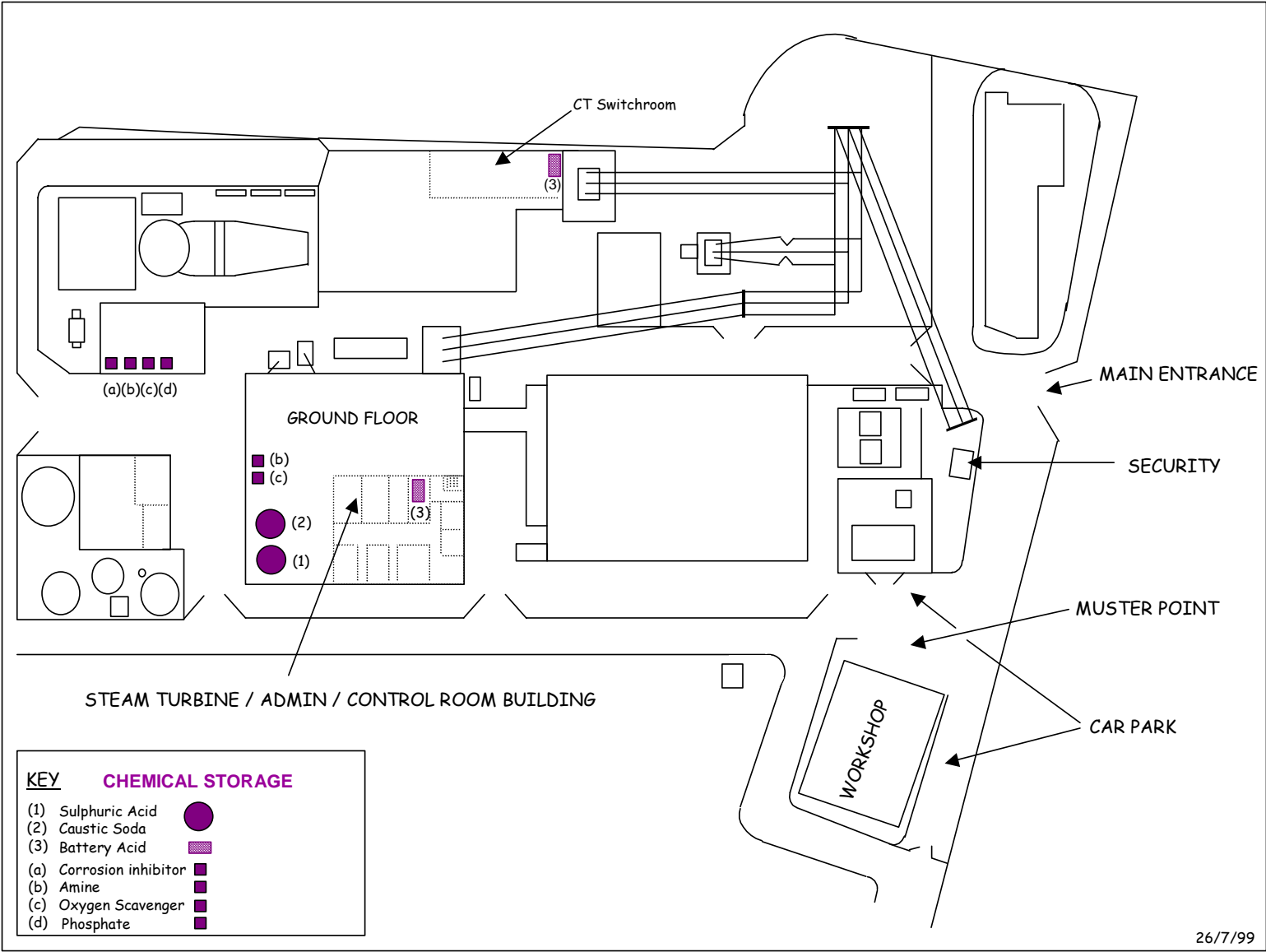


Figure 7(a): Raw Materials Storage (Chemicals)

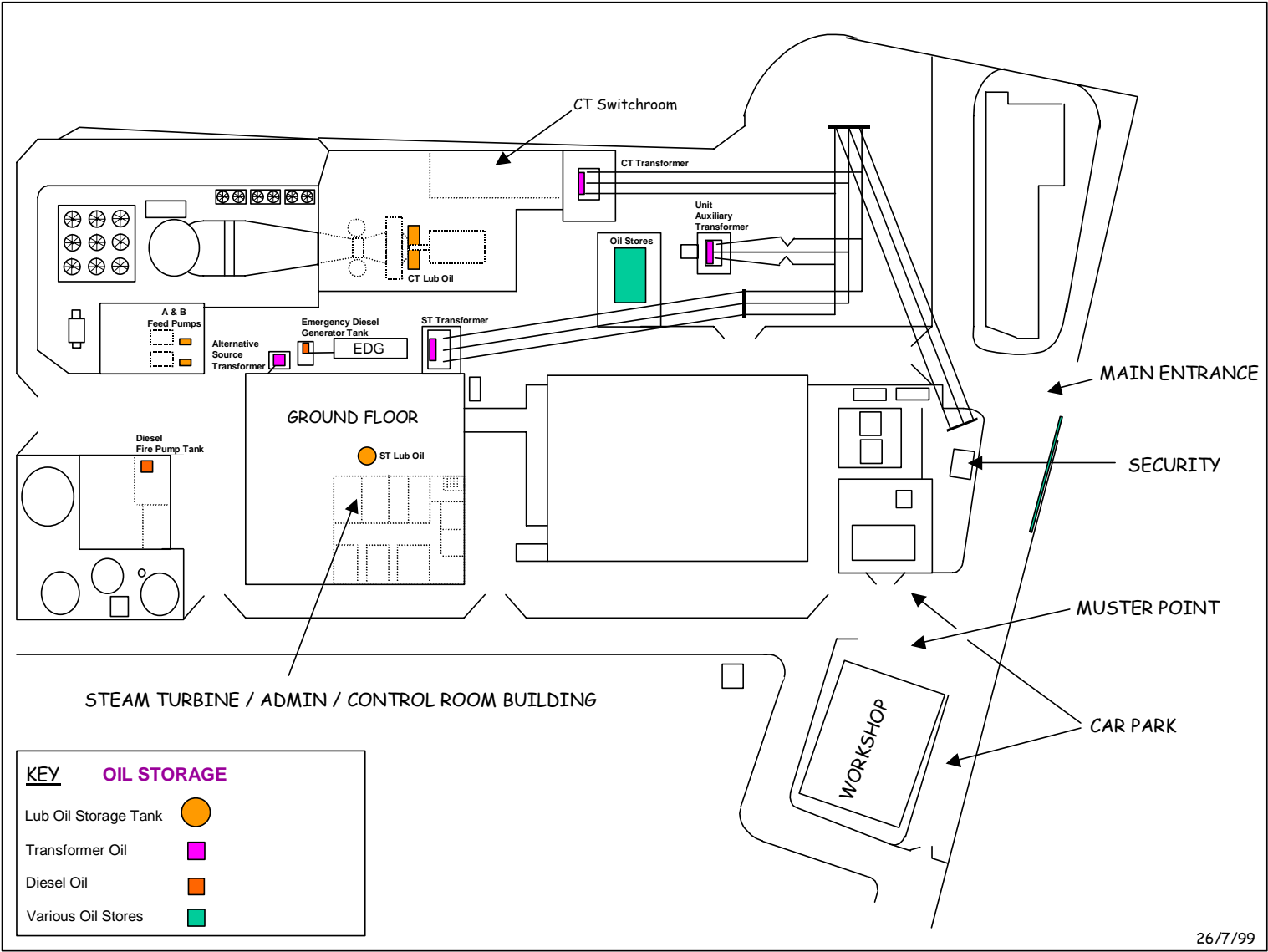


Figure 7(b): Raw Materials Storage (Oils)

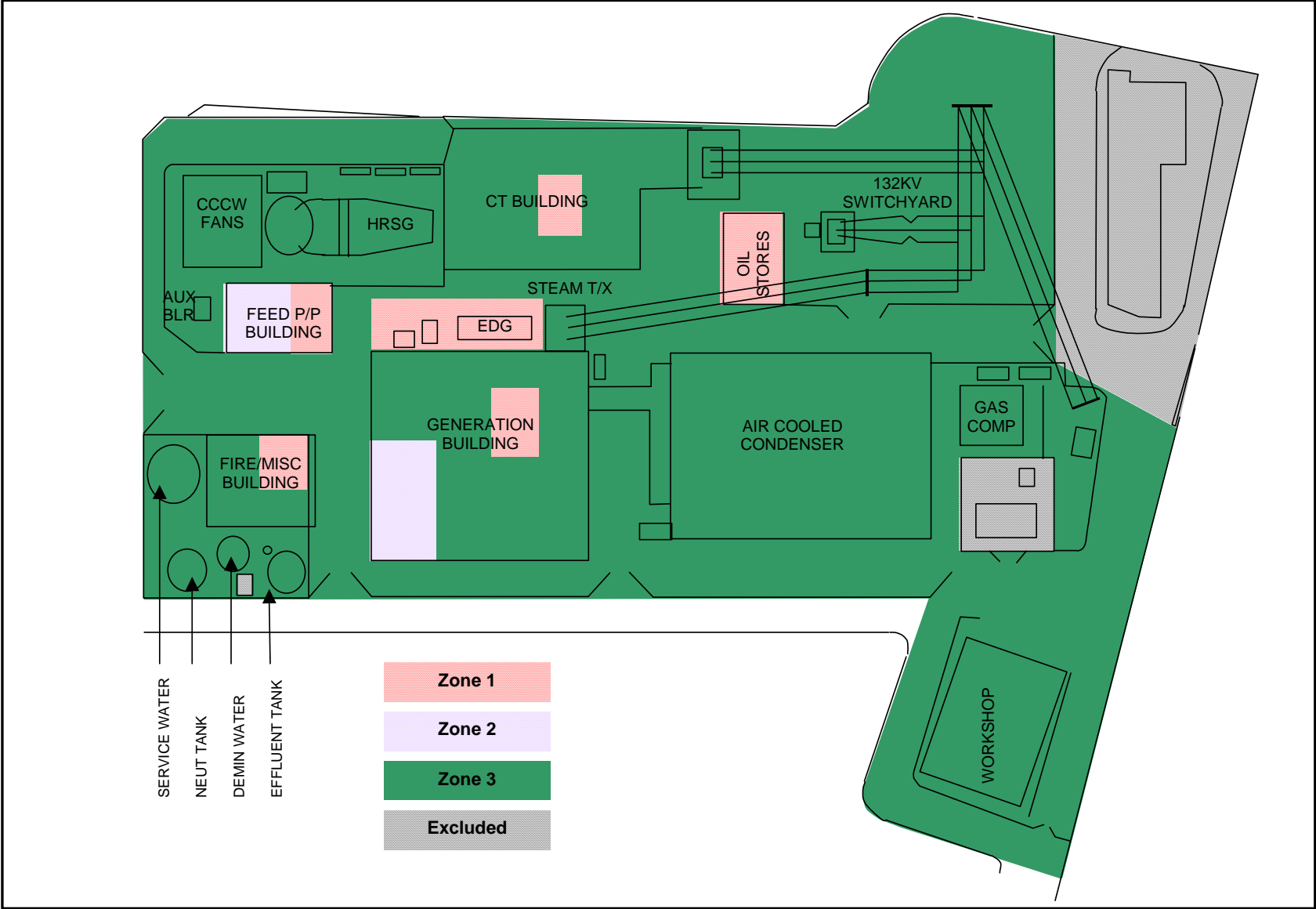


Figure 8: Site Zoning

APPENDIX B – SITE RECONNAISSANCE

APPENDIX C – DESK STUDY INFORMATION

C1 – Environmental Consents, Licences, Authorisations And Permits For Site And Surrounding Area

C2 – Existing Site Investigation, Assessment And Remediation Records

APPENDIX D – DATA ASSESSMENT

D1 – Potentially Polluting Substances and Hazard Potential

Historical Contamination

The site was formerly a part of a chemical works and was then, following a period as derelict, redeveloped as Barry Power Station in 1997. The following table summarises the principal source areas and the potential contaminants that may be anticipated in those areas.

Table D1: Potential Areas of Concern and Associated Contaminants

Zone	Source Area	Potential Contaminants
Zone 1	Oil Stores	Fuel oil hydrocarbons and waste oil during unloading
	Emergency Diesel Generator (EDG)	Diesel petroleum hydrocarbons as fuel supply to generator
	Fire / Miscellaneous Pumps Building	Diesel petroleum hydrocarbons as fuel supply to fire system
	Boiler /CCCW Feed Pump Building	Lube oil supply tanks for the feed pumps
	CT Building	Lube oil supply tank
	Generation Building	Lube oil supply tank
Zone 2	Generation Building - Sulphuric acid storage	Sulphuric acid (bulk storage tank) used for water treatment
	Generation Building – Caustic soda storage	Caustic soda alkaline (bulk storage tank) used for water treatment
	Generation Building – water treatment chemicals	Amine and oxygen scavenger chemicals for water treatment
	Boiler Feed Pump Building	Corrosion inhibitor, amines, oxygen scavenger, phosphate chemical store.
Zone 3	Surface water, oily water and chemical drainage System	Oily water/ effluent if integrity is compromised
	Electrical transformers	Transformer oils
	Gas Compressor Compound	Lube oils from plant
	Air Cooling system	Lubricating Oils
	Trade Effluent System	Boiler Blow-down Water and Neutralised Effluent
	Waste storage	General waste
	Turbine Wash-down tank	Oily water

Future Activities

Potential raw materials, products wastes and any intermediates associated with future activities are summarised below in Table D2.

Table D2: Potential Hazardous Compounds Associated with Future Activities

Zone	Compound	Hazards Posed if Uncontrolled	Estimated / Potential Inventory
1	Diesel Fuel	Potential for ground and water contamination.	~4,000 litres
	Cleaning chemicals	Used in exceptionally small quantity. No significant risk to ground, surface water or groundwater	10 Litres
	Lubricant and transformer oil	Potential for ground and water contamination.	~25,000 litres
	Waste oils	Potential for ground and water contamination.	~1,000 litres
	Oily water	Potential for ground and water contamination.	~8,000 litres
2	Water Treatment Chemicals (Including Sulphuric Acid and Caustic Soda, corrosion inhibitor, amine, oxygen scavenger)	Hazardous to the Environment. Depletes oxygen in watercourses. Toxic to aquatic organisms.	~40,000 litres
3	Sewage waste	Oxygen depletion in watercourses.	~4,000 litres
	Metal	Limited contamination risk	1 Tonne.
	Neutralised Effluent	Potential for ground and water contamination	~330,000 litres
	Batteries	Potential for ground and water contamination	10 Kg
	Fluorescent tubes	Potential for ground and water contamination	10 Kg
	General waste (mixed composition)	Oxygen depletion in watercourses. Limited potential for ground contamination	3m ³
	Oily rags	Potential for ground contamination	0.3m ³

Table D2A: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Potential for Pollution from the Relevant Activity	Records of Pollution	Existence of Pollution Prevention Measures	Nature of Primary Containment	Testing and Inspection of Primary Containment	Nature of Secondary Containment	Columns Continue on to Table 2B
Emergency Diesel Generator and EDG Tank (Zone 1)	Gas Oil (Diesel)	Delivery by tanker and offloading	Overflow from tank, spillage from tanker/fill point leading to ground, groundwater or surface water contamination	No evidence of incidents	No	Tanker, EDG tank and associated pipework	Preventative Maintenance Schedule for EGD and visual inspection for EDG tank and associated pipework	For tanker - concrete hardstanding sloped towards surface water/oil drain. Valves configured to route spillage to surface water ditch via Penstock valve. Concrete bund for EDG tank with drain leading to oil/water interceptor (normally plugged).	→
		Storage and transport via above ground pipelines to EDG	Leakages from tank and/or loss of gas oil from above-ground pipelines on to unmade ground below	No evidence of incident	Yes	Tanks/pipelines	Visual inspection	Tank bund for storage tank and concrete foundation draining to surface water/ oil drain. Valves configured to route spillage to surface water ditch via Penstock valve.	

Table D2B: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Testing and Inspection of Secondary Containment	Nature of Tertiary Containment	Testing and Inspection of Tertiary Containment	Adequacy of Pollution Prevention Measures	Are the proposed integrity testing of pollution prevention measures adequate?	Is there an adequate documented management system	Little Likelihood of Pollution	Reasonable Possibility of Pollution
Emergency Diesel Generator and EDG Tank (Zone 1)	Gas (Diesel) Oil	Delivery by tanker and offloading	Visual inspection of hardstanding and bund. CCTV survey undertaken to confirm integrity of subsurface pipework	None	None	No. However, EDG tank fitted with High-Level Alarm and transmitter? Unloading operation is supervised. Procedures will be modified to ensure drain covered during deliveries and penstock valve closed.	Yes	See Proposed Improvement Programme in PPC application	-	✓
		Storage and transport via above ground pipelines to EDG	Visual inspection and CCTV survey for subsurface pipework. None for above ground pipework. Confirm bund holds >110% total tank volume?	Concrete hardstanding sloped towards surface water/ oil drain for EDG tank. Valves configured to route spillage to surface water ditch via Penstock valve. None for above ground pipework	None	Yes.	Yes	Yes	✓	-

Table D2A: Assessment of the Likelihood of Land Pollution


Site Operation or Site Zone	Substance	Relevant Activity	Potential for Pollution from the Relevant Activity	Records of Pollution	Existence of Pollution Prevention Measures	Nature of Primary Containment	Testing and Inspection of Primary Containment	Nature of Secondary Containment	Columns Continue on to Table 2B
CT Lube Oil Reservoir (Zone 1)	CT Lube Oil	Transfer of CT lube oil from 200-litre drum in Oil Store and filling of CT lube oil reservoir to CT Lube Oil Reservoir	Spillage of CT lube during transfer leading to surface water contamination	No evidence of incident	Yes	Lube oil container and CT lube oil reservoir	Visual inspection	Enclosed oil storage and metal bund for lube oil container. None for reservoir - spillage in CT Building would run off to surface water/oil drain close to EDG. Valves configured to route spillage to surface water ditch via Penstock valve.	
		Storage and transfer of CT lube oil into Gas Turbine	Failure of reservoir and lines and spillage during transfer leading to surface water contamination	No evidence of incident	No	Metal tanks and above ground pipework	<i>Visual inspection</i>	None. Spill would fall onto impervious building floor, and runoff into surface water/oil drain close to EDG. Valves configured to route spillage to surface water ditch via Penstock valve.	

Table D2B: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Testing and Inspection of Secondary Containment	Nature of Tertiary Containment	Testing and Inspection of Tertiary Containment	Adequacy of Pollution Prevention Measures	Are the proposed integrity testing of pollution prevention measures adequate?	Is there and adequate documented management system	Little Likelihood of Pollution	Reasonable Possibility of Pollution
CT Lube Oil Reservoir (Zone 1)	CT Lube Oil	Transfer of CT lube oil from 200-litre drum in Oil Store and filling of CT lube oil reservoir to CT Lube Oil Reservoir	Visual inspection of oil storage area. None for CT lube oil reservoir	None for CT lube oil reservoir. Spill from Oil Storage could drain to SW drain	None	Yes for Oil Storage. No for CT lube oil reservoir - See Proposed Improvement Programme in PPC application. However, strategically located spill kits are available for use. Transfer is manned. Provision exists to divert runoff from surface water/oil drain to oil/water separator	Yes	Yes	-	✓
		Storage and transfer of CT lube oil into Gas Turbine	None	None	None	No - See Proposed Improvement Programme in PPC application.	Yes	Yes	-	✓



Table D2A: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Potential for Pollution from the Relevant Activity	Records of Pollution	Existence of Pollution Prevention Measures	Nature of Primary Containment	Testing and Inspection of Primary Containment	Nature of Secondary Containment	Columns Continue on to Table 2B
Generation Building - ST Lube Oil Reservoir (Zone 1)	ST Lube Oil	Transfer of ST lube oil from 200-litre drum in Oil Store and filling of ST lube oil reservoir to ST Lube Oil Reservoir	Spillage of ST lube during transfer leading to surface water contamination	No evidence of incident	Yes	Lube oil container and ST lube oil reservoir	Visual inspection	Enclosed oil storage and metal bund for lube oil container. Concrete bund for ST lube oil reservoir.	→
		Storage and transfer of ST lube oil into Steam Turbine	Failure of reservoir and lines and spillage during transfer leading to surface water contamination	No evidence of incident	Yes	Metal tanks and above ground pipework	Visual inspection	Reservoir is contained within concrete bund.	
Oil Stores (Zone 1)	Turbine lube, Transformer and Waste Oils	Delivery, unloading and storage	Rupture of containerised chemicals leading to land or surface water contamination	No evidence of incident	Yes	IBCs/containers	Visual inspection	Locked container unit with drill tray bund inside	→
Misc. Pumps Building (Zone 1)	Gas Oil (Diesel)	Transfer of gas oil from tanker to Firewater Diesel Tank	Spillage during transfer and ground and/or surface water contamination	No evidence of incident	Yes.	Tanker/Diesel Firewater Tank	Visual inspection	Concrete hardstanding (external) sloping towards Surface Water Drain for spillages from Tanker. Concrete bund for diesel storage tank	→
		Storage and delivery to Diesel Firewater Pump	Failure of storage tanks and associated pipework leading to surface water contamination	No evidence of incident	Yes	Tanks and pipework	Visual inspection	Concrete bund for Diesel Tank and impervious floor leading to oil/water separator for above ground pipework	

Table D2B: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Testing and Inspection of Secondary Containment	Nature of Tertiary Containment	Testing and Inspection of Tertiary Containment	Adequacy of Pollution Prevention Measures	Are the proposed integrity testing of pollution prevention measures adequate?	Is there an adequate documented management system	Little Likelihood of Pollution	Reasonable Possibility of Pollution
Generation Building - ST Lube Oil Reservoir (Zone 1)	ST Lube Oil	Transfer of ST lube oil from 200-litre drum in Oil Store and filling of ST lube oil reservoir to ST Lube Oil Reservoir	Visual inspection	None for CT lube oil reservoir.	None	Yes, strategically located spill kits are available for use. Transfer is manned.	Yes	Yes	✓	-
		Storage and transfer of ST lube oil into Gas Turbine	Visual inspection of bund. None for above ground pipework	None	None	No - see Proposed Improvement Programme in PPC application.	Yes	Yes	✓	-
Oil Stores (Zone 1)	Turbine lube, Transformer and Waste Oils	Delivery, unloading and storage	Visual inspection	Runoff from storage area could flow into nearby Surface Water Drain	None	Yes. See Proposed Improvement Programme in PPC application.	Yes.	No - See Proposed Improvement Programme in PPC application).	✓	-
Misc. Pumps Building (Zone 1)	Gas (Diesel) Oil	Transfer of gas oil from tanker to Firewater Diesel Tank	Visual Inspection	Impervious floor leading to oil/water separator for Diesel. None for tanker	None	Yes	Yes	No - See Proposed Improvement Programme in PPC application.	✓	-
		Storage and delivery to Diesel Firewater Pump	Visual inspection for bund	Building floor slopes toward internal Oily water drain to oil/water interceptor	None	Yes	Yes	Yes	✓	-

Table D2A Continued: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Potential for Pollution from the Relevant Activity	Records of Pollution	Existence of Pollution Prevention Measures	Nature of Primary Containment	Testing and Inspection of Primary Containment	Nature of Secondary Containment	Columns Continue on to Table D2B
Bulk acid and caustic soda tanks (Zone 2)	Caustic and sulphuric acid	Delivery by tanker and offloading	Overflow from tank, spillage from tanker/fill point leading to ground, or surface water contamination	No evidence of incidents	No	Tanker, bulk tank and associated pipework	Contractor requirements/visual inspection	Chemical resistant unloading containment area bund for losses from tanker and fill points. Tanks located within a concrete bund situated in the Generation Building.	→
		Storage and transport via above ground pipelines to Demineralisation Plant and Neutralisation Tank	Leakages from tank and/or pipelines	No evidence of incident	Yes	Tanks/pipelines	Visual inspection.	Tank bund for storage tank. Floor drainage leads to chemical sump and ultimately to foul sewer via Neutralisation Tank and Effluent Tank	
Boiler Feed/CCCW Pump Building (Zone 2)	Boiler Feedwater and CCC Water Treatment Chemicals	Delivery, unloading and storage	Surface water contamination in case of spillage	No evidence of incident	Yes	IBC	Visual inspection	Concrete bund within enclosed building with drain leading to oil/water separator (normally plugged)	→
Generation Building – Boiler Water Treatment (Zone 2)	Boiler Water Treatment Chemicals	Delivery, unloading and storage	Surface water contamination in case of spillage	No evidence of incident	Yes	IBC	Visual inspection	Concrete bund within enclosed building with drain leading to oil/water separator (normally plugged)	→

Table D2B Continued: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Testing and Inspection of Secondary Containment	Nature of Tertiary Containment	Testing and Inspection of Tertiary Containment	Adequacy of Pollution Prevention Measures	Are the proposed integrity testing of pollution prevention measures adequate?	Is there an adequate documented management system	Little Likelihood of Pollution	Reasonable Possibility of Pollution
Bulk acid and caustic soda tanks (Zone 2)	Caustic and sulphuric acid	Delivery by tanker and offloading	Visual inspection	Floor drainage leads to chemical sump and ultimately to foul sewer via Neutralisation Tank and Effluent Tank. None for tanker.	None	Yes.	No - See Proposed Improvement Programme in PPC application.	No - See Proposed Improvement Programme in PPC application.	✓	-
		Storage and transport via above ground pipelines to Demineralisation Plant and Neutralisation Tank	Visual inspection	Floor drainage leads to chemical sump and ultimately to foul sewer via Neutralisation Tank and Effluent Tank. None for pipework.	None	Yes. Tanks are fitted with level indication and the operation is supervised	Yes	Yes	✓	-
Boiler Feed/CCCW Pump Building (Zone 2)	Boiler Feedwater and CCC Water Treatment Chemicals	Delivery, unloading and storage	Visual inspection	Floor drainage diverts spillage outside potentially to surface water drain located outside	None	Yes. See Proposed Improvement Programme in PPC application.	Yes.	No - See Proposed Improvement Programme in PPC application.	✓	-
Generation Building – Boiler Water Treatment (Zone 2)	Boiler Water Treatment Chemicals	Delivery, unloading and storage	Visual inspection	Impervious building floor potentially diverts runoff into external surface water drainage network via penstock valve	None	Yes. See Proposed Improvement Programme in PPC application.	Yes.	No - See Proposed Improvement Programme in PPC application.	✓	-

Table D2A Continued: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Potential for Pollution from the Relevant Activity	Records of Pollution	Existence of Pollution Prevention Measures	Nature of Primary Containment	Testing and Inspection of Primary Containment	Nature of Secondary Containment	Columns Continue on to Table D2B
Generation Building (Zone 3)	Water-based turbine wash detergent and effluent	Turbine washing (off-line)	Failure of containment system and surface water contamination	No evidence of incident	Yes	IBCs	Visual inspection	Mobile bund for Wash Detergent and Turbine wash-water IBC	→
Gas Compressor Compound (Zone 3)	Engineering Oils	Operation and maintenance	Release of lubricant oils to ground	No evidence of incident	No	Compressor	Visual inspection	None	→
Air Cooled Condensers (Zone 3)	Engineering Oils	Operation and maintenance	Release of lubricant oils to ground	No evidence of incident	No	Oil gearbox and sump	Visual inspection	None	→
Transformers (Zone 3)	Transformer Oil	Operation and maintenance	Release of lubricant oils to ground	No evidence of incident	Yes	Transformer	Visual inspection	Concrete bund with drain routed to oil/water separator (normally plugged)	→
Surface Water Drainage (Zone 3)	Rainwater and potential chemical spillage	Collection and discharge of surface water	Surface water contamination in event of chemical spillage	No evidence of incident	Yes	Subsurface pipework and sump	CCTV surveys undertaken.	None	→

Table D2B Continued: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Testing and Inspection of Secondary Containment	Nature of Tertiary Containment	Testing and Inspection of Tertiary Containment	Adequacy of Pollution Prevention Measures	Are the proposed integrity testing of pollution prevention measures adequate?	Is there an adequate documented management system	Little Likelihood of Pollution	Reasonable Possibility of Pollution
Generation Building (Zone 3)	Water-based turbine wash detergent and effluent	Turbine washing (off-line)	Visual inspection	None	None	Yes. See Proposed Improvement Programme in PPC application (BPS9).	Yes	Yes	✓	-
Gas Compressor Compound (Zone 3)	Engineering Oils	Operation and maintenance	None	None	None	No, but limited potential to impact on ground due to limited quantity	Yes.	Yes	-	✓ But stored in limited quantity
Air Cooled Condensers (Zone 3)	Engineering Oils	Operation and maintenance	None	None	None	No, but limited potential to impact on ground due to limited quantity	Yes.	Yes	-	✓ But stored in limited quantity
Transformers (Zone 3)	Transformer Oil	Operation and maintenance	Visual inspection	None	None	Yes. However, require confirmation that bund capacities are 110% of transformer oil inventory	Yes	Yes	✓	-
Surface Water Drainage (Zone 3)	Rainwater and potential chemical spillage	Collection and discharge of surface water	None	None	None	Yes. Discharge can be isolated using penstock valve	Yes. See Proposed Improvement Programme in PPC application.	See Proposed Improvement Programme in PPC application.	✓	-

Table D2A Continued: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Potential for Pollution from the Relevant Activity	Records of Pollution	Existence of Pollution Prevention Measures	Nature of Primary Containment	Testing and Inspection of Primary Containment	Nature of Secondary Containment	Columns Continue on to Table D2B
Tank Farm – Trade Effluent System (Zone 3)	Chemical, foul and oily water	Discharge to foul sewer	Failure of tanks and connecting pipework leading to ground contamination	No evidence of incident	Yes	Tanks/pipeline	Visual inspection and CCTV survey	None	→

Table D2B Continued: Assessment of the Likelihood of Land Pollution

Site Operation or Site Zone	Substance	Relevant Activity	Testing and Inspection of Secondary Containment	Nature of Tertiary Containment	Testing and Inspection of Tertiary Containment	Adequacy of Pollution Prevention Measures	Are the proposed integrity testing of pollution prevention measures adequate?	Is there and adequate documented management system	Little Likelihood of Pollution	Reasonable Possibility of Pollution
Tank Farm – Trade Effluent System (Zone 3)	Chemical, foul and oily water	Discharge to foul sewer	None	None	None	Yes. High level alarm, Low-level alarm and level transmitter to DCIS	See Proposed Improvement Programme in PPC application.	Yes	✓	-

APPENDIX E – CONCEPTUAL SITE MODEL

E1 – Tabular

The conceptual site model is summarised below in Table E1. Where the risk of contamination occurs from a current or future source arising from the operation of Barry Power Station, the area has been lightly shaded.

Previous investigations undertaken prior to the power station construction identified some contamination and there was some documentary evidence to suggest that remedial activity occurred. No data was available for a rigorous review and it is therefore possible that historic contamination may be present in the ground at the site. No intrusive investigations have been carried out following the construction and operation of the site and therefore no assessment of the current quality of the underlying soil or groundwater has been made. Whilst no hydrocarbon spills have been recorded, areas of localised hydrocarbon impact not identified in the investigations to date cannot be discounted.

Table E1 - Tabular representations of the Conceptual Site Model (CSM)

Source	Current or Historic Source? Zone?	Pathway	Receptor	Linkage Complete
Contaminants associated with previous site uses	Historic	Vertical migration through subsurface strata and leachate generation via rainwater infiltration	Groundwater	No There is little likelihood of impact - no reliable data available regarding presence of source
Caustic Soda	Historic and current	Surface runoff from spillages/leaks	Groundwater and surface water	No There is little likelihood of impact due to the presence of adequate site containment measures
Sulphuric Acid	Historic and current	Surface runoff from spillages/leaks	Groundwater and surface water	No There is little likelihood of impact due to the presence of adequate site containment measures
Hydrocarbon contamination from gas oil or oily water	Historic and Current	Surface runoff from spillage/surface water drainage	Groundwater Surface water	Yes – low risk. Although impact has not been confirmed, CT lube oil reservoir situated in CT building without containment. This has been identified as an action for improvement.



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**First Phase Reporting of the
Site Protection and
Monitoring Programme for
Barry Power Station, Centrica
Energy**

**Where Reference Data is
Required**

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0. SUMMARY

This document represents the first report of the Site Protection and Monitoring Programme (SPMP) for the Barry Power Station submitted to the Environment Agency in pursuance of Condition 2.8.1 of the Permit No. JP3333LV (the "Permit") authorising the operation of Barry Power Station (the "Installation").

An intrusive investigation was undertaken to characterise substances identified as being present or potentially present in, on or under the ground in the Application Site Report (ASR) submitted with the Permit Application. The scope of the investigation is detailed within the Design SPMP submitted in pursuance of Condition 2.8.1 of the above mentioned Permit. This document should be read in conjunction with both documents.

This report sets the reference data for the installation which are summarised in Section 2.4 and Appendix G.

The monitoring programme for the site is presented in Section 4 of the Design SPMP.



1. INTRODUCTION

1.1. GENERAL INTRODUCTION

Centrica Energy commissioned Ford Consulting Group Ltd (FCG) to undertake an intrusive ground investigation to collect reference data at Barry Power Station. The drilling works were undertaken by Ground Restoration Ltd under the supervision of FCG. Soil and groundwater samples obtained during the investigation were analysed by ALcontrol Geochem Ltd at their Chester laboratory.

1.2. SITE LOCATION

The Centrica Barry Power Station location is illustrated by Figure A1. It is located on the western side of Sully Moors Road around 3km east of Barry Town centre and 1.5km north of the Bristol Channel. It is sited on the eastern side of an area extensively developed for Chemical manufacturing with active chemical manufacturing storage and distribution facilities to the north, east and south. On the far side of Sully Moors Road is an area of flat lying rough pastureland beyond which is a slope rising up to Sully Village around 400m to the East.

The current site layout is illustrated by Figure A2. It comprises an approximately T shaped plot of around 2,200m² in area. The facility is a Combined Cycle Gas Turbine Power Station (CCGT) rated at 230MW. Principal structures at the site include:

- A Generation Building (with offices and control room);
- Combustion plant and turbine building;
- An Air Cooled Condenser
- An effluent treatment area including bulk above ground storage tanks for effluent storage and neutralisation.
- The Gas Receiver and Compressor area, and;
- A combined Stores and workshop building.

The location of these features is illustrated by Figure A2

2. INTRUSIVE INVESTIGATION

2.1. INVESTIGATION AND SAMPLING STRATEGY

The following Sections detail variations to and deviations from the Design SPMP.

2.1.1. GENERAL

The site work elements of this study were completed in the period between the 16th and the 27th April 2007. FCG personnel undertaking this work were:

- James Wragg (Project Director) with responsibilities including on-site liaison with Centrica Energy, supervision of the drilling contractor, soil and groundwater logging and sampling;



- Peter Dunn (Site Engineer) provided assistance with supervision of the drilling contractor, soil & groundwater logging and sampling, monitoring well elevations survey and groundwater sampling;

Weather conditions varied from fine and warm to cold and wet over the 2 weeks of the investigation period.

The main elements of the site work can be summarised as follows:

Borehole Drilling, Soil Sampling and Groundwater Monitoring Well Installation.

Soil samples were collected at the points illustrated on Figure A3. Borehole logs for each sample location are provided as Appendix D1(a) to this report. The samples were recovered using a combination of the following general techniques:

- Where present concrete and asphalt was removed by use of a pneumatic breaker. This enabled access to the underlying soils;
- A combination of hollow stem auger, DTH (Down The Hole) Hammer and solid stem auger rotary techniques were utilised to extend each sampling point to its target depth. Further detail regarding the specific methodologies employed for individual sampling locations is provided in Section 2.1.2;
- Arisings from the borehole drilling process were logged by an FCG site engineer in accordance with BS5930 1999;
- Soil samples were generally collected at the target depths of 0.25m, 0.5m, 1.5m (approximate shallow water table depth) and at around 2.5m – within the natural clay. The samples were placed, using pre-cleaned stainless steel tools and fresh surgical gloves, in dedicated laboratory supplied containers specific to the scheduled analytical suite. The samples collected are recorded on the borehole logs in Appendix D1(a);
- A Photo-Ionisation Detector (PID) instrument was used to provide a screening analysis of the soil profile for volatile organic compounds by the use of headspace tests on soils recovered through the boring soil profile. Headspace analysis results are provided on the borehole logs in Appendix D1(a);
- The samples were handled and transported to the laboratory in accordance with standard chain of custody procedures in cool boxes incorporating ice packs and within the recommended holding times to reduce the potential for sample deterioration;
- Arisings from the drilling of boreholes were placed in sealed bags, labeled and put in a skip designated by the client until the laboratory analysis data was provided so that an appropriate waste disposal route could be identified;
- All down-hole drilling equipment was washed down using a jet wash at a location agreed with site personnel.

Monitoring Well and Groundwater Elevation Survey



A GPSMAP 60C handheld global positioning system (GPS) was used to establish the location of each monitoring well (12 figure National Grid reference) and are provided in Table 1 of this report. The level of each monitoring well was measured relative to an arbitrary site datum using a calibrated Leica Runner 20 level, tripod and staff. Measurements were taken from the top of the monitoring well installation standpipe (top of casing) or ground level where wells were not installed. The reference point elevations are provided in Table 1.

The depth to groundwater from the top of the well casing (mbct) was measured using a Geotechnical Instruments interface probe. Groundwater elevations were measured on 27th April 2007. The reduced groundwater elevations (relative to arbitrary site datum) are provided in Appendix D2(c).

Groundwater Sampling

Groundwater monitor wells were installed in six of the ten boreholes attempted as part of this investigation. The wells were installed at a nominal 50mm diameter using HDPE well screen and casing fitted with top and bottom caps to a depth of up to 5.4 m. The well casing was fitted with a geotextile wrap and the borehole annulus was filled with a pre-washed, inert, rounded and graded gravel pack, a bentonite seal and concrete to the surface. The wells were completed either with flush mounted or up standing steel covers. The flush mounted covers are fitted with integral seals that are designed for heavy duty traffic applications.

Key elements of the groundwater sampling exercise included:

- A groundwater elevation survey was undertaken prior to sampling. This included all existing and new monitor wells available at the site. An interface probe was also used to check for the presence and measure the thickness of any accumulated floating hydrocarbon product within each well prior to sampling;
- The wells were purged of at least three well volumes of water to optimise collection of representative groundwater samples. Where possible, the purging of individual wells continued until wellhead parameters had stabilised (stabilised readings of pH temperature, redox potential and electrical conductivity). The purging was undertaken with a dedicated Polyethylene bailer;
- Following purging, samples were collected using dedicated (well-specific) bailers to prevent cross-contamination. Samples were handled and despatched using US EPA-based protocols;

2.1.2. CONSTRAINTS ON INVESTIGATIONS

Outlined below is a summary of the constraints placed on the performance of this investigation by site conditions that required an alteration to the methodologies employed in collecting reference data for the Barry Power Station:

- At a number of locations in the central section of the site the natural soils were found to be at a greater depth than 1.0m. The Made Ground in this area appeared to have been laid down during development of the power station. In addition to electrical cables, drains, water & gas mains, underground services at the site include an earthing matt which extends over much of the site area. In practice it was found that the network of cables associated with



this earthing mat were very difficult to locate using electrical cable avoidance tool equipment. For this reason, it was decided to rely on the hand dug excavation to penetrate power station related fill materials prior to advancement of boreholes with mechanical equipment;

- Further complications were encountered during the drilling of sample points sited in the western half of the site. Here historical concrete slabs were encountered at depths varying between 0.5-1.1m below ground level. In consultation with Centrica staff a decision was made to utilise the drilling rigs pneumatic hammer (DTH) to penetrate through these slabs on the basis that all Power Station related services would be above these slabs and that older live services were not present in these areas. This applied to sample locations BPS-BH4A, 4B, 5, 6 and 7;
- Hand dug starter pits were excavated to a maximum depth of 1.0m or to undisturbed natural ground if encountered at shallower depths. It was not possible to extend hand-dug starter pits to a depth where underground services could be guaranteed as absent at locations BPS-BH3 & 8. to facilitate the collection of reference data in these areas it was decided either to rely on samples collected from the starter pit wall (BPS-BH3) and from hand dug shallow excavations closer to the potential source(s) of concern (BPS-BH12&13, replacing BPS-BH8);
- On penetration of the Made Ground borings were then progressed to their target depths. This was between 3.7 to 5.4m below ground level;
- The borings were drilled using a track mounted rotary drilling rigs at diameters of between 100 to 120mm. For sample locations BPS-BH1 and 2A the drilling technique used to penetrate unconsolidated soils comprised a hollow stem auger with undisturbed soil cores being collected using split spoon samplers. The split spoon tubes were pre-cleaned and once extracted from the ground provided access to an undisturbed core of soil over the interval sampled. A photographic record of the soil cores recovered for BPS-BH1 & 2A is provided as Appendix D1(b) to this report. The Hollow Stem casing was advanced after each split spoon sample was retrieved thereby sealing the bore and minimising the potential for vertical cross contamination during the drilling process;
- For sample locations BPS-BH4A, 4B, 5, 6 and 7 it was necessary to reduce the drilling diameter following the use of DTH equipment to penetrate old concrete slabs. This resulted in the subsequent drilling of unconsolidated soils by solid stem auger rather than the hollow stem used for borings to the east. This precluded use of the split spoon sampler and disturbed soil samples were recovered from the flight augers. Steel drive casing was introduced to the borehole progressively as it was direct advanced thereby sealing the bore and minimising the potential for vertical cross contamination during the drilling process;
- An obstruction encountered during the drilling of BPS-BH7 at the base of the Made Ground could not be cleared using the DTH. This is believed to have been a large cobble. It was driven in advance of the drill bit through the soft alluvial clay for a distance of 0.6m with no returns. It was decided to install a shallow monitor well at that depth;
- Insufficient groundwater had accumulated three days after purging in borehole BPS-BH1 to enable the collection of water samples for analysis. Otherwise groundwater samples from all of the wells were collected and tested for the full suite of scheduled analyses.



2.1.3. SOIL INVESTIGATION SAMPLING TECHNIQUES AND PROTOCOLS

As stipulated in the Design SPMP, driven tube sampling methods were employed where possible. Otherwise, and for reasons described above, disturbed samples were collected directly from the solid stem auger.

The soil sampling regime stipulated in the Design SPMP required a minimum of four soil samples at each location, at nominal depths of 0.25, 0.50, 1.50 (approximate water table depth) and 2.5 mbgl. In addition the recovered soil samples were to reflect changes in lithology or the occurrence of changes in the visual or olfactory indications of contamination (i.e. stains or odours).

It was not always possible to obtain soil samples at the pre-determined depths, generally where very coarse grain size materials or concrete was present. Where this was the case, samples were taken across depth intervals as close as possible to that indicated in the design SPMP.

Visual and olfactory evidence of soil contamination was observed during the drilling of BPS-BH7, 12, and 13. Soil samples were collected from those horizons exhibiting visual or olfactory indications of contamination.

A list of the soil samples collected during the investigation is presented Table D2(a) of Appendix D.

The relevant sections of the quality assurance and quality control (QA/QC) plan in Appendix B and Appendix F detail the controls and checks employed within the soil sample collection, handling and transport procedures respectively.

2.1.4. GROUNDWATER INVESTIGATION SAMPLING TECHNIQUES AND PROTOCOLS

Given the apparent low permeability of water bearing alluvial clays encountered beneath the Installation, low-flow purging and sampling procedures specified in the Design SPMP were not considered to be a suitable technique for groundwater sampling.

Groundwater monitoring wells were purged and sampled using dedicated, well specific, clean 38mm ID PE bailers. A sample was only obtained once three well volumes had been purged or, if purged dry, once groundwater levels had recovered sufficiently. Water levels in wells that were purged dry (BPS-BH5, BPS-BHA1, BPS-BHB1) were regularly monitored. As indicated previously, BPS-BHA1 had not recovered enough three days after purging to allow sample collection for SPMP related parameters.

The groundwater sample inventory for the investigation is presented Table D2(b) of Appendix D.

Borehole BPS-BHA1&B1 were pre-existing installations for which no borehole logs are available. They were found to be 2.198m & 3.09m deep respectively, and therefore assumed to be screened at a relatively shallow depth. As such they were included in the shallow groundwater quality baseline sampling exercise for the Barry Power Station.



The relevant sections of the quality assurance and quality control (QA/QC) plan in Appendix B and Appendix F detail the controls and checks employed within the soil sample collection, handling and transport procedures respectively.

2.1.5. INFRASTRUCTURE INVESTIGATION SAMPLING TECHNIQUES AND PROTOCOLS

It is not proposed that any amendments are made to the scope, sampling techniques and protocols employed for pollution control infrastructure as the result of the findings of the reference data collection exercise. As such they should be consistent with those set out in the Design SPMP.

2.2. SAMPLE LOCATIONS

Sample locations were surveyed in using a portable handheld GPS unit and an engineer's level/tripod staff for lateral and vertical measurements taken from the casing top (or ground level where no monitoring well was installed) respectively. The measurements taken have a horizontal accuracy of $\pm 1.0\text{m}$ and a vertical accuracy of 0.01m . GPS readings were unable to be taken for locations where signal strength did not allow it (under installations and between buildings), where this was the case they have been estimated on the basis of Ordinance Survey mapping. Elevation data is based on an arbitrary site datum. Sample locations for the site are shown in Figure A3 of Appendix A.

Samples have been referenced using the classification system detailed in the Design SPMP (Section 3.2) as shown in Table 1 below.

TABLE 1 - SAMPLE LOCATIONS AND ELEVATIONS

Well	National Grid Reference	Elevation (mAD)
BPS-BH1	ST1465368509	6.029
BPS-BH2A	ST1457468607	6.256
BPS-BH3	ST1463668514*	6.664**
BPS-BH4A	ST1447768570	6.735
BPS-BH4B	ST1448068520	6.229
BPS-BH5	ST1447068487	5.952
BPS-BH6	ST1451668427	6.932
BPS-BH7	ST1450768539	7.426
BPS-BH8	ST1466468529*	6.459**



Well	National Grid Reference	Elevation (mAD)
BPS-BH12	ST1467268536*	6.464**
BPS-BH13	ST1467868427*	6.394**
BPS-BHA1	ST1458268512	6.036
BPS-BHB1	ST1467868427*	6.029

* Estimated National Grid References

** Ground surface elevation (where no monitor well was installed)

The findings of investigations are discussed in Section 4 and all physical ground results (borehole logs & tables including sample inventories/wellhead parameters) are reproduced in Appendix D.

2.3. ANALYTICAL STRATEGY

2.3.1. JUSTIFICATION OF ANALYTICAL SUITES

The analytical suites agreed in the Design SPMP were used in the analysis of samples for this reference data collection exercise.

2.3.2. JUSTIFICATION OF ANALYTICAL/FIELD TECHNIQUE AND DETECTION LIMITS

The laboratory/field analytical techniques and detection limits for each analysis were as set out in the Design SPMP.

2.3.3. LABORATORY ACCREDITATION/QUALITY ASSURANCE & QUALITY CONTROL

2.3.3.1. LABORATORY ACCREDITATION

All laboratory analytical techniques undertaken are within UKAS Accreditation. MCERTS accredited analysis methods were adopted for soil samples where available.

2.3.3.2. QUALITY CONTROL

There were no modifications to the agreed sampling and analytical quality assurance and quality control plan.



2.4. FINDINGS OF THE GROUND INVESTIGATION

2.4.1. SUMMARY OF SITE PHYSICAL CONDITIONS AND REFINEMENT OF CONCEPTUAL SITE MODEL

Ground conditions were found to be comparable to those described in the ASR and Design SPMP for the Installation. The following general sequences of strata were encountered during the drilling works; more detailed borehole logs are presented in the Table D1 of Appendix D:

- Made Ground, over;
- Estuarine alluvium (clay), over;
- Triassic Mercia Mudstone Marginal Facies bedrock.

Made Ground varies between 0.7-2.2m in thickness and comprises a variable sequence of imported materials, residual floor slabs and foundations from earlier chemical plant and reworked natural strata. Made Ground beneath much of the site is granular with crushed stone in a sandy matrix predominating. This tends to have a greater component of brick and concrete fragments with depth and grades in to reworked clay above the natural strata. Beneath the western section of the site the fill materials at the majority of the locations drilled contain old concrete ground slabs.

The fill materials have been found to be uniformly underlain by a firm to very soft, grey brown silty clay. This unit is inferred to represent Estuarine Alluvium. It tends to become softer, grey in colour with a higher silt content beneath around 2.0-2.5mbgl (below ground level). In boreholes sited towards the eastern end of the site this unit becomes inter-bedded with clayey sand and sandy clay horizons. The base of this unit is at between 4.0 to 6.5m below ground level.

The bedrock is a complex unit of inter-bedded strata that includes, with increasing depth, reddish brown mudstones, grey green and reddish brown conglomerates and grey limestones. All of these varied lithologies are recorded on borehole logs to occur within 10m of the bedrock surface beneath the site. Correlating between borehole logs from this and earlier investigations at the site suggests a bedrock dip to the south. The Marginal Facies strata are thought to unconformably overlie Carboniferous Limestone.

Groundwater was encountered at the following horizons during this investigation:

- **Made Ground Shallow Perched groundwater:** The borings installed during this study generally did not encounter groundwater within the Made Ground. Exceptions to this occurred in three locations at the western end of the site namely in BPS-BH6 and 7 where a localised perched system was encountered.
- **Estuarine Alluvium:** All borings extended to this depth encountered minor to moderate groundwater strikes within the estuarine alluvium. These were more significant lower in the sequence where sand lenses were present. Shallow wells at the site were screened across this horizon. Figure A4 illustrates the groundwater elevations recorded for that horizon and shows inferred contours and horizontal flow vectors. This Figure suggests that shallow groundwater beneath the site flows radially away from a central ridge that runs east to west down the spine of the site. It is likely that this flow regime is the result of



shallow groundwater discharging to the surface water courses that are present to the North (unnamed drainage channel) and South (Sully Brook) of the site.

The schematic geological cross section provided as Figure A5 also shows the piezometric surface for wells installed in the estuarine alluvium.

The bedrock beneath the site is considered to be a major aquifer although it is understood not to be utilised locally, the closest licensed abstractions being some kilometres to the north and therefore up gradient of the site.

Hydrochemical parameters (measured in the field) describing the groundwater beneath the Installation are summarised in Table 2 below and Table D2(c) of Appendix D.

In general groundwater was pH neutral or very mildly alkaline. Exceptions to this being the groundwater encountered at BPS-BH7 which was found to be alkaline (pH of 11.7) and that in the monitoring wells installed prior to this investigation (BPS-BHA1& B1) and located along the southern site boundary which showed very slightly acidic conditions. The laboratory measurements of groundwater pH are in the main slightly more alkaline than those observed from field measurements. This is often the case where degassing of groundwater (by for example carbon dioxide) post sample collection alters the hydrochemistry of groundwater samples and results in a higher pH. As a result it is normal to regard field measurements as a more accurate reflection of site conditions.

Water temperature is slightly elevated compared to the UK average (11°C). Electrical conductivity measurements were variable, with one reading being over the instrument detection limit of 3999 $\mu\text{S}/\text{cm}$. ORP measurements were also highly variable, with readings from the old monitoring wells all giving negative values (therefore reducing condition) whilst the new monitor wells generally gave positive results.

TABLE 2 – SUMMARY OF HYDROCHEMICAL PARAMETERS

Parameter	Units	Minimum	Maximum	Mean
pH	[-]	6.4	11.7	7.8
Electrical Conductivity	$\mu\text{S}/\text{cm}$	454	>3999	1651
ORP	mV	-146	90	-17.4
Temperature	°C	11.7	14.5	13.0

2.4.2. ANALYTICAL RESULTS

The monitoring wells were located with consideration to the sources, pathways and receptors identified within the conceptual model for the site detailed in Section 6 of the ASR. The six new monitoring wells were strategically positioned within Zones 1 and 3 along with a further three soil sampling locations in Zone 3 to identify contamination, which may have occurred as a result of activities in these areas. Figure A3 of Appendix A illustrates the delineation of zones on site and the monitoring well locations.



The potential soil and groundwater contaminants within Zone 1 at BPS-BH7 were considered to be Total Petroleum Hydrocarbons (TPH) and, Polycyclic Aromatic Hydrocarbons (PAH) from the nearby diesel powered generator. The potential soil and groundwater contaminants within Zone 3 at BPS-BH1, BH2, BH3, BH4, BH5, BH6, BH8, BH12, BH13 and groundwater only sample location BPS-BHA1 were those associated with loss of materials from Zones 1 & 2 and consisted of TPH, PAH and sulphate. In addition, groundwater samples were also analysed for chloride to assess the potential for saline groundwaters beneath the Installation.

In general there were little or no visual or olfactory indications of ground contamination made during the borehole installation programme at Barry. In addition the extensive number of sub-samples subjected to headspace analysis for Volatile Organic Compounds by use of a Photo-Ionisation Detector (PID) all returned non-detect results. The following Table 3 summarises the limited occurrence of staining and odours observed during the site works.

TABLE 3 - OLFATORY INDICATIONS OF CONTAMINATION

Borehole	Depth of Observation (m)	Details of Observation
BPS-BH7	1.0-1.9m	Hydrocarbon staining and strong hydrocarbon odour with slight solvent odour noted in fill materials
BPS-BH12	0.3-0.35m	Slight hydrocarbon odour and staining noted
BPS-BH13	0.3-0.35m	Slight hydrocarbon odour and staining noted

Twenty five (25) soil samples and six (6) groundwater samples were collected from Zone 1 & 3 for chemical analysis. The analytical results are discussed in the following sections.

2.4.2.1. RESULTS FOR SOILS

The results of the analyses performed on soil samples are summarised in Table 4 below.

Table 4 - Analytical Results for Soils

Determinand	Units	No. Samples Analysed	No. Samples > MDL	No. Samples < MDL	Min.	Max.	Mean ^A
TPH ^C	mg/kg	25	12	11	0.1	2200	324.12
PAH ^B	mg/kg	24	0	24	1.8	2.06	1.82
Sulphate (Total)	mg/kg	3	3	0	310	530	387
Sulphate (WS)	g/l	3	2	1	0.003	0.039	0.02
Chloride	mg/kg	3	3	0	140	380	223
pH	mg/kg	14	14	0	7.53	9.58	8.77

MDL - Method Detection Limit. ^A Calculated assuming non-detect samples have concentrations equal to the MDL, rounded to the accuracy of the analysis. ^B Sum of 18 PAH compounds analysed. ^C Sum of C₅-C₃₅ aliphatic & aromatic compounds



Twenty five soil samples were analysed for Total Petroleum Hydrocarbons, points to note in respect of this data are as follows:

- Half of the samples tested returned results for TPH below the laboratory method detection limit. Samples returning positive results were for a mixture of aliphatic and aromatic compounds with carbon chain lengths of between C10 to C35 with the longer chain length fractions predominating. These suggest a degraded diesel or heavier grade product type. The majority of the samples returning positive results were collected from the Made Ground. Deeper samples collected from the estuarine clay that yielded positive results, albeit at much lower concentrations were from boreholes BPS-BH2A, 4B and 6.
- The highest TPH results were obtained from the shallow soil samples collected at BPS-BH12 and 13 (2,200 and 1,200mg/kg) in the area affected by runoff from the gas compressor blow down. The clayey nature of the fill materials exposed in this area should limit a widespread impact by this material. The only other result above 200mg/kg was for a sample of fill material collected in the vicinity of the sites emergency diesel generator (BPS-BH7). This returned a TPH result of 1,100mg/kg. Hydrocarbon staining and odours were noted in the soils recovered from this boring.

Twenty four soil samples were analysed for 18 speciated PAHs during this investigation. All of the samples analysed for PAHs returned non-detect results.

Sulphate concentrations (BPS-BH1 & BH3) were in general at relatively low levels, the most elevated concentration was reported at BPS-BH1 at 0.9-1.1m (530mg/kg). Soils were mildly alkaline, ranging between ~pH 7.53 and ~pH 9.58.

2.4.2.2. RESULTS FOR GROUNDWATER

Analytical results for the groundwater samples obtained during this investigation are summarised by Table 5 below. Seven groundwater samples were analysed for PAHs and sulphate during this investigation. All of the PAHs were found to be below the laboratory detection limit. Sulphate results were also relatively modest.

Seven groundwater samples were analysed for Total Petroleum Hydrocarbons. The results are presented in Table 5. Only a single sample generated a positive result for TPH. That was from BPS-BH7 where 0.26mg/l C21-C35 aliphatic petroleum hydrocarbons was reported. This indicates a degraded diesel or heavier oil type source.

Elevated Chloride results were obtained for shallow groundwater samples collected on the southern site boundary at BPS-BH1 and B1 (2,400 and 550mg/l respectively). The groundwater flow regime and distribution of chloride results would tend to preclude saline intrusion as the source for these elevated results.



TABLE 5 - ANALYTICAL RESULTS FOR GROUNDWATER

Determinand	Units	No. Samples Analysed	No. Samples > MDL	No. Samples < MDL	Min.	Max.	Mean ^A
TPH	µg/l	7	1	6	<10	260	41.25
PAH ^B	µg/l	7	0	7	<1	<1	<1
Sulphate	mg/l	7	7	0	25	180	81.13
Chloride	mg/l	7	7	0	32	2400	416
pH ^C	[-]	7	7	0	8.31	11.29	8.95

MDL – Method Detection Limit

^A Calculated assuming non-detect samples have concentrations equal to the MDL, rounded to the accuracy of the analysis.

^B Sum of 18 PAH compounds analysed.

^C Laboratory data.

2.5. DATA INTERPRETATION

2.5.1. STATISTICAL ANALYSIS OF DATA

The statistical analysis of soil and groundwater sample testing data for this investigation is presented in Appendix E. A summary of these calculations is provided below.

Assuming the datasets were normally distributed, the maximum value test described in Appendix A, Contaminated Land Report 7 was performed for each contaminant dataset.

Much of the analytical data was reported as less than method detection limit (< MDL) for both the soil and groundwater samples for TPH and PAH. It was noted that, on the whole, samples with quantifiable concentrations were outliers to the sample population.

3. STATEMENT OF REFERENCE DATA

Reference Data for the site have been collected by this report and are presented in Appendix E1 and as summary tables in Appendix G. A statistical analysis of the data is presented in Appendix E2.

The relevant sections of the quality assurance and quality control (QA/QC) plan in Appendix B and Appendix F detail the controls and checks employed within the soil sample collection, handling and transport procedures respectively.

4. INSPECTION AND MONITORING PROGRAMME

The investigations to collect reference data have not led to any amendments to the monitoring and inspection programme.



The findings of this investigation (Sections 2.4 & 2.5) concur with the Design SPMP. No future environmental monitoring is proposed at the installation under the SPMP due to the following reasons:

- The installation is considered to present a very low risk of future contamination to soil and groundwater due to the preventative measures in place; and
- Both the history of the site, and the results of this reference data collection exercise have identified low levels of existing contamination; and as such are unlikely to pose a risk in the future if current site infrastructure is maintained.

5. REFERENCES

Centrica Barry Ltd (2006) Appendix A to PPC Permit Application: Application Site Report, Barry Power Station, South Glamorgan

DEFRA & Environment Agency (2002) Overview of Guidance on the Assessment of Contaminated Land, Contaminated Land Report 7.

Environment Agency (2003c) Template for First Phase Reporting of the Site Protection and Monitoring Programme for Installations where Reference Data is Required. IPPC H7 (Reporting Template 4). Version 1.

RSK Group (2007) Design of a Site Protection and Monitoring Programme for Barry Power Station, Centrica Energy: Requiring Reference Data to be Collected.

6. GLOSSARY

FCG	Ford Consulting Group Ltd
ASR	Application Site Report
SPMP	Site Protection and Monitoring Programme
GPS	Global Positioning System
ID	Internal diameter
HDPE	High Density Poly Ethylene
PE	Polyethylene
QA/QC	Quality Assurance/Quality Control
ORP	Oxidation-Reduction Potential or Redox Potential
MDL	Method Detection Limit



TPH	Total Petroleum Hydrocarbons
PAH	Poly Aromatic Hydrocarbons
WS	Water soluble
AST	Above ground storage tank
mbgl	Metres below ground level
mbct	Metres below top of monitoring well installation casing
mAD	Metres above arbitrary site datum
Ha	Hectares
NVO	No Visual/ Olfactory Indications of contamination
mg/kg	Milligrams per kilogram (mass concentration)
µg/kg	Micrograms per kilogram (mass concentration = 10^{-3} mg/kg)
g/l	Grams per litre (volumetric concentration)
mg/l	Milligrams per litre (volumetric concentration = 10^{-3} g/l)
µg/l	Micrograms per litre (volumetric concentration = 10^{-6} g/l)
ng/l	Nanograms per litre (volumetric concentration = 10^{-9} g/l)
ml	Millilitre
mV	Millivolts
°C	Degrees celsius
µS/cm	Microsiemens per centimetre



APPENDICES



FIGURES & PLANS

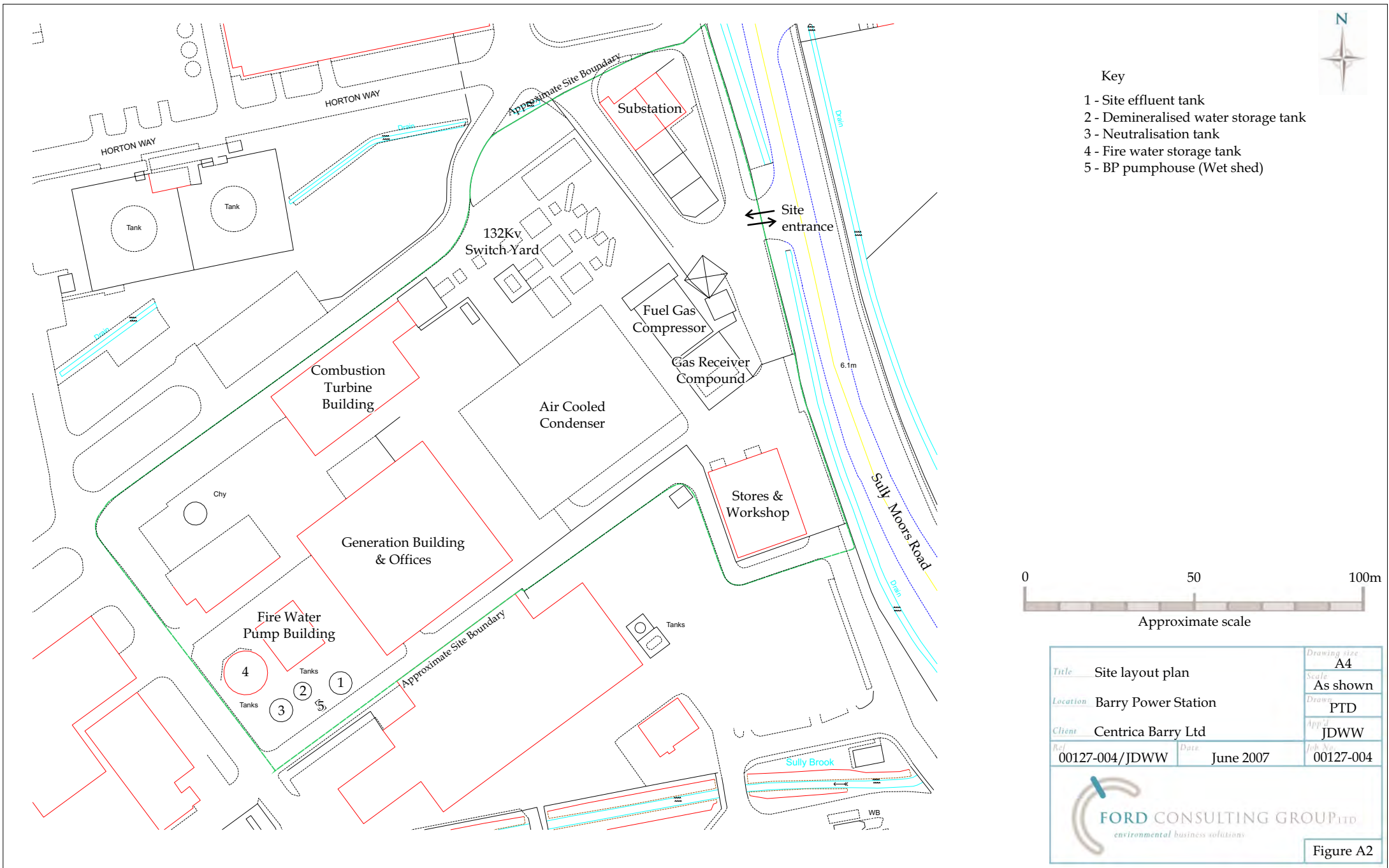
Figure A1	Site Location
Figure A2	Site Layout
Figure A3	Site layout plan including site zoning and sampling locations
Figure A4	Shallow groundwater elevations & inferred flow regime
Figure A5	Schematic geological cross section

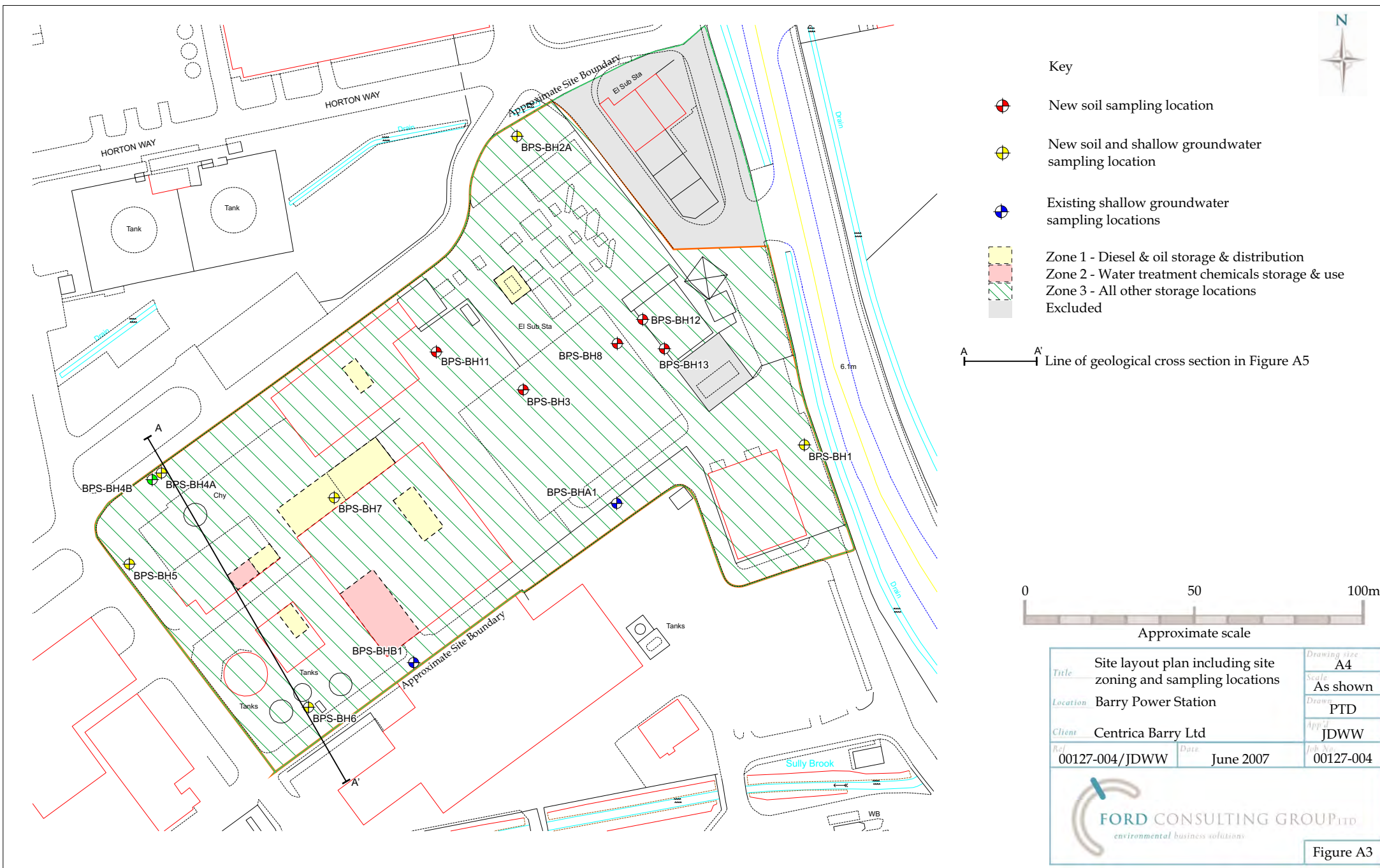
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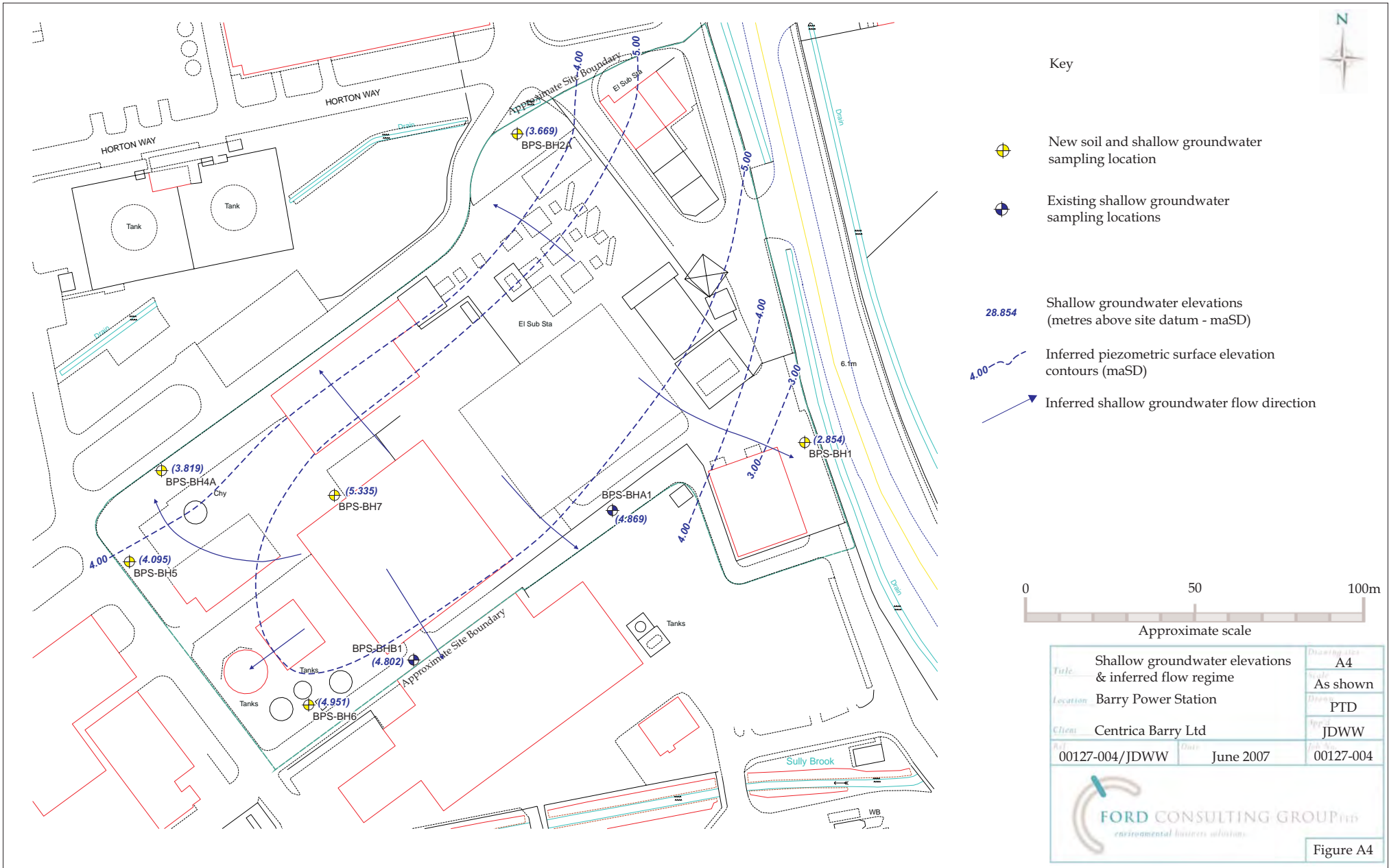


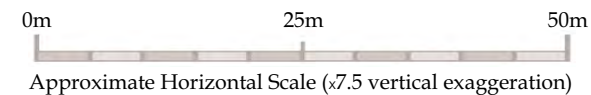
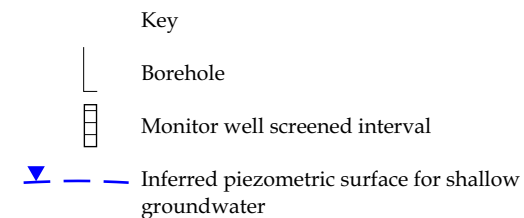
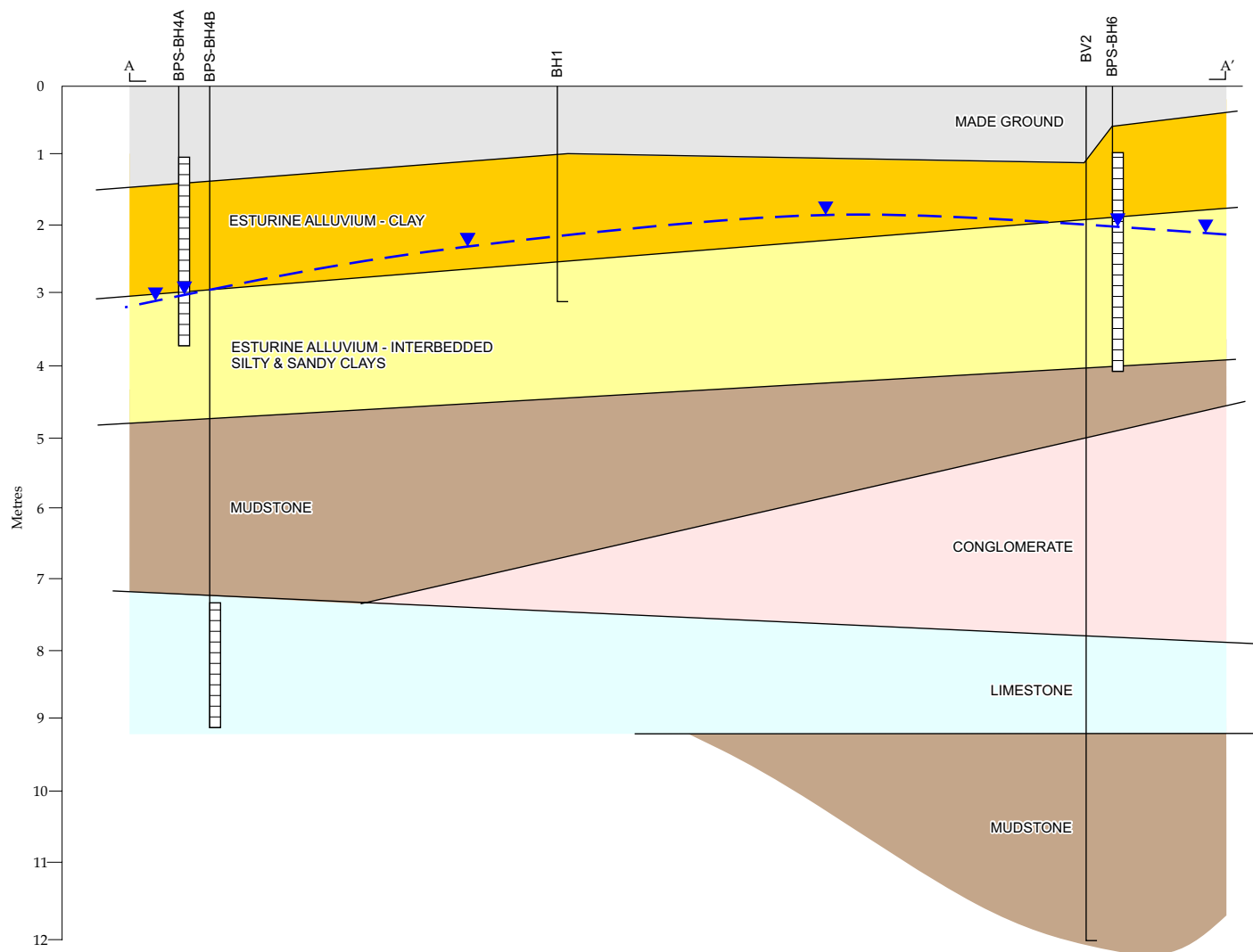
Reproduced from OS Explorer 151 Scale 1:25000 map by permission of Ordnance Survey® on behalf of the Controller of Her Majesty's Stationary Office. © Crown copyright. All rights reserved. Licence Number WL8078.	Title	Site location map	Drawn	A4
	Scale	Barry Power Station	Scale	1:35000
	Location	Centrica Barry Ltd	Drawn	PTD
	Client	00127-004/JDWW	App	JDWW
	Date	June 2007	Ref	00127-004
 FORD CONSULTING GROUP LTD environmental business solutions				


Figure A1









Title		Schematic geological cross section	Drawing size	A4
Location		Barry Power Station	Scale	As shown
Client		Centrica Barry Ltd	Drawn	PTD
Ref		00124-004/JDWW	App'd	JDWW
Date		June 2007	Job No	00124-004
 FORD CONSULTING GROUP LTD environmental business solutions				
				Figure A5



INVESTIGATION & SAMPLING PROTOCOLS

Environmental Method Statement MS1:	Borehole drilling by auger
Environmental Method Statement MS2:	Soil sampling
Environmental Method Statement MS3:	Monitoring well installation
Environmental Method Statement MS4:	Groundwater sampling

A P P E N D I X B



STANDARD INVESTIGATION & SAMPLING PROTOCOLS

The main objective of environmental sampling is to collect samples so that representative and repeatable chemical analyses may be obtained for each sample. The following environmental method statements are designed to enable the collection of soil and groundwater samples in a manner that will allow this:

- MS1: Borehole Drilling by Auger
- MS2: Soil Sampling
- MS3: Monitoring Well Installation
- MS4: Groundwater Sampling

ADDITIONAL INFORMATION

Guidance providing standard methods of sampling at potentially contaminated sites includes:

- BS 5930:1999 **“Code of Practice for Site Investigations”**
- BS 10175:2001 **“Code of Practice for the Investigation of Potentially Contaminated Sites”**
- BS ISO 5667-18 : 2001 **“Water Quality Sampling - Guidance on Sampling of Groundwater at Contaminated Sites”**
- Neal Wilson (1995) **“Soil and Groundwater Sampling”**

BS 10175:2001 guidance is applicable to the investigation of all potentially contaminated sites. It provides a framework around activities such as setting investigation objectives and strategy, designing the investigation scope of works, sampling and on-site testing, laboratory analysis and data reporting. This, along with BS 5750:1999, are considered key documents that underpin the protocols presented herein.



ENVIRONMENTAL METHOD STATEMENT MS1: BOREHOLE DRILLING BY AUGER

The borehole drilling and installation process can be split into 3 stages, as follows:

Concrete Coring &/ or Inspection Pit Excavation

The aim of coring is to simply remove a concrete/tarmac core where hard standing is present to allow direct access to the soils. A small electrical or pneumatic powered unit is anchored next to the drilling location and the diamond-tipped, water flushed, coring barrel is slowly lowered until the base of the hard standing is reached. The barrel is then removed and the core is lifted out. In some cases, where proposed drilling locations are potentially close to underground services a hand dug inspection pit (to a nominal depth of 1m) may be required. This can be done using a range of non-mechanical hand tools, e.g. trowels, spades, spoons, to reach the desired depth where drilling can commence.

Drilling

A track mounted rotary flight auger drilling rig is used to advance boreholes at a diameter of up to 145mm.

Soil samples should be collected as the borehole is progressed in accordance with the procedure described in Environmental Method Statement MS2. When the total required depth is achieved, the shell and final cuttings are removed which should leave a clean, temporarily cased borehole.

Borehole completion

Where a monitoring well is required, this is then installed in accordance with the procedure outlined in Environmental Method Statement MS3. If no installation is needed, then the borehole should be backfilled using bentonite or and the hard standing surface repaired as required. It is acceptable to backfill a borehole with the drilling returns provided they were not grossly contaminated and can be compacted sufficiently. It is noted that all boreholes should be accurately located on a site plan which should be included with any report that is completed.



ENVIRONMENTAL METHOD STATEMENT MS2: SOIL SAMPLING

In addition to selecting appropriate techniques a prime consideration of any sampling programme is to take all appropriate and practical steps to ensure the chemical integrity of the sample is maintained and that "foreign" chemicals are not added or chemicals present in the sample lost.

One potential source for the addition of foreign chemicals to a sample is by the use of sampling equipment which contains; or includes chemical residues from the previous sampling event. To ensure the integrity of the sample being collected all foreign chemical residues have to be removed from the sampling equipment. This can be done by a variety of methods, which essentially involves the thorough cleaning of reusable equipment and the single use of disposable equipment.

Before commencing drilling works, the soil sampling equipment and materials should be laid out close to the sampling location, on clean plastic sheeting to prevent direct contact with the ground surface if this is potentially contaminated. The sampler should collect regular samples of soil cuttings recovered from the borehole as it is progressed, so they can:

- Record details of the geological strata encountered in accordance with BS5930;
- Observe and record any visual or olfactory indications of contamination impacts, such as stains and odours;
- Where appropriate, undertake on site screening analyses of soil samples such as headspace analysis for Volatile Organic Compounds (VOCs)

The sampler should also record any observations of groundwater ingress, e. g. damp soils or water strikes, however small or localised. The selection of individual samples to be retained for laboratory analysis will be dependent upon consideration of the following main factors:

- The results of appropriate screening tests or observations of contamination indicators such as staining and odours;
- Changes in geological strata
- The position of the water table
- The physio-chemical properties of potential chemicals of concern, and hence their likely fate and transport in the subsurface;
- The objectives of the sampling exercise (e.g. shallow soils only, depth profiling, saturated soils, etc).

Undisturbed samples (where possible) should be collected by use of pre-cleaned sampling equipment such as U100 tubes (cohesive soils) and split spoon samplers (non cohesive soils). Where disturbance of the soil matrix is less critical, it may be possible to obtain samples from the drilling auger as it is retrieved from the borehole.

Once a sample location has been specified the sample should be taken with minimal disturbance to the soil matrix to prevent loss of volatiles. Sub-samples for chemical testing should be placed in laboratory supplied bottles using clean equipment, such as a stainless steel putty knife, whilst wearing new disposable latex or nitrile surgical gloves. Take care to fill sample containers, leaving minimal headspace (specifically for VOC related samples) and immediately cover the top of the jars and tightly screw on the lid. Label the jars and store in a cool box or refrigerator. Complete a Chain of Custody form once each borehole has been completed or once a sufficiently large batch of samples has been collected to require



dispatch to the laboratory. Consider use of QA:QC samples such as duplicates (10% of samples) and field blanks such as trip and field equipment rinse water blanks.

All sampling equipment in contact with soils must be decontaminated between each sample. This should be done by thoroughly wiping equipment that contacts the soil sample and by using detergent wash and clean water rinse (allowed to air dry where possible) as needed. Persistent soil residues should be removed using a clean scrubbing brush if necessary and then final rinsed.



ENVIRONMENTAL METHOD STATEMENT MS3: MONITORING WELL INSTALLATION

Upon completion of the drilling, where a monitoring well is required the well screen and casing is installed. Its design is based on the geological succession encountered, and the depth of the groundwater. In designing a monitoring well it is important to minimise the potential for introducing a short circuit between two water bearing horizons. An installed monitoring well should typically comprise approximately 0.6mm machine slotted screen (slot aperture ~0.6mm) and plain HDPE pipe of 50mm internal diameter. The screen is surrounded by a gravel filter pack and the monitoring well annulus filled to near surface using a bentonite pellet based seal. The slotted casing is typically installed at the base of the well, extending above the water table, with the plain casing at the top. The slotted section should be covered with a HDPE or PE filter sock (geomembrane) to enhance the retention of fines.

The ends of the casing are secured using water tight caps (bottom cap should be screw threaded). The annulus surrounding the casing is then filled by a gravel pack so that where possible it extends 0.2-0.3m higher than the top of the slotted section of the casing. The gravel pack should comprise of clean inert graded material appropriate to act as a filter and minimise the ingress of the fine soils into the well screen (1-4mm diameter washed and graded quartz based gravel recommended). Gravel pack or bentonite is introduced to the annulus slowly with the temporary drill casing gradually lifted from the borehole as it progresses. This should allow the gravel or bentonite to gravity fall down and fill the entire annulus whilst preventing bridging or collapse of the borehole around the monitoring well. After the well is sealed, an appropriate monitoring well cover is concreted in place and the hard standing is then repaired to the required standard.

After installation, the well is developed. This is done to remove any water that was added during the drilling process and to internally develop the gravel and filter pack designed to minimise future 'silting up', increasing the life of the well. Well development should involve the removal of at least 10 well volumes of water if possible (this may not be possible due to the likelihood of the wells drying up), using a bailer to both surge the well and remove groundwater. The aim is to remove as much suspended/mobile fines as possible whereby the purged groundwater becomes relatively sediment free by the end of the well development exercise. On completion of the monitoring well all equipment used should be decontaminated using clean detergent water, followed by a clean water rinse before moving onto the next location.



ENVIRONMENTAL METHOD STATEMENT MS4: GROUNDWATER SAMPLING

There are three main tasks required to complete the groundwater sampling from on-site monitoring wells as follows.

Water level monitoring

Once all wells have been installed, developed and left to equilibrate (for at least one week) a water level monitoring round should be completed prior to the sampling round. This should include existing wells and new wells as required. Initially check each well for signs of damage and undertake or programme repair if required. Particular attention should be paid to ensuring that the well head prevents ingress of surface water due to damaged or missing caps, etc.

An interface probe should be used to measure the depth of the groundwater and the thickness of any Non-Aqueous Phase Liquids (NAPLs) if present. The base of the well should also be tested in case Dense NAPL (DNAPL) is present. All such data should be tabulated and submitted as part of the project deliverable. Note that slowly lowering and rewinding the probe (do this at least twice) to measure the thickness of NAPLs increases the accuracy of the reading. The validity of groundwater sample organic analysis results from monitoring wells containing free phase product may be impaired due to the difficulty of ensuring that no free product is entrained by the sampling equipment. As such it is critical to understand if it is present, so as to modify the sampling strategy as necessary and interpret the analytical results accordingly.

Decontaminate the interface probe and line between wells using clean water (and detergent water mix if necessary) to help prevent cross contamination. Once the groundwater level has been established, calculate monitoring well specific purging volumes using measurements of the height of the water column and the well diameter. The depth of each monitoring well should be compared to drilled depth so as to estimate the degree of silting up at the base of each monitoring well.

Purging

Where known (from previous monitoring round data or drilling evidence if new wells), sampling should be carried out from the potentially least to most contaminated well. Purge using dedicated disposable or appropriately decontaminated equipment. Each well should be purged of a minimum of 3 borehole volumes. Further, if requested well purging should continue until the field measured parameters such as groundwater pH, temperature and electrical conductivity appear to have stabilised. If the well becomes dry before the purge volume is reached, then leave the well to recharge and repeat the process. Allow the well to recharge until sufficient water is available to allow sampling to proceed. Purge waters should be collected into sealable containers when expecting high levels of contamination or into buckets which can be later emptied on open ground close to the well in areas of lower contamination (presuming there to be no excessive surface pooling of water and no possibility of uncontrolled entry into drains). Purging should be carried out by either:

- Bailer – using a dedicated weighted HDPE bailer and line. Lower the bailer to below the surface of the water and allow the bailer to take up slack on the line. Tug the line to ensure a basal valve closes and then remove the bailer from the well. Empty into an appropriate graduated receptacle (e.g., 10 litres graduated bucket).
- Inertial pumping system - using dedicated HDPE tubing and a decontaminated reusable stainless steel foot-valve. Lower the tubing (with the valve attached) into the well until the valve is submerged. Repeatedly raise and lower the tube in a short rhythm to bring the water to the surface and empty into receptacle, as above.



- Peristaltic pump – using dedicated PE tubing. A battery powered motor controls the squeezing and releasing of flexible tubing causing a vacuum that draws the water out of the well. This method may also be combined with the use of a Flow Through Cell to facilitate more accurate (and continuous) measurements of well head parameters.

Sampling

Groundwater sampling should take place immediately after purging has finished preferably using a dedicated HDPE (PE) bailer and slow flow sampling tap. If purging was carried out with a bailer, it is possible to use the same bailer to sample the well. A fresh pair of nitrile gloves should be worn for the sampling exercise and between wells to prevent cross contamination.

A sub-sample for on-site final measurement of pH, electric conductivity and temperature should be taken, followed by the samples in order of likely parameter sensitivity, with care being taken to gently decant the sample into its receptacle to minimise disturbance. This is especially true of Volatile Organic Compounds (VOCs), where the glass vial should be filled to the top, and a meniscus formed. After the vial is sealed invert it and give it a light tap to check for air bubbles, refilling if any bubbles are found. Sample bottles for non-volatile analytes should be filled, or to a minimum volume as specified by the laboratory. Samples requiring filtration should be collected on-site using dedicated 0.45µm filters and transferred to plastic bottles, with preservative as supplied by the laboratory.

Label each sample bottle and enter the details onto a chain of custody form. The samples should be stored and packed carefully in a cool box with protective padding and ice packs. Where samples are being stored for extended periods, e.g. overnight; they should be stored in a dedicated refrigerator if possible and certainly not in a refrigerator that contains chemicals (such as may be the case for a site laboratory fridge). A trip bank sample should be arranged to be used where site samples are expected to have to be stored in non ideal conditions at the site. Samples should be dispatched to the laboratory on an approximately daily basis using an overnight courier (sent pm to arrive am next day). They must be packed in sealed cool boxes containing ice packs and insulated packing material, under strict chain of custody procedures (one copy of chain of custody form to be retained by the sampler).

After sampling has finished, each well should be sealed and secured properly to prevent deterioration and the area around the well left in a safe and tidy condition.



ANALYTICAL PROTOCOLS & LABORATORY ACCREDITATION

- C1 Laboratory Accreditation (ALcontrol Geochem) – Water Analysis**
- C2 Laboratory Accreditation (ALcontrol Geochem) – Soil Analysis**

A P P E N D I X C

C1 - LABORATORY ACCREDITATION (ALCONTROL GEOCHEM, CHESTER)

WATERS & LEACHATES				
Analysis	Method	MDL µg/l	UKAS	MCERTS
Petroleum Hydrocarbons				
EPH (Formerly DRO) by GC-FID (C10-40)	GC-FID following solvent extraction, inc traces and interpretation	10	yes	NA
EPH (C10-40) and C10-16,16-24,24-40	As above	10	yes	NA
TPH - WCG (C5-35) based on TNRCC method 1006	GC-FID - aliphatic/aromatic split, two separate runs. Includes BTEX/MTBE	10	yes	NA
Semi - Volatile Organic Compounds (SVOCs)				
SVOCs target list Inc PAHs (one extraction only)	Determination of Semivolatile Organic Compounds by GC-MS	1	NA	NA
Inorganics & Metals				
Chloride	Spectrophotometric analysis	1mg/l	yes	NA
pH	pH meter	0.01pH units	yes	NA
Sulphate	Spectrophotometric	3mg/l	yes	NA
Notes: UKAS - yes* - accepted by UKAS in June 2003, awaiting certificate MCERTS - NA - not applicable to water or leachate analysis				

C2 - LABORATORY ACCREDITATION (ALCONTROL GEOCHEM, CHESTER)

SOILS				
Analysis	Method	MDL mg/kg	UKAS	MCERTS
Petroleum Hydrocarbons				
EPH (Formerly DRO) by GC-FID (C10-40)	GC-FID following solvent extraction, inc traces and interpretation	1	yes	yes
EPH (C10-40) and C10-12,12-16,16-21,21-40	As above	1	yes	yes
TPH - CWG (C5-35)	GC-FID - aliphatic/aromatic split, two separate runs, and carbon banded. Includes BTEX/MTBE	0.1	yes	yes
Semi - Volatile Organic Compounds (SVOCs)				
PAH16-MS	PAH 16 Speciated (Naphthalene (10), Chrysene (10), Benzo(b)fluoranthene (16), Benzo(k)fluoranthene (25), Benzo(a)pyrene (12), Indeno(123cd)pyrene (11), Dibenzo(ah)anthracene (8), Benzo(ghi)perylene (10), Acenaphthylene (5), Acenaphthene (14), Fluorene (12), Phenanthrene (21), Anthracene (9), Fluoranthene (25), Pyrene (22), Benz(a)anthracene (12)	See brackets (mg/kg)	yes	yes
Inorganics & Metals				
Chloride	Spectrophotometric analysis	5	yes	p
pH	pH meter	0.01pH Units	yes	NA
Sulphate (water Soluble)	Spectrophotometric	3	yes	p
Notes: UKAS - yes - accepted by UKAS in June 2003, awaiting certificate MCERTS - p - pending MCERTS - NA - not applicable				

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

Copy



**TESTING LABORATORY
No. 1291**

ALcontrol Laboratories

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005
General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.org.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.



Accreditation Manager, United Kingdom Accreditation Service

**Initial Accreditation date
16 August 1993**

**This certificate issued on
02 January 2007**

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and persons



RECORDS OF INVESTIGATION FINDINGS

- D1(a) Borehole Logs
- D1(b) Photographic Record of drilling returns
- D2(a) Soil Sample Inventory
- D2(b) Groundwater Sample Inventory

A P P E N D I X D

Appendix D1(a) - Borehole Logs



KEY TO BOREHOLE LOG RECORDS

Well Construction Details

	Filter gravel (1.0-1.8mm)
	Bentonite
	HDPE 63mm or 32mm OD Screen (Slot size 0.6mm)
	HDPE 63mm OD Plain Casing
	PVC screw top well cap
	Concrete reinstatement

Soil/Rock Types

	MADE GROUND
	CLAY
	SILT
	SAND
	SAND & GRAVEL
	GRAVEL
	SANDSTONE
	MUDSTONE
	COAL SEAM
	Limestone

Sample Types

	Disturbed		Undisturbed
--	-----------	--	-------------

Groundwater

▼	Groundwater Table
▼P	Perched Groundwater Table

Soil Vapour

Photo Ionisation Detector limit 2999ppm

* Headspace Analysis

Downhole measurement

June 2007
Barry Power Station



Borehole No.	BPS-BH1	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hollow Stem Auger
Date	23/04/2007	Total Depth	5.4m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.10m					
	MADE GROUND: Concrete		0.20m					
	MADE GROUND: Dense gravel and cobbles of angular concrete with black ash sand		0.70m					
1.0	Soft to firm grey slightly silty CLAY with brown mottles. At 0.9m becoming firm to stiff.				*0ppm		Sample SO-BPSBH1 0.90-1.10m	
					*0ppm			
	At 1.8m becoming firm with some light grey and orange brown mottles.						Sample SO-BPSBH1 1.45-1.55m	
2.0					*0ppm		Sample SO-BPSBH1 1.85-1.95m	
	Soft grey with black mottles silty CLAY		2.50m					
3.0				▼	*0ppm			
	At 3.2-3.3m sandy							
4.0							Sample SO-BPSBH1 4.00-4.10m	
	At 4.5-4.7m dark grey				*0ppm			
5.0								
	Borehole completed at 5.4m		5.40m					
6.0								
7.0								
8.0								

Notes: Borehole located in parking area to the north of the workshop & stores building
Reference Point - Casing Top
Reference Point Elevation 6.029 (mASD)



Borehole No.	BPS-BH2A	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hollow Stem Auger
Date	19/04/2007	Total Depth	5.5m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.20m			*0ppm	Sample SO-BPSBH2A 0.25-0.35m	
1.0	MADE GROUND: Dense black sandy gravel of ash and clinker with brick fragments and patches of clay.		0.80m				Sample SO-BPSBH2A 1.00-1.10m	
	MADE GROUND: Soft grey brown clayey sand.		0.90m			*0ppm	Becoming damp	
2.0	Soft to firm brown and grey mottled slightly silty CLAY.					*0ppm	Sample SO-BPSBH2A 1.65-1.75m	
	At 1.8m becoming with dark brown sandy layers.							
	At 2.1m becoming grey slightly silty CLAY						Sample SO-BPSBH2A 2.50-2.60m	
	At 2.5m becoming with rare sandy partings					*0ppm		
3.0								
4.0	Soft to firm reddish brown silty CLAY with some residual mudstone fabric (Highly weathered bedrock)		4.00m			*0ppm	Becoming wet	
							Sample SO-BPSBH2A 4.10-4.20m	
5.0			5.30m			*0ppm		
	Weak grey green SILTSTONE (highly weathered)		5.50m					
6.0	Borehole completed at 5.5m							
7.0								
8.0								

Notes: Borehole located on gravelled surface in the 132KV switch Yard and fitted with upstanding cover

Reference Point - Casing top

Reference Point Elevation 6.256 (mASD)



Borehole Log

Borehole No.	BPS-BH3	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	23/04/2007	Total Depth	1.00m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Dense reddish brown sandy angular gravel and cobbles of limestone with some concrete fragments and sandy matrix						Sample SO-BPSBH3 0.30-0.40m	
1.0	At 0.9m becoming with much concrete cobbles Obstruction at 1.0m borehole abandoned		1.00m			*0ppm		
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located beneath the ACC

Reference Point - Ground level

Reference Point Elevation 6.664 (mASD)

Three starter pits attempted at this location none could be extended beyond the Made Ground. Risks posed to underground utilities precluded drilling at this location without first securing a hand dig to natural ground.



Borehole No.	BPS-BH4A	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	25/04/2007	Total Depth	3.7m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.16m			*0ppm	Wet at 1.15m - 1.25m Damp	
	MADE GROUND: Dense reddish brown sandy gravel of angular limestone		0.80m					
1.0	MADE GROUND: Concrete		1.15m					
	MADE GROUND: Black ashy gravel		1.25m					
	Soft to firm dark grey slightly silty CLAY At 1.5m becoming brown with grey mottles					*0ppm		
2.0	At 2.2m becoming grey with black mottles							
3.0								
4.0	Borehole completed at 3.7m							
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on asphalted access roadway in the north west corner of the site
Reference Point - Casing top
Reference Point Elevation 6.735 (mASD)
Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole No.	BPS-BH4B	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	24-25/04/2007	Total Depth	9.0m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.10m					
	MADE GROUND: Concrete		0.20m					
	MADE GROUND: Dense sand & gravel		0.30m					
	MADE GROUND: Concrete		0.90m					
1.0	MADE GROUND: Loose black and brown ashy gravel and clinker		1.10m				Wet - malodorous, rotting vegetation odour	
	MADE GROUND: Soft dark grey clay with gravel and cobbles of brick & concrete		1.40m			*0ppm	SO-BPSBH4B 1.20-1.40m	
2.0	Soft to firm grey and brown mottled slightly silty to silty CLAY							
	At 2.0m becoming grey with black mottles					*0ppm	Sample SO-BPSBH4B 2.20-2.30m	
3.0	At 3.0m becoming very silty					*0ppm	Sample SO-BPSBH4B 3.10-3.20m	
4.0						*0ppm	Becoming wet, Sample SO-BPSBH4B 4.10-4.20m	
5.0	Reddish brown silty highly weathered MUDSTONE.		4.50m					
6.0								
7.0								
	Light Grey LIMESTONE		7.20m					
9.0	Borehole completed at 9.00m							
10.0								

Notes: Borehole located on asphalted access roadway in the north west corner of the site
 Unconsolidated soils drilled using solid stem auger. Cased to bedrock and drilled with air flush DTH
 Reference Point - Casing top
 Reference Point Elevation 6.229 (mASD)



Borehole No.	BPS-BH5	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	25/04/2007	Total Depth	5.3m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Borehole Log

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Asphalt		0.10m					
	MADE GROUND:Dense reddish grey sandy gravel. Gravel of angular limestone							
			0.8-0.9m					
1.0	MADE GROUND: Concrete		0.9-1.0m					
	MADE GROUND: Grey sandy gravel		1.0-1.1m					
	MADE GROUND: Concrete		1.1-1.2m					
	MADE GROUND: Grey sandy gravel							
2.0	Soft to firm light to dark grey silty slightly sandy CLAY. At 1.5m becoming with brown sandy pockets.					*0ppm	SO-BPSBH5 1.50-1.60m	
						*0ppm	SO-BPSBH5 2.50-2.60m	
3.0						*0ppm	SO-BPSBH5 3.50-3.60m	
4.0	Soft to firm reddish brown silty CLAY with some residual mudstone fabric (Highly weathered bedrock)		4.00m			*0ppm	SO-BPSBH5 4.50-4.60m	
5.0								
	Borehole completed at 5.3m		5.30m					
6.0								
7.0								
8.0								

Notes: Borehole located on asphalted access roadway adjacent to the western site boundary
Reference Point - Casing top
Reference Point Elevation 5.952 (mASD)
Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole Log

Borehole No.	BPS-BH6	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	26/04/2007	Total Depth	4.80m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.40m					
	MADE GROUND: Concrete		0.50m				Wet returns	
	MADE GROUND: Brown sand & gravel		0.60m					
1.0	MADE GROUND: Firm grey gravelly clay		0.80m				Sample SO-BPSBH6 1.10-1.20m	
	Soft to firm grey with brown mottles slightly silty CLAY.					*0ppm	Damp returns	
2.0							Sample SO-BPSBH6 2.10-2.20m	
						*0ppm		
3.0	At 3.0m becoming with occasional sandy partings and black mottles					*0ppm	Sample SO-BPSBH6 3.10-3.20m	
	At 3.5m becoming very soft, silty and occasionally sandy.						Wet returns	
4.0						*0ppm	Sample SO-BPSBH6 4.10-4.20m	
5.0	Borehole completed at 4.80m							
6.0								
7.0								
8.0								

Notes: Borehole located on gravelled surface adjacent to the Wet Shed (Upstanding cover installed)

Reference Point - Casing Top

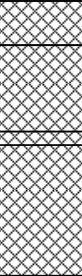

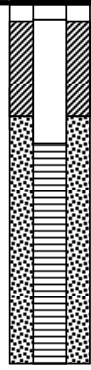
Reference Point Elevation 6.932 (mASD)

Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole Log

Borehole No.	BPS-BH7	Driller	GRL
Site Location	Barry Power Station	Drilling Method	See Notes
Date	26/04/2007	Total Depth	2.5m
Project No.	00127-004	Borehole diameter	205mm
Client	Centrica Barry Ltd	Well diameter	63mm
Logged by	JDWW	Slot size	0.6mm

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.30m	▼		*0ppm	Sample SO-BPSBH7 1.00-1.10m Strong Hydrocarbon and slight solvent odour at 1.00-1.90m	
	MADE GROUND: Orangy brown sandy subangular limestone gravel		0.90m					
1.0	MADE GROUND: Concrete fragments		1.00m					
	MADE GROUND: soft to firm dark grey to black silty clay with some gravel.							
2.0	Obstruction at 1.9m driven to 2.5m no returns							
3.0	Borehole completed at 2.5m							
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on gravel surface adjacent to the emergency diesel generator. Upstanding cover.
Reference Point - Casing Top
Reference Point Elevation 7.426 (mASD)
Drilling methods were solid stem auger and Air flush DTH for historical concrete slabs.



Borehole Log

Borehole No.	BPS-BH8	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	19/04/2007	Total Depth	0.90m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Dense reddish brown sandy angular gravel and cobbles of limestone with some concrete fragments and sandy matrix							
1.0	At 0.5m becoming with much concrete cobbles Concrete obstruction at 0.9m borehole abandoned		0.90m			*0ppm		
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located beneath the ACC

Reference Point - Ground level

Reference Point Elevation 6.459 (mASD)

Five starter pits attempted at this location none could be extended beyond the Made Ground. Risks posed to underground utilities precluded drilling at this location without first securing a hand dig to natural ground.

For SPMP purposes, replaced by hand excavated samples at locations BPS-BH12 & 13



Borehole Log

Borehole No.	BPS-BH12	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	24/04/2007	Total Depth	0.35m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.30m			*0ppm	Sample SO-BPSBH12 0.30-0.35m	
1.0	MADE GROUND: Reddish brown sand and gravel with patches of stiff clay Borehole completed at 0.35m						Slight hydrocarbon staining and odour	
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on a gravelled strip adjacent to the gas compressor slab
Reference Point - Ground level
Reference Point Elevation 6.464 (mASD)
This location was used as a partial replacement for BPS-BH8



Borehole Log

Borehole No.	BPS-BH13	Driller	GRL
Site Location	Barry Power Station	Drilling Method	Hand Dug
Date	24/04/2007	Total Depth	0.35m
Project No.	00127-004	Borehole diameter	200mm
Client	Centrica Barry Ltd	Well diameter	NA
Logged by	JDWW	Slot size	NA

Depth (mbgl)	Description	Log	Depth of Change in Strata (mbgl)	Groundwater	Samples	Soil Vapour	Observations	Well Construction Details
0.0	MADE GROUND: Loose, coarse subangular Limestone gravel		0.30m			*0ppm	Sample SO-BPSBH13 0.30-0.35m	
	MADE GROUND: Reddish brown sand and gravel.						Slight hydrocarbon staining and odour	
1.0	Borehole completed at 0.35m							
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								

Notes: Borehole located on a gravelled strip adjacent to the gas compressor slab

Reference Point - Ground level

Reference Point Elevation 6.394 (mASD)

This location was used as a partial replacement for BPS-BH8

Appendix D1(b) - Photographic Record of Drilling Returns

Borehole: BPS BH2A

1.8m

0.9m



2.7m

1.8m



4.5m

3.6m



Borehole: BPS BH1

1.8m

0.9m



2.7m

1.8m



3.6m

2.7m



4.5m

3.6m



Appendix D
Table D2(a) - Soil Sample Inventory

	Borehole	Sample Code	Date Samples Taken	Speciated TPH (CWG)	PAHs	Sulphate	Chloride	pH
Soil Analysis	BPS-BH1	SO-BPSBH1 0.90-1.10m	23/04/2007	x	x	x	x	x
		SO-BPSBH1 1.45-1.55m		x	x			
		SO-BPSBH1 1.85-1.95m		x	x	x	x	x
		SO-BPSBH1 4.00-4.10m		x	x			
	BPS-BH2A	SO-BPSBH2A 0.25-0.35m	19/04/2007	x	x			x
		SO-BPSBH2A 1.00-1.10m		x	x			
		SO-BPSBH2A 1.65-1.75m		x	x			
		SO-BPSBH2A 2.50-2.60m		x	x			
		SO-BPSBH2A 4.10-4.20m						x
	BPS-BH3	SO-BPSBH3 0.30-0.40m	23/04/2007	x	x	x	x	x
	BPS-BH4B	SO-BPSBH4B 1.20-1.40m	24/04/2007	x	x			x
		SO-BPSBH4B 2.20-2.30m		x	x			x
		SO-BPSBH4B 3.10-3.20m		x	x			
		SO-BPSBH4B 4.10-4.20m		x	x			
	BPS-BH5	SO-BPSBH5 1.50-1.60m	25/04/2007	x	x			x
		SO-BPSBH5 2.50-2.60m		x	x			x
		SO-BPSBH5 3.50-3.60m		x	x			
		SO-BPSBH5 4.50-4.60m		x	x			
	BPS-BH6	SO-BPSBH6 1.10-1.20m	26/04/2007	x	x			x
		SO-BPSBH6 2.10-2.20m		x	x			x
		SO-BPSBH6 3.10-3.20m		x	x			x
		SO-BPSBH6 4.10-4.20m		x	x			x
	BPS-BH7	SO-BPSBH7 1.00-1.10m	26/04/2007	x	x			x
	BPS-BH12	SO-BPSBH12 0.30-0.35m	19/04/2007	x	x			
	BPS-BH13	SO-BPSBH13 0.30-0.35m	19/04/2007	x	x			
Total Number of Samples: 24								
TPH (CWG) - Total Petroleum Hydrocarbon Criteria Working Group								
Sulphate - Total and water soluble								

Appendix D
Table D2(b) -
Groundwater Sample Inventory

	Well Name	Sample Code	Date Samples Taken	Speciated TPH (CWG)	PAHs	Sulphate	Chloride	pH
Groundwater Analysis	BPS-BH1	GW-BPS BH1- 01	25/04/2007	x	x	x	x	x
	BPS-BH2A	GW-BPS BH2A- 01	25/09/2007	x	x	x	x	x
	BPS-BH4A	GW-BPS BH4A- 01	26/04/2007	x	x	x	x	x
	BPS-BH5	GW-BPS BH5- 01	26/04/2007	x	x	x	x	x
	BPS-BH6	GW-BPS BH6- 01	27/04/2007	x	x	x	x	x
	BPS-BH7	GW-BPS BH7- 01	27/04/2007	x	x	x	x	x
	BPS-BHB1	GW-BPS BHB1- 01	24/04/2007	x	x	x	x	x
Total Number of Samples: 7								
TPH (CWG) - Total Petroleum Hydrocarbon Criteria Working Group								
Sulphate - Soluble								

Appendix D Table D2(c) - Well Parameters

Well Name	DTGW (mbct)	~DTB (mbct)	Reference point Elevation (mAD)	GW Elevation (mAD)	Purge Volume (L)	Redox (mV)	EC (µS/cm)	T (°C)	pH	Field Observations
BPS-BH1	3.175	5.206	6.029	2.854	19	90	>3999	12.1	7.00	
BPS-BH2A	2.587	5.004	6.256	3.669	48	78	749	11.7	7.09	
BPS-BH4A	2.916	3.696	6.735	3.819	18	-5	717	12.4	8.78	
BPS-BH5	1.857	5.275	5.952	4.095	16	-125	578	14.5	7.44	Very slow recovery after purging
BPS-BH6	1.981	4.894	6.932	4.951	18	54	454	12.8	7.54	
BPS-BH7	2.091	2.467	7.426	5.335	5	-29	864	13.1	11.7	Very limited water depth in the installation
BPS-BHA1	1.167	2.198	6.036	4.869	2	-56	2258	14	6.35	Very slow recovery after purging
BPS-BHB1	1.227	3.09	6.029	4.802	5	-146	3592	13	6.89	Very slow recovery after purging
>3999 - recorded conductivity value greater than maximum range of the meter.										



ANALYTICAL DATA AND STATISTICAL ANALYSIS

- E1 Analytical Laboratory Results (ALcontrol Geochem)**
- E2(a) Statistical Analysis of Soil Results**
- E2(b) Statistical Analysis of Groundwater Results**

A P P E N D I X E

ALcontrol Geochem Analytical Services

Sample Descriptions

Job Number: 07/07209/02/01

Client: Ford Consulting Group Ltd

Client Ref : 00127-004

Grain sizes

<0.063mm	Very Fine
0.1mm - 0.063mm	Fine
0.1mm - 2mm	Medium
2mm - 10mm	Coarse
>10mm	Very Coarse

Sample Identity	Depth (m)	Colour	Grain Size	Description	Batch
SO - BPS - BH4B	1.2-1.4	Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH4B	2.2-2.3	Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH4B	3.1-3.2	Grey	<0.063mm	Clay	2
SO - BPS - BH4B	4.1-4.2	Dark Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH5	1.5-1.6	Grey	<0.063mm	Clay	2
SO - BPS - BH5	2.5-2.6	Dark Grey	<0.063mm	Clay	2
SO - BPS - BH5	3.5-3.6	Grey	<0.063mm	Clay	2
SO - BPS - BH5	4.5-4.6	Grey	<0.063mm	Clay	2
SO - BPS - BH6	1.1-1.2	Dark Grey	<0.063mm	Clay	2
SO - BPS - BH6	2.1-2.2	Light Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH6	3.1-3.2	Grey	<0.063mm	Clay with some Stones	2
SO - BPS - BH6	4.1-4.2	Grey	<0.063mm	Clay	2
SO - BPS - BH7	1.0-1.1	Grey	<0.063mm	Clay with some Stones	2
SO - BPS BH1	0.9-1.1	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH1	1.45-1.55	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH1	1.8-1.95	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH1	4.0-4.1	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	0.25-0.35	Black	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	1.0-1.1	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	1.65-1.75	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	2.5-2.6	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH2A	4.1-4.2	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH3	0.3-0.4	Red	0.1mm - 2mm	Gravel with some Stones	1
SO - BPS BH9	0.4-0.5	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH9	1.1-1.2	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH10	0.45-0.50	Black	0.1mm - 2mm	Sand with some Stones	1
SO - BPS BH10	0.95-1.0	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH12	0.3-0.35	Brown	0.1mm - 2mm	Clay with some Stones	1
SO - BPS BH13	0.3-0.35	Brown	0.1mm - 2mm	Clay with some Stones	1

* These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials-whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

¹ Sample Description supplied by client

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Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	Method Code	LoD/Units
Depth (m)	1.2-1.4	2.2-2.3	3.1-3.2	4.1-4.2	1.5-1.6	1.5-1.6	2.5-2.6	2.5-2.6	3.5-3.6		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	24.04.07	24.04.07	24.04.07	24.04.07	25.04.07	24.04.07	25.04.07	25.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	42-45	46-48,79	49-50	51,80	53	52,54-55	57	56,58	59-60		
GRO (C4-C12)	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
MTBE	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Benzene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Toluene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Ethyl benzene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
m & p Xylene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
o Xylene	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Aliphatics C5-C6	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C6-C8	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C8-C10	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C10-C12	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aliphatics >C12-C16	5600	<100	<100	<100	-	2000	-	<100	<100	TM173 [#]	<100 ug/kg
Aliphatics >C16-C21	9300	<100	<100	<100	-	7700	-	<100	<100	TM173 [#]	<100 ug/kg
Aliphatics >C21-C35	56000	<100	<100	3700	-	9100	-	<100	<100	TM173 [#]	<100 ug/kg
Total Aliphatics C5-C35	70000	<100	<100	3700	-	19000	-	<100	<100	TM61/89	<100 ug/kg
Aromatics C6-C7	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Aromatics >C7-C8	<10	<10	<10	<10	-	<10	-	<10	<10	TM089 [#] _M	<10 ug/kg
Aromatics >EC8-EC10	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aromatics >EC10-EC12	<10	<10	<10	<10	-	<10	-	<10	<10	TM089	<10 ug/kg
Aromatics >EC12-EC16	<100	<100	<100	<100	-	200	-	<100	<100	TM173 [#]	<100 ug/kg
Aromatics >EC16-EC21	<100	<100	<100	<100	-	200	-	<100	<100	TM173 [#]	<100 ug/kg
Aromatics >EC21-EC35	2000	1300	<100	2700	-	1000	-	<100	<100	TM173 [#]	<100 ug/kg
Total Aromatics C6-C35	2000	1300	<100	2700	-	1400	-	<100	<100	TM61/89	<100 ug/kg
TPH (Aliphatics and Aromatics C5-C35)	72000	1300	<100	6400	-	20000	-	<100	<100	TM61/89	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	Method Code	LoD/Units
Depth (m)	1.2-1.4	2.2-2.3	3.1-3.2	4.1-4.2	1.5-1.6	1.5-1.6	2.5-2.6	2.5-2.6	3.5-3.6		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	24.04.07	24.04.07	24.04.07	24.04.07	25.04.07	24.04.07	25.04.07	25.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	42-45	46-48,79	49-50	51,80	53	52,54-55	57	56,58	59-60		
Phenols											
2-Chlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Methylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Nitrophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4-Dichlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4-Dimethylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4,5-Trichlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4,6-Trichlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Chloro-3-methylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Methylphenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Nitrophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Pentachlorophenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Phenol	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Methylnaphthalene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Acenaphthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Acenaphthylene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Anthracene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(a)anthracene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(a)pyrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(b)fluoranthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(ghi)perylene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Benzo(k)fluoranthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Chrysene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Fluoranthene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Fluorene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Naphthalene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH4B	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	SO - BPS - BH5	Method Code	LoD/Units
Depth (m)	1.2-1.4	2.2-2.3	3.1-3.2	4.1-4.2	1.5-1.6	1.5-1.6	2.5-2.6	2.5-2.6	3.5-3.6		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	24.04.07	24.04.07	24.04.07	24.04.07	25.04.07	24.04.07	25.04.07	25.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	42-45	46-48,79	49-50	51,80	53	52,54-55	57	56,58	59-60		
PAHs (cont)											
Phenanthrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Pyrene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Butylbenzyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Di-n-butyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Di-n-Octyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Diethyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Dimethyl phthalate	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
1,3-Dichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
1,4-Dichlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2-Nitroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,4-Dinitrotoluene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
2,6-Dinitrotoluene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
3-Nitroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Bromophenylphenylether	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Chloroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Chlorophenylphenylether	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
4-Nitroaniline	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Azobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Carbazole	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Dibenzofuran	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg
Hexachlorobenzene	<100	<100	<100	<100	-	<100	-	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH5	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	Method Code	LoD/Units
Depth (m)	4.5-4.6	1.1-1.2	1.1-1.2	2.1-2.2	3.1-3.2	3.1-3.2	3.1-3.2	4.1-4.2	4.1-4.2		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	25.04.07	24.04.07	26.04.07	26.04.07	24.04.07	25.04.07	26.04.07	24.04.07	26.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	61-62	81	63-65	66-69	71	70	72	73,82	74		
GRO (C4-C12)	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
MTBE	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#]	<10 ug/kg
Benzene	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
Toluene	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
Ethyl benzene	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
m & p Xylene	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
o Xylene	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
Aliphatics C5-C6	<10	-	<10	<10	-	-	<10	<10	-	TM089	<10 ug/kg
Aliphatics >C6-C8	<10	-	<10	<10	-	-	<10	<10	-	TM089	<10 ug/kg
Aliphatics >C8-C10	<10	-	<10	<10	-	-	<10	<10	-	TM089	<10 ug/kg
Aliphatics >C10-C12	<10	-	<10	<10	-	-	<10	<10	-	TM089	<10 ug/kg
Aliphatics >C12-C16	<100	-	340	<100	-	<100	-	<100	-	TM173 [#]	<100 ug/kg
Aliphatics >C16-C21	<100	-	1800	<100	-	<100	-	<100	-	TM173 [#]	<100 ug/kg
Aliphatics >C21-C35	<100	-	8400	<100	-	<100	-	<100	-	TM173 [#]	<100 ug/kg
Total Aliphatics C5-C35	<100	-	10000	<100	-	<100	-	<100	-	TM61/89	<100 ug/kg
Aromatics C6-C7	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
Aromatics >C7-C8	<10	-	<10	<10	-	-	<10	<10	-	TM089 [#] _M	<10 ug/kg
Aromatics >EC8-EC10	<10	-	<10	<10	-	-	<10	<10	-	TM089	<10 ug/kg
Aromatics >EC10-EC12	<10	-	<10	<10	-	-	<10	<10	-	TM089	<10 ug/kg
Aromatics >EC12-EC16	<100	-	<100	<100	-	<100	-	<100	-	TM173 [#]	<100 ug/kg
Aromatics >EC16-EC21	<100	-	<100	<100	-	<100	-	<100	-	TM173 [#]	<100 ug/kg
Aromatics >EC21-EC35	<100	-	6200	<100	-	4100	-	<100	-	TM173 [#]	<100 ug/kg
Total Aromatics C6-C35	<100	-	6200	<100	-	4100	-	<100	-	TM61/89	<100 ug/kg
TPH (Aliphatics and Aromatics C5-C35)	<100	-	17000	<100	-	4100	-	<100	-	TM61/89	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH5	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	Method Code	LoD/Units
Depth (m)	4.5-4.6	1.1-1.2	1.1-1.2	2.1-2.2	3.1-3.2	3.1-3.2	3.1-3.2	4.1-4.2	4.1-4.2		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	25.04.07	24.04.07	26.04.07	26.04.07	24.04.07	25.04.07	26.04.07	24.04.07	26.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	61-62	81	63-65	66-69	71	70	72	73,82	74		
Phenols											
2-Chlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Methylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Nitrophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4-Dichlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4-Dimethylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4,5-Trichlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4,6-Trichlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Chloro-3-methylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Methylphenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Nitrophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Pentachlorophenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Phenol	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Methylnaphthalene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Acenaphthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Acenaphthylene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Anthracene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(a)anthracene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(a)pyrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(b)fluoranthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(ghi)perylene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Benzo(k)fluoranthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Chrysene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Fluoranthene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Fluorene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Naphthalene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH5	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	SO - BPS - BH6	Method Code	LoD/Units
Depth (m)	4.5-4.6	1.1-1.2	1.1-1.2	2.1-2.2	3.1-3.2	3.1-3.2	3.1-3.2	4.1-4.2	4.1-4.2		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	25.04.07	24.04.07	26.04.07	26.04.07	24.04.07	25.04.07	26.04.07	24.04.07	26.04.07		
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07		
Batch	2	2	2	2	2	2	2	2	2		
Sample Number(s)	61-62	81	63-65	66-69	71	70	72	73,82	74		
PAHs (cont)											
Phenanthrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Pyrene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Butylbenzyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Di-n-butyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Di-n-Octyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Diethyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Dimethyl phthalate	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
1,3-Dichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
1,4-Dichlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2-Nitroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,4-Dinitrotoluene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
2,6-Dinitrotoluene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
3-Nitroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Bromophenylphenylether	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Chloroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Chlorophenylphenylether	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
4-Nitroaniline	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Azobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Carbazole	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Dibenzofuran	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg
Hexachlorobenzene	<100	-	<100	<100	-	<100	-	<100	-	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH7	SO - BPS - BH7	SO - BPS - BH1	SO - BPS - BH1	SO - BPS - BH1	SO - BPS - BH1	SO - BPS - BH2A	SO - BPS - BH2A	SO - BPS - BH2A	Method Code	LoD/Units
Depth (m)	1.0-1.1	1.0-1.1	0.9-1.1	1.45-1.55	1.8-1.95	4.0-4.1	0.25-0.35	1.0-1.1	1.65-1.75		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	26.04.07	23.04.07	23.04.07	23.04.07	23.04.07	19.04.07	19.04.07	19.04.07		
Sample Received Date	28.04.07	28.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	2	2	1	1	1	1	1	1	1		
Sample Number(s)	78	75-77	1-4	5-6	7-10	11-12	13-16	17-18	19-20		
SVOC by GCMS											
Phenols											
2-Chlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Methylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Nitrophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4-Dichlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4-Dimethylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4,5-Trichlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4,6-Trichlorophenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Chloro-3-methylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Methylphenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Nitrophenol	-	<100	<100	<100	<100	<100	<200	<100	<100	TM157	<100 ug/kg
Pentachlorophenol	-	<100	<100	<100	<100	<100	<200	<100	<100	TM157	<100 ug/kg
Phenol	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Methylnaphthalene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Acenaphthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Acenaphthylene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Anthracene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(a)anthracene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(a)pyrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(b)fluoranthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(ghi)perylene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Benzo(k)fluoranthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Chrysene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Fluoranthene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Fluorene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS - BH7	SO - BPS - BH7	SO - BPS BH1	SO - BPS BH1	SO - BPS BH1	SO - BPS BH1	SO - BPS BH2A	SO - BPS BH2A	SO - BPS BH2A	Method Code	LoD/Units
Depth (m)	1.0-1.1	1.0-1.1	0.9-1.1	1.45-1.55	1.8-1.95	4.0-4.1	0.25-0.35	1.0-1.1	1.65-1.75		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	24.04.07	26.04.07	23.04.07	23.04.07	23.04.07	23.04.07	19.04.07	19.04.07	19.04.07		
Sample Received Date	28.04.07	28.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	2	2	1	1	1	1	1	1	1		
Sample Number(s)	78	75-77	1-4	5-6	7-10	11-12	13-16	17-18	19-20		
PAHs (cont)											
Naphthalene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Phenanthrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Pyrene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	-	2400	<100	160	<100	<100	180000	400	<100	TM157	<100 ug/kg
Butylbenzyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Di-n-butyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Di-n-Octyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Diethyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Dimethyl phthalate	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
1,3-Dichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
1,4-Dichlorobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2-Nitroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,4-Dinitrotoluene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
2,6-Dinitrotoluene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
3-Nitroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Bromophenylphenylether	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Chloroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Chlorophenylphenylether	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
4-Nitroaniline	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Azobenzene	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Carbazole	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg
Dibenzofuran	-	<100	<100	<100	<100	<100	<1000	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS BH2A	SO - BPS BH2A	SO - BPS BH3	SO - BPS BH9	SO - BPS BH9	SO - BPS BH10	SO - BPS BH10	SO - BPS BH12	SO - BPS BH13	Method Code	LoD/Units
Depth (m)	2.5-2.6	4.1-4.2	0.3-0.4	0.4-0.5	1.1-1.2	0.45-0.50	0.95-1.0	0.3-0.35	0.3-0.35		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	19.04.07	19.04.07	23.04.07	18.04.07	18.04.07	18.04.07	18.04.07	19.04.07	19.04.07		
Sample Received Date	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	21-22	23-24	25-28	29-30	31-32	33-34	35-36	37-38	39-40		
SVOC by GCMS											
Phenols											
2-Chlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Methylphenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Nitrophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4-Dichlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4-Dimethylphenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4,5-Trichlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4,6-Trichlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Chloro-3-methylphenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Methylphenol	<100	-	<100	<100	<100	<100	<100	180	<100	TM157	<100 ug/kg
4-Nitrophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Pentachlorophenol	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Phenol	<100	-	<100	<100	<100	<100	<100	2900	810	TM157	<100 ug/kg
PAHs											
2-Chloronaphthalene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Methylnaphthalene	<100	-	<100	150	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Acenaphthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Acenaphthylene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Anthracene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(a)anthracene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(a)pyrene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(b)fluoranthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(ghi)perylene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Benzo(k)fluoranthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Chrysene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Dibenzo(a,h)anthracene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Fluoranthene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Fluorene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Indeno(1,2,3-cd)pyrene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: SOLID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	SO - BPS BH2A	SO - BPS BH2A	SO - BPS BH3	SO - BPS BH9	SO - BPS BH9	SO - BPS BH10	SO - BPS BH10	SO - BPS BH12	SO - BPS BH13	Method Code	LoD/Units
Depth (m)	2.5-2.6	4.1-4.2	0.3-0.4	0.4-0.5	1.1-1.2	0.45-0.50	0.95-1.0	0.3-0.35	0.3-0.35		
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date	19.04.07	19.04.07	23.04.07	18.04.07	18.04.07	18.04.07	18.04.07	19.04.07	19.04.07		
Sample Received Date	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07	25.04.07		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	21-22	23-24	25-28	29-30	31-32	33-34	35-36	37-38	39-40		
PAHs (cont)											
Naphthalene	<100	-	<100	270	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Phenanthrene	<100	-	<100	140	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Pyrene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Phthalates											
Bis(2-ethylhexyl) phthalate	<100	-	<100	130	<100	<100	<100	5400	6800	TM157	<100 ug/kg
Butylbenzyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Di-n-butyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Di-n-Octyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Diethyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Dimethyl phthalate	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Other Semi-volatiles											
1,2-Dichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
1,2,4-Trichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
1,3-Dichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
1,4-Dichlorobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2-Nitroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,4-Dinitrotoluene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
2,6-Dinitrotoluene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
3-Nitroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Bromophenylphenylether	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Chloroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Chlorophenylphenylether	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
4-Nitroaniline	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Azobenzene	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethoxy)methane	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Bis(2-chloroethyl)ether	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Carbazole	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg
Dibenzofuran	<100	-	<100	<100	<100	<100	<100	<100	<100	TM157	<100 ug/kg

All results expressed on a dry weight basis.

Date 20.06.2007

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» Shown on prev. report

Client Contact: Peter Dunn

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07209/02/01

Matrix: LIQUID

Client: Ford Consulting Group Ltd

Location: RFQ South Wales

Client Ref. No.: 00127-004

Client Contact: Peter Dunn

Sample Identity	GW - BPS BH1 - 01	GW - BPS BH1 - 01	GW - BPS BH5 - 01	GW - BPS BH5 - 01	GW - BPS BH9 - 01	GW - BPS - BHB1 - 01				Method Code	LoD/Units
Depth (m)	-	-	-	-	-	-					
Sample Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID					
Sampled Date	25.04.07	27.04.07	25.04.07	26.04.07	24.04.07	25.04.07					
Sample Received Date	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07	28.04.07					
Batch	2	2	2	2	2	2					
Sample Number(s)	85-88	89	121	119-120,122-123	124-129	137-141					
PAHs											
2-Chloronaphthalene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
2-Methylnaphthalene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Acenaphthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Acenaphthylene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Anthracene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(a)anthracene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(a)pyrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(b)fluoranthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(ghi)perylene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Benzo(k)fluoranthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Chrysene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Dibenzo(a,h)anthracene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Fluoranthene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Fluorene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Indeno(1,2,3-cd)pyrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Naphthalene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Phenanthrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Pyrene	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Phthalates											
Bis(2-ethylhexyl) phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Butylbenzyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Di-n-butyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Di-n-Octyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Diethyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Dimethyl phthalate	<1	-	-	<1	<1	<1				TM143	<1 ug/l
Other Semi-volatiles											
1,2-Dichlorobenzene	<1	-	-	<1	<1	2				TM143	<1 ug/l
1,2,4-Trichlorobenzene	<1	-	-	<1	<1	<1				TM143	<1 ug/l

Date 20.06.2007

Validated ☒
Preliminary ☐

ALcontrol Geochem Analytical Services

Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/07487/02/01 **Matrix:** LIQUID
Client: Ford Consulting Group Ltd **Location:** RFQ South Wales
Client Ref. No.: 00127-004 **Client Contact:** Jim Wragg

Sample Identity	GW-BPS-BH6-01	GW-BPS-BH7-01	GW-BPS-BHAI-01								
Depth (m)	-	-	-								
Sample Type	LIQUID	LIQUID	LIQUID								
Sampled Date	27.04.07	27.04.07	27.04.07								
Sample Received Date	28.04.07	28.04.07	28.04.07								
Batch	1	1	1								
Sample Number(s)	1-6	7-12	13-15								
PAHs											
2-Chloronaphthalene	<1	<1	-							TM143	<1 ug/l
2-Methylnaphthalene	<1	<1	-							TM143	<1 ug/l
Acenaphthene	<1	<1	-							TM143	<1 ug/l
Acenaphthylene	<1	<1	-							TM143	<1 ug/l
Anthracene	<1	<1	-							TM143	<1 ug/l
Benzo(a)anthracene	<1	<1	-							TM143	<1 ug/l
Benzo(a)pyrene	<1	<1	-							TM143	<1 ug/l
Benzo(b)fluoranthene	<1	<1	-							TM143	<1 ug/l
Benzo(ghi)perylene	<1	<1	-							TM143	<1 ug/l
Benzo(k)fluoranthene	<1	<1	-							TM143	<1 ug/l
Chrysene	<1	<1	-							TM143	<1 ug/l
Dibenzo(a,h)anthracene	<1	<1	-							TM143	<1 ug/l
Fluoranthene	<1	<1	-							TM143	<1 ug/l
Fluorene	<1	<1	-							TM143	<1 ug/l
Indeno(1,2,3-cd)pyrene	<1	<1	-							TM143	<1 ug/l
Naphthalene	<1	<1	-							TM143	<1 ug/l
Phenanthrene	<1	<1	-							TM143	<1 ug/l
Pyrene	<1	<1	-							TM143	<1 ug/l
Phthalates											
Bis(2-ethylhexyl) phthalate	<1	<1	-							TM143	<1 ug/l
Butylbenzyl phthalate	<1	<1	-							TM143	<1 ug/l
Di-n-butyl phthalate	<1	<1	-							TM143	<1 ug/l
Di-n-Octyl phthalate	<1	<1	-							TM143	<1 ug/l
Diethyl phthalate	<1	<1	-							TM143	<1 ug/l
Dimethyl phthalate	<1	<1	-							TM143	<1 ug/l
Other Semi-volatiles											
1,2-Dichlorobenzene	<1	<1	-							TM143	<1 ug/l
1,2,4-Trichlorobenzene	<1	<1	-							TM143	<1 ug/l

Date 14.06.2007

ALcontrol Geochem Analytical Services

Table Of Results - Appendix

Job Number: 07/07209/02/01
Client: Ford Consulting Group Ltd
Client Ref. No.: 00127-004

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample ¹	Surrogate Corrected
TM070	Modified: US EPA Method 8250 & 625	Determination of Total Polychlorinated Biphenyls (PCB's) as Aroclor 1254 and the ICE 7 Congeners by GC-MS	✓		DRY	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)			WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓		WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓	✓	WET	
TM097	Modified: US EPA Method 325.1 & 325.2	Determination of Chloride using the Kone Analyser	✓		NA	
TM097	Modified: US EPA Method 325.1 & 325.2	Determination of Chloride using the Kone Analyser	✓	✓	DRY	
TM098	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Sulphate using the Kone Analyser	✓		NA	
TM098	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Sulphate using the Kone Analyser	✓	✓	DRY	
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS	✓		WET	
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS	✓	✓	WET	
TM127	Method 3112B, AWWA/APHA, 20th Ed., 1999	The Determination of Trace Level Mercury in Aqueous Media and Soil Extracts by Atomic Absorption Spectroscopy	✓		NA	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer			DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓		DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓	✓	DRY	

¹ Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. **NA** = not applicable.

ALcontrol Geochem Analytical Services

Table Of Results - Appendix

Job Number: 07/07209/02/01
Client: Ford Consulting Group Ltd
Client Ref. No.: 00127-004

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample ¹	Surrogate Corrected
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓		NA	
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓	✓	WET	
TM143	Modified: US EPA Method 8270C	Determination of Semivolatile Organic Compounds by GC-MS			NA	
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS	✓		NA	
TM157		Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone			WET	
TM173		Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID	✓		DRY	
TM174		Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID			NA	
TM61/89		see TM061 and TM089 for details			WET	

¹ Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. **NA** = not applicable.

Appendix E
Table E2(a)
Statistical Analysis of Soil Analytical Results

Statistical Analysis of Soil Results	Total Sulphate	Water Soluble Sulphate as SO ₄ 2:1 Extract	Chloride (soluble)	pH Value	Aliphatics C5-C6	Aliphatics >C6-C8	Aliphatics >C8-C10	Aliphatics >C10-C12	Aliphatics >C12-C16	Aliphatics >C16-C21	Aliphatics >C21-C35	Aromatics C6-C7	Aromatics >C7-C8	Aromatics >EC8-EC10	Aromatics >EC10-EC12	Aromatics >EC12-EC16
Units	mg/kg	g/l	mg/kg	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Method Detection Limit (MDL)	<100	<0.003	<2	<1.00	<10	<10	<10	<10	<100	<100	<100	<10	<10	<10	<10	<100
Number of samples tested analysed	3	3	3	14	14	14	14	14	14	14	14	14	14	14	14	14
Highest sample value	530	0	380	10	10	10	10	10	21000	63000	1800000	10	10	10	10	6900
Third highest sample value	310	0	140	9	10	10	10	10	2000	7800	820000	10	10	10	10	880
Mean (average) for all samples tested	387	0	223	9	10	10	10	10	1996	8443	259441	10	10	10	10	713
Sample standard deviation	124	0	136	1	0	0	0	0	5524	18238	551245	0	0	0	0	1806
Student's <i>t</i> value (probability 95%)	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Adjusted US95 (or equivalent) value	NA	NA	NA	9	10	10	10	10	4610	17075	520347	10	10	10	10	1568
Number of Statistical Outliers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes: Where concentration reported < MDL, MDL value used for statistical analysis. Mean, Standard Deviation and US95 all calculated for single sample populations where outliers have been removed. Calculated Statistics rounded to the accuracy of the analysis.																

Appendix E
Table E2(a)
Statistical Analysis of Soil Analytical Results

Statistical Analysis of Soil Results	Aromatics >EC16-EC21	Aromatics >EC21-FC35	2-Chloronaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(b)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Method Detection Limit (MDL)	<100	<100	<10	<5	<14	<12	<21	<9	<25	<22	<12	<10	<16	<25	<12	<11	<8	<10	<11	<12
Number of samples tested analysed	14	14	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Highest sample value	22000	340000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Third highest sample value	2000	170000	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean (average) for all samples tested	2329	53586	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Sample standard deviation	5994	108413	184	184	184	184	184	184	184	184	184	184	184	184	184	184	184	184	184	184
Student's <i>t</i> value (probability 95%)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Adjusted US95 (or equivalent) value	5165	104898	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202
Number of Statistical Outliers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes: Where concentration reported < MDL, MDL value used for statistical analysis. Mean, Standard Deviation and US95 all calculated for single sample populations where outliers have been removed. Calculated Statistics rounded to the accuracy of the analysis.																				

**Appendix E -
Table E2(b) - Statistical Analysis of Groundwater Analytical Results**

Statistical Analysis of Groundwater Results	Sulphate (soluble)	Chloride	pH Value	Aliphatics C5-C6	Aliphatics >C6-C8	Aliphatics >C8-C10	Aliphatics >C10-C12	Aliphatics >C12-C16	Aliphatics >C16-C21	Aliphatics >C21-C35	Aromatics C6-C7	Aromatics >C7-C8	Aromatics >EC8-EC10	Aromatics >EC10-EC12	Aromatics >EC12-EC16	Aromatics >EC16-EC21
Units	mg/l	mg/l		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Method Detection Limit (MDL)	<3	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Number of samples tested analysed	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Highest sample value	260	3300	11	2000	540	10	10	10	10	260	60	10	10	10	10	10
Third highest sample value	110	550	9	10	10	10	10	10	10	10	10	10	10	10	10	10
Mean (average) for all samples tested	104	754	9	231	69	10	10	10	10	38	16	10	10	10	10	10
Sample standard deviation	74	1220	1	663	177	0	0	0	0	83	17	0	0	0	0	0
Student's t value (probability 95%)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Adjusted US95 (or equivalent) value	150	1510	9	642	178	10	10	10	10	89	26	10	10	10	10	10
Number of Statistical Outliers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

Where concentration reported < MDL, MDL value used for statistical analysis.

Mean, Standard Deviation and US95 all calculated for single sample populations where outliers have been removed.

Calculated Statistics rounded to the accuracy of the analysis.

**Appendix E -
Table E2(b) - Statistical Analysis of Groundwater Analytical Results**

Statistical Analysis of Groundwater Results	Aromatics >EC21-EC35	2-Chloronaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Method Detection Limit (MDL)	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Number of samples tested analysed	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Highest sample value	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Third highest sample value	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mean (average) for all samples tested	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sample standard deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Student's t value (probability 95%)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Adjusted US95 (or equivalent) value	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Statistical Outliers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

Where concentration reported < MDL, MDL value used for statistical analysis.

Mean, Standard Deviation and US95 all calculated for single sample populations where outliers have been removed.

Calculated Statistics rounded to the accuracy of the analysis.



QUALITY ASSURANCE & QUALITY CONTROL

F1 Quality Assurance & Quality Control

A P P E N D I X F



F1 - QUALITY ASSURANCE & QUALITY CONTROL

Analytical work was subcontracted to ALcontrol Geochem in Chester. This laboratory has been selected on the basis of review through our quality system under supplier control requirements. Selection of such suppliers is based on a review of the supplier's ability to meet the following criteria:

1. Capability; to include a review of technical competency in relation to the sub-contract works required.
2. Appropriate resources to fulfil the project requirements on time, safely and within budget.
3. Appropriate Insurance, to include Employers and Public Liability cover and Professional Indemnity (as appropriate).

Each analytical laboratory has their own QA/QC programme, which includes the normal QC requirements required for NAMAS / UKAS (and where appropriate MCERTS) accreditation and those required by individual test methods.

Most laboratory QC programmes would include:

- **Reference Standards:** A reference standard contains a known analyte concentration. The standard is analysed with a batch of project samples to evaluate analytical accuracy.
- **Laboratory Splits:** Laboratory split duplicates for organic analytes are two aliquot taken from a single extract. In the case of inorganic analytes the sample is crushed and pulverised first, and then divided into two aliquots before digestion and analysis. Comparison of results obtained for the split samples will provide data on the precision of the analysis.
- **Spikes and Surrogates:** As discussed above.



BASELINE CONDITIONS

- G1 Soil Reference Data**
- G2 Groundwater Reference Data**

A P P E N D I X G

Appendix G - Table G1 - Soil Inorganics Reference Data

Sample Location	Depth	Analyte	Total Sulphate	Water Soluble Sulphate as SO ₄ 2:1 Extract	Chloride (soluble)	pH Value
		Units	mg/kg	g/l	mg/kg	
		Method Detection Limit	<100	<0.003	<2	<1.00
		Sample Identity				
BPS-BH1	0.9-1.1	SO - BPS BH1	530	0.008	140	7.53
BPS-BH1	1.8-1.95	SO - BPS BH1	320	<0.003	150	8.77
BPS-BH2A	0.25-0.35	SO - BPS BH2A	-	-	-	7.72
BPS-BH2A	4.1-4.2	SO - BPS BH2A	-	-	-	8.76
BPS-BH3	0.3-0.4	SO - BPS BH3	310	0.039	380	8.97
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	-	-	-	9.42
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	-	-	-	9.22
BPS-BH5	1.5-1.6	SO - BPS - BH5	-	-	-	8.32
BPS-BH5	2.5-2.6	SO - BPS - BH5	-	-	-	8.73
BPS-BH6	1.1-1.2	SO - BPS - BH6	-	-	-	9.00
BPS-BH6	2.1-2.2	SO - BPS - BH6	-	-	-	8.92
BPS-BH6	3.1-3.2	SO - BPS - BH6	-	-	-	8.90
BPS-BH6	4.1-4.2	SO - BPS - BH6	-	-	-	8.98
BPS-BH7	1.0-1.1	SO - BPS - BH7	-	-	-	9.58

Appendix G - Table G1 - Soil PAH Reference Data

Sample Location	Depth	Analyte	2-Chloronaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		Method Detection Limit	<100	<100	<100	<100	<100
		Sample Identity					
BPS-BH1	0.9-1.1	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	1.45-1.55	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	1.8-1.95	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	4.0-4.1	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH2A	0.25-0.35	SO - BPS BH2A	<1000	<1000	<1000	<1000	<1000
BPS-BH2A	1.0-1.1	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH2A	1.65-1.75	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH2A	2.5-2.6	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH3	0.3-0.4	SO - BPS BH3	<100	<100	<100	<100	<100
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	3.1-3.2	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	4.1-4.2	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH5	1.5-1.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	2.5-2.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	3.5-3.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	4.5-4.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH6	1.1-1.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	2.1-2.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	3.1-3.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	4.1-4.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH7	1.0-1.1	SO - BPS - BH7	<100	<100	<100	<100	<100
BPS-BH12	0.3-0.35	SO - BPS BH12	<100	<100	<100	<100	<100
BPS-BH13	0.3-0.35	SO - BPS BH13	<100	<100	<100	<100	<100

Appendix G - Table G1 - Soil PAH Reference Data

Sample Location	Depth	Analyte	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		Method Detection Limit	<100	<100	<100	<100	<100
		Sample Identity					
BPS-BH1	0.9-1.1	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	1.45-1.55	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	1.8-1.95	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	4.0-4.1	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH2A	0.25-0.35	SO - BPS BH2A	<1000	<1000	<1000	<1000	<1000
BPS-BH2A	1.0-1.1	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH2A	1.65-1.75	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH2A	2.5-2.6	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH3	0.3-0.4	SO - BPS BH3	<100	<100	<100	<100	<100
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	3.1-3.2	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	4.1-4.2	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH5	1.5-1.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	2.5-2.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	3.5-3.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	4.5-4.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH6	1.1-1.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	2.1-2.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	3.1-3.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	4.1-4.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH7	1.0-1.1	SO - BPS - BH7	<100	<100	<100	<100	<100
BPS-BH12	0.3-0.35	SO - BPS BH12	<100	<100	<100	<100	<100
BPS-BH13	0.3-0.35	SO - BPS BH13	<100	<100	<100	<100	<100

Appendix G - Table G1 - Soil PAH Reference Data

Sample Location	Depth	Analyte	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		Method Detection Limit	<100	<100	<100	<100	<100
		Sample Identity					
BPS-BH1	0.9-1.1	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	1.45-1.55	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	1.8-1.95	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH1	4.0-4.1	SO - BPS BH1	<100	<100	<100	<100	<100
BPS-BH2A	0.25-0.35	SO - BPS BH2A	<1000	<1000	<1000	<1000	<1000
BPS-BH2A	1.0-1.1	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH2A	1.65-1.75	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH2A	2.5-2.6	SO - BPS BH2A	<100	<100	<100	<100	<100
BPS-BH3	0.3-0.4	SO - BPS BH3	<100	<100	<100	<100	<100
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	3.1-3.2	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH4B	4.1-4.2	SO - BPS - BH4B	<100	<100	<100	<100	<100
BPS-BH5	1.5-1.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	2.5-2.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	3.5-3.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH5	4.5-4.6	SO - BPS - BH5	<100	<100	<100	<100	<100
BPS-BH6	1.1-1.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	2.1-2.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	3.1-3.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH6	4.1-4.2	SO - BPS - BH6	<100	<100	<100	<100	<100
BPS-BH7	1.0-1.1	SO - BPS - BH7	<100	<100	<100	<100	<100
BPS-BH12	0.3-0.35	SO - BPS BH12	<100	<100	<100	<100	<100
BPS-BH13	0.3-0.35	SO - BPS BH13	<100	<100	<100	<100	<100

Appendix G - Table G1 - Soil PAH Reference Data

Sample Location	Depth	Analyte	Naphthalene	Phenanthrene	Pyrene
		Units	ug/kg	ug/kg	ug/kg
		Method Detection Limit	<100	<100	<100
		Sample Identity			
BPS-BH1	0.9-1.1	SO - BPS BH1	<100	<100	<100
BPS-BH1	1.45-1.55	SO - BPS BH1	<100	<100	<100
BPS-BH1	1.8-1.95	SO - BPS BH1	<100	<100	<100
BPS-BH1	4.0-4.1	SO - BPS BH1	<100	<100	<100
BPS-BH2A	0.25-0.35	SO - BPS BH2A	<1000	<1000	<1000
BPS-BH2A	1.0-1.1	SO - BPS BH2A	<100	<100	<100
BPS-BH2A	1.65-1.75	SO - BPS BH2A	<100	<100	<100
BPS-BH2A	2.5-2.6	SO - BPS BH2A	<100	<100	<100
BPS-BH3	0.3-0.4	SO - BPS BH3	<100	<100	<100
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	<100	<100	<100
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	<100	<100	<100
BPS-BH4B	3.1-3.2	SO - BPS - BH4B	<100	<100	<100
BPS-BH4B	4.1-4.2	SO - BPS - BH4B	<100	<100	<100
BPS-BH5	1.5-1.6	SO - BPS - BH5	<100	<100	<100
BPS-BH5	2.5-2.6	SO - BPS - BH5	<100	<100	<100
BPS-BH5	3.5-3.6	SO - BPS - BH5	<100	<100	<100
BPS-BH5	4.5-4.6	SO - BPS - BH5	<100	<100	<100
BPS-BH6	1.1-1.2	SO - BPS - BH6	<100	<100	<100
BPS-BH6	2.1-2.2	SO - BPS - BH6	<100	<100	<100
BPS-BH6	3.1-3.2	SO - BPS - BH6	<100	<100	<100
BPS-BH6	4.1-4.2	SO - BPS - BH6	<100	<100	<100
BPS-BH7	1.0-1.1	SO - BPS - BH7	<100	<100	<100
BPS-BH12	0.3-0.35	SO - BPS BH12	<100	<100	<100
BPS-BH13	0.3-0.35	SO - BPS BH13	<100	<100	<100

Appendix G - Table G1 - Soil Total Petroleum Hydrocarbons (TPH) Reference Data

Sample	Depth	Analyte	Aliphatics >C12-C16	Aliphatics >C16-C21	Aliphatics >C21-C35	Total Aliphatics C5-C35	Aromatics C6-C7	Aromatics >C7-C8	Aromatics >EC8-EC10
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		Method Detection Limit	<100	<100	<100	<100	<10	<10	<10
		Sample Identity							
BPS-BH1	0.9-1.1	SO - BPS BH1	<100	<100	<100	<100	<10	<10	<10
BPS-BH1	1.45-1.55	SO - BPS BH1	<100	<100	<100	<100	<10	<10	<10
BPS-BH1	1.8-1.95	SO - BPS BH1	<100	<100	<100	<100	<10	<10	<10
BPS-BH1	4.0-4.1	SO - BPS BH1	<100	<100	<100	<100	<10	<10	<10
BPS-BH2A	0.25-0.35	SO - BPS BH2A	<100	<100	4300	4300	<20	<20	<20
BPS-BH2A	1.0-1.1	SO - BPS BH2A	<100	<100	<100	<100	<10	<10	<10
BPS-BH2A	1.65-1.75	SO - BPS BH2A	<100	<100	<100	<100	<10	<10	<10
BPS-BH2A	2.5-2.6	SO - BPS BH2A	<100	<100	150	150	<10	<10	<10
BPS-BH3	0.3-0.4	SO - BPS BH3	<100	<100	<100	<100	<10	<10	<10
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	5600	9300	56000	70000	<10	<10	<10
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	<100	<100	<100	<100	<10	<10	<10
BPS-BH4B	3.1-3.2	SO - BPS - BH4B	<100	<100	<100	<100	<10	<10	<10
BPS-BH4B	4.1-4.2	SO - BPS - BH4B	<100	<100	3700	3700	<10	<10	<10
BPS-BH5	1.5-1.6	SO - BPS - BH5	2000	7700	9100	19000	<10	<10	<10
BPS-BH5	2.5-2.6	SO - BPS - BH5	<100	<100	<100	<100	<10	<10	<10
BPS-BH5	3.5-3.6	SO - BPS - BH5	<100	<100	<100	<100	<10	<10	<10
BPS-BH5	4.5-4.6	SO - BPS - BH5	<100	<100	<100	<100	<10	<10	<10
BPS-BH6	1.1-1.2	SO - BPS - BH6	340	1800	8400	10000	<10	<10	<10
BPS-BH6	2.1-2.2	SO - BPS - BH6	<100	<100	<100	<100	<10	<10	<10
BPS-BH6	3.1-3.2	SO - BPS - BH6	<100	<100	<100	<100	<10	<10	<10
BPS-BH6	4.1-4.2	SO - BPS - BH6	<100	<100	<100	<100	<10	<10	<10
BPS-BH7	1.0-1.1	SO - BPS - BH7	21000	63000	820000	900000	<10	<10	<10
BPS-BH12	0.3-0.35	SO - BPS BH12	<100	7800	1800000	1800000	<10	<10	<10
BPS-BH13	0.3-0.35	SO - BPS BH13	2300	35000	990000	1000000	<10	<10	<10

Appendix G - Table G1 - Soil Total Petroleum Hydrocarbons (TPH) Reference Data

Sample	Depth	Analyte	Aromatics >EC10- EC12	Aromatics >EC12- EC16	Aromatics >EC16- EC21	Aromatics >EC21- EC35	Total Aromatics C6-C35	TPH (Aliphatics and Aromatics C5-C35)	PCBs (vs Aroclor 1254)
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		Method Detection Limit	<10	<100	<100	<100	<100	<100	<20
		Sample Identity							
BPS-BH1	0.9-1.1	SO - BPS BH1	<10	<100	<100	<100	<100	<100	-
BPS-BH1	1.45-1.55	SO - BPS BH1	<10	<100	<100	<100	<100	<100	-
BPS-BH1	1.8-1.95	SO - BPS BH1	<10	<100	<100	<100	<100	<100	-
BPS-BH1	4.0-4.1	SO - BPS BH1	<10	<100	<100	<100	<100	<100	-
BPS-BH2A	0.25-0.35	SO - BPS BH2A	<20	3400	5700	29000	38000	42000	150
BPS-BH2A	1.0-1.1	SO - BPS BH2A	<10	<100	<100	<100	<100	<100	<20
BPS-BH2A	1.65-1.75	SO - BPS BH2A	<10	<100	<100	<100	<100	<100	-
BPS-BH2A	2.5-2.6	SO - BPS BH2A	<10	<100	<100	<100	<100	150	-
BPS-BH3	0.3-0.4	SO - BPS BH3	<10	<100	<100	<100	<100	<100	<20
BPS-BH4B	1.2-1.4	SO - BPS - BH4B	<10	<100	<100	2000	2000	72000	-
BPS-BH4B	2.2-2.3	SO - BPS - BH4B	<10	<100	<100	1300	1300	1300	-
BPS-BH4B	3.1-3.2	SO - BPS - BH4B	<10	<100	<100	<100	<100	<100	-
BPS-BH4B	4.1-4.2	SO - BPS - BH4B	<10	<100	<100	2700	2700	6400	-
BPS-BH5	1.5-1.6	SO - BPS - BH5	<10	200	200	1000	1400	20000	-
BPS-BH5	2.5-2.6	SO - BPS - BH5	<10	<100	<100	<100	<100	<100	-
BPS-BH5	3.5-3.6	SO - BPS - BH5	<10	<100	<100	<100	<100	<100	-
BPS-BH5	4.5-4.6	SO - BPS - BH5	<10	<100	<100	<100	<100	<100	-
BPS-BH6	1.1-1.2	SO - BPS - BH6	<10	<100	<100	6200	6200	17000	-
BPS-BH6	2.1-2.2	SO - BPS - BH6	<10	<100	<100	<100	<100	<100	-
BPS-BH6	3.1-3.2	SO - BPS - BH6	<10	<100	<100	4100	4100	4100	-
BPS-BH6	4.1-4.2	SO - BPS - BH6	<10	<100	<100	<100	<100	<100	-
BPS-BH7	1.0-1.1	SO - BPS - BH7	<10	6900	22000	170000	200000	1100000	-
BPS-BH12	0.3-0.35	SO - BPS BH12	<10	1000	7400	340000	350000	2200000	-
BPS-BH13	0.3-0.35	SO - BPS BH13	<10	<100	2000	220000	220000	1200000	-

Appendix G - Table G2 - Groundwater Inorganics Reference Data

Sample Location	Analyte	Sulphate (soluble)	Chloride	pH Value
	Units	mg/l	mg/l	
	Method Detection Limit	<3	<1	<1.00
	Sample Identity			
BPS - BH1	GW - BPS - BH1 - 01	180	2400	8.31
BPS - BH2A	GW - BPS - BH2A - 01	25	52	8.95
BPS - BH4A	GW - BPS - BH4A - 01	84	36	8.32
BPS - BH5	GW - BPS - BH5 - 01	110	56	8.78
BPS - BH6	GW-BPS-BH6-01	49	78	8.40
BPS - BH7	GW-BPS-BH7-01	60	130	11.29
BPS - BHB1	GW - BPS - BHB1 - 01	110	550	8.87

Appendix G - Table G1 - Groundwater PAH Reference Data

Sample Location	Analyte	2-Chloronaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene
	Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	Method Detection Limit	<1	<1	<1	<1	<1	<1
	Sample Identity						
BPS - BH1	GW - BPS - BH1 - 01	<1	<1	<1	<1	<1	<1
BPS - BH2A	GW - BPS - BH2A - 01	<1	<1	<1	<1	<1	<1
BPS - BH4A	GW - BPS - BH4A - 01	<1	<1	<1	<1	<1	<1
BPS - BH5	GW - BPS - BH5 - 01	<1	<1	<1	<1	<1	<1
BPS - BH6	GW-BPS-BH6-01	<1	<1	<1	<1	<1	<1
BPS - BH7	GW-BPS-BH7-01	<1	<1	<1	<1	<1	<1
BPS - B1	GW - BPS - BHB1 - 01	<1	<1	<1	<1	<1	<1

Appendix G - Table G1 - Groundwater PAH Reference Data

Sample Location	Analyte	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene
	Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	Method Detection Limit	<1	<1	<1	<1	<1	<1
	Sample Identity						
BPS - BH1	GW - BPS - BH1 - 01	<1	<1	<1	<1	<1	<1
BPS - BH2A	GW - BPS - BH2A - 01	<1	<1	<1	<1	<1	<1
BPS - BH4A	GW - BPS - BH4A - 01	<1	<1	<1	<1	<1	<1
BPS - BH5	GW - BPS - BH5 - 01	<1	<1	<1	<1	<1	<1
BPS - BH6	GW-BPS-BH6-01	<1	<1	<1	<1	<1	<1
BPS - BH7	GW-BPS-BH7-01	<1	<1	<1	<1	<1	<1
BPS - B1	GW - BPS - BHB1 - 01	<1	<1	<1	<1	<1	<1

Appendix G - Table G1 - Groundwater PAH Reference Data

Sample Location	Analyte	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
	Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	Method Detection Limit	<1	<1	<1	<1	<1	<1
	Sample Identity						
BPS - BH1	GW - BPS - BH1 - 01	<1	<1	<1	<1	<1	<1
BPS - BH2A	GW - BPS - BH2A - 01	<1	<1	<1	<1	<1	<1
BPS - BH4A	GW - BPS - BH4A - 01	<1	<1	<1	<1	<1	<1
BPS - BH5	GW - BPS - BH5 - 01	<1	<1	<1	<1	<1	<1
BPS - BH6	GW-BPS-BH6-01	<1	<1	<1	<1	<1	<1
BPS - BH7	GW-BPS-BH7-01	<1	<1	<1	<1	<1	<1
BPS - B1	GW - BPS - BHB1 - 01	<1	<1	<1	<1	<1	<1

Appendix G - Table G1 - Groundwater Total Petroleum Hydrocarbons (TPH) Reference Data

Sample Location	Analyte	GRO (C4-C12)	MTBE	Benzene	Toluene	Ethyl benzene	m & p Xylene	o Xylene	Aliphatics C5 C6	Aliphatics >C6-C8	Aliphatics >C8-C10	Aliphatics >C10-C12	Aliphatics >C12-C16
	Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	Method Detection Limit	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Sample Identity												
BPS - BH1	GW - BPS - BH1 - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH2A	GW - BPS - BH2A - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH4A	GW - BPS - BH4A - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH5	GW-BPS-BH5-01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH6	GW-BPS-BH6-01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH7	GW - BPS - BH7 - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BHB1	GW - BPS - BHB1 - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Appendix G - Table G1 - Groundwater Total Petroleum Hydrocarbons (TPH) Reference Data

Sample Location	Analyte	Aliphatics >C16-C21	Aliphatics >C21-C35	Total Aliphatics C5 C35	Aromatics C6-C7	Aromatics >C7-C8	Aromatics >EC8-EC10	Aromatics >EC10-EC12	Aromatics >EC12-EC16	Aromatics >EC16-EC21	Aromatics >EC21-EC35	Total Aromatics C6-C35	TPH (Aliphatics and Aromatics C5-C35)
	Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	Method Detection Limit	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Sample Identity												
BPS - BH1	GW - BPS - BH1 - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH2A	GW - BPS - BH2A - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH4A	GW - BPS - BH4A - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH5	GW-BPS-BH5-01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH6	GW-BPS-BH6-01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BPS - BH7	GW - BPS - BH7 - 01	<10	260	260	<10	<10	<10	<10	<10	<10	<10	<10	260
BPS - BHB1	GW - BPS - BHB1 - 01	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Appendix J
SPMP Review Reports



**Site Protection &
Monitoring Programme
Review for Barry Power
Station**

**On Behalf of Centrica
Energy**

August 2011

Project 00127-027 (BPS)



Project Title: Site Protection Monitoring Programme Review for Barry Power Station.

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EXECUTIVE SUMMARY

This document presents a review of the Site Protection and Monitoring Programme (SPMP) for the Barry Power Station. This original design SPMP was prepared by RSK Group Ltd and submitted to the Environment Agency in pursuance of Condition 3.6.5 of the Permit No. JP3333LV (the 'Permit') authorising the operation of Barry Power Station (the 'installation'). This study has sought to:

- *Identify any changes that may be required to the SPMP in order that it continues to be relevant to current site conditions and in particular the hazardous material inventory and containment measures; and*
- *Evaluate the impact of any incidents or potential releases of contamination to soil and groundwater at the site and the efficacy of the SPMP in evaluating the impacts to soil and groundwater quality at the site.*

The works undertaken by Ford Consulting Group Ltd ('FCG') in completing this assessment included a document review, interviews of key personnel, completion of a site tour and inspections of containment infrastructure and the groundwater monitoring well network at the site.

The outcome of the SPMP review for the Barry Power Station has indicated that the infrastructure monitoring programme set out in the design SPMP is being adhered to. Effective management and control of containment infrastructure is being implemented through the Computerised Maintenance Management System (CMMS).

The site audit confirmed that the overall condition of the installation including the existing environmental infrastructure and preventative measures were adequate for the ongoing site operations and are compliant to current UK guidance.

However, a key area where further attention by Centrica Energy needs to be considered is:

- **GT & ST Transformers Cooling Oil Loss** – *A 'critical defect' has been identified by Centrica in the form of ongoing minor losses of cooling oil from the 3-phase gaskets on the GT and ST transformers. The oil losses have continued for a period of 14 months, however the rate of loss is currently very slow and no losses to ground or breach of containment have been reported or were evident from our observations on site. It is understood that ongoing monitoring of the situation and further investigations are being actively pursued by Centrica.*

Two incidents of potential soil and groundwater contamination events have occurred at the site over the period since the reference data was collected in 2007. These relate to the spillage of glycol contaminated condensate water from a faulty pressure release valve and the potential loss of boiler water blowdown from a leaking pipe close to the HSRG sump. The former event occurred in 2009 and samples of soil and groundwater were collected in the area to assess impacts to ground by glycols in the vicinity of the spillage. The analysis results were below method detection limits and shallow soils in area were removed as a precautionary measure. With regards to the HSRG sump and associated pipeline leak, repairs to this structure are currently underway. Soil samples of the excavation wall in the area potentially affected by any contamination release were also taken and the results are awaiting. It should be noted that the relative elevation of water in the sump/pipe and surrounding groundwater are such that inflow of groundwater to the sump is anticipated rather than loss of contaminated sump water to ground.

These incidents are considered to demonstrate the effective management and proactive approach to dealing with potential ground contamination sources arising at the site.

A review of the SPMP monitoring well network has found the overall condition of the wells to be good and the inferred groundwater flow regime broadly concurs with the previous groundwater monitoring



undertaken at the site. The shallow groundwater flow regime has been shown to be broadly a radially divergent flow from a central ridge running down the centre of the site. Based on the location of potential contamination sources relative to monitoring well locations and the inferred hydrogeological regime, it is considered that the current wells are in appropriate locations to identify significant contamination issues arising at the site. The need for further monitoring of shallow groundwater quality should be considered in the event of a future operational loss at the site.



1. INTRODUCTION

Ford Consulting Group Ltd ('FCG') was retained by Centrica Energy ('Centrica') to undertake a review of the Site Protection and Monitoring Programme ('SPMP') for Barry Power Station, Vale of Glamorgan, South Wales (the 'site').

The Site Protection and Monitoring Programme (SPMP) comprise a series of activities designed to ensure that the handling and storage of hazardous materials at the Installation does not result in an impact to soil and groundwater quality. Typically this comprises works to monitor and maintain containment infrastructure coupled with (where necessary) monitoring of environmental media for contamination relative to reference data collected at the time of the Environmental Permit (formerly IPPC) being issued. The design SPMP for the Barry Power Station was developed and reference data collected in 2007. This review is therefore being undertaken 4 years after the permit was issued.

Centrica identified the need for this review to document how the SPMP has been implemented, record any material contamination release incidents, assess the adequacy of current containment infrastructure and to provide recommendations for any changes to this and the scope of the SPMP going forward.

The review and inspections of the facility were undertaken by Phillip Parker (Environmental Consultant) of FCG on Tuesday 15th March 2011 in the company of Mr Stephen Blair and Mr Andrew Martinson of Centrica Energy.

1.1. SITE LOCATION

The installation is located on the eastern side of an area extensively developed for chemical manufacturing, storage and distribution on Sully Moors Road approximately 3km east of Barry Town centre. The centre of the site is at National Grid Reference (NGR) ST 145 684. The site location, installation boundary and site layout are illustrated on Figure 1 and 2, respectively.

The site is broadly 'T' shaped in plan and occupies approximately 2.2 hectares. It is bordered to the immediate north by a former chemical manufacturing facility, currently being demolished. The wider industrial estate borders the site to the south and west with open agricultural land to the east. The Sully Brook is located approximately 70m south of the site.

2. OBJECTIVES & SCOPE OF WORK

The objectives to be met and scope of works undertaken by this study were as follows:

- To undertake an assessment of the current status and adequacy of the hazardous material containment infrastructure at the site. Make recommendations for improvements to the containment infrastructure in the event that this is deemed necessary;
- To provide a review of the site performance in relation to the inspection, monitoring and maintenance of their containment infrastructure and other aspects of their scheduled SPMP activities. Where necessary, provide recommendations for any alterations to the monitoring programme of these



structures going forward;

- Review records of any potentially significant environmental incidents over the period since 2006/07 to assess the need for any additional assessment of soil and groundwater contamination at the site;
- Undertake a groundwater elevation monitoring round to confirm the shallow groundwater regime and confirm the efficacy of the monitoring well network in providing appropriate data to assess impacts arising from hazardous material releases;
- Inspect the current condition of the groundwater monitoring well network to identify the need for any maintenance of these to ensure their availability for future monitoring events; and
- Review the results of groundwater monitoring events at the site to assess the need for, scope and frequency of future monitoring rounds.

3. REVIEW OF DESIGN SPMP (RSK LTD) AND FIRST PHASE REPORTING (FCG) DOCUMENTS

3.1. DESIGN SPMP

RSK Group Ltd ('RSK') was commissioned by Centrica to design the SPMP for Barry Power Station following the submission by Centrica of the Pollution Prevention Control ('PPC') permit in January 2006 (Permit No. JP3333LV) to the Environment Agency accompanied by the Application Site Report ('ASR'). The design SPMP document was required in pursuance of Condition 2.8.1 of the PPC permit (now termed the Environmental Permit) for the site.

The objective of the design SPMP was to:

- Design a robust site investigation to obtain adequate reference data to allow a baseline assessment of ground contamination by potentially hazardous materials to be handled by the facility to be undertaken and refinement of the ASR conceptual site model. The reference data would be used to assess ground contamination issues at the outset of the permit and thereby assist with identifying work that may be required to address additional contamination present at the time of the PPC permit surrender;
- Design a monitoring programme for the installation that would allow ongoing assessment of the effectiveness of the pollution prevention infrastructure and where necessary through further sampling to provide early warning of any release of polluting substances to ground or groundwater; and
- Specify any inspection and testing programme for the installation's pollution prevention infrastructure to ensure continued integrity.

The design SPMP detailed a zonation scheme for the installation that identified areas with the potential for ground contamination due to the storage and handling of hazardous chemicals.

The design SPMP divided the site into three zones (Zones 1 to Zone 3) based on the activities undertaken and the potential for contaminated land. The zonation of the site is detailed below and illustrated by Figure 2.



- Zone 1 – Diesel and oil storage and distribution (covering diesel storage tanks, transformers and emergency diesel generator.
- Zone 2 – Water Treatment Chemicals, storage, transfer and use; and
- Zone 3 – All remaining storage locations across the installation.

3.1.1. ACQUISITION OF BASELINE DATA (INTRUSIVE INVESTIGATION)

To facilitate the collection of reference data and to characterise the site condition in terms of substances identified as being potentially present in, on or under the ground the following intrusive investigation was proposed:

- Construction of 13No. boreholes at targeted locations across the installation (BPS-BH1 – BPS-BH3, BPS-BH4A, BPS-BH4B, BPS-BH5-BPS-BH8, BPS-BH12-BPS-BH13, BPS-BHA1 and BPS-BHB1);
- In-situ testing, visual and olfactory inspection of the subsurface including soil logging in accordance with BS5930;
- Representative soil sampling at discrete horizons and environmental laboratory chemical analysis for a range of organic and inorganic determinants, namely Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), chlorides, pH and sulphates; and
- Groundwater monitoring to collect reference data for groundwater quality. Chemical analysis of groundwater samples for a range of determinands including TPH, PAHs, chlorides, pH and sulphates. Monitoring of groundwater levels and inference of the shallow groundwater flow regime.

This programme of works was subsequently completed by FCG as part of the First Phase reporting of the SPMP and is summarised in Section 3.2 below.

3.1.2. ENVIRONMENTAL MONITORING AND INFRASTRUCTURE PROGRAMME

The design SPMP specified (due to the relative risks posed by the installation) that no further environmental monitoring of the soil and groundwater was required beyond the collection of reference data. The only groundwater monitoring that has been undertaken over the period since the reference data was collected related to the sampling of two wells for glycols and TPH following the loss of condensate in 2009. This issue is discussed in section 4.2.

RSK's review of the existing pollution prevention infrastructure at the installation found that it was deemed sufficient to prevent and control any potential future losses of hazardous materials from site operations.

An infrastructure monitoring programme for all aspects of the installation relating to the storage and use of bulk hazardous materials and secondary containment was devised. A copy of the RSK infrastructure monitoring programme table is presented at Appendix A.

3.2. FIRST PHASE REPORTING OF THE SPMP

FCG were commissioned by Centrica in September 2007 to undertake an intrusive investigation to collect reference data at the Barry Power Station. The intrusive investigation was required to fulfil the requirements of the design SPMP completed



by RSK in 2007.

The reference data collection exercise was undertaken in accordance with the scope and methodologies set out in the design SPMP. Specifically, the following investigation and soil and groundwater sampling strategy were employed:

- Drilling of boreholes using a combination of hollow stem auger, DTH (down the hole) hammer and solid stem auger rotary techniques from 3.7m to 5.5m below ground level (m bgl). A single borehole (BPS-BH4B) was drilled to 9m bgl using solid stem auger and DTH hammer techniques;
- Soil samples taken from discrete horizons as stipulated in the design SPMP and submitted to an appropriately accredited environmental laboratory for a range of organic and inorganic determinands including Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAHs), total Sulphate, Water soluble Sulphate and pH.
- Installation of 50mm ID HDPE monitoring standpipes with response zones designed for the ground and groundwater conditions encountered.
- Groundwater sampling as stipulated in the design SPMP for a range of organic and inorganic determinands including TPH, PAHs, VOC's, Sulphate, Chloride and pH.

The findings of the intrusive investigation are detailed as follows:

- Geological strata encountered during the intrusive investigation were comparable to those described in the ASR and design SPMP documents;
- Ground conditions encountered during the intrusive investigation were typically granular Made Ground overlying Estuarine Alluvium (clay) over Triassic Mercia Mudstone, Marginal Facies bedrock and comparable to those described in the ASR and design SPMP documents;
- The ground conditions observed typically comprising a variable sequence of imported granular crushed stone and sand, residual floor slabs (derived from previous chemical manufacturing plant) and reworked natural strata ranging in thickness from 0.7-2.2 metres. The estuarine alluvium comprised a very soft to firm grey brown silty clay which became softer with high silt content at depths between 2.0-2.5m bgl. Competent bedrock was encountered at depths of 4.0-6.5m bgl and comprised a complex interbedded sequence including strata of reddish brown mudstone, grey green and reddish brown conglomerates and grey limestone which were inferred to dip to the south beneath the site;
- Minor to moderate groundwater strikes were encountered within the estuarine alluvium deposits with shallow groundwater inferred to flow radially away from a central ridge that runs east to west down the spine of the site created by shallow groundwater discharging to surface water courses;
- Groundwater analysis results reported a single detectable TPH concentration (0.26mg/l) at BPS-BH7 dominated by C₂₁-C₃₅ aliphatic carbon chains indicating a degraded diesel or similar heavier oil product. All PAH analysis reported concentrations below laboratory method detection limits;
- Elevated chloride concentrations were detected locally in shallow groundwater samples collected at the southern site boundary. However, the groundwater



flow regime would tend to preclude saline intrusion as being the sources of these elevated chloride results;

- The findings of the intrusive investigation to collect reference data did not lead to any recommendations for amendments to the monitoring and inspection programme; and
- The installation was considered to be a relatively low risk in terms of the potential for future contamination of soil and groundwater. This conclusion was based on contemporary preventative measures, maintenance of this site infrastructure and the assumption that improvements in the containment infrastructure/procedures set out in the design SPMP were undertaken.

4. SPMP REVIEW (FEBRUARY 2011)

4.1. INTRODUCTION

In order to establish whether the current environmental infrastructure and preventative measures are adequate to minimise the potential for new soil and groundwater contamination at the installation, a detailed review of hazardous material storage and handling at the site was undertaken. This includes an assessment of the current containment measures, coupled with a review of the current procedures monitoring and maintenance of these. The findings of this review are set out below:

4.2. OUTCOME OF THE PRE-SITE INSPECTION QUESTIONNAIRE & SITE INTERVIEWS

Discussions with Andrew Martinson confirmed that the site operations had not materially altered since the implementation of the design SPMP and once the improvement conditions, namely BPS1, BPS2, BPS3 and BPS10 as stipulated in the Environmental Permit (formerly IPPC) had been addressed.

The management and maintenance of the containment infrastructure for the site is conducted on a routine basis and is controlled through the internal Computerised Maintenance Management System ('CMMS'). Scheduled daily inspections are undertaken by site operatives with issues or concerns raised as a 'defect'. These are prioritised by site management and rectified according to perceived severity.

A programme of hydrostatic testing of all secondary containment infrastructure has been established at the site and controlled through the CMMS. Ultrasonic thickness tests of the water effluent tank, neutralisation and acid tanks have been completed and no significant issues have been raised. However, the acid tank containment bund was relined with a chemical resistant lining following visual observations of cracking of internal surfaces. It is understood this work was completed as a precautionary measure and that no breach of containment had occurred as a result of the bund condition.

An environmental incident relating to the release of 550 litres of glycol water coolant (50%:50%) was reported at the site in October 2009. The incident was caused by the failure of a pressure release valve and the liquid was lost to an area of gravel surfaced ground. Representative soil and groundwater samples were taken by FCG in October 2009 and reported glycol concentrations below method detection limits.



The area was excavated down to the old foundation slab and arisings disposed off-site as a precaution. The incident was reported to the Environment Agency which classified it as a 'category 2 – minor incident'. However, no further action was taken by the regulator. As such this environmental incident is not considered to require any further action at this stage.

A further incident at the Barry facility has recently been identified. This relates to a breach in a redundant drain line close to the HSRG sump. The sump receives boiler water blowdown that is potentially contaminated by dilute water treatment chemicals (oxygen scavengers). FCG recently attended site to collect soil samples from an excavation adjacent to the sump that had been dug to complete repairs to the broken drain line. The samples have been scheduled for analysis to evaluate potential impacts on soil quality by these water treatment chemicals. This work is considered to be a precautionary measure as the concentrations of water treatment chemicals are likely to be very low and the groundwater locally is higher than the water level in the sump. This should preclude the loss of blowdown water from the sump system to the surrounding soil and groundwater. The results of this exercise are due shortly. In the unlikely event that the findings of the study indicate the need for further investigations or corrective action then recommendations for the same will be included in the FCG report.

The site audit identified an ongoing seepage of GT and ST transformer cooling oil from faulty 3-phase gaskets. It is understood the oil losses have continued for a period of 14 months. However, all oils are contained within the transformer beyond sump system and are recovered through the oily water drainage system and an oil skimmer pump within the oil water interceptor. Discussions with the site established that the issue was being monitored and managed through the CMMS. The site has reported and observations during the site audit identified no loss to ground or breach of containment from either the GT or ST containment bunds.

In summary, our review of the pre-site visit questionnaire response and the outcome of site interviews has led to the conclusion that the infrastructure containment monitoring programme as set out in the SPMP has been adhered to since its adoption with only minor issues relating to operational processes being reported. It is understood that any losses of GT & ST transformer cooling oil are being effectively managed through the CMMS. The outcome of the HSRG sump investigation is due to be reported in the near future.

4.3. REVIEW OF INFRASTRUCTURE MONITORING PROGRAMME

4.3.1. INFRASTRUCTURE ASSESSMENT & SITE INSPECTION

The type of existing hazardous material containment infrastructure is detailed in Table 3 of the design SPMP document and formed the basis of the site audit and inspection undertaken as part of this study. A copy of the RSK Group Table 3 – Infrastructure Monitoring Programme is provided in Appendix A.

Where the site audit identified issues relating to the condition or operation and maintenance of the existing containment infrastructure, recommendations for improvements have been developed and are detailed below:

- **GT & ST Transformers Cooling Oil Loss** – As outlined above a 'critical defect' has been identified by Centrica in the form of ongoing minor losses of cooling oil



from the 3-phase gaskets on the GT and ST transformers. The oil losses have continued for a period of 14 months, however the rate of loss is currently very slow and no losses to ground or breach of containment have been reported or were evident from our observations on site. It is understood that ongoing monitoring of the situation and further investigations are being actively pursued by Centrica.

The outcome of the SPMP review has found the overall condition of the existing pollution containment infrastructure to be in good condition except for the transformer coolant oil losses and issues associated with the HSRG sump which are currently being repaired. Routine inspections coupled with an effective management system (CMMS) are considered sufficiently robust to manage and monitor the containment infrastructure in accordance with the requirements of the design SPMP.

A copy of the proposed update of the infrastructure monitoring programme table is attached at Appendix B.

4.3.2. OUTCOME OF THE SPMP MONITORING WELL NETWORK INSPECTION

A visual inspection and assessment of the monitoring well network including measurement of resting groundwater conditions was undertaken as part of the infrastructure monitoring assessment.

The overall condition of the monitoring well network was observed to be good. The condition of the well network is presented in Table 1.

The shallow groundwater flow regime was established by measuring the resting groundwater levels using an electronic oil-water interface meter. Resting groundwater levels for the well network are presented in Table 2. An inferred shallow groundwater regime plan is presented in Figure 3. The general groundwater flow direction appears to be radially divergent slow from a central ridge running down the centre of the site. The shallow groundwater flow regime broadly concurs with that inferred for the 2007 groundwater elevation survey.

An assessment of the SPMP monitoring well network suggests that the position of the wells relative to the groundwater flow regime and the key areas of hazardous material storage and handling have found these to be adequate. That is they should be able to provide effective monitoring and sampling of impacted areas shallow groundwater in the event of a potential future release of hazardous materials to soil and groundwater.

5. CONCLUSIONS

Ford Consulting Group Ltd was retained by Centrica to undertake a review of the Site Protection and Monitoring Programme for the Barry Power Station, Vale of Glamorgan, South Wales.

The outcome of the SPMP review and walk-over survey has found the overall site operations to be well managed from an environmental perspective with all infrastructure containment provision to be effectively controlled through a robust CMMS management tool coupled with routine daily inspections. The SPMP review has indicated that the installation, hazardous material containment infrastructure



and preventative measures are adequate for the ongoing site operations and are compliant with current UK guidance.

There have been three incidents at the site of potential contamination releases over the review period. These relate to the condensate release in 2009, a breached drain close to the HRSG sump and issues with the cooling oil seepage from gaskets on the GT & ST transformers. The site has demonstrated a pro-active approach to correcting these defects and where necessary assessing and addressing impacts to soil and groundwater quality that may have arisen.

The outcome of the SPMP monitoring well network assessment has found the overall condition of the wells to be good. The shallow groundwater flow regime has broadly shown a divergent radial flow from a central ridge down the centre of the site and based on the location of potential contamination sources relative to monitoring well locations and the inferred hydrogeological regime, it is considered that the current wells are in appropriate locations to identify significant contamination issues arising at the site. The need for further monitoring of shallow groundwater quality should be considered in the event of a future operational loss at the site.

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Ford Consulting group Ltd trust that the contents of this report meet you current requirements. We look forward to receiving any comments you may have in due course prior to finalising this document. If in the meantime you should have any queries regarding any of the matters raised then please do not hesitate to contact the undersigned.

Respectfully submitted

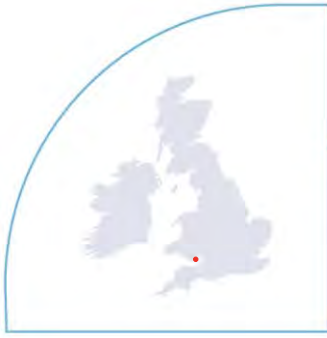
On behalf of **Ford Consulting Group Ltd**

Phillip Parker
Project Manager

Jim Wragg
Project Director



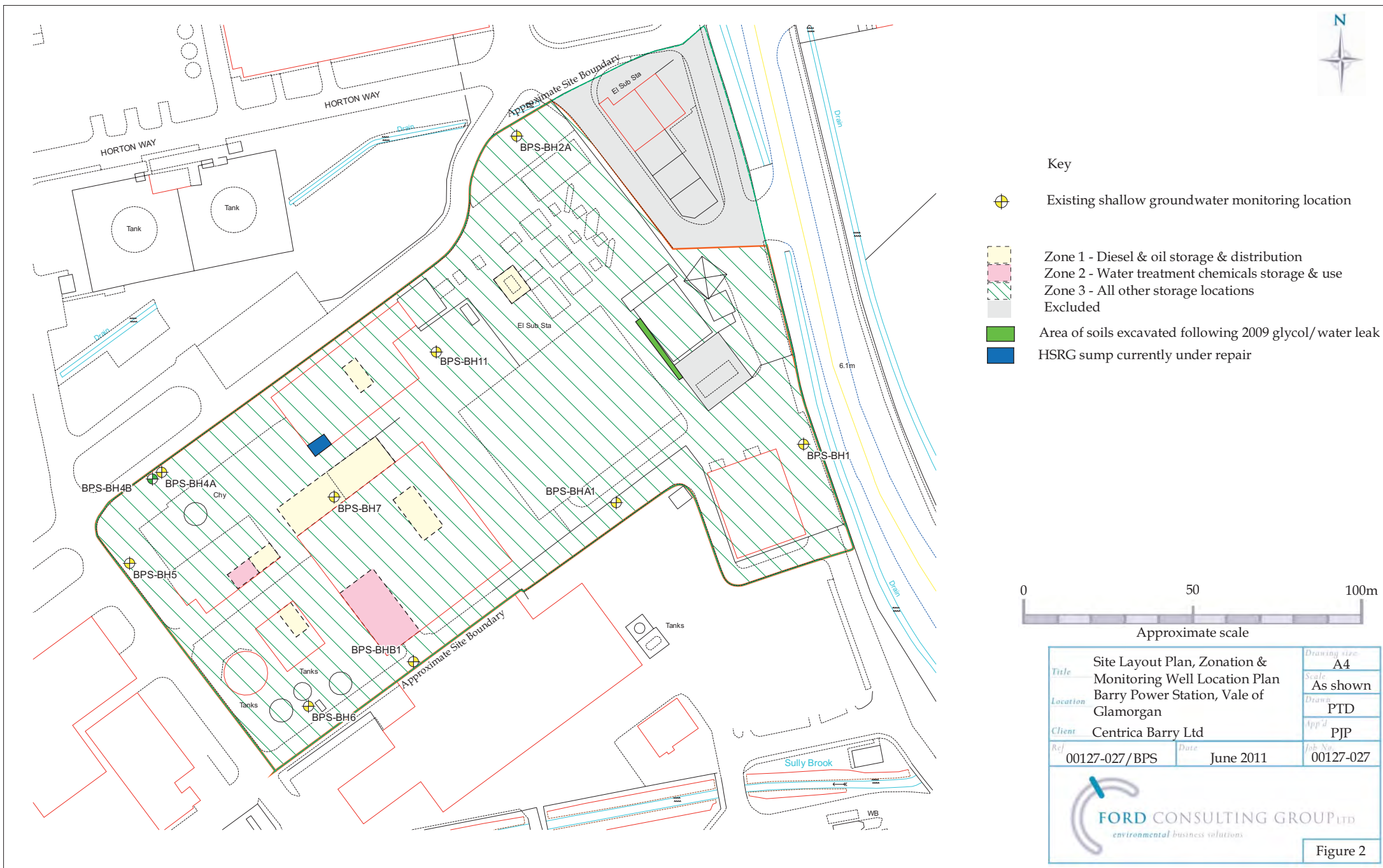
FIGURES

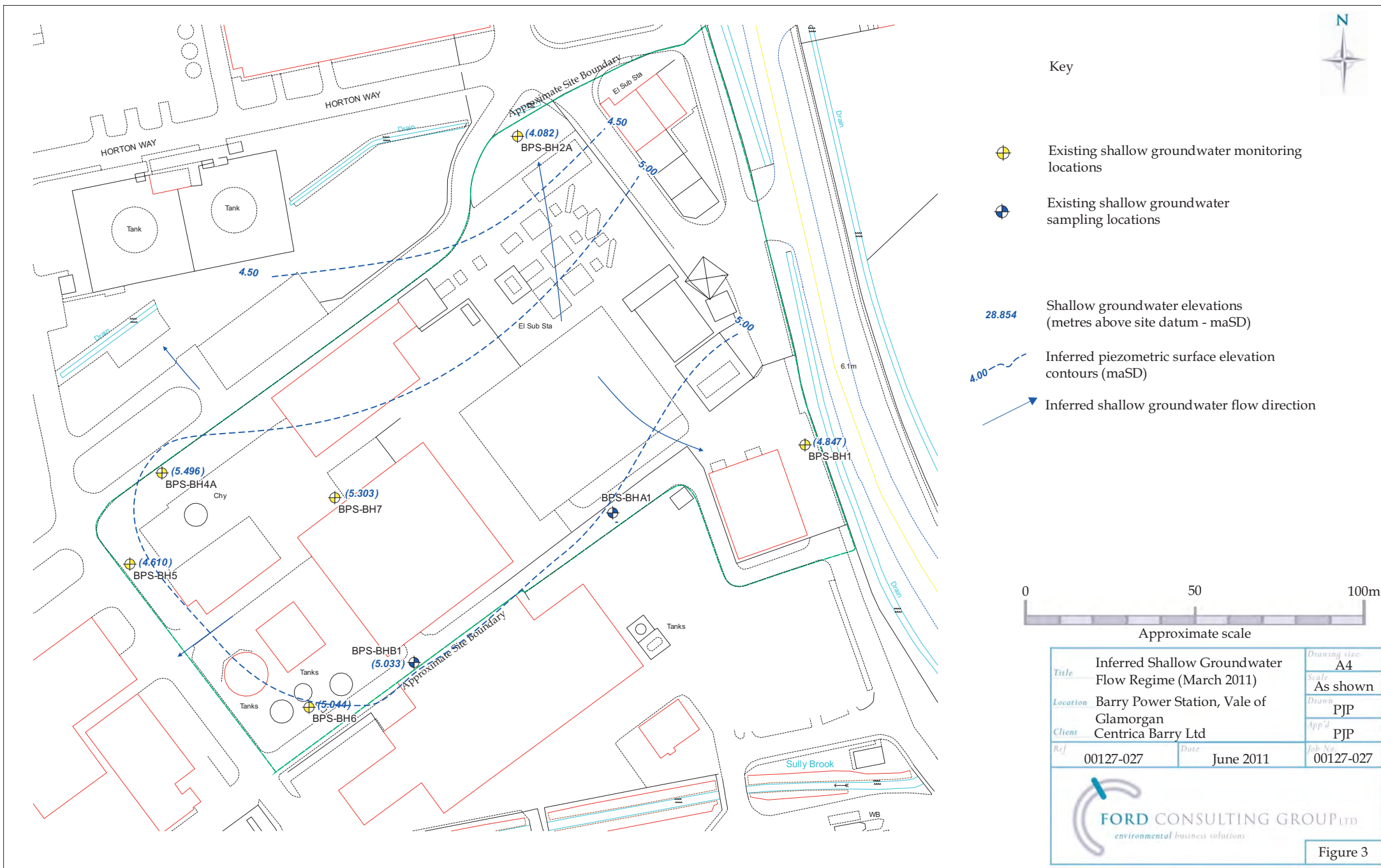


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	Barry Power Station, Vale of Glamorgan		Scale 1:35000
	Client Centrica Barry Ltd		Drawn PTD
	Ref 00127-027 / BPS		App'd PJP
	Date June 2011		Job No 00127-027

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Figure 1







TABLES

Table 1 - Design SPMP Monitoring Wells - Condition Survey

Borehole	Observations
BPS - BH1	Wellhead condition considered to be good - No issues.
BPS - BH2A	Wellhead condition considered to be good - No issues.
BPS - BH2AA	Wellhead condition considered to be good - No issues.
BPS - BH4A	Wellhead condition considered to be good - No issues.
BPS - BH4B	Wellhead condition considered to be good - No issues.
BPS - BH5	Wellhead condition considered to be good - No issues.
BPS - BH6	Wellhead condition considered to be good - No issues.
BPS - BH7	Wellhead condition considered to be good - No issues.
BPS-BHB1	Wellhead condition considered to be good - No issues.
BPS-BHB1A	Wellhead condition considered to be good - No issues.
BPS-BHA1	Wellhead condition considered to be good - No issues.
BPS-BHA1A	Wellhead condition considered good - Unable to access.

Table 2 - Design SPMP Monitoring Wells - Groundwater Elevations (2011)

Well	Casing Top Elevation	Depth to Groundwater (September 2007)	Depth to Base of Well (September 2007)	Groundwater Elevation (September 2007)	Depth to Groundwater (February 2011)	Groundwater Elevation (March 2011)
	mAD	mbct	mbct	mbct	mbct	mAD
BPS - BH1	6.029	3.175	5.206	2.854	1.182	4.847
BPS - BH2A	6.256	2.587	5.004	3.669	2.174	4.082
BPS - BH4A	6.735	2.916	3.696	3.819	1.239	5.496
BPS - BH4B	6.229	1.064	8.667	5.62	2.491	3.738
BPS - BH5	5.952	1.857	5.275	4.095	1.342	4.61
BPS - BH6	6.932	1.981	4.894	4.951	1.888	5.044
BPS - BH7	7.426	2.091	2.467	5.335	2.123	5.303
BPS-BHB1	6.029	1.227	3.09	4.802	0.996	5.033
BPS-BHA1	6.036	1.167	2.198	4.869	-	-
mAD	metres above site datum					
mbct	metres below casing top					
-	denotes unable to locate					



APPENDIX A

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
1	Emergency Diesel Generator Storage Tank - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and route spillage to surface water ditch via Penstock valve	Diesel storage tank equipped with high level transmitter and local level indication. Activity continuously supervised	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Emergency Diesel Generator Storage Tank	Steel	Diesel	~2600 litres	Concrete bund. Overflow from tank flows into the bunded area.	Diesel storage tank equipped with high level transmitter and local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Emergency Diesel Generator Storage - Transfer Pipework	Steel	Diesel	~ 60 litres	Concrete bund.	Low-level alarm on tank. Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	CT Lube Oil Reservoir - Drum	Steel	CT Lube Oil	200 litres	Bund	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1 Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	CT Lube Oil Reservoir - Tank	Steel	CT Lube Oil	18,000 litres max (9,000 litres working volume)	Impervious building floor of CT building and bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	CT Lube Oil Reservoir - Transfer Pipework	Steel	CT Lube Oil	9,000 litres working volume (max)	Impervious building floor of CT building and bund	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	ST Lube Oil Reservoir - Drum	Steel	ST Lube Oil	200 litres	Metal bund	Transfer and filling operation performed manually and under continuous supervision	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	ST Lube Oil Reservoir - Tank	Steel	ST Lube Oil	11,000 litres (5,500 litres working)	Concrete bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
1	ST Lube Oil Reservoir - Transfer Pipework	Steel	ST Lube Oil	5500 litres (working)	Double-walled pipe	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Oil Stores - Drums/IBC	Metal/ plastic	Turbine lube, transformer and waste oils	8 x 200-litre 15 x 25-litre 900 litre waste oil IBC	Locked container unit with spill trays	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Fire/ Miscellaneous Pumps Unloading Area - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and routing spillage to surface water ditch via Penstock valve	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Fire/ Miscellaneous Pumps Building - Day Tank	Steel	Diesel	800 litre	Concrete bund	Local level indication. Low-level alarm and level switch Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
1	Fire/ Miscellaneous Pumps Building - Pump	Steel	Diesel	N/A	Impervious building floor sloping towards oily drain routed to oil/water separator	Local level indication. Low-level alarm and level switch Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Visual inspection twice a day. Weekly testing of pumps for 30min	Daily shift inspection log. PM-OPS-2D
1	Mobile Diesel Bowser	Steel	Diesel	1000 litres	Double-skinned tank	Routine checks once per shift	Approved Operating Procedures (AOP) 'Using the Mobile Diesel Bowser' AOP048, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Sulphuric Acid Tank Unloading Area - Tanker	N/A	98% w/w sulphuric acid	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Sulphuric Acid Tank	Stainless Steel	98% w/w sulphuric acid	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in banded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	HSE Guidance - Bulk Storage of Acids HSG235	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
2	Bulk Sulphuric Acid Tank - Transfer pipework	Lined stainless steel	98% w/w sulphuric acid	15 litres	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Acid is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Acid Pump Oil Change' AOP025, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Caustic Solution Tank Unloading Area - Tanker	N/A	50% w/w caustic solution	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Caustic Solution Tank	Stainless Steel	50% w/w caustic solution	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bunded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Bulk Caustic Solution Tank - Transfer pipework	Lined stainless steel	50% w/w caustic solution	N/A	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Caustic solution is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Caustic Pump Oil Change' AOP024, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Boiler Feed/ CCCW Pump Building - IBC	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	500 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Boiler Feed/ CCCW Pump Building - pipework	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Generation Building - IBC	Stainless Steel	Amine and oxygen scavenger chemicals	1000 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers; PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
2	Generation Building - pipework	Stainless Steel	Amine and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
3	Air Cooled Condensers	Carbon steel	Engineering oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Oil pressure indication and low oil pressure alarm Routine checks once per shift	Approved Operating Procedures (AOP) 'Air-Cooled Condenser Fan Oil Change' AOP006, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Gas Compressor	Carbon steel	Engineering oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Transformers	Carbon steel	Transformer oil	N/A	Concrete bund with drain (normally isolated) routed to oil/water separator. Discharge via manually operated valve	Remote monitoring from control room Routine checks once per shift	Approved Operating Procedures (AOP) 'Check CT/ST/AUX Transformer Bund Levels and Isolation Valves' AOP047, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Site drainage system - Oil separator/ coalescers	GRP	Oily Water	8000 litre	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Continuous oil-in-water analyser and high oil-in-water alarm. High-level and low-level switches, indicators and alarms and automatic closure device.	Approved Operating Procedures (AOP) 'Oil/Water Separator Alarms and Manual Emptying' AOP052, Issue 1	Maintained in accordance with manufacturers instructions; PPG18 - Managing Firewater and Major Spillages and PPG3 - Use and Design of Oil Separators	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Site drainage system - Pipes	Various	Oily Water	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	None	Approved Operating Procedures (AOP) 'Monitor and Maintain Surface and Storm Water Drain Quality' AOP051, Issue 1		CCTV Survey has been undertaken to determine the integrity of drainage system.	Results of Camera Surveys recorded on DVD and summary report kept on record. Any defects requiring attention are raised on CMMS system. Water samples recorded on monthly plant checks
3	Neutralisation Tank	Steel	Water treatment plant effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM- HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Effluent Tank	Steel	Waste effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM- HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Solid Waste Skips	Metal	Wood, metal, general waste		Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG11 - Preventing Pollution from Industrial Sites	Not required for the SPMP (no significant risk of ground or groundwater contamination)	N/A

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)
3	Liquid Waste - IBC	Steel	CT blade wash effluent	1000 litres	Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Batteries	Plastic	Battery electrolyte	10kg	Acid resistant floor graded towards chemical drain and lip at entrance	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Turbine (off-line) washwater effluent - IBC	Steel	CT wash residue	1 m ³	Mobile bund located within the CT building	Tank level gauge Routine checks once per shift	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets
3	Turbine washwater effluent tank (off- line) - Tanker	N/A	CT wash residue	N/A	Impervious building floor of CT building would divert loss into surface water/oil drain close to EDG. Valves are configured to route spillage to surface water ditch via Penstock valve	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 2		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets



APPENDIX B

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
Further Action Required											
3	Transformers	Carbon steel	Transformer oil	N/A	Concrete bund with drain (normally isolated) routed to oil/ water separator. Discharge via manually operated valve	Remote monitoring from control room Routine checks once per shift	Approved Operating Procedures (AOP) 'Check CT/ST/AUX Transformer Bund Levels and Isolation Valves' AOP047, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	The rate of loss from the 3-phase gaskets of the GT&ST transformers was observed as a seepage. Centrica are recommended to monitor the current situation and investigate.
No Further Action Required											
1	Emergency Diesel Generator Storage Tank - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and route spillage to surface water ditch via Penstock valve	Diesel storage tank equipped with high level transmitter and local level indication. Activity continuously supervised	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Emergency Diesel Generator Storage Tank	Steel	Diesel	~2600 litres	Concrete bund. Overflow from tank flows into the bunded area.	Diesel storage tank equipped with high level transmitter and local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 & BPS3 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Emergency Diesel Generator Storage - Transfer Pipework	Steel	Diesel	~ 60 litres	Concrete bund.	Low-level alarm on tank. Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	CT Lube Oil Reservoir - Drum	Steel	CT Lube Oil	200 litres	Bund	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1 Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 & BPS3 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	CT Lube Oil Reservoir - Tank	Steel	CT Lube Oil	18,000 litres max (9,000 litres working volume)	Impervious building floor of CT building and bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	CT Lube Oil Reservoir - Transfer Pipework	Steel	CT Lube Oil	9,000 litres working volume (max)	Impervious building floor of CT building and bund	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	ST Lube Oil Reservoir - Drum	Steel	ST Lube Oil	200 litres	Metal bund	Transfer and filling operation performed manually and under continuous supervision	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 & BPS3 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	ST Lube Oil Reservoir - Tank	Steel	ST Lube Oil	11,000 litres (5,500 litres working)	Concrete bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	ST Lube Oil Reservoir - Transfer Pipework	Steel	ST Lube Oil	5500 litres (working)	Double-walled pipe	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Oil Stores - Drums/IBC	Metal/ plastic	Turbine lube, transformer and waste oils	8 x 200-litre 15 x 25-litre 900 litre waste oil IBC	Locked container unit with spill trays	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 & BPS3 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
1	Fire/ Miscellaneous Pumps Unloading Area - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and routing spillage to surface water ditch via Penstock valve	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Fire/ Miscellaneous Pumps Building - Day Tank	Steel	Diesel	800 litre	Concrete bund	Local level indication. Low-level alarm and level switch Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA- based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Fire/ Miscellaneous Pumps Building - Pump	Steel	Diesel	N/A	Impervious building floor sloping towards oily drain routed to oil/ water separator	Local level indication. Low-level alarm and level switch Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Visual inspection twice a day. Weekly testing of pumps for 30min	Daily shift inspection log. PM-OPS-2D	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Mobile Diesel Bowser	Steel	Diesel	1000 litres	Double-skinned tank	Routine checks once per shift	Approved Operating Procedures (AOP) 'Using the Mobile Diesel Bowser' AOP048, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Sulphuric Acid Tank Unloading Area - Tanker	N/A	98% w/w sulphuric acid	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Sulphuric Acid Tank	Stainless Steel	98% w/w sulphuric acid	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bunded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	HSE Guidance - Bulk Storage of Acids HSG235	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA- based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Sulphuric Acid Tank - Transfer pipework	Lined stainless steel	98% w/w sulphuric acid	15 litres	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Acid is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Acid Pump Oil Change' AOP025, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA- based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Caustic Solution Tank Unloading Area - Tanker	N/A	50% w/w caustic solution	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Caustic Solution Tank	Stainless Steel	50% w/w caustic solution	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bunded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA- based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Caustic Solution Tank - Transfer pipework	Lined stainless steel	50% w/w caustic solution	N/A	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Caustic solution is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Caustic Pump Oil Change' AOP024, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA- based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Boiler Feed/ CCCW Pump Building - IBC	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	500 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA- based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/ interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
2	Boiler Feed/ CCCW Pump Building - pipework	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Generation Building - IBC	Stainless Steel	Amine and oxygen scavenger chemicals	1000 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers; PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Generation Building - pipework	Stainless Steel	Amine and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Site drainage system - Pipes	Various	Oily Water	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	None	Approved Operating Procedures (AOP) 'Monitor and Maintain Surface and Storm Water Drain Quality' AOP051, Issue 1		CCTV Survey has been undertaken to determine the integrity of drainage system.	Results of Camera Surveys recorded on DVD and summary report kept on record. Any defects requiring attention are raised on CMMS system. Water samples recorded on monthly plant checks	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Air Cooled Condensers	Carbon steel	Engineering oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Oil pressure indication and low oil pressure alarm Routine checks once per shift	Approved Operating Procedures (AOP) 'Air-Cooled Condenser Fan Oil Change' AOP006, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Gas Compressor	Carbon steel	Engineering oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Site drainage system - Oil separator/ coalescers	GRP	Oily Water	8000 litre	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Continuous oil-in-water analyser and high oil-in-water alarm. High-level and low-level switches, indicators and alarms and automatic closure device.	Approved Operating Procedures (AOP) 'Oil/Water Separator Alarms and Manual Emptying' AOP052, Issue 1	Maintained in accordance with manufacturers instructions; PPG18 - Managing Firewater and Major Spillages and PPG3 - Use and Design of Oil Separators	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Neutralisation Tank	Steel	Water treatment plant effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Effluent Tank	Steel	Waste effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application . The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Solid Waste Skips	Metal	Wood, metal, general waste		Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG11 - Preventing Pollution from Industrial Sites	Not required for the SPMP (no significant risk of ground or groundwater contamination)	N/A	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Liquid Waste - IBC	Steel	CT blade wash effluent	1000 litres	Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/ interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off-loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
3	Batteries	Plastic	Battery electrolyte	10kg	Acid resistant floor graded towards chemical drain and lip at entrance	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Turbine (off-line) washwater effluent - IBC	Steel	CT wash residue	1 m ³	Mobile bund located within the CT building	Tank level gauge Routine checks once per shift	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Turbine washwater effluent tank (off-line) - Tanker	N/A	CT wash residue	N/A	Impervious building floor of CT building would divert loss into surface water/oil drain close to EDG. Valves are configured to route spillage to surface water ditch via Penstock valve	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 2		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Site Protection and Monitoring Programme Review

Barry Power Station

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EXECUTIVE SUMMARY

This report presents a review of the Site Protection and Monitoring Programme (SPMP) for the Barry Power Station ('the site'). The original SPMP design was prepared by RSK Group Ltd in January 2006. An earlier review of the SPMP for the site was undertaken by Ford Consulting Group Ltd ('FCG') in 2011. The objectives of the 2011 study and this update are to:

- Identify any changes that may be required to the SPMP in order that it continues to be relevant to current site conditions and in particular the hazardous material inventory and containment measures at the site; and*
- Evaluate the impact of any incidents or potential releases of contamination to soil and groundwater at the site and the efficacy of the SPMP in evaluating the impacts to soil and groundwater quality at the site.*

The works undertaken by Geosyntec in completing this assessment included a document review, interviews of key site personnel, completion of a site tour that included inspections of containment infrastructure and the groundwater monitoring well network at the site.

At the time of this review, the Barry Power Station is generating power in both open and combined cycle mode, in order to meet the present demands of the UK energy market. This change in operation has not brought about any significant changes to the hazardous substances inventory or containment infrastructure which were in place at the site at the time of the 2011 SPMP Review.

The outcome of the SPMP review for the Barry site has indicated that the infrastructure monitoring programme set out in the SPMP design is being adhered to. Effective management and control of containment infrastructure is being implemented through routine daily inspections and the site's computerised maintenance management system, SAP, as well as the daily operations systems.

The site audit confirmed that the overall condition of the installation including existing hazardous material containment infrastructure and measures to prevent impacts to soil, groundwater and surface water were considered broadly adequate for the ongoing site operations and are compliant with relevant UK guidance.

Records maintained in the SAP system, and checked during the site visit, confirm regular inspection of the site bunds and tanks are being carried out

The Bulk Caustic Soda Tank's thermal lagging system is currently preventing routine visual inspections, detailed external inspections and ultrasonic thickness testing being carried out. We recommend that the site consider implementing elements of the RWE Technical Procedure: Bulk Storage Tanks (TECH/PROC/011 Part 2) guidance to enable these inspections to be undertaken.

The site is not carrying out regular inspections of its drainage network, which is considered good practise to identify areas of potential soil and groundwater contamination occurring before they develop. As such it is recommended that consideration be given to the development of a regular CCTV drain inspection programme for the site.

A seepage of cooling oil from the GT and ST transformers, which was identified in the 2011 SPMP and recommended for potential improvement, remains ongoing. Since 2011 repair attempts have been made but were unsuccessful. More recently, a consultancy which

specialises in transformer repairs has been engaged to address this issue. However, the leaked oil is being effectively managed by secondary containment and site operations. Though the risk of soil and groundwater impact is elevated by the leak, existing arrangements are considered adequate to manage this risk until further repair work is undertaken.

Two leaks associated with the Service Water Tank, and the Firewater System into which it feeds, have been ongoing since 2014. Repair works are planned for April 2016. Due to the quality of the leaking water (potable, mains-fed), the risk to soil and groundwater quality is not considered to be significant.

Our review of the site records and the infrastructure inspection did not identify any potentially significant sources of soil or groundwater contamination that may have arisen over the past 4 years.

An inspection of the site's previously installed groundwater monitoring well network identified 11 accessible monitoring wells. Shallow groundwater elevation measurements from these wells indicate radially divergent flow from a ridge along the centre of the site (SW-NE), broadly concurrent with previous investigations; as well as a groundwater mound towards the site's western boundary, which is believed to be the result of preferential recharge associated with the leaking Service Water Tank.

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1 INTRODUCTION

Geosyntec Consultants Ltd¹ ('Geosyntec'), have been retained by Centrica Energy ('Centrica') to undertake a review of the Site Protection and Monitoring Programme ('SPMP') for the Barry Power Station in South Glamorgan, Wales (the 'site').

The Site Protection and Monitoring Programme comprises a series of activities designed to ensure that the handling and storage of hazardous materials at the installation does not result in an impact to soil and groundwater quality beneath the installation. Typically, this includes works to monitor and maintain hazardous material containment infrastructure. Where necessary this is coupled with periodic monitoring of environmental media for contamination having collected reference data at the time of the Environmental Permit (formerly IPPC) being issued. The SPMP design for the site was developed in January 2006 by RSK Group Ltd and reference data collected in April 2007 by Ford Consulting Group Ltd (FCG). An initial review of the SPMP was undertaken in 2011 by FCG. This second SPMP review is therefore being undertaken 8 years after the permit was initially issued.

Centrica has identified the need for periodic reviews to document how the SPMP has been implemented, record any material contamination release incidents, assess the adequacy of current containment infrastructure and to provide recommendations for any changes to this and the scope of the SPMP going forward.

The review and inspection of the facility was undertaken on Monday 21st September 2015 by Jim Forde of Geosyntec, in the company of Andrew Martinson (Environmental Adviser) for Centrica Energy.

1.1 Site Location

The installation is located on the eastern side of Sully Moors Road, approximately 3km east of Barry Town centre, in an area which is extensively developed for chemical manufacturing, storage and distribution. The centre of the site is at National Grid Reference (NGR) ST 145 684. The site location, installation boundary and site layout are illustrated by Figures 1 and 2, respectively.

The site is broadly 'T' shaped in plan and occupies approximately 2.2 hectares. It is bordered immediately to the north by vacant land upon which a chemical manufacturing facility was formerly located (now demolished). Since 2011, a Diesel and Gas fuelled power generation facility has been developed close to the site's northern boundary; however, at the time of this review this facility was yet to be fully commissioned.

The wider industrial estate borders the site to the south and west with open agricultural land on the other side of the Sully Moors Road, to the east. The Sully Brook is located approximately 70m south of the site.

¹ Previously Ford Consulting Group Ltd ('FCG')

1.2 Objectives & Scope of Work

The objectives to be met and scope of works undertaken by this study were as follows:

- Assess the current status of the hazardous materials containment infrastructure at the site and associated monitoring and maintenance works undertaken over the past 4 years.
- Review site performance in relation to the inspection and integrity testing of containment infrastructure. Where necessary, provide recommendations for changes to the monitoring of these structures going forward.
- Review records relating to potentially significant environmental incidents over the relevant period to understand the need for additional assessment of associated residual soil and groundwater contamination.
- Complete a groundwater elevation monitoring round at the site to re-assess the site groundwater flow regime. Use this to evaluate the adequacy of current monitoring well network. The monitoring well network should provide an appropriate level of data coverage to allow a robust assessment of potential groundwater impacts arising from potential future hazardous material releases.
- Inspect the groundwater monitoring well network condition at the installation to identify any maintenance needs for the same (to assess suitability for use and availability for future monitoring events).
- Re-assess the scope and frequency of future SPMP groundwater monitoring. In particular, the SPMP groundwater analytical suite will be re-assessed with reference to potential changes to hazardous materials (use, storage and handling) and containment infrastructure on site.

The findings of the SPMP review for the Barry Power Station are presented below.

2 BARRY POWER STATION SPMP SUMMARY

2.1 Design SPMP (RSK Ltd, January 2006)

RSK Group Ltd ('RSK') was commissioned by Centrica in January 2006 to design the SPMP for Barry Power Station as a requirement of the site's Pollution Prevention Control ('PPC') permit.

The objectives of the SPMP Design were to:

- Specify a robust site investigation design that would enable the characterisation of baseline ground conditions and in particular potential areas of pre-existing ground contamination at the installation, at the outset of the PPC Permit.
- Design a monitoring programme to allow ongoing assessment of the effectiveness of the pollution prevention infrastructure at the site and where necessary provide early warning of any releases of polluting substances to the ground or groundwater; and
- Specify appropriate inspection and testing programmes for the installation's pollution prevention infrastructure to ensure and demonstrate its continued integrity.

The SPMP design divided the site into three zones (Zones 1 to Zone 3) based on the activities undertaken and the potential for contaminated land. The zonation of the site is described below and illustrated by Figure 2:

- Zone 1 - Gas Oil Storage, distribution and other oil uses (covering lube oils, diesel and waste oil storage, emergency diesel generator and diesel firewater pumps). The zone also includes the engineering oil store;
- Zone 2 - Water Treatment Chemicals, Storage, Transfer and Use; and
- Zone 3 - All remaining storage locations across the installation.

The SPMP design specified (due to the relatively modest risks posed by the installation) that no further environmental monitoring of the soil and groundwater was required during the site's operational phase, beyond the collection of the initial reference data.

RSK's review of the existing pollution prevention infrastructure at the installation found it to be sufficient to prevent and/or control any potential future losses of hazardous materials from site operations. An infrastructure monitoring programme for all aspects of the installation containment infrastructure relating to the storage and use of bulk hazardous materials was devised.

2.2 First Phase Reporting (FCG, June 2007)

FCG were commissioned by Centrica in September 2007 to undertake the intrusive investigation specified in the SPMP design to collect reference data for the site.

The principle elements of the reference data collection investigation were as follows:

- Drilling of 13 soil and groundwater sampling boreholes (BPS-BH1 – BPS-BH3, BPS-BH4A, BPS-BH4B, BPS-BH5-BPS-BH8, BPS-BH12-BPS-BH13, BPS-BHA1 and BPS-BHB1) and installation of 50mm ID HDPE monitoring standpipes with response zones designed for the ground and groundwater conditions encountered. The borehole locations are illustrated by Figures 2 and 3.
- Collection of soil samples from discrete horizons as stipulated in the SPMP design and submittal of these to an appropriately accredited environmental laboratory to be analysed for a range of organic and inorganic determinants including Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), sulphates, chlorides and pH;
- Groundwater sampling and analysis as stipulated in the SPMP design and as subsequently extended at the request of the Environment Agency, for a range of organic and inorganic determinants including TPH, PAHs, sulphate, chloride and pH.

The findings of the intrusive reference data collection investigation can be summarised as follows:

- The superficial soils encountered beneath the site typically comprised a variable thickness of Made Ground of reworked clay. The Made Ground was found to overlie Estuarine Alluvium (clay) over Triassic Mercia Mudstone (Marginal Facies) bedrock, which is comparable to the findings described in the Application Site Report and design SPMP documents.
- The ground conditions observed typically comprising a variable sequence of imported granular crushed stone and sand, residual floor slabs (derived from previous chemical manufacturing plant) and reworked natural strata ranging in thickness from 0.7-2.2 metres. The estuarine alluvium comprised a very soft to firm grey brown silty clay which became softer with high silt content at depths between 2.0-2.5m bgl. Competent bedrock was encountered at depths of 4.0-6.5m bgl and comprised a complex interbedded sequence including strata of reddish brown mudstone, grey green and reddish brown conglomerates and grey limestone which were inferred to dip to the south beneath the site;
- Minor to moderate groundwater strikes were encountered within the estuarine alluvium deposits. The shallow groundwater was inferred to flow radially away from a central ridge that runs east to west down the spine of the site, created by shallow groundwater discharging to surface water courses
- The findings of the intrusive investigation to collect reference data did not lead to any recommendations for amendments to the monitoring and inspection programme set out in the SPMP design.

The SPMP design and reference data collection exercises concluded that the installation was relatively low risk in terms of the potential for future contamination of soil and groundwater. Assumptions underpinning this conclusion were that the contemporary containment measures, ongoing maintenance of the site infrastructure and the assumption that the recommended improvements in the site containment infrastructure/procedures set out in the SPMP design would be undertaken.

2.3 2011 SPMP Review (FCG, February 2011)

FCG were commissioned by Centrica in February 2011 to undertake a review of the SPMP implementation at the Barry site. The objectives of the review were the same as those for this investigation, which is to:

- Identify any changes that may be required to the SPMP in order that it continues to be relevant to current site conditions and in particular the hazardous material inventory and containment measures; and
- Evaluate the impact of any incidents or potential releases of contamination to soil and groundwater at the site and the efficacy of the SPMP in evaluating the impacts to soil and groundwater quality at the site.

The works completed included a document review, interviews of key personnel, completion of a site tour and inspections of containment infrastructure and the groundwater monitoring well network at the site.

The outcome of the SPMP review indicated that the infrastructure monitoring programme set out in the SPMP design was being adhered to. Effective management and control of containment infrastructure was being implemented through routine daily inspections and the site's computerised maintenance management system.

The following environmental incidents were identified during the review, which had occurred at the site since the SPMP design reference data collection (2007):

- The release of 550 litres of glycol water coolant (50%:50%), in October 2009. The incident was caused by the failure of a pressure release valve and the liquid was lost to an area of gravel surfaced ground. Representative soil and groundwater samples were taken by FCG in October 2009 and reported glycol concentrations below method detection limits. The area was excavated down to the old foundation slab, and arisings disposed of off-site as a precaution. The incident was reported to the Environment Agency which classified it as a 'category 2 – minor incident'. However, no further action was taken by the regulator.
- A breach in a redundant drain line close to the HSRG sump. This issue had been identified a short time before the 2011 site audit. The HSRG sump receives boiler water blowdown that is potentially contaminated by dilute water treatment chemicals (oxygen scavengers). The concentrations of water treatment chemicals in any leaked blowdown water was likely to be very low. Moreover, the local groundwater was higher than the water level within the sump, which should preclude any loss off blowdown water. However, as a

precautionary measure, FCG undertook soil sampling from an excavation adjacent to the sump that had been dug to complete repairs to the broken drain line. On the basis of the soil analysis data, it was concluded that the drain breach did not have any adverse impact on the quality of soils around the sump and no further investigation or corrective action was recommended.

- Ongoing seepage of cooling oil in the GT and ST transformers, suspected to be due to faulty 3-phase gaskets. It is understood these oil losses were first observed in December 2009. All of the released oil was being contained within the transformers' sump system. These were being periodically drained to the sites' oily water drainage system. The oil skimmer pump within the oil water interceptor recovered oil into IBCs, which were subsequently removed from site. Water from the interceptor was discharged from site, following quality assurance analysis. Discussions with the site established that the issue was raised on the site's maintenance management system. The leak was being monitored and corrective works were planned. Inspection of the GT and ST transformers during the site audit, identified good bund integrity and no indication of losses to ground or breach of containment from either.

In the 2011 review, groundwater elevation data was obtained from 8 groundwater monitoring wells in the SPMP network. These wells were found to be in good condition. The inferred general shallow groundwater flow regime was found to be radially divergent direction, with groundwater flow directions moving outward from a central ridge running down the centre of the site (SW-NE). This observation broadly concurred with the groundwater flow direction inferred from the levels measured in 2007.

3 SPMP REVIEW (GEOSYNTEC, SEPTEMBER 2015)

3.1 Introduction

This review has been carried out to determine whether the installation's SPMP is currently fit for purpose. By which it is meant, whether the current hazardous material containment infrastructure, and associated preventative measures implemented by the site management, are adequate to minimise the potential for new soil and groundwater contamination to occur at the installation. This review involved discussions with site management going through their responses to a questionnaire sent prior to the visit, and a review of details pertaining to:

- Recorded environmental incidents that have occurred since the previous SPMP review;
- Infrastructure monitoring records; and
- A visual inspection of the installation's hazardous material containment infrastructure.

The findings of this review are set out below.

3.2 Questionnaire response and discussion with site management

3.2.1 General

Discussions with Andrew Martinson (Environmental Adviser) indicated that the power station is currently generating for the Balancing Mechanism Market (BMM), as well as for the Short Term Operating Reserve (STOR).

The installation's Environmental Permit (EPR/JP3333LV) was most recently varied in December 2012, to permit open-cycle generation; which was required by the site to achieve the faster start-up times associated with BMM and STOR operation. No changes to infrastructure or hazardous containment inventory were required for the site to generate electricity in open-cycle, and as required, it continues to generate in combined-cycle mode as well.

The Environmental Permit is expected to be updated before the end of 2015, to meet the deadline for the application of the Industrial Emissions Directive to large combustion plants already in existence before January 2014.

Since the 2011 review, a small-scale power generation facility has been developed close to the site's northern boundary, consisting of 11No. 2MW diesel generators, and 6No. gas fuelled reciprocating engines (power unknown). At the time of this review, the neighbouring facility was not yet commissioned.

3.2.2 Recommendations from the 2011 SPMP review

As outlined in Section 2.3, the previous review of the SPMP recommended a single area for potential improvement. This was the ongoing seepage of cooling oil from the GT and ST transformers. Seepage of insulation oil from both of these units is an ongoing issue. The rate of seepage appears slightly greater from the CT transformer.

Over this period, the transformers have continued to be monitored closely and repair works have been attempted, but have proved unsuccessful to date. An external organisation (Belzona Polymerics Limited) that specialises in solutions to transformer leaks is currently being consulted in the repair process. Repair options under consideration include clamping the transformers' leaking turrets. Belzona were planned to visit the site as part of ongoing investigations on 25th September 2015.

A visual inspection of the transformer bunds during the site visit indicates they remain integral, and continue to prevent any environmental breach of the leaked oil. Weekly visual inspections are carried out on the transformer bunds to confirm integrity. Any observed defects are raised on the SAP management system, which instructs corrective action. There have been no observed defects relating to the transformer bund integrity since the previous review.

As part of the weekly inspection, the transformer bunds' accumulated rainwater and oil mixture is drained to the site's oil interceptor, via the oily-water drainage system. Following oil removal by the interceptor, water flows via an inline water quality analyser to the site's Effluent Tank, before offsite discharge to the main sewer. Accumulated oil in the interceptor is pumped into dedicated IBCs which are stored in bunded areas before being transferred offsite for disposal.

3.2.3 Changes to hazardous substance inventory or containment infrastructure

The site's hazardous material inventory and containment infrastructure, as it was last updated in 2011, is described in the Previous Infrastructure Monitoring Programme table provided in Appendix A. This table is a revision of the original version from the SPMP Design (see Section 2.1 of this report). The Previous Infrastructure Monitoring Programme table formed the basis of the current site audit.

Any changes to the site's hazardous substance inventory or defects in the containment infrastructure, observed as part of this review are described in the Updated Infrastructure Monitoring Table, provided in Appendix B, and are discussed below. To improve the identification of facilities described in the Infrastructure Monitoring Table on the site layout plan (Figure 2), each line item in the updated table has been given a unique reference number that are also shown on Figure 2.

The site's inventory of bulk hazardous chemicals is generally unchanged from the previous SPMP review. Some minor changes were observed during the site audit, and are described in the updated table.

3.2.4 Groundwater monitoring

As per the site's SPMP Design, no permanent environmental monitoring is required by the installation.

FCG undertook soil sampling and analyses on behalf of Centrica, following the discovery of a breach in a redundant drain connected to the HRSG sump in 2011 (see Section 2.3).

It is understood that there has been no attempt to access or sample the groundwater monitoring wells since the previous SPMP review in 2011.

3.2.5 Environmental Incidents

Environmental incidents are recorded on the HSE section of the Centrica-wide intranet site. No incidents have occurred since the previous review which are considered to present a material risk to soil and groundwater quality. As described in Section 3.2.2 of this report, the CT and ST transformer oil leaks continue but are being effectively managed by the secondary containment and site operations.

Two separate leaks, associated with the Service Water Tank and the Firewater System pipework, are ongoing at the site. The leaking infrastructure is located close together, near the site's western boundary. A leak at the base of the Service Water Tank was first detected in April 2014. Following an attempted repair to the external surface of the tank, the leak was identified again in July 2015. The extent of the Service Water Tank leak is estimated to be around 3m³/day. The leak in an underground section of the Firewater system pipework was detected in November 2014, through an internal inspection which was carried out to investigate observed pressure losses. The Firewater pipework leak is estimated to be less than 1m³/day. The site plans to drain the Service Water Tank and carry out internal repairs of both leaks during the planned outage in April 2016. The water held by the Service Water Tank and the Firewater system are potable, mains-supply water; thus, the leak is not considered to present a risk of material impact to soil and groundwater quality.

3.3 Infrastructure monitoring

The site's containment infrastructure inspection and maintenance programme is managed through the daily and weekly operations routines; and the SAP management system, through which notices to site staff of planned works are raised, and records of checks are maintained. In addition the SAP system is also used to record evidence of any observed defects and subsequent follow-up action. The current programme of infrastructure monitoring was discussed with Andrew Martinson during the site visit and follow-up enquiries as this report was being developed.

3.3.1 Bunds

All site bunds are visited daily, as part of the operations routine performed at the beginning of a shift change. The daily visit involves a visual inspection of the bunds to ascertain if any spillages have occurred and to verify the status of accumulated rainwater. Externally located bunds are drained via manual release valves to the site's drainage system when considered necessary. Evidence of daily checks are recorded on paper check lists, which are maintained in the central control room.

The weekly transformer bund Daily check records are maintained on the 'Opra-Log', operations management system. No routine hydrostatic testing of bunds is carried out at the site, due to a previous risk assessment finding that the testing activity increases the risk of the integrity of the bunds being compromised.

3.3.2 Tanks

As for bunds, site tanks are subject to the daily visual inspection as part of the new shift operations routine. Tanks are also subject to a programme of regular integrity inspections, which are instructed by SAP system work orders. Where possible, this is in accordance with the RWE Technical Procedure: Bulk Storage Tanks (TECH/PROC/011 Part 2). The frequency of each inspection is dependent on its nature:

- 7-yearly internal surface inspection (bulk chemical tanks only). This inspection comprises a tank's inventory being removed and a visual inspection of the internal surfaces. This inspection was last performed in 2009, where corrosion of internal pipework in the neutralising tank was identified. The defect was raised on the SAP management system and repair work subsequently carried out. The next round of inspections is due in 2016;
- 4-yearly ultrasonic tank wall thickness tests carried out by an external organisation. In 2013 ultrasonic thickness tests were carried out on the Effluent, De-mineralised Water, Neutralisation, Surface Water and Bulk Sulphuric Acid tanks. The 2013 tests were carried out by RWE and no defects were identified. The testing round did not include the Bulk Caustic Soda Tank because of the presence of thermal lagging system around the tanks' exterior surface (see below).

- 1-yearly detailed visual inspection of the tanks' exterior surfaces.

Inspection notices and observed defects are recorded on the SAP system.

The thermal lagging system is a permanent feature of site's the Bulk Caustic Soda Tank because caustic soda (46%) solidifies at around 8°C and therefore must be stored in heated and lagged tanks and pipework. Then lagging system is currently preventing routine visual inspections, detailed external inspections and ultrasonic thickness testing being carried out.

Appendix E.2 of TECH/PROC/011 Part 2 outlines guidance on the detailed external inspection and testing of steel vessels and tanks containing caustic soda. The guidance places emphasis on the areas not normally accessible, or restricted due to limited access, during the routine visual inspections. The following is recommended:

- Ultra-sonic thickness testing of the vessel shell should be carried out at the designated points where removable sections of lagging should be provided.
- Condition and integrity of the lagging should be checked. Areas indicating water ingress should be removed to allow inspection of the steel structure;
- The condition and function of the electrical, or steam, trace heating should be checked, including correct operation of the temperature control device e.g. thermostat.

We recommend that the site consider implementing elements of the TECH/PROC/011 Part 2 guidance outlined above to enable routine visual inspections, detailed external inspections and ultrasonic thickness testing of the Bulk Caustic Soda Tank to be carried out.

3.3.3 Drainage Network

The site's surface water drainage system discharges offsite to the Sully Brook via the penstock sump, close to the south-eastern site boundary. The penstock sump is sampled weekly and analysed for pH, presence of oil and grease, and clarity; as per the conditions laid out in the Environmental Permit. There have been no recent breaches of discharge limits: pH 6-9, and visible oil or grease. The penstock valve is closed in the event of a release incident or when contamination is detected in the surface water drainage system.

The site's process water drains flow, via a neutralising tank for pH correction, to the Effluent Water Tank, located in the tank farm adjacent to the south-western site boundary. The Effluent Water Tank also receives water from the oil-water separator, following oil removal. Water from the oil-water separator is subject to continuous in-line oil-in-water and pH analysis. The presence of oil or extreme pH (<6 or >9) is alerted to the site control room by automatic alarms. From the effluent tank, water is discharged offsite via the mains sewer.

A full-site CCTV drain survey has not been performed since 2007. The 2007 survey report was not available to review during the site visit. A localised CCTV survey was carried out on a section of the drains (from bund Penstock Valve 6.3m into gulley) for the CT and Auxiliary transformer bunds in 2009, where failure to hold accumulated rainwater was observed during weekly bund inspections. The survey identified the probable cause of leaks as either slightly open joints in the gulley, or a leaky valve. Repair works were undertaken, including the re-lining of drains with an epoxy resin. Recent observations of the bund suggest the defect has been corrected.

It is recommended that the site considers the performance of more regular CCTV inspections of the drainage network, to identify and facilitate correction of any significant defects prior to this leading to significant ground contamination issues.

3.3.4 Findings

In summary, the pre-site visit questionnaire responses and information provided during the site interviews indicate that the infrastructure containment monitoring programme as set out in the SPMP had been adhered to since the previous programme review in 2011. Some minor defects to site infrastructure were observed, and recommendations for improvement are included in Section 4 of this report.

3.4 SPMP Monitoring Well Network Inspection

A visual inspection and assessment of the currently available SPMP monitoring well network, including the performance of groundwater elevation measurements, was undertaken as part of this review. The condition of the well network is summarised by Table 1. Groundwater elevations were measured using an electronic oil-water interface probe, and are presented in Table 2.

During the 2015 site visit, each of the 12 No groundwater monitoring wells were located, from the SPMP network. Of these only 11 No. monitoring wells could be accessed; the steel well cover of the BPS-BHA1 well was significantly corroded and proved unable to be opened. The locations of these wells illustrated by Figures 2 and 3.

The groundwater elevation data collected during this monitoring round was sufficient to infer the shallow groundwater flow regime for the wider site area. The inferred groundwater flow direction is radially divergent, flowing out from a ridge running down the centre of the site (SW-NE). This aspect of the inferred 2015 groundwater flow regime is broadly consistent with that observed in 2011 and 2007. However, an additional feature was observed in the 2015 data. A groundwater mound is apparent towards the site's western boundary, which is likely the result of preferential recharge associated with the Service Water Tank leak in the same area (see Section 3.2.5).

An assessment of the SPMP monitoring well network suggests that the position of the wells relative to the groundwater flow regime and the key areas of hazardous material storage and handling have found these to be adequate. That is they should be able to provide effective monitoring of impacted shallow groundwater in the event of a potential future release of hazardous materials at the site.

4 CONCLUSIONS & RECOMMENDATIONS

4.1 Conclusions

Geosyntec was retained by Centrica to undertake a review of the Site Protection and Monitoring Programme for the Barry Power Station, North Lincolnshire.

The outcome of the SPMP review and walk-over survey has found the hazardous material containment infrastructure provision to be broadly adequate, well managed and controlled through the SAP and operations management system, which are considered robust management tools to monitor and manage the containment infrastructure in accordance with the SPMP design.

It has been found that the seepage of cooling oil from the GT and ST transformers is ongoing. The site has continued to closely monitor the leaks and currently secondary containment measures are considered adequate to manage the risk of oils impacts on soil and groundwater quality. A number of repair attempts have been made but to date have been unsuccessful. Transformer repair specialists, Belzona Polymeric Limited, are currently being consulted to investigate other repair options

The Bulk Caustic Soda Tank's thermal lagging system is currently preventing routine visual inspections, detailed external inspections and ultrasonic thickness testing being carried out. We recommend that the site consider implementing elements of the RWE Technical Procedure: Bulk Storage Tanks (TECH/PROC/011 Part 2) guidance to enable these inspections to be undertaken, namely:

- Ultra-sonic thickness testing of the vessel shell should be carried out at the designated points where removable sections of lagging should be provided.
- Condition and integrity of the lagging should be checked. Areas indicating water ingress should be removed to allow inspection of the steel structure;
- The condition and function of the electrical, or steam, trace heating should be checked, including correct operation of the temperature control device e.g. thermostat.

A full site CCTV drain survey has not been performed since 2007. More regular inspections would be needed in order to identify areas of damaged drain integrity so that the occurrence of significant soil and groundwater impacts can be prevented in a timely manner.

Two separate leaks, associated with the Service Water Tanks and the Firewater System into which it feeds, are ongoing at the site. The quality of the leaking water presents no risk of soil and groundwater contamination and repair works are planned for April 2016.

No other areas of the existing containment provision where consideration to require improvement.

Overall, the SPMP review confirmed the existing hazardous material containment infrastructure and preventative measures to be adequate for the ongoing site operations and are compliant with current UK guidance.

A number of minor changes to the site's chemical inventory were observed during the site inspection. These have been reflected in the updated Infrastructure Monitoring Table (Appendix B).

The outcome of the review of the SPMP and previously existing groundwater monitoring well network has found that 11No. monitoring wells are accessible. The wider site groundwater flow direction inferred from this data set, showed a radially divergent direction, from a SW-NE ridge along the centre of the site. This is consistent with that inferred previously. In addition a groundwater mound is inferred to be present adjacent to the site's western boundary. This is suspected to be caused by the preferential recharge associated with the ongoing Service Water Tank leak.

1.1. RECOMMENDATIONS

The key infrastructure improvements are:

- Continue to monitor and seek a solution to the ongoing CT and ST transformer cooling oil leak;
- Consider implementing elements of the RWE Technical Procedure: Bulk Storage Tanks (TECH/PROC/011 Part 2) guidance to enable routine visual inspections, detailed external inspections and ultrasonic thickness testing of the Bulk Caustic Soda Tank; and
- Carry out more regular CCTV inspections of the site drainage network.

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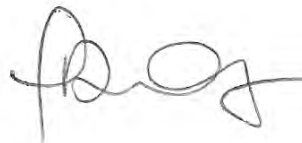
Geosyntec trust that the contents of this report meet you current requirements. We look forward to receiving any comments you may have in due course prior to finalising this document. If in the meantime you should have any queries regarding any of the matters raised then please do not hesitate to contact the undersigned.

Respectfully submitted

On behalf of **Geosyntec**



Jim Forde
Project Manager



Jim Wragg
Project Director

TABLES

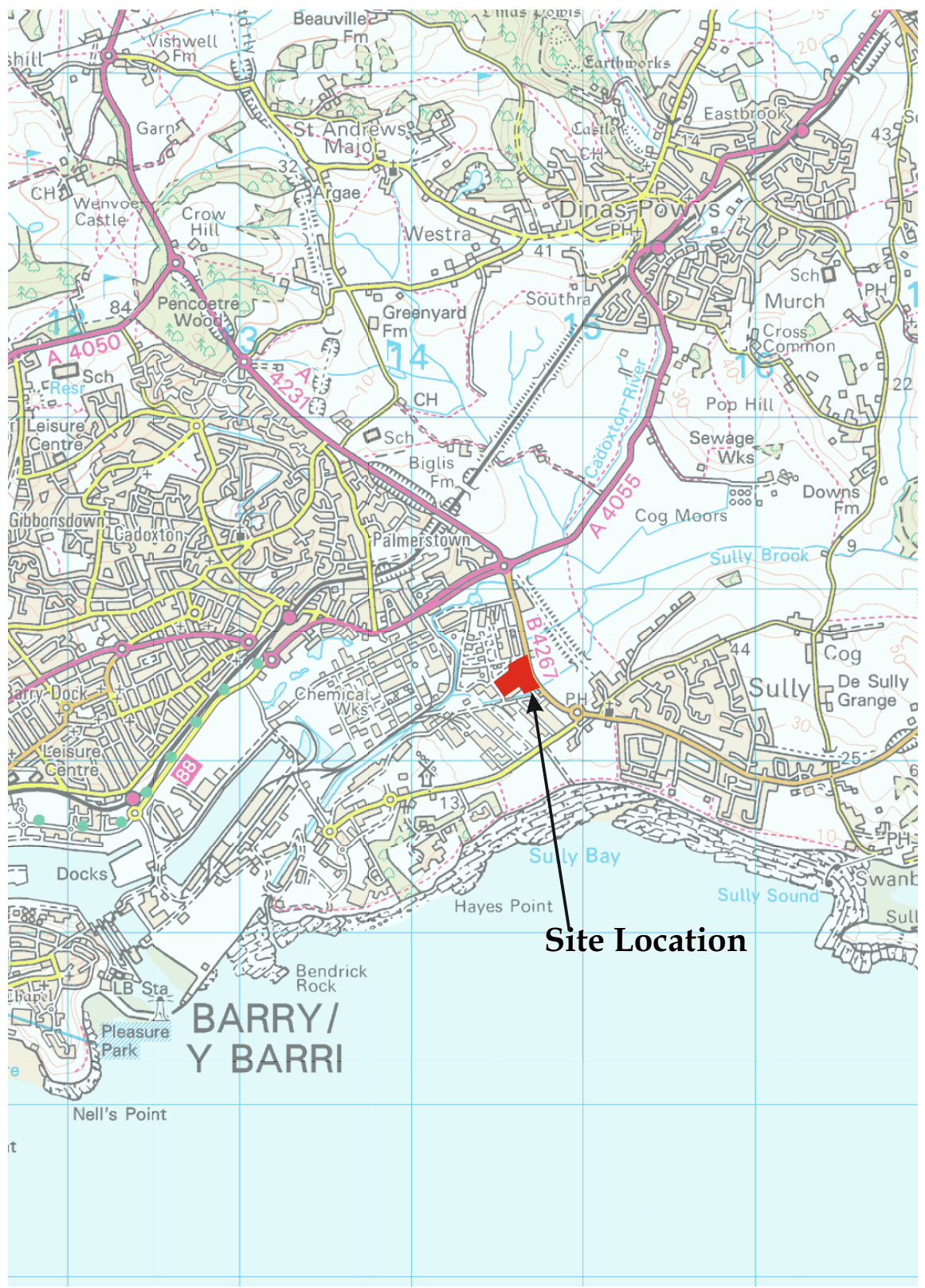
Table 1 - Groundwater Monitoring Wells - Condition Survey

Borehole	Observations
BPS - BH1	Wellhead condition considered to be good - No issues.
BPS - BH2A	Wellhead condition considered to be good - two bolts are missing from the well cover.
BPS - BH2B	The concrete at the wellhead is significantly degraded. Recommend re-setting concrete.
BPS - BH4A	Wellhead condition considered to be good - No issues.
BPS - BH4B	Wellhead condition considered to be good - No issues.
BPS - BH5	Wellhead condition considered to be good - No issues.
BPS - BH6	Wellhead condition considered to be good - No issues.
BPS - BH7	Wellhead condition considered to be good - No issues.
BPS-BHA1	Steel well cover is significantly corroded. Unable to open.
BPS-BHA2	Wellhead condition considered to be good - all three bolts are missing from the well cover.
BPS-BHB1	Wellhead is infilled with soil. Requires cleaning out.
BPS-BHB2	Wellhead is infilled with soil. Requires cleaning out.


Table 2 - Groundwater Monitoring Wells - Groundwater Elevations (2015)

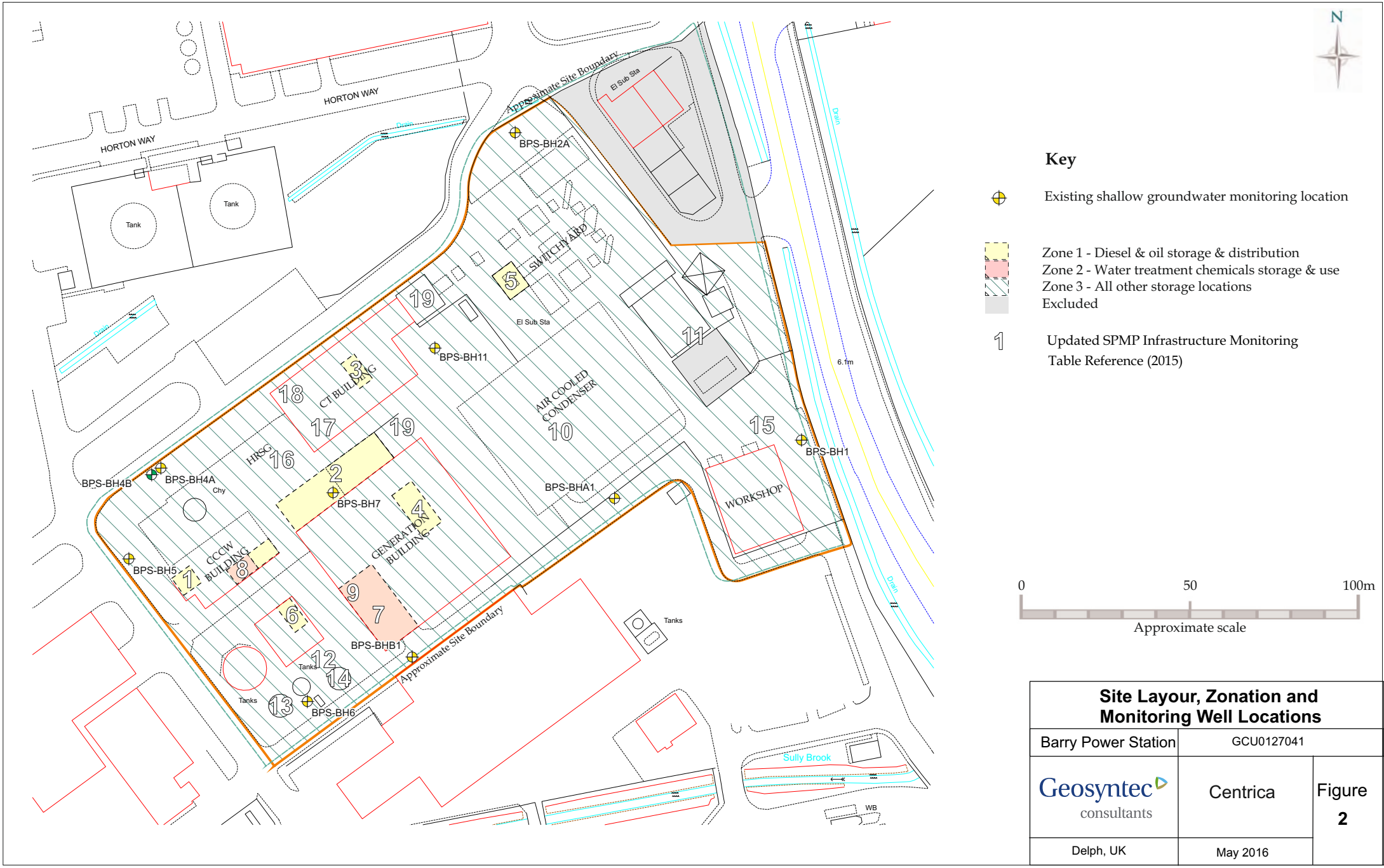
Well	Casing Top Elevation	Depth to Base of Well (Sep 2007)	Depth to Groundwater (Sep 2007)	Depth to Groundwater (March 2011)	Depth to Groundwater (Sep 2015)	Groundwater Elevation (Sep 2015)
	mAD	mbct	mbct	mbct	mbct	mAD
BPS - BH1	6.029	5.206	3.175	1.182	1.270	4.759
BPS - BH2A	6.256	5.004	2.587	2.174	1.985	4.271
BPS - BH2B	6.281	9.467	2.121	-	1.605	4.676
BPS - BH4A	6.735	3.696	2.916	1.239	1.200	5.535
BPS - BH4B	6.229	8.667	1.064	2.491	2.320	3.909
BPS - BH5	5.952	5.275	1.857	1.342	1.195	4.757
BPS - BH6	6.932	4.894	1.981	1.888	1.735	5.197
BPS - BH7	7.426	2.467	2.091	2.123	2.040	5.386
BPS-BHA1	6.036	2.198	1.167	-	-	-
BPS-BHA2	5.963	8.715	2.208	-	1.570	4.393
BPS-BHB1	6.029	3.09	1.227	0.996	1.220	4.809
BPS-BHB2	6.046	8.89	2.776	-	1.685	4.361
mAD	metres above site datum					
mbct	metres below casing top					
-	denotes unable to locate					

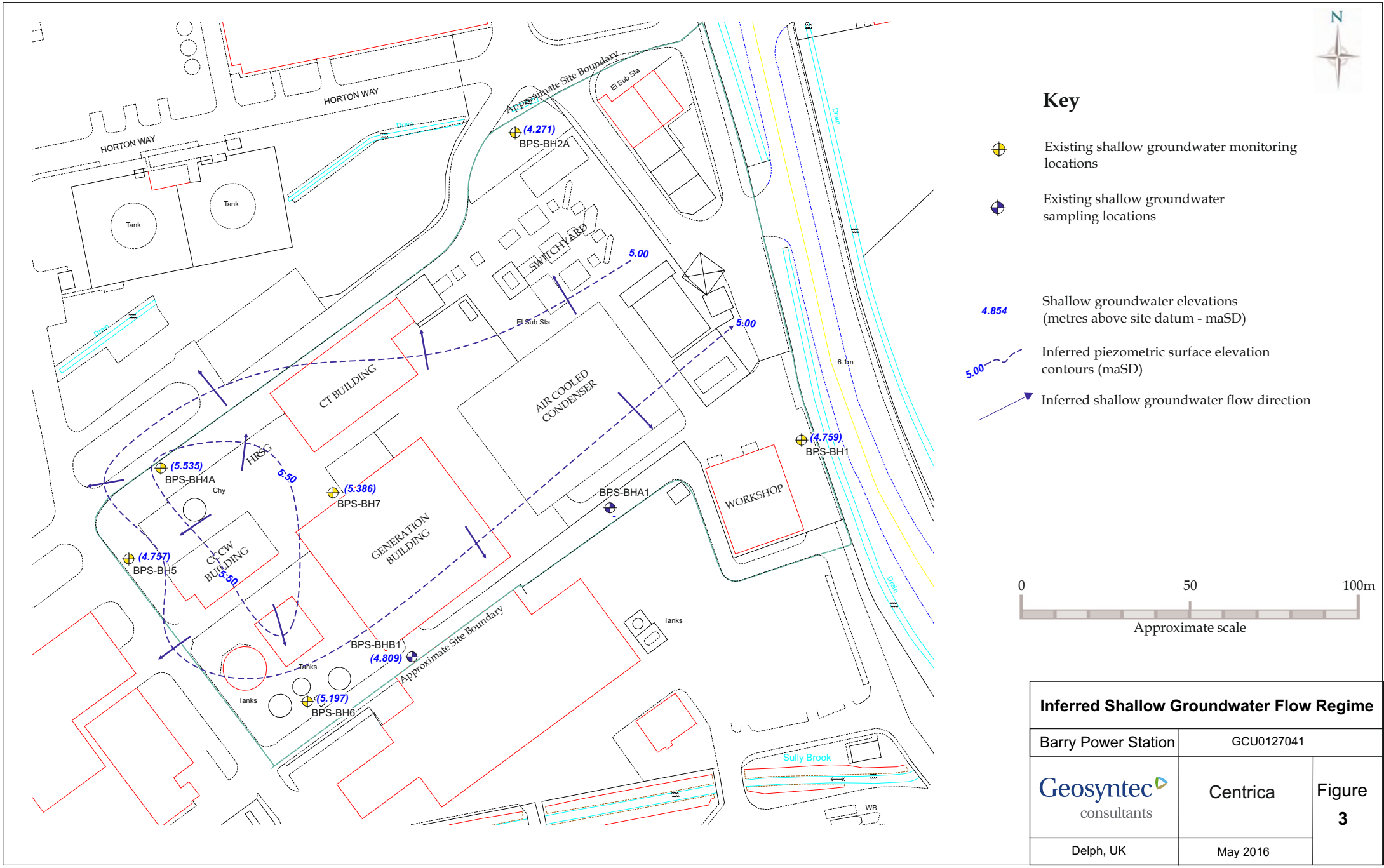
FIGURES



Site Location

Site Location		
Barry Power Station	GCU0127041	
	Centrica	Figure 1
	Delph, UK	





APPENDIX A

Existing Infrastructure Monitoring Table (2011)

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
Further Action Required											
3	Transformers	Carbon steel	Transform er oil	N/A	Concrete bund with drain (normally isolated) routed to oil/ water separator. Discharge via manually operated valve	Remote monitoring from control room Routine checks once per shift	Approved Operating Procedures (AOP) 'Check CT/ST/AUX Transformer Bund Levels and Isolation Valves' AOP047, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	The rate of loss from the 3-phase gaskets of the GT&ST transformers was observed as a seepage. Centrica are recommended to monitor the current situation and investigate.
No Further Action Required											
1	Emergency Diesel Generator Storage Tank - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and route spillage to surface water ditch via Penstock valve	Diesel storage tank equipped with high level transmitter and local level indication. Activity continuously supervised	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improveemnt Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Emergency Diesel Generator Storage Tank	Steel	Diesel	~2600 litres	Concrete bund. Overflow from tank flows into the bunded area.	Diesel storage tank equipped with high level transmitter and local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improveemnt Conditions BPS10 & BPS3 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Emergency Diesel Generator Storage - Transfer Pipework	Steel	Diesel	~ 60 litres	Concrete bund.	Low-level alarm on tank. Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improveemnt Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	CT Lube Oil Reservoir - Drum	Steel	CT Lube Oil	200 litres	Bund	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1 Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improveemnt Conditions BPS10 & BPS3 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	CT Lube Oil Reservoir - Tank	Steel	CT Lube Oil	18,000 litres max (9,000 litres working volume)	Impervious building floor of CT building and bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	CT Lube Oil Reservoir - Transfer Pipework	Steel	CT Lube Oil	9,000 litres working volume (max)	Impervious building floor of CT building and bund	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	ST Lube Oil Reservoir - Drum	Steel	ST Lube Oil	200 litres	Metal bund	Transfer and filling operation performed manually and under continuous supervision	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improveemnt Conditions BPS10 & BPS3 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	ST Lube Oil Reservoir - Tank	Steel	ST Lube Oil	11,000 litres (5,500 litres working)	Concrete bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	ST Lube Oil Reservoir - Transfer Pipework	Steel	ST Lube Oil	5500 litres (working)	Double-walled pipe	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
1	Oil Stores - Drums/IBC	Metal/ plastic	Turbine lube, transformer and waste oils	8 x 200-litre 15 x 25-litre 900 litre waste oil IBC	Locked container unit with spill trays	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning PPG8 - Safe storage and disposal of fuel oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 & BPS3 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Fire/ Miscellaneous Pumps Unloading Area - Tanker	Steel	Diesel	15000 litres	Concrete hardstanding sloping towards surface water/oil drain and routing spillage to surface water ditch via Penstock valve	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Conditions BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Fire/ Miscellaneous Pumps Building - Day Tank	Steel	Diesel	800 litre	Concrete bund	Local level indication. Low- level alarm and level switch Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Fire/ Miscellaneous Pumps Building - Pump	Steel	Diesel	N/A	Impervious building floor sloping towards oily drain routed to oil/water separator	Local level indication. Low- level alarm and level switch Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Visual inspection twice a day. Weekly testing of pumps for 30min	Daily shift inspection log. PM-OPS-2D	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
1	Mobile Diesel Bowser	Steel	Diesel	1000 litres	Double-skinned tank	Routine checks once per shift	Approved Operating Procedures (AOP) 'Using the Mobile Diesel Bowser' AOP048, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Sulphuric Acid Tank Unloading Area - Tanker	N/A	98% w/w sulphuric acid	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Sulphuric Acid Tank	Stainless Steel	98% w/w sulphuric acid	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in banded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	HSE Guidance - Bulk Storage of Acids HSG235	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Sulphuric Acid Tank - Transfer pipework	Lined stainless steel	98% w/w sulphuric acid	15 litres	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Acid is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Acid Pump Oil Change' AOP025, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Caustic Solution Tank Unloading Area - Tanker	N/A	50% w/w caustic solution	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
2	Bulk Caustic Solution Tank	Stainless Steel	50% w/w caustic solution	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bunded area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Bulk Caustic Solution Tank - Transfer pipework	Lined stainless steel	50% w/w caustic solution	N/A	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Caustic solution is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Caustic Pump Oil Change' AOP024, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Boiler Feed/ CCCW Pump Building - IBC	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	500 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Boiler Feed/ CCCW Pump Building - pipework	Stainless Steel	Amine, phosphates and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Generation Building - IBC	Stainless Steel	Amine and oxygen scavenger chemicals	1000 litres	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers; PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
2	Generation Building - pipework	Stainless Steel	Amine and oxygen scavenger chemicals	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Site drainage system - Pipes	Various	Oily Water	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	None	Approved Operating Procedures (AOP) 'Monitor and Maintain Surface and Storm Water Drain Quality' AOP051, Issue 1		CCTV Survey has been undertaken to determine the integrity of drainage system.	Results of Camera Surveys recorded on DVD and summary report kept on record. Any defects requiring attention are raised on CMMS system. Water samples recorded on monthly plant checks	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Air Cooled Condensers	Carbon steel	Engineerin g oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Oil pressure indication and low oil pressure alarm Routine checks once per shift	Approved Operating Procedures (AOP) 'Air-Cooled Condenser Fan Oil Change' AOP006, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Gas Compressor	Carbon steel	Engineerin g oils	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Site drainage system - Oil separator/ coalescers	GRP	Oily Water	8000 litre	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Continuous oil-in-water analyser and high oil-in-water alarm. High-level and low-level switches, indicators and alarms and automatic closure	Approved Operating Procedures (AOP) 'Oil/Water Separator Alarms and Manual Emptying' AOP052, Issue 1	Maintained in accordance with manufacturers instructions; PPG18 - Managing Firewater and Major Spillages and PPG3 - Use and Design of Oil Separators	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
3	Neutralisation Tank	Steel	Water treatment plant effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Effluent Tank	Steel	Waste effluent	300,000 litres	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the ENGICA-based Computerised Maintenance Management System (CMMS). Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Solid Waste Skips	Metal	Wood, metal, general waste		Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG11 - Preventing Pollution from Industrial Sites	Not required for the SPMP (no significant risk of ground or groundwater contamination)	N/A	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Liquid Waste - IBC	Steel	CT blade wash effluent	1000 litres	Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Batteries	Plastic	Battery electrolyte	10kg	Acid resistant floor graded towards chemical drain and lip at entrance	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Turbine (off-line) washwater effluent - IBC	Steel	CT wash residue	1 m ³	Mobile bund located within the CT building	Tank level gauge Routine checks once per shift	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.
3	Turbine washwater effluent tank (off-line) - Tanker	N/A	CT wash residue	N/A	Impervious building floor of CT building would divert loss into surface water/oil drain close to EDG. Valves are configured to route spillage to surface water ditch via Penstock valve	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 2		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	No further action required as operation was improved through Improvement Condition BPS10 of PPC Permit Application. The operational CMMS procedure coupled with continuous attendance by a Centrica operative during infrequent fuel oil deliveries concludes that no further action is required to comply with current UK guidance.

APPENDIX B

Updated Infrastructure Monitoring Table (2015)

Appendix B: Updated Infrastructure Monitoring Programme (2015)												
SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
Further Action Required												
7	2	Bulk Caustic Solution Tank	Stainless Steel	50% w/w caustic solution	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bund area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Consider implementing elements of the RWE Bulk Storage Installations guidance (TECH/PROC/011 Part 2) to enable routine visual inspections, detailed external inspections and ultrasonic thickness testing.
7	2	Bulk Caustic Solution Tank - Transfer pipework	Lined stainless steel	50% w/w caustic solution	N/A	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Caustic solution is diluted with demineralised water via in-	Approved Operating Procedures (AOP) 'Caustic Pump Oil Change' AOP024, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Consider implementing elements of the RWE Bulk Storage Installations guidance (TECH/PROC/011 Part 2) to enable routine visual inspections, detailed external inspections and ultrasonic thickness testing.
No above ground infrastructure	3	Site drainage system - Pipes	Various	Oily Water	N/A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	None	Approved Operating Procedures (AOP) 'Monitor and Maintain Surface and Storm Water Drain Quality' AOP051, Issue 1		Regular CCTV Survey inspections of the drainage network.	Inspection notification and maintenance records (corrective and preventative) managed by the SAP management system.	Carry out more regular CCTV inspections of the site drainage network.
19	3	Transformers	Carbon steel	Transform er oil	N/A	Concrete bund with drain (normally isolated) routed to oil/water separator. Discharge via manually operated valve	Remote monitoring from control room Routine checks once per shift	Approved Operating Procedures (AOP) 'Check CT/ST/AUX Transformer Bund Levels and Isolation Valves' AOP047, Issue 1		Routine visual inspections carried out weekly	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	The loss of insulating oil loss from the 3-phase gaskets of the GT&ST transformers which was observed as a seepage during the 2011 review, persists at a similar rate. It is recommended that the leak continues to be monitored, and practicallably managed.
No Further Action Required												
1	1	Auxillary (Emergency) Diesel Generator Tank	Steel	Diesel	1.5m ³	Concrete hardstanding sloping towards surface water/oil drain and route spillage to surface water ditch via Penstock valve	Diesel storage tank equipped with high level transmitter and local level indication. Activity continuously supervised	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
2	1	Diesel Storage Tank	Steel	Diesel	approx. 2.6m ³	Concrete bund. Overflow from tank flows into the bund area.	Diesel storage tank equipped with high level transmitter and local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06) Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection. Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
2	1	Diesel Storage - Transfer Pipework	Steel	Diesel	~ 60 litres	Concrete bund.	Low-level alarm on tank. Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection. Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
3	1	CT Lube Oil Reservoir - Drum	Steel	CT Lube Oil	200 litres	Bund	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1 Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
3	1	CT Lube Oil Reservoir - Tank	Steel	CT Lube Oil	18m3 litres max (9m3 litres working volume)	Impervious building floor of CT building and bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
3	1	CT Lube Oil Reservoir - Transfer Pipework	Steel	CT Lube Oil	9m3 litres working volume (max)	Impervious building floor of CT building and bund	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Working within the CT Generation Enclosure' AOP062, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
4	1	ST Lube Oil Reservoir - Drum	Steel	ST Lube Oil	200 litres	Metal bund	Transfer and filling operation performed manually and under continuous supervision	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
4	1	ST Lube Oil Reservoir - Tank	Steel	ST Lube Oil	11m3 (5.5m3 working)	Concrete bund	High-level and low-level alarms and local and remote level indication (via DCIS) Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.

SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
4	1	ST Lube Oil Reservoir - Transfer Pipework	Steel	ST Lube Oil	5.5m3 (working)	Double-walled pipe	Pressure gauge and remote pressure alarm and indication via DCIS Routine checks once per shift	Approved Operating Procedures (AOP) 'Steam Turbine Lubricating Oil Filter Change' AOP004, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
5	1	Oil Stores - Drums/IBC	Metal/ plastic	Turbine lube, transformer and waste oils	8 x 200-litre 15 x 25-litre 900 litre waste oil IBC	Locked container unit with spill trays	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning PPG8 - Safe storage and disposal of waste	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
6	1	Fire/ Miscellaneous Pumps Unloading Area - Tanker	Steel	Diesel	15m3	Concrete hardstanding sloping towards surface water/oil drain and routing spillage to surface water ditch via Penstock valve	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Daily Steam Turbine and Gas Turbine Plant Checksheets	Infrastructure containment considered compliant with design SPMP and current UK guidance.
6	1	Fire/ Miscellaneous Pumps Building - Day Tank	Steel	Diesel	800 litre	Concrete bund	Local level indication. Low- level alarm and level switch Routine checks once per shift	Approved Operating Procedures (AOP) 'Diesel Fuel Delivery' AOP063, Issue 1 (19/12/06)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2005	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
6	1	Fire/ Miscellaneous Pumps Building - Pump	Steel	Diesel	N/A	Impervious building floor sloping towards oily drain routed to oil/ water separator	Local level indication. Low- level alarm and level switch Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Visual inspection twice a day. Weekly testing of pumps for 30min	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
2	1	Mobile Diesel Bowser	Steel	Diesel	1m3	Double-skinned tank	Routine checks once per shift	Approved Operating Procedures (AOP) 'Using the Mobile Diesel Bowser' AOP048, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets Assessment carried out against CoP (Oil Storage) Regs 2002 in November 2006	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
7	2	Bulk Sulphuric Acid Tank Unloading Area - Tanker	N/A	98% w/w sulphuric acid	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
7	2	Bulk Sulphuric Acid Tank	Stainless Steel	98% w/w sulphuric acid	28.6 m ³	Concrete bund.	Tank vents locally at high level and overflows in bund area. Local level indication. Routine checks once per shift	Approved Operating Procedures (AOP) 'Sulphuric Acid Delivery' AOP009, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	HSE Guidance - Bulk Storage of Acids HSG235	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
7	2	Bulk Sulphuric Acid Tank - Transfer pipework	Lined stainless steel	98% w/w sulphuric acid	15 litres	Tank bund and floor drainage in Generation building (routed to the neutralisation tank via the chemical sump)	Remote low-flow alarm and indication. Dosing is automated and is controlled from Water Treatment Plant control panel. Acid is diluted with demineralised water via in-line tee-mixer	Approved Operating Procedures (AOP) 'Acid Pump Oil Change' AOP025, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
7	2	Bulk Caustic Solution Tank Unloading Area - Tanker	N/A	50% w/w caustic solution	25 m ³	Kerbed containment area lined with chemically resistant material. Discharge points located within containment area which drains into a local sump	Local level indication on tank. Filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'Caustic Delivery' AOP010, Issue 1 and 'Emptying the Acid and Caustic Delivery Bund and Sump' AOP008, Issue 1	PPG11 - Preventing Pollution from Industrial Sites	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
8	2	Boiler Feed/ CCCW Pump Building - IBC	Stainless Steel	Nalco Elimin-Ox (oxygen scavenger); Amine; phosphate s; potassium permanganate	1 m3 stainless steel IBC containter for each chemical (4 m3 in total)	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
8	2	Boiler Feed/ CCCW Pump Building - pipework	Stainless Steel	Nalco Elimin-Ox (oxygen scavenger); Amine; phosphate s; potassium permanganate	N/A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.

Appendix B: Updated Infrastructure Monitoring Programme (2015)												
SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
9	2	Generation Building - IBC	Stainless Steel	Amine and Nalco Elimin-Ox (oxygen scavenger)	1 m3 stainless steel IBC containter for eacg chemical (2 m3 in total)	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG26 - Storage and Handling of Drums and Intermediate Bulk Containers; PPG21 - Pollution Incident Response Planning	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
9	2	Generation Building - pipework	Stainless Steel	Amine and Nalco Elimin-Ox (oxygen scavenger)	N/ A	Concrete bund with tertiary containment provided by floor drainage which diverts spillages to neutralisation tank	Local level indication. Oxygen scavenger and amine feed pumps automatically controlled from DCIS in proportion to condensate flow rates Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
10	3	Air Cooled Condensers	Carbon steel	Engineerin g oils	N/ A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Oil pressure indication and low oil pressure alarm Routine checks once per shift	Approved Operating Procedures (AOP) 'Air-Cooled Condenser Fan Oil Change' AOP006, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
11	3	Gas Compressor	Carbon steel	Engineerin g oils	N/ A	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.

SPMP Ref.	Zone	Tank/Equipment (tank/ pipe/ pumps/ drainage)	Construction Material	Substance	Inventory	Secondary Containment (bunds/ catchpits/ hardstanding & kerbs/interceptors)	Protective Devices (level measurement/ alarms/ automatic shut-off/ leak detection system/ corrosion detection system)	Other Techniques for Prevention (Security arrangements/ off- loading procedure/ EMS/ Inventory Control/ Accident Response)	Identification of Standard (BS/ API standards/ manufacturer's recommendations/ pollution prevention guidelines)	Details of Examinations Required to meet identified standard (Preventative maintenance/ Statutory inspection/ manufacturer's recommendation/ installation inspection scheme)	Means by which Examination is recorded (Forms, audit reports, daily log, operators note book)	Recommendation If Further Action is Required
12	3	Site drainage system - Oil separator/ coalescers	GRP	Oily Water	8000 litre	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	Continuous oil-in-water analyser and high oil-in-water alarm. High-level and low-level switches, indicators and alarms and automatic closure devices	Approved Operating Procedures (AOP) 'Oil/Water Separator Alarms and Manual Emptying' AOP052, Issue 1	Maintained in accordance with manufacturers instructions; PPG18 - Managing Firewater and Major Spillages and PPG3 - Use and Design of Oil Separators	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
13	3	Neutralisation Tank	Steel	Water treatment plant effluent	300m3	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
14	3	Effluent Tank	Steel	Waste effluent	300m3	None - primary, secondary and tertiary containment measures will be reviewed as part of PPC Improvement Condition	High level and low level alarm. Level transmitter linked to DCIS. Continuous flow monitor on effluent tank discharge. Overflow into drain Routine checks once per shift	Emergency response procedures covered under Emergency Plan; PM-HSE-9G-SD (19/03/07)		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets. Detailed external and ultrasonic inspection testing/inspection.	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
15	3	Solid Waste Skips	Metal	Wood, metal, general waste		Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG11 - Preventing Pollution from Industrial Sites	Not required for the SPMP (no significant risk of ground or groundwater contamination)	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
16	3	Liquid Waste - IBC	Steel	CT blade wash effluent	1m3	Located on tarmac in designated area with impervious cover	Routine checks once per shift	Procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition	PPG8 - Safe storage and disposal of used oils	Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
17	3	Batteries	Plastic	Battery electrolyte	10kg	Acid resistant floor graded towards chemical drain and lip at entrance	Routine checks once per shift	Spill response procedures and training will be reviewed and developed/modified as part of PPC Improvement Condition		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
18	3	Turbine (off-line) washwater effluent - IBC	Steel	CT wash residue	1 m ³	Mobile bund located within the CT building	Tank level gauge Routine checks once per shift	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 1		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.
18	3	Turbine washwater effluent tank (off-line) - Tanker	N/A	CT wash residue	N/A	Impervious building floor of CT building would divert loss into surface water/oil drain close to EDG. Valves are configured to route spillage to surface water ditch via Penstock valve	Transfer and filling operation performed manually and under continuous supervision	Approved Operating Procedures (AOP) 'On-line and off-line CT Compressor Washing' AOP128, Issue 2		Routine visual inspections once per shift in accordance with "Daily Steam Turbine and Gas Turbine Plant Checks" sheets	Maintenance records (corrective and preventative) managed by the SAP management system. Daily Checksheets (paper copies).	Infrastructure containment considered compliant with design SPMP and current UK guidance.

Appendix L
HRSG Blow-Down Sump

00127-031/PJP/ JDWW
24th June 2011

Mr David Waite
Centrica Barry Power Station
Sully Moors Road
Barry
Vale of Glamorgan
CF64 5YU

Dear Mr. Waite

**LETTER REPORT FOR THE ENVIRONMENTAL SAMPLING OF THE HRSG BLOW-DOWN
SUMP AT CENTRICA BARRY POWER STATION, BARRY, VALE OF GLAMORGAN.**

1. INTRODUCTION

This letter report presents the results of a soil sampling exercise associated with an excavation adjacent to the HRSG blow-down sump. The work was commissioned by Mr David Waite of Centrica Energy following the discovery of a breach in a redundant drain line connected to the sump at the Centrica Barry Power Station (the 'site').

The work was undertaken in response to a request by the Environment Agency for Centrica to evaluate potential impacts by boiler water treatment chemicals that may have been present, albeit at low concentrations in the water which had leaked from the sump/drain structure. The specific chemicals of potential concern were:

- Carbohydrazide;
- Morpholine;
- Cyclohexylamine;
- Sodium and Potassium Hydroxide.

These substances were identified from the Material Safety Data Sheets provided by Centrica as the ingredients of boiler water chemicals used in plant feeding the HRSG sump. The overall objective of the environmental soil sampling was to assess whether a potential release of boiler water treatment chemicals and alkali solutions from the HRSG blow-down sump had impacted soils adjacent to the sump and whether further investigations or corrective action may be necessary.

2. SCOPE OF WORK

The environmental soil sampling was undertaken by Phillip Parker of Ford Consulting Group Ltd on the 23rd May 2011 and comprised the collection of representative soil samples from the face of the excavation adjacent to the HRSG blow-down sump and from the soil arisings generated by the excavation works.



All soil samples were collected using clean stainless steel tools (as required) and transferred to appropriate laboratory supplied containers and stored in a cool box incorporating frozen ice packs and logged onto a laboratory chain of custody form, all samples being given unique identifiers (sample labels).

The soil samples were given the following unique identifiers;

- SO/HRSG/01 was taken from the excavation face adjacent to the HRSG blow-down sump;
- SO/HRSG/02 was taken from the excavation spoil arisings;

The soil samples were scheduled for pH and alkalinity, Sodium and Potassium (used to determine alkali chemical releases) and Oxygen scavengers including speciated analysis for Carbohydrazide, Morpholine and Cyclohexylamine. All samples were couriered overnight to Jones Environmental Laboratory Chester, a UKAS MCERTs accredited environmental laboratory.

3. SOIL RESULTS AND CONCLUSIONS

The soils were observed to be a silty medium to coarse sub angular limestone gravel. There was no visual or olfactory indication of contamination.

The soil chemical data reported the concentrations of the oxygen scavengers to be below the laboratory method detection limits (refer to laboratory chemical certificates) as follows:

- Carbohydrazide: <2.0mg/kg
- Morpholine: <1mg/kg
- Cyclohexylamine <0.15mg/kg

These substances do not have soil quality criteria available from which a direct assessment can be made of the detection limits and therefore the 'potential' concentrations that may still be in the soils. However, the levels detected are 3-4 orders of magnitude lower than the toxicity data for mammals indicated by the MSDS sheets. As such it would be reasonable to conclude that the soils tested have not been significantly contaminated by these substances.

Sodium and Potassium would be expected to be present naturally in soils beneath the site. They are considered to have relatively low toxicities and as a consequence are not provided with soil quality criteria from which an assessment can be made of the concentrations reported for the samples collected as part of this exercise. The results obtained were:

- Sodium concentrations 150mg/kg (SO/HRSG/02) to 173mg/kg (SO/HRSG/01);
- Potassium concentrations 113mg/kg (SO/HRSG/01) to 220mg/kg (SO/HRSG/02).

These values are of a similar order of magnitude to those obtained for Chloride in soils at the site during a due diligence investigation undertaken in 2007. As such the Sodium concentrations could be attributable to the natural salinity of the soils in what is an estuarine environment (with regards to the deposition environment for the underlying sediments).

The total alkalinity ranged from 268mg/kg (SO/HRSG/01) to 392mg/kg (SO/HRSG/02) and pH values were around 9.3. These levels would be considered typical in a fill material with a significant component of limestone gravel.

In conclusion, the environmental soil sampling returned results below detection limit for the oxygen scavenger compounds in soils adjacent to the HRSG blow-down sump. Whilst the sodium, potassium,



23rd June 2011

pH and alkalinity analyses returned positive results the levels detected were not outside the ranges expected given the soil environment under consideration.

On the basis of the soil analysis data, it is concluded that the breach in a redundant drain line connected to the HRSG blow-down sump has not had an adverse impact on the quality of soils around the sump and there is no requirement for further investigations or corrective action to be undertaken at the site.

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Ford Consulting Group trusts that the contents of this letter report meet your current requirements. Should you have any questions regarding the findings of this study then please do not hesitate to contact the undersigned.

Yours sincerely for

Ford Consulting Group Ltd.

Mr Phillip Parker
Environmental Consultant

Mr Jim Wragg
Director



Jones Environmental Laboratory

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No.4225

Attention : Phillip Parker
Date : 23rd June 2011
Your reference : 00127-031
Our reference : Test Report 11/548
Location : Centrica - Barry Power Station
Date samples received : 25/05/11
Status : Final Report
Issue : 2

Three samples were received for analysis on 25th May 2011 which was completed on 13th June 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.
All interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

J W Farrell- Jones CChem FRSC
Chartered Chemist

JE Job No.: 11/548

Report : Solids

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

[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. Your final report will reflect this, with non-MCERTS results on separate pages.

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.

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

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

+ Failed AQC results should be considered as indicative only and are not accredited.

++ Result outside calibration range, may be possible to re-run with higher detection limits

00127-031/ JDWW
6th September 2011

Mr David Waite
Centrica Barry Power Station
Sully Moors Road
Barry
Vale of Glamorgan
CF64 5YU

Dear Mr. Waite

**RESPONSE TO EA QUERIES IN RELATION TO THE ENVIRONMENTAL SAMPLING OF THE
HRSG BLOW-DOWN SUMP AT CENTRICA BARRY POWER STATION, BARRY, VALE OF
GLAMORGAN.**

This letter provides responses to the queries raised on the 19th July 2011 by the Environment Agency in respect of our letter report entitled

'Letter Report for the environmental sampling of the HRSG blow-down sump at Centrica Barry Power Station, Barry, Vale of Glamorgan. Reference 00127-031/PJP/JDWW, dated 24th June 2011'

The specific queries raised by the EA for which they requested comment and our responses are set out below:

- 1) *We are not sure of the real extent of the leak or the volume of soil impacted or the size of the soil heap so are unable comment on whether enough samples have been collected to adequately characterise the soil in question. The report does talk about representative soil samples from the face of the excavation and from the soil arisings generated by the soil excavation works. However it looks as if only 3 samples were sent to the laboratory which produced only 2 subsequent analyses. Taking more samples would have given a more robust data set.*

The volume of boiler blow-down water lost to ground is not known with any certainty but it is understood that under normal conditions the adjacent shallow groundwater was higher than the level of fluid in the sump and that ingress of groundwater to the sump occurred rather than egress of boiler blow down water to the surrounding soils. As such the net volume of boiler blow down water lost to ground is expected to be modest.

The excavation was formed to remedy the breaches in the sump and drainage containment and to excavate soils in close proximity to the sump structure where the leaks potentially occurred. The volume of soils excavated was in the order of 10m³. This was stockpiled adjacent to the sump at the time of the FCG site visit. The majority of this material comprised coarse angular crushed limestone and shale material with only a minor component (<5%) of fines that were suitable for sampling for analysis (i.e. 900kg). Whilst only one sample of the stockpiled material was collected this was a composite of the fine component of the soil and is likely to have been reasonably representative of that fraction. If consideration is given to the prevalence of natural organic material in the fine fraction then the organic



analysis of this portion of the soil is likely to represent a worse case when compared to the soils as a whole.

The sample collected from the excavation face was limited by one side of the excavation being formed by the sump wall and the remainder being fitted with shoring. The sample from the excavation wall was collected through gaps in the shoring at an elevation adjacent to the original breach in the sump, was selected from the finer component of the exposed soils (due to the need to provide the laboratory with a sample that could be readily analysed) and thereby was considered to be indicative of the reasonable worse case conditions.

- 2) *It is unclear whether samples were taken from the excavation and soil arisings to produce composite samples for analysis or whether spot samples were obtained. Were areas that were obviously contaminated (if visible) sampled preferentially? No statistical justification for the sampling strategy was given.*

The samples were essentially composite in nature due to the need to sample the minor component of fines so that laboratory testing could be undertaken. There were no obvious indicators of contamination visible in either the soils in the stock pile or in the excavation face.

- 3) *Carbohydrazide, Morpholine and Cyclohexylamine are relatively obscure chemical substances: We do not have pre-existing soil quality data so it is impossible if deterioration has occurred (does any exist from the Application Site Report). However the concentrations of the 3 substances are below their detection limits. The detection limits for Carbohydrazide and Morpholine appear high compared to other organic chemicals but we have no reason to believe they are incorrect.*

These substances were not tested for during baseline SPMP sampling at the site. The polar nature of these compounds requires specialised methodologies to be adopted for their analysis and also results in the relatively high detection limits.

- 4) *We note these analyses were subcontracted to another un-named laboratory away from the Jones Environmental Laboratory. Please clarify which lab was used.*

The subcontracted analysis was undertaken by the RPS Mountainheath Laboratory at 2 Shaftesbury Industrial Estate, Icknield Way, Letchworth, Hertfordshire SG6 1HE,

- 5) *Carbohydrazide reacts with O₂ to form water, nitrogen and urea, therefore likely that its half-life in the environment is low. Morpholine is added to boiler fluids (if that is what we are dealing with) at the ppm level so its concentration to begin with is quite small. It may be that all 3 compounds behave chemically in a similar way to amines in which case they will probably breakdown to ammonia.*

We understand that the HRSG sump received blow down from the boiler that had low doses of the oxygen scavenger compounds and we also anticipate these to have short half lives in the natural environment.

- 6) *Sodium and potassium hydroxide. Na and K are common constituents of soils and the levels shown come within the range for natural soils.*

Agreed



6th September 2011

- 7) *However the pH value is very high presumably because of the spill. However this should reduce the pH in time given the influence of acid rain etc. Comments on this should be made.*

We agree that the elevated pH of the soils should reduce over time through the influence of acidic recharging rainfall. Natural shallow groundwater quality at the site as evidenced by the SPMP baseline sampling is typically alkaline and in the range of that observed in the soil samples from the HRSG sump area. Table G2 in the SPMP First phase report indicates groundwater pH in the order of 11.3 (BPS-BH7) and 8.3-8.8 in boreholes down gradient (BPS-BH4 & 5).

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Ford Consulting Group trusts that the contents of this letter meet your current requirements. Should you have any questions regarding the findings of this study then please do not hesitate to contact the undersigned.

Yours sincerely for

Ford Consulting Group Ltd.

Mr Jim Wragg
Director